SAT

Test #1

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

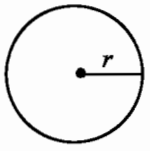
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

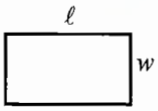
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

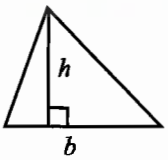


$A = \pi r^2$

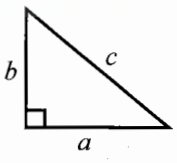
$C = 2\pi r$



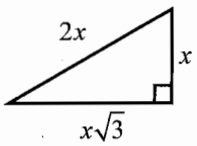
$A = \ell w$

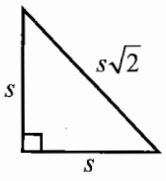


$A = \frac{1}{2}bh$

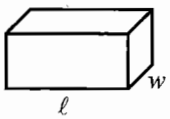


$c^2 = a^2 + b^2$





Special Right Triangles

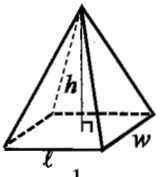


$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

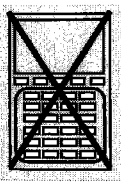
$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



3

1

If $\frac{2x-3}{2} = k-1$ and $k = 5$, what is the value of $2x$?

A) 4

B) 5.5

C) 8

D) 11

2

$$(5+3i)-(8-2i) = a+bi$$

In the equation above, a and b are real numbers. If $i = \sqrt{-1}$, what is the value of b?

A) -1

B) 1

C) -5

D) 5

3

If Claire paid k dollars for a computer that was only 20 dollars more than half the original price, what was the original price, in dollars?

A) $k+20$

B) $k-40$

C) $2k-20$

D) $2k-40$

4

Jenny is on the school swim team and has swim practice m hours in the morning and p hours in the evening each day. The schedule is the same each day. If she swims k hours for five days, which of the following is the expression for m?

A) $\frac{k-p}{5}$

B) $\frac{k-5p}{5}$

C) $k-5p$

D) $5(k-p)$

5

A certain business is marketing its product and has determined that, when it raised the selling price of its product, its sales went down. The number of units sold, P, is modeled by the equation $P = 1200 - 20s$, where s is the selling price, in dollars. Based on this model, what is the decrease in selling price from 700 units sold to 900 units sold?

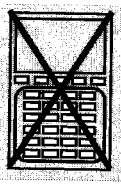
A) 5

B) 10

C) 15

D) 20

CONTINUE



6

$$\left(x^2+y^2\right)^2-\left(x^2-y^2\right)^2$$

Which of the following is equivalent to the expression above?

A) x^4-y^4

B) $2\left(x^2+y^2\right)$

C) $2x^2y^2$

D) $4x^2y^2$

7

Kimberly earns k dollars per week. At this rate how many weeks will it take her to earn p dollars?

A) $\frac{p}{k}$

B) $\frac{k}{p}$

C) kp

D) $\frac{10p}{k}$

8

If $\frac{2a}{b}=5$, what is the value of $\frac{5b}{a}$?

A) 2

B) 4

C) 10

D) 12.5

9

$$2x+by=10$$
$$ax+4y=15$$

In the system of equations above, a and b are constants and $a=2b$. If the system has no solution, which of the following could be a possible value of a?

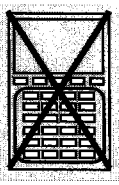
A) -2

B) $\frac{1}{2}$

C) 4

D) 8

CONTINUE



10

$$f(x) = ax^2 - 15$$

For the function f defined above, a is a constant and $f(3) = 10$. Which of the following is equal to the value of $f(5)$?

A) $f(0)$

B) $f(3)$

C) $f(-3)$

D) $f(-5)$

11

A certain job can be done in 20 hours by 4 people. How many people are needed to do the same job in 10 hours?

A) 2

B) 4

C) 8

D) 10

12

Which of the following is equivalent to $f(x) = x^2 - 6x + 7$?

A) $f(x) = (x+3)^2 + 5$

B) $f(x) = (x-3)^2 + 2$

C) $f(x) = (x-3)^2 - 2$

D) $f(x) = (x-7)(x+1)$

13

If $24x^2 - kx + 16 = (3x+4)(ax-b)$ for all values of x, where a, b, and k are constants, what is the value of k?

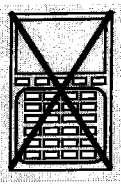
A) -44

B) -12

C) 12

D) 44

CONTINUE



14

In the xy-plane, the equation of line ℓ is $x+3y=5$. If line m is perpendicular to line ℓ, what is a possible equation of line m?

A) $y=-\frac{1}{3}x+2$

B) $y=\frac{1}{3}x-1$

C) $y=-3x+1$

D) $y=3x+\frac{2}{3}$

15

If $a+b=8$ and $\frac{27^a}{3^b}=81$, what is the value of a?

A) 3

B) 4

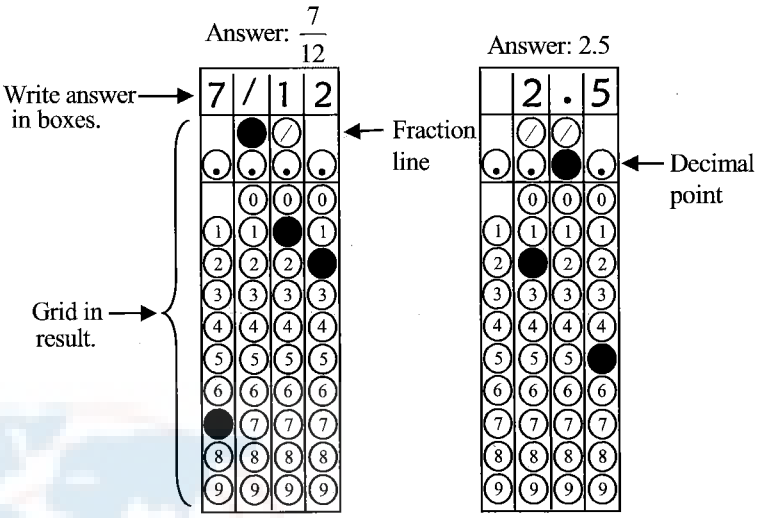
C) 5

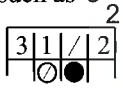
D) 6

CONTINUE

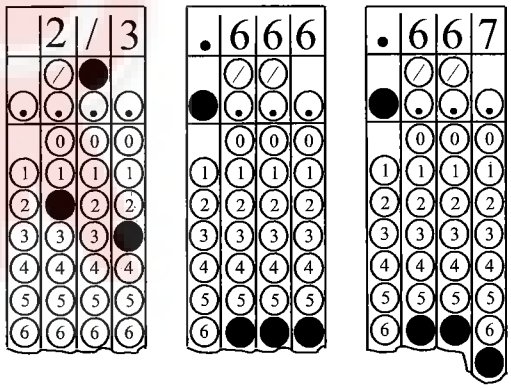
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

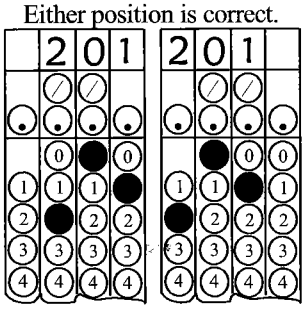


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



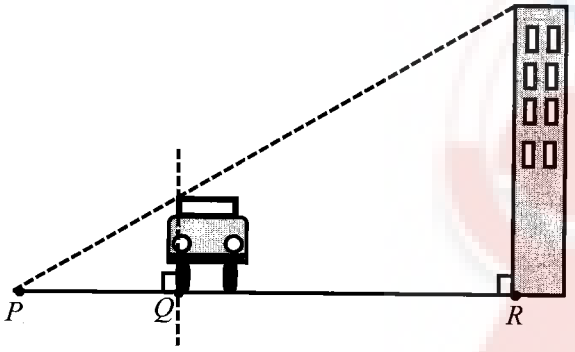
Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16

In a right triangle, one of the angles is x°. If $\tan x^\circ = \frac{5}{12}$, what is the value of $\sin x^\circ$?

17



Dawson needs to measure the height of a building near his house. He chooses a point P on the ground where he can visually align the roof of his car with the edge of the building roof. The height of the car is 4 feet and the distance from point P to point Q is 10 feet, as shown in the figure above. If the distance from point Q to point R is 80 feet, and the height of the building is k feet, what is the value of k?

18

If $a(x+1)+b(x-1)=7x$ for all real number x, where a and b are constants, what is the value of a?

19

According to the formula $p=\frac{4}{3}k+81$, if the value of p is increased by 16, by how much does the value of k increase?

20

$$x^2+y^2=56$$
$$y=\sqrt{x}$$

According to the system of equations above, what is the value of x?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

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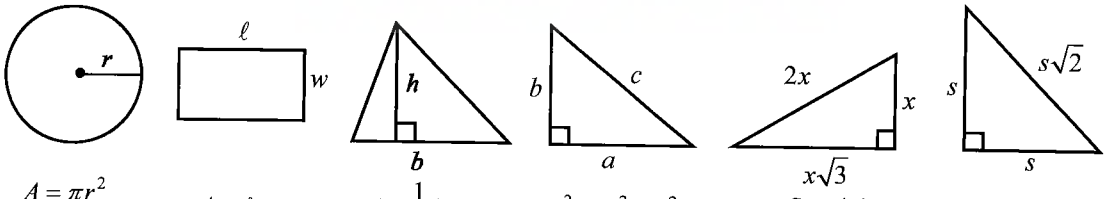


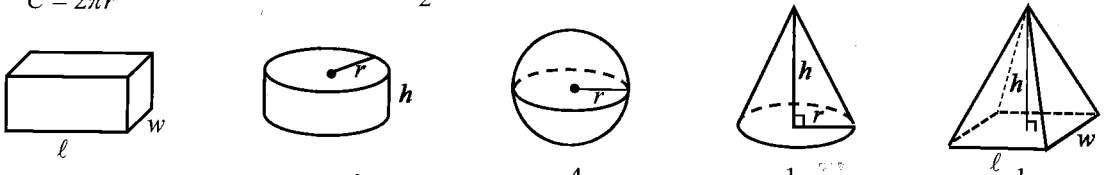
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

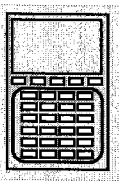
$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



4

1

x	$f(x)$
1	6
2	10
3	14
4	18
5	22

The selected values of a function shown in the table above represent a linear function. Which of the following equals $f(10)$?

A) 36

B) 40

C) 42

D) 44

2

If $3(a+2b-c)=12$, what is the value of $a+2b$ in terms of c?

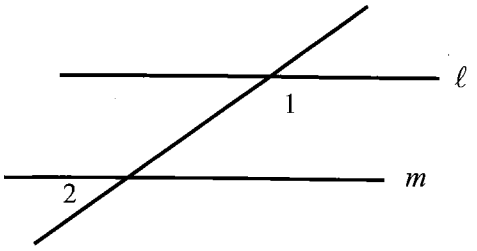
A) $3c-4$

B) $c-12$

C) $c+4$

D) $c-4$

3



In the figure above, lines ℓ and m are parallel. If the measure of $\angle 1$ is twice the measure of $\angle 2$, what is the measure of $\angle 1$?

A) 100°

B) 120°

C) 135°

D) 145°

4

If $8^n \times 4^2 = 2^{10}$, what is the value of n?

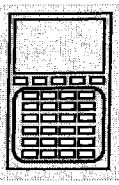
A) 2

B) 3

C) 4

D) 5

CONTINUE



5

For what value of n is $|n+4|+1$ less than 0?

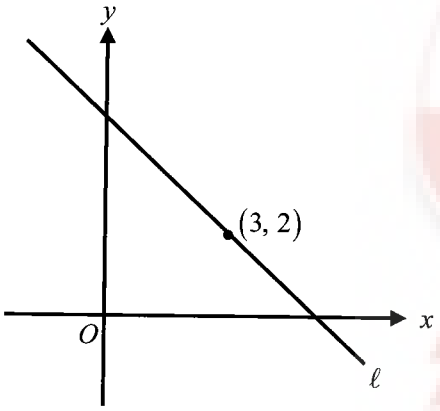
A) -5

B) -4

C) 3

D) There is no such value of n.

6



The equation of the graph of line ℓ in the xy - plane above is $y = mx + 6$, where m is a constant. If the line passes through a point $(3, 2)$, what is the value of m?

A) $-\frac{4}{3}$

B) $-\frac{2}{3}$

C) $-\frac{1}{2}$

D) $-\frac{1}{4}$

7

In Ms. Lee's class, the number of boys is more than twice the number of girls. There are at least 7 girls and there are no more than 15 boys. How many students are in the class?

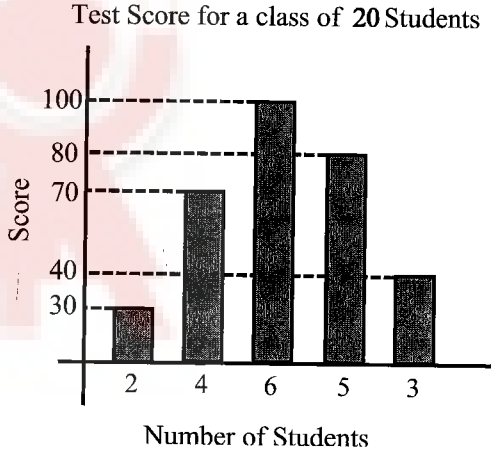
A) 19

B) 20

C) 21

D) 22

8



The graph above shows the test scores of 20 students. Based on the histogram above, what is the average (arithmetic mean) score on the test?

A) 70

B) 73

C) 75

D) 78

CONTINUE

Questions 9 and 10 refer to the following information.

$$h(t) = -16t^2 + 128t + 320$$

A science class determined that the motion of a ball launched from the top of a 10-story building could be described by the function above, where t represents the time the ball is in the air in seconds and h, the height in feet of the ball above the ground.

9

What is the number of seconds it takes for the ball to reach its peak?

A) 2

B) 4

C) 8

D) 10

10

At what time will the ball hit the ground?

A) 5

B) 8

C) 10

D) 12

11

The perimeter of a rectangle is 54 cm. If the length is 2 cm more than its width, what is the area of the rectangle?

A) $181.25\,\text{cm}^2$

B) $728\,\text{cm}^2$

C) $800\,\text{cm}^2$

D) $820\,\text{cm}^2$

12

$$3x - y > 0$$

$$2x + y > 1$$

Which of the following is NOT a solution of the system of inequalities above?

A) $(3,0)$

B) $(2,5)$

C) $(0,-3)$

D) $(5,-8)$

CONTINUE

13

x	y
0	2
k	14
$k+2$	17

The table above shows the point (x, y) represented on a straight line. If the point $(16, m)$ lies on the same line, what is the value of m?

A) 26

B) 24

C) 22

D) 20

14

James spent $\frac{3}{4}$ of his allowance on a music CD. He spent $\frac{2}{3}$ of what was left on a hamburger. If this left him P dollars, which of the following was his allowance in dollars?

A) $12P$

B) $14P$

C) $16P$

D) $18P$

Questions 15 and 16 refer to the following information.

Radioactive decay is an exponential function where the amount , y, of radioactive material is reduced by one-half over a certain period of time t. Material M has a half- life of 50 years.

15

If there are 800 grams of radioactive material M, which of the following best represents the decay equation?

A) $y = 800 - 400t$

B) $y = 800\left(\frac{1}{2}\right)^t$

C) $y = 800\left(\frac{1}{2}\right)^{\frac{t}{50}}$

D) $y = 800(1 - 0.5t)$

16

If there are 800 grams of radioactive material M, then how much of this material would remain radioactive after 200 years?

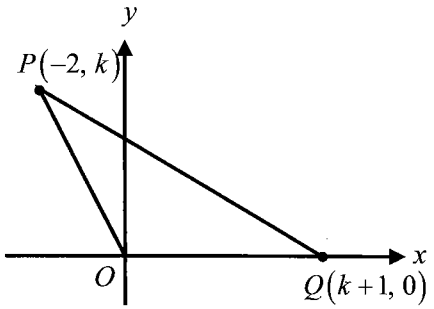
A) 25 grams

B) 50 grams

C) 100 grams

D) 200 grams

17



Note: Figure not drawn to scale.

In the xy-plane above, the area of ΔOPQ is 3. What is the value of k?

A) 2

B) 4

C) 6

D) 8

18

A circle in the xy-plane with center $(4,0)$ passes through point $(7,4)$. Which of the following is the equation of the circle?

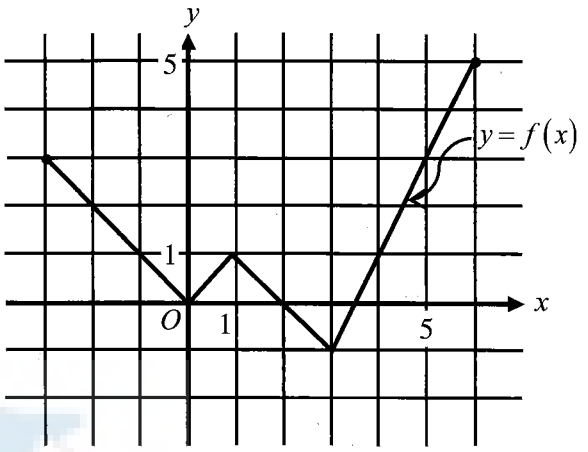
A) $(x-4)^2+y^2=9$

B) $(x-4)^2+y^2=25$

C) $(x-4)^2+y^2=5$

D) $(x+4)^2+y^2=5$

19



The graph of the function f is shown in the xy-plane above. Which of the following is the average rate of change between $x=-3$ and $x=6$?

A) $\frac{2}{9}$

B) $\frac{8}{9}$

C) 2

D) It cannot be determined from the given information.

CONTINUE

20

Emily traveled 60 miles on the highway and 16 miles on the local roads to reach her destination. On the highway, she traveled 30 miles faster than on the local roads. If her speed on local roads is 20 miles per hour, then what was her average speed, in miles per hour, during her entire trip?

A) 24

B) 25

C) 35

D) 38

21

For O.K theater tickets, a ticket for an adult is 5 dollars more than a ticket for a child. If a group of 6 adults and 10 children pay a total of 142 dollars, what is the cost, in dollars, of a ticket for one adult and one child?

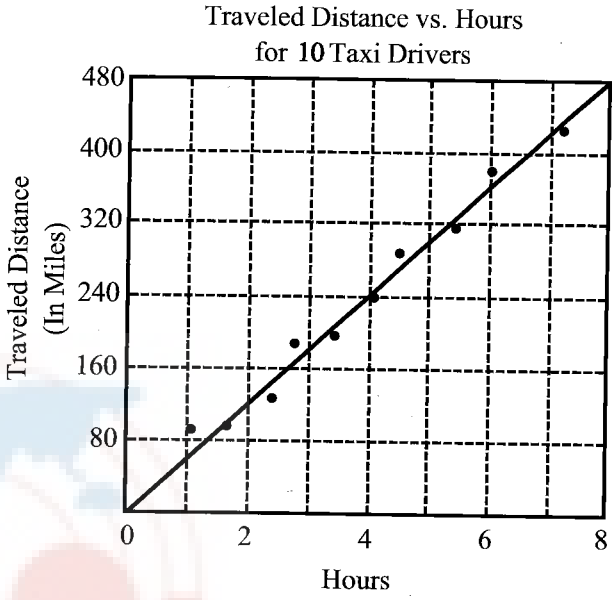
A) 19

B) 18

C) 17

D) 16

22



The scatterplot above shows the distance traveled in hours for 10 taxi drivers and the line of best fit for the data. Which of the following is closest to the average speed, in miles per hour, for the drivers?

A) 54

B) 59

C) 65

D) 68

23

For a polynomial $p(x)$, the value of $p(-5)=0$.
Which of the following must be true about $p(x)$?

A) $(x-5)$ is a factor of $p(x)$.

B) $(x+5)$ is a factor of $p(x)$.

C) x is a factor of $p(x)$.

D) When $p(x)$ is divided by $(x+5)$, the remainder is -5.

24

$$y \le 3x + \frac{1}{2}$$

$$y \ge \frac{1}{2}x + 3$$

If the system of inequalities above is graphed in the xy-plane, which quadrant contains solutions to the system?

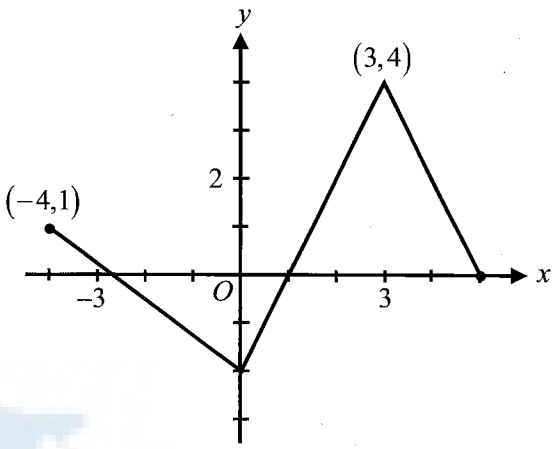
A) Quadrant I

B) Quadrant II

C) Quadrant III

D) Quadrant IV

25



The figure above shows the graph of the piece-wise function f defined for $-4 \le x \le 5$. For which of the following values of x is $f(x) < |f(x)|$?

A) -3

B) -1.3

C) 2.5

D) 3.7

26

If a and b are positive integers and $a^2 - b^2 = 24$, which of the following could be the smallest value of a?

A) 4

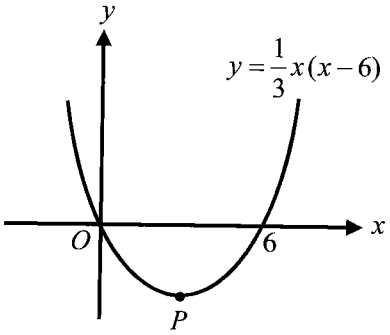
B) 5

C) 7

D) 8

CONTINUE

27



The graph of $y=\frac{1}{3}x(x-6)$ is shown in the xy-plane above. Which of the following are the coordinates of vertex P?

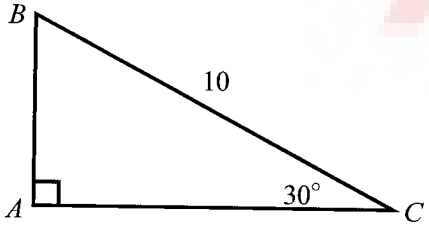
A) $(3,-2)$

B) $(2,-4)$

C) $(3,-3)$

D) $(3,-4.5)$

28



In right triangle ABC above, if $BC=10$ and $\angle C=30°$, what is the approximate perimeter of the triangle?

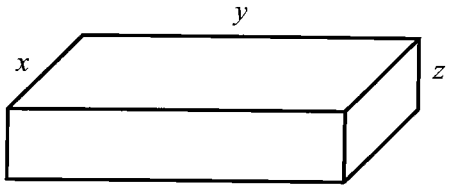
A) 20

B) 23.7

C) 25.8

D) 27.2

29



The figure above shows a rectangular solid with width x, length y, and height z. If $xy=20$, $yz=10$, and $xz=18$, what is the volume of the solid?

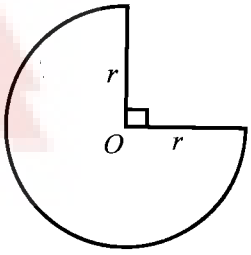
A) 60

B) 70

C) 80

D) 90

30



The figure above shows a sector O with radius r. If the area of the sector is 3π, what is the approximate perimeter of the sector?

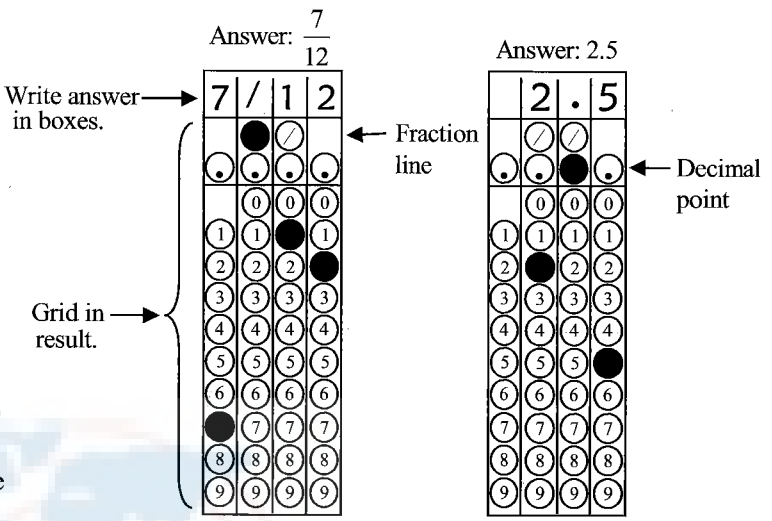
A) 10

B) 12.5

C) 13.4

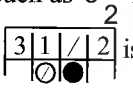
D) 15.6

CONTINUE

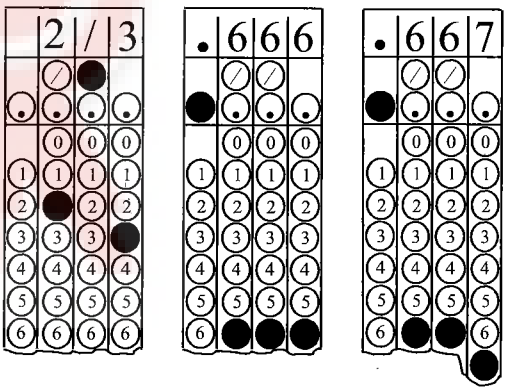


DIRECTIONS

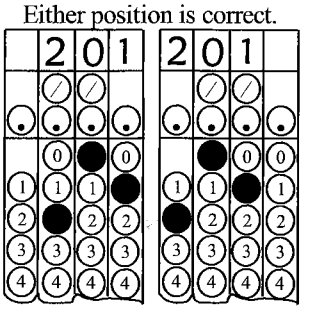
For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

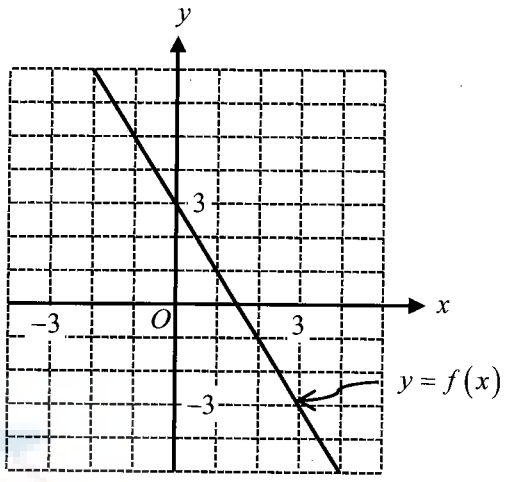
31

Kara needs three hours to mow and trim Mrs. Tayler's lawn. One day she asked her friend Peter to work with her. When Peter worked with her, the job took only one hour. How long would it take Peter, in hours, to complete the job himself?

32

The County Reception Hall charges a rental fee of $\$1,000$ and at least $\$3,000$ for food. Olivia is planning a class reunion. If she has chosen a buffet that costs $\$38.56$ per person, what is the minimum possible number of people who must attend to support the expense?

33



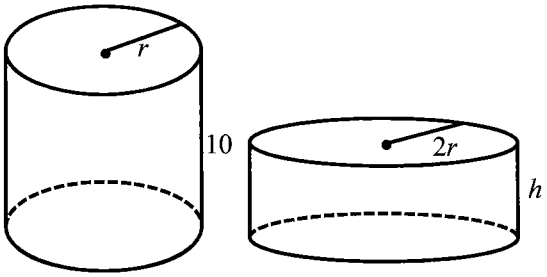
The graph of a linear function f is shown in the xy-plane above. If $f(k) = 1$, what is the value of $f(-2k)$?

34

If the average of $2a$ and b is equal to 50 percent of $4b$, what is the value of $\frac{a}{b}$?

CONTINUE

35



Cylinder I Cylinder II

Two cylinders shown above have the same volume. If the radius of cylinder II is twice the radius of cylinder I and the height of cylinder I is 10, what is the height h of cylinder II?

36

$$g(x)=\frac{x^2-3x+2}{(x+2)^2-8x}$$

For what value of x is the function above undefined?

Questions 37 and 38 refer to the following information.

Suppose Claire deposits a principal amount of P dollars in a bank account that pays compound interest. If the annual interest is r (expressed as a decimal) and the bank makes interest payments n times every year, she would have an amount of money equal to R after t years, given by

$$R(t)=P\left(1+\frac{r}{n}\right)^{nt}$$

37

If she deposit $\$2,000$ into an account paying 4% annual interest compounded annually, what is the amount of interest after one year? (Disregard the $ sign when gridding your answer.)

38

If she deposits $\$2,000$ into an account paying 4% annual interest compounded quarterly, what is her account balance after one year? (Round your answer to the nearest dollar and disregard the $ sign when gridding your answer.)

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 1 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
D	D	D	B	B	D	A	A	C	D
11	12	13	14	15	16	17	18	19	20
C	C	A	D	A	$\frac{5}{13}$	36	3.5	12	7

SECTION 4

1	2	3	4	5	6	7	8	9	10
C	C	B	A	D	A	D	B	B	C
11	12	13	14	15	16	17	18	19	20
A	C	A	A	C	B	A	B	A	D
21	22	23	24	25	26	27	28	29	30
A	B	B	A	B	B	C	B	A	C
31	32	33	34	35	36	37	38		
1.5	52	7	3/2	2.5	2	80	2081		

SAT

Test #2

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

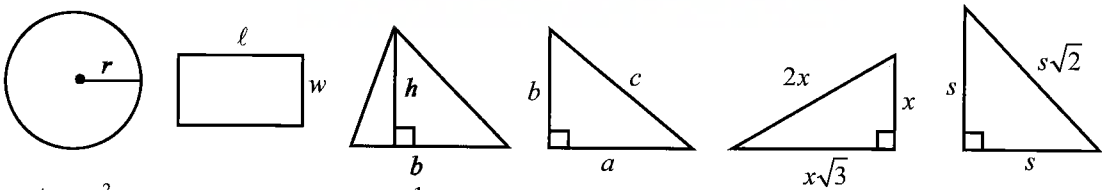
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENC



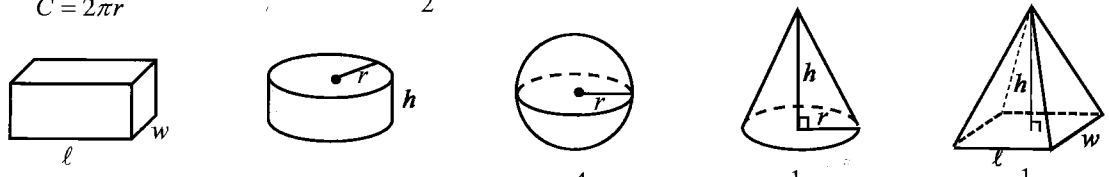
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

If $x-2y=10$, $y=z+1$, and $z=2$, what is the value of x?

A) 12

B) 14

C) 16

D) 18

2

$$2x+6y=5$$
$$ax+by=7$$

If the system of equations above has only one solution, which of the following could be the values of a and b?

A) $a=1$ and $b=3$

B) $a=2$ and $b=6$

C) $a=3$ and $b=8$

D) $a=4$ and $b=12$

3

A smart phone company plans to produce and sell p smart phones. The cost of producing p phones is given by $265,000+150p$ in dollars. The company receives \$400 on the sale of each phone, so the revenue for selling p phones is given by $400p$. For what value of p is the revenue equal to the cost?

A) 500

B) 840

C) 1060

D) 1200

4

$$\left(a+\frac{1}{a}\right)^2-2$$

Which of the following is equivalent to the expression above?

A) $a^2+\frac{1}{a^2}$

B) $a^2+\frac{1}{a^2}-2$

C) $a^2-2a+\frac{1}{a^2}$

D) $a^2+2+\frac{1}{a^2}$

5

$$\sqrt{a^2-a+4}=2$$

If a is a positive number in the equation above, what is the value of a?

A) 10

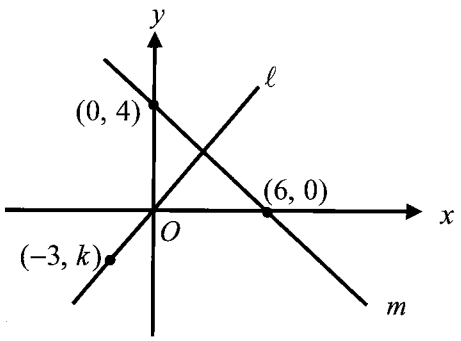
B) 8

C) 4

D) 1

CONTINUE

6



In the xy-plane above, line ℓ is perpendicular to line m. What is the value of k?

A) -1

B) -2

C) -3

D) -4.5

7

If $4a = 2b = c$, what is the average (arithmetic mean) of a, b, and c in terms of a?

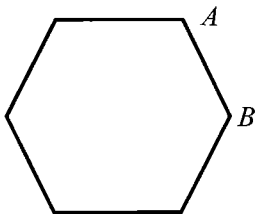
A) $\frac{4a}{3}$

B) $2a$

C) $\frac{7a}{3}$

D) $3a$

8



The figure above shows a regular hexagon. If the length of $\overline{AB}$ is 4, what is the area of the hexagon?

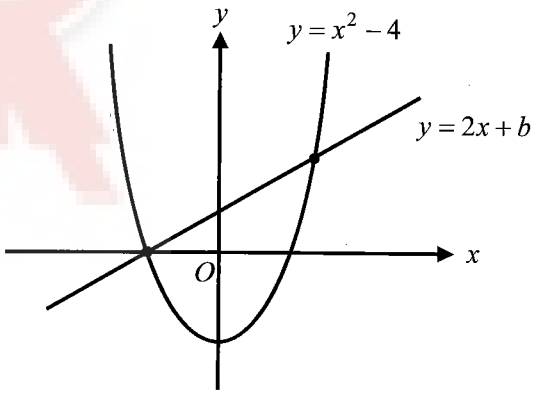
A) 24

B) $24\sqrt{3}$

C) 32

D) $32\sqrt{3}$

9



In the xy-plane above, two graphs intersect at two points. What is the value of b?

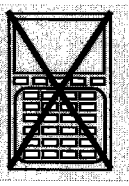
A) 1

B) 2

C) 3

D) 4

CONTINUE



3

10

$$\frac{1}{2}\left(\frac{1}{x-1}-\frac{1}{x+1}\right)$$

Which of the following is equivalent to the expression above?

A) $\frac{1}{2}\left(\frac{1}{x^2-1}\right)$

B) $\frac{1}{x^2-1}$

C) $\frac{-2}{x^2-1}$

D) $\frac{-2x}{x^2-1}$

11

The surface area S of a cylinder with radius r and height h is $S=2\pi r^2+2\pi rh$. If the surface area of the cylinder is 20π and the height is 3, what is the value of r?

A) 1

B) 2

C) 4

D) 5

12

$$R=\frac{(m_1+m_2)}{m_1}$$

The ratio for the kinetic energy between two objects of mass m_1 and m_2 before and after the collision is given above. Which of the following is equivalent to the expression for m_1?

A) $\frac{m_2}{R}$

B) $\frac{R-1}{m_2}$

C) $\frac{m_2}{R-1}$

D) $\frac{m_2-R}{R}$

13

$$f(x)=x^2+ax-10$$

If $f(2)=0$ in the quadratic function above, which of the following must be true?

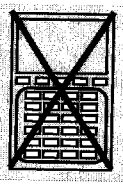
A) $f(-5)=0$

B) $f(-2)=0$

C) $f(-1)=0$

D) $f(0)=0$

CONTINUE



14

$$2a + (4a + 2)i = b - 10i$$

If $i = \sqrt{-1}$ in the equation above, where a and b are constants, what is the value of b?

A) 6

B) 4

C) –3

D) –6

15

Esposito tried to compute the average of his 10 math scores. He mistakenly divided the correct total S of his scores by 8. The result was 5 more than what it should have been. Which of the following would determine the value of S?

A) $10S = 7S + 5$

B) $\frac{S}{10} = \frac{S}{8} + 5$

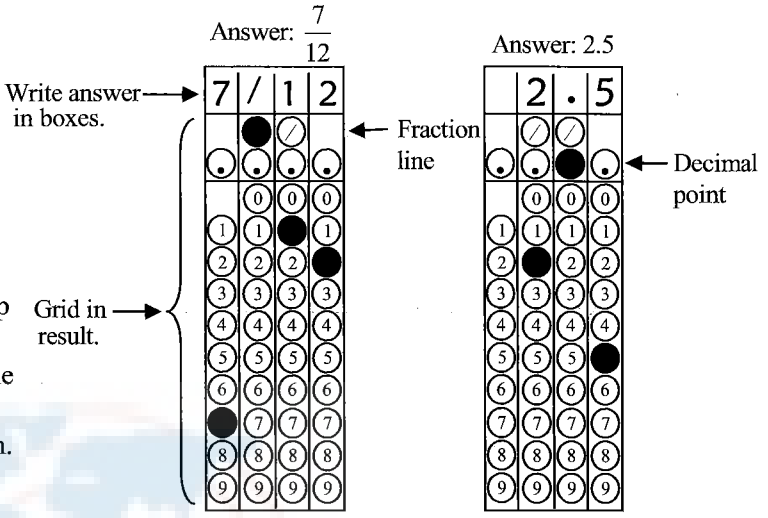
C) $\frac{S}{8} - \frac{S}{10} = 5$

D) $\frac{S + 5}{10} = \frac{S}{8}$

CONTINUE

DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.



1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
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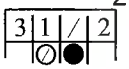
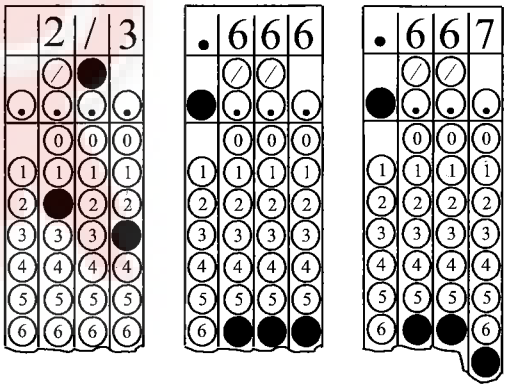
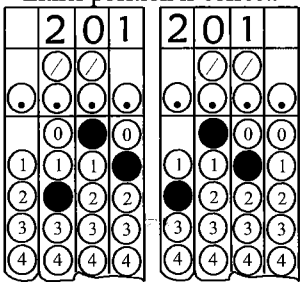
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



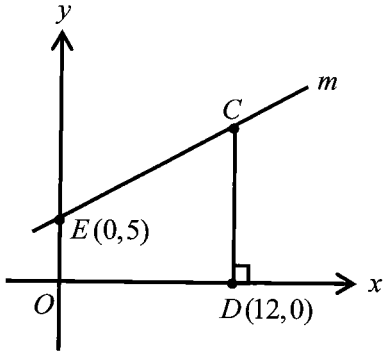
Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16



If the slope of line m in the xy-plane above is $\frac{1}{3}$, what is the area of quadrilateral $OECD$?

17

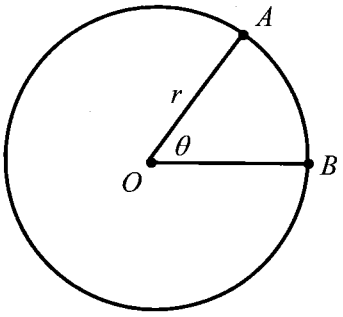
Claire and Peter both want to buy new smart phones. Claire has already saved 100 dollars and plans to save 5 dollars per week until she can buy the phone. Peter has 25 dollars and plans to save 8 dollars per week. In how many weeks will Claire and Peter have saved the same amount of money?

18

$$(a-8)x^2+(b-5)x+c+2=0$$

In the equation above, a, b, and c are constants. If the equation is true for all values of x, what is the value of $a+b+c$?

19



In the figure above, O is the center of the circle with radius r, and the measure of θ is $\frac{\pi}{5}$ radians. If the length of minor arc AB is 3π, what is the value of r?

20

In a certain class of 70 students, $\frac{4}{7}$ of the students are boys, and the ratio of students 10 years or older to students less than 10 years is 2:3. If $\frac{2}{3}$ of the girls are less than 10 years old, how many boys are 10 years old or older?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

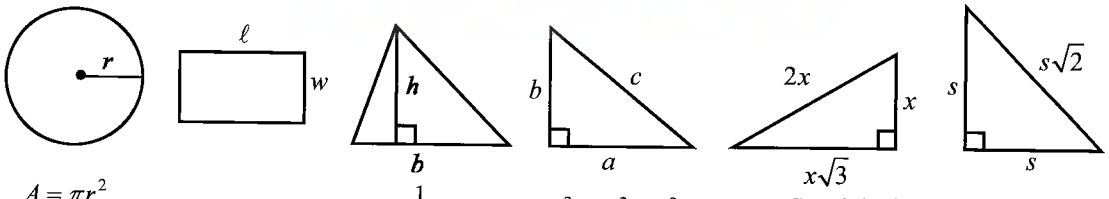
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

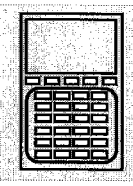
$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



4

1

During its Labor Day sale, a store advertises that \$40 will be deducted from every purchase over \$200. In addition, after the deduction is taken, the store offers an early-bird discount of 40% to any person who makes a purchase before 9 a.m. If Claire makes a purchase of k dollars, $k > 200$, at 8 a.m., which of the following expressions represents the cost of her purchase?

A) $0.4k - 16$

B) $0.4k - 24$

C) $0.6k - 24$

D) $0.6k - 40$

2

On a map, 3 centimeters represents k kilometers. How many kilometers are represented by p centimeters?

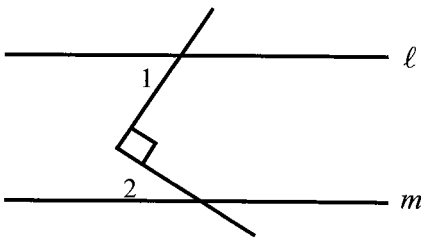
A) $3pk$

B) $\frac{k}{3p}$

C) $\frac{3k}{p}$

D) $\frac{pk}{3}$

3



In the figure above, lines ℓ and m are parallel. If the measure of $\angle 1$ is 20° more than the measure of $\angle 2$, what is the measure of $\angle 1$?

A) 35°

B) 45°

C) 55°

D) 75°

4

$$T = 150 + 20w$$

Cassy plans to buy a new computer, and plans to save \$20 each week for the next w weeks. The total amount of money she saved is represented by the equation above, where T is the total amount. Which of the following is the best interpretation of the number 150 in the equation?

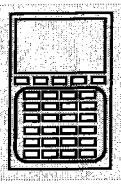
A) The new computer costs \$150.

B) She saved \$150 each week.

C) She wants to buy a computer when she saves \$150.

D) She has already saved \$150 toward the cost of a new computer.

CONTINUE



Questions 5 and 6 refer to the following information.

Dog age (D)	0	2	4	6	8	⋯	15
Human age (H)	a	10	20	30	40	⋯	b

The chart above shows equivalent ages for dogs and humans. Human age is directly proportional to dog age.

5

What is the value of $a+b$?

A) 60

B) 75

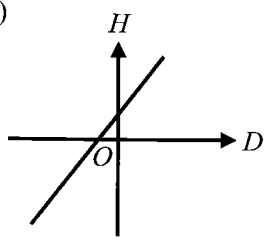
C) 80

D) 85

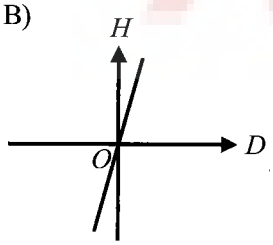
6

Which of the following graphs best represents the relationship between dog and human ages?

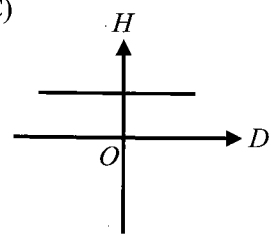
A)



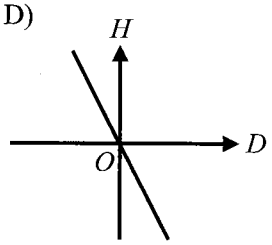
B)



C)



D)



7

In the fraction $\frac{a-5}{2b}$, a is 5 less than two times b. If the fraction is equal to $\frac{1}{2}$, what is the value of a?

A) 15

B) 20

C) 25

D) 30

8

Tyler spent 60 dollars at an amusement park for admission and rides. If he paid \$10 for admission, and rides cost \$3 each, what is the maximum number of rides that he went on?

A) 16

B) 17

C) 18

D) 20

CONTINUE

9

For a school summer concert, one type of ticket costs \$5 and another costs \$10. The supervisor of the concert can sell at most 500 tickets, but the gross receipts must total at least \$3,000 in order for the concert to be held. Which of the following systems of inequalities could represent this relationship?

A) $\begin{cases} 5x+10y \geq 3000 \\ x+y \leq 500 \\ x \geq 0 \\ y \geq 0 \end{cases}$

B) $\begin{cases} \frac{5}{x}+\frac{10}{y} \leq 500 \\ x+y \leq 3000 \\ x \geq 0 \\ y \geq 0 \end{cases}$

C) $\begin{cases} 5x+10y \leq 3000 \\ x+y \leq 500 \\ x \geq 0 \\ y \geq 0 \end{cases}$

D) $\begin{cases} 5x+10y > 3000 \\ x+y < 500 \\ x > 0 \\ y > 0 \end{cases}$

10

If a linear function f satisfies $f(3)=10$ and $f(7)=18$, what is the value of $f(5)$?

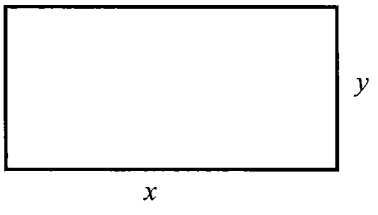
A) 12

B) 14

C) 15

D) 16

Questions 11 and 12 refer to the following information.



A rancher has 100 feet of fencing to enclose rectangular region as shown above. The length and width are represented by x and y respectively.

11

Which of the following expressions represents the area of the rectangular region as a function of x?

A) $100x-x^2$

B) $50x-x^2$

C) $50x+x^2$

D) $50x^2$

12

If the value of y is 25, what is the area of the rectangular region in square feet?

A) 325

B) 625

C) 1250

D) 2500

CONTINUE

13

Factory Workers over 60		
Year	Percent of Men	Percent of Women
1990	19.6	13.5
2000	23.6	10.8

The table above shows the percent of men and women 60 years and older who were working in a certain factory in the U.S. in the given years. If the rate of increase or decrease every year is constant, which of the following represents the percent of men over 60 who were working in the factory in the year 2015?

A) 26.6

B) 27.2

C) 29.6

D) 30.5

14

Mary is making a rectangle whose perimeter is less than 100 inches. If the dimensions of the rectangle are integers, what is the largest possible area for the rectangle in square inches?

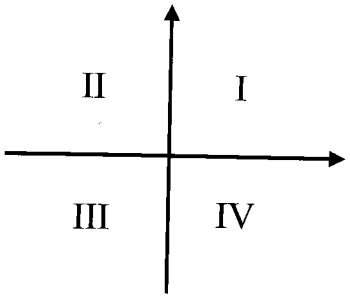
A) 600

B) 625

C) 650

D) 800

15



If $z = 3 + 2i$ is in the first quadrant of the complex number plane above, then which quadrant contains z^2?

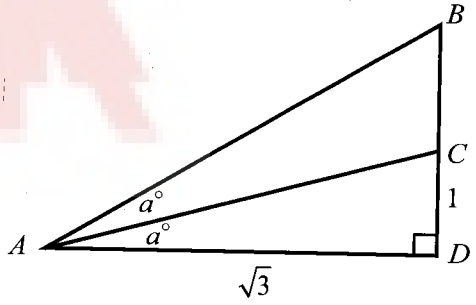
A) Quadrant I

B) Quadrant II

C) Quadrant III

D) Quadrant IV

16



In the figure above, $AD = \sqrt{3}$ and $CD = 1$. What is the length of $\overline{AB}$?

A) 2

B) 3

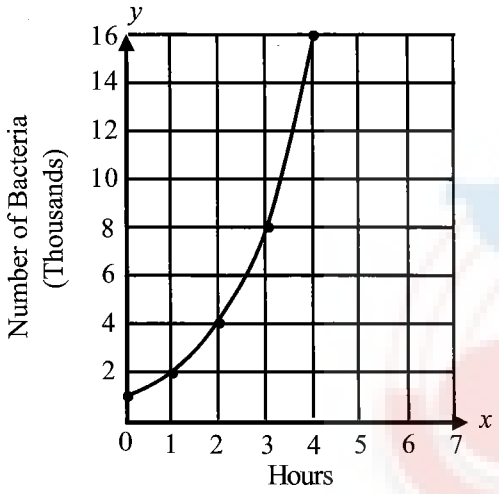
C) $2\sqrt{3}$

D) $3\sqrt{3}$

Questions 17and 18 refer to the following information.

The number of bacteria in a controlled laboratory environment is defined by the function $f(x) = 1000 \times b^x$, where x is the time in hours.

The graph of f is shown in the xy-plane below.



17

What is the value of b?

A) 1

B) 2

C) 3

D) 4

18

What is the number of bacteria in 5 hours?

A) 27,000

B) 32,000

C) 40,000

D) 64,000

19

A school nurse chose 50 girls from the seventh grade and measured their weight, in pounds, shown in the table below.

Measure of Weight	Frequency
70	5
75	8
78	20
80	10
85	5
90	2

If there is a total of 500 girls in the seventh grade, what could be the possible number of girls in the median measure of weight for the entire grade?

A) 80

B) 100

C) 150

D) 200

20

$$x^2 - 2x + y^2 = 10$$

The equation of a circle in the xy-plane is shown above. What is the center of the circle?

A) (1, –1)

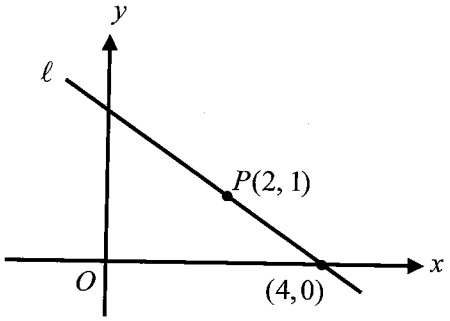
B) (1, 1)

C) (1, 0)

D) (2, 0)

CONTINUE

21



The graph of line ℓ is shown in the xy-plane above. Line m (not shown) has the equation $y = ax + b$, where a and b are constants. If line m is perpendicular to line ℓ and passes through point P, what is the value of b?

A) 0

B) −1

C) −2

D) −3

22

$$2^{3k-3} = 64$$

In the equation above, what is the value of 2^k?

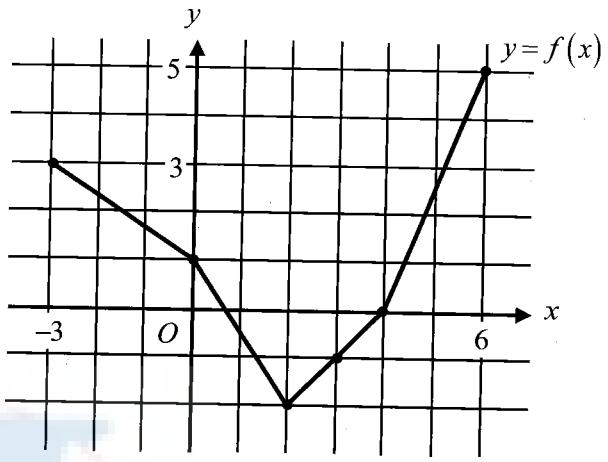
A) 4

B) 8

C) 16

D) 32

23



The complete graph of the function f is shown in the xy-plane above. Which of following is true?

A) $f(0) > |f(0)|$

B) $f(2.2) < |f(2.2)|$

C) $f(3) > |f(3)|$

D) $f(-2) < |f(-2)|$

24

$$y = -\frac{1}{10}x^2 + k$$
$$y = 5$$

In the system of equations above, k is a constant. For which of the following values of k does the system of equations have no real solution?

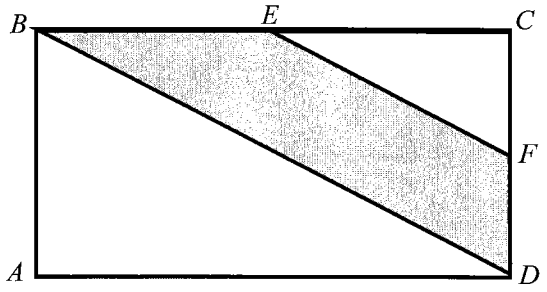
A) 10

B) 8.5

C) 5

D) −0.05

25



In the figure above, E and F are the mid points of two sides of a rectangle. If the area of ΔCEF is 10, what is the area of the shaded region?

A) 15

B) 20

C) 25

D) 30

26

$$x - y = 5$$
$$xy = 10$$

In the equations above, what is the value of $x^2 + y^2$?

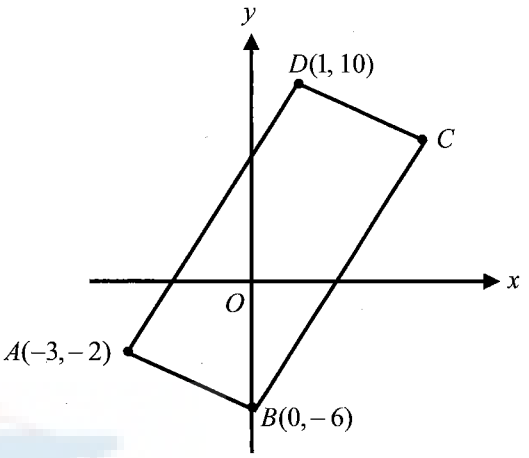
A) 15

B) 25

C) 36

D) 45

27



In the xy-plane above, the figure shows the coordinates of points A, B, and C of a parallelogram. Which of the following are the coordinates of point C?

A) (3, 5)

B) (4, 6)

C) (5, 5)

D) (6, 5)

28

$$a^2 + b^2 \leq 25$$
$$b \geq 3$$

In the inequalities above, what is the greatest possible value of a?

A) −4

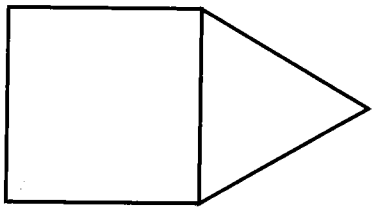
B) −3

C) 3

D) 4

CONTINUE

29



The figure above shows a square and an equilateral triangle. If the area of the triangle is $25\sqrt{3}$ square inches, what is the area, in square inches, of the square?

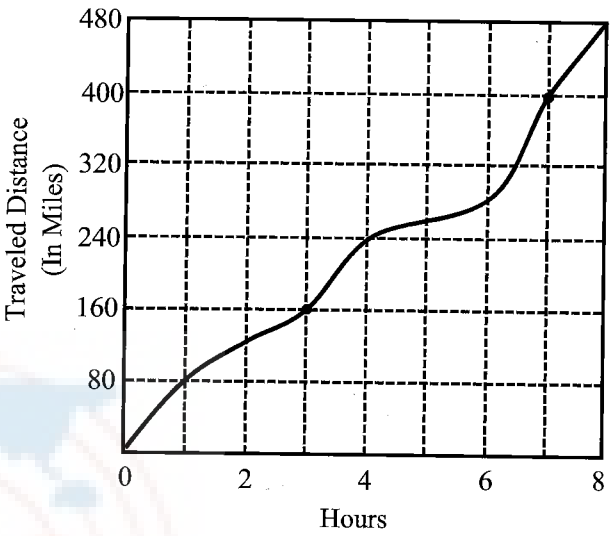
A) $50\sqrt{3}$

B) 100

C) $100\sqrt{3}$

D) 125

30



The graph above compares the distance with the number of hours that a car traveled. Which of the following is the average speed, in miles per hour, of the car during the time between 3 and 7 hours?

A) 50

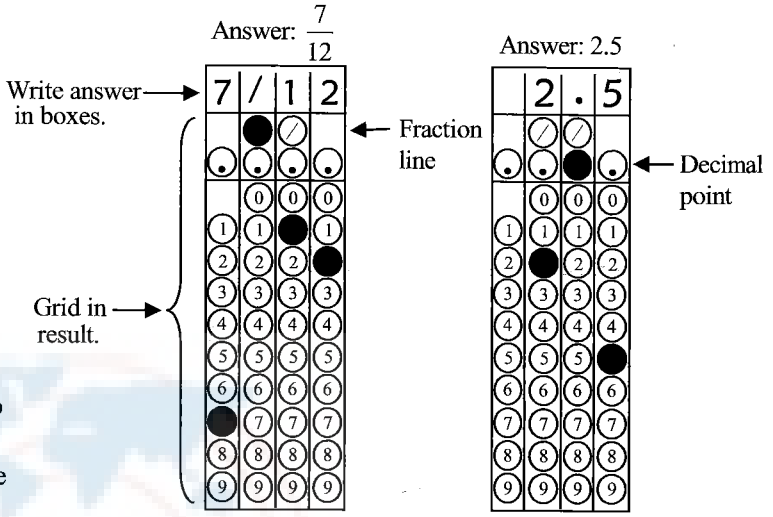
B) 55

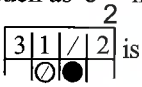
C) 60

D) It cannot be determined from the given information.

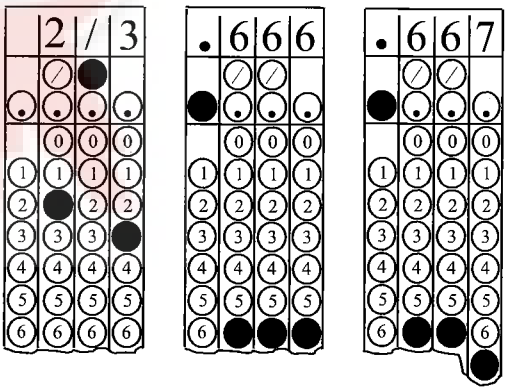
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

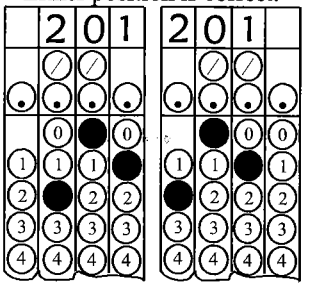


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

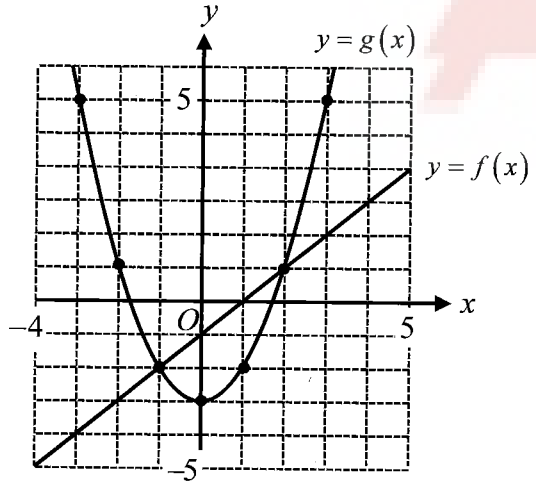
31

Jackie goes on a 30-mile bike ride every Sunday. He rides the distance in 3 hours. At this rate, how many miles can he ride in 5 hour and 30 minutes?

32

The average of a set of 8 consecutive odd integers is 18. What is the greatest of these 8 integers?

33



The graphs of a linear function f and a quadratic function g are shown in the xy-plane above. If $f(g(k)) = -3$, what is the value of $|k|$?

34

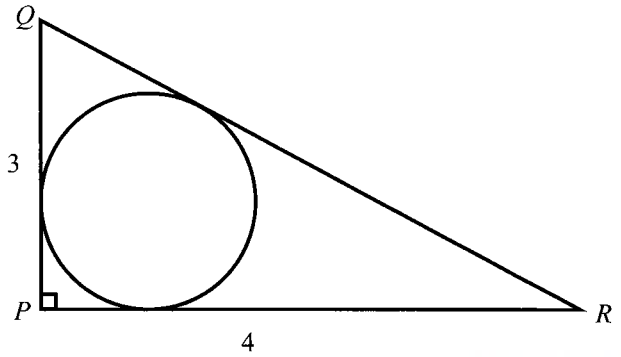
In the xy-plane, line $x = 2$ is the axis of symmetry of the graph of $f(x) = 5x^2 - kx + 2$. What is the value of k?

35

Twenty grams of solution P is 10% alcohol and 30 grams of solution Q is 20% alcohol by mass. If these two solutions are mixed together, what is the percent of alcohol in the mixture? (Disregard the % sign when gridding your answer.)

CONTINUE

36



In the figure above, a circle is inscribed in ΔPQR. If $PQ = 3$ and $PR = 4$, what is the radius of the circle?

Questions 37 and 38 refer to the following information.

The total cost of an internet phone-call is the sum of

(1) a basic fixed charge for using the internet and
(2) an additional charge for each minute that is used.

The total cost of a 20 minute-call is \$24 and the total cost of a 35 minute-call is \$31.50.
(Disregard the \$ sign when gridding your answer.)

37

What is the basic fixed charge, in dollars, for using the internet?

38

What is the total cost, in dollars, of a 40 minute-call?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 2 Answers and Explanations

SECTION 3	1	2	3	4	5	6	7	8	9	10
	C	C	C	A	D	D	C	B	D	B
	11	12	13	14	15	16	17	18	19	20
	B	C	A	D	C	84	25	11	15	18
SECTION 4	1	2	3	4	5	6	7	8	9	10
	C	D	C	D	B	B	A	A	A	B
	11	12	13	14	15	16	17	18	19	20
	B	B	C	A	A	C	B	B	D	C
	21	22	23	24	25	26	27	28	29	30
	D	B	B	D	D	D	B	D	B	C
	31	32	33	34	35	36	37	38		
	55	25	1	20	16	1	14	34		

SAT

Test #3

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

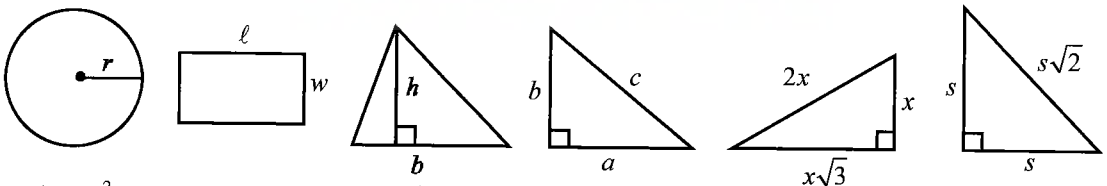
DIRECTION

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENC



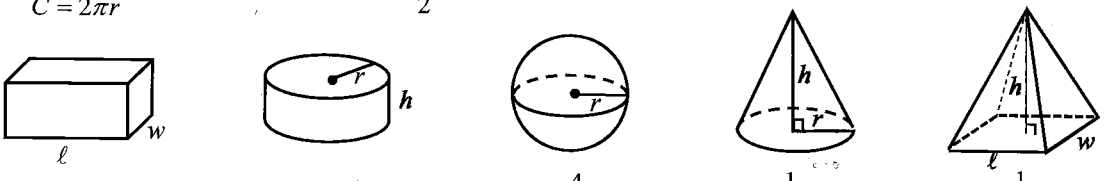
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

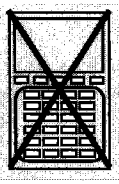
$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

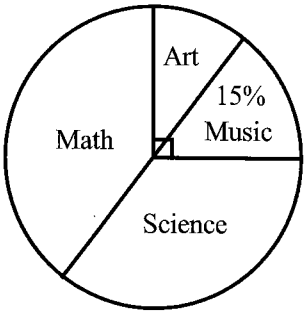
$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



1



A total of 40 students in Mr. Lee's class voted for their favorite subject. The results are shown in the pie chart above. How many students voted for math?

A) 12

B) 14

C) 16

D) 18

2

If $3r+5=10$, what is the value of $6r+5$?

A) 10

B) 15

C) 20

D) 21

3

If $a^{-2}=\frac{1}{5}$, what is the value of $5a^2$?

A) 1

B) 5

C) 10

D) 25

4

When a certain number p is divided by 10, the quotient is k and the remainder is r. Which of the following expressions represents r?

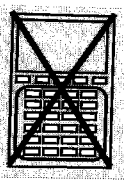
A) $r=p-10k$

B) $r=10p-k$

C) $r=10(k-p)$

D) $r=10k-p$

CONTINUE



5

If $\frac{5}{12}=\frac{1}{a}+\frac{1}{b}$ and $ab=24$, what is the value of $a+b$?

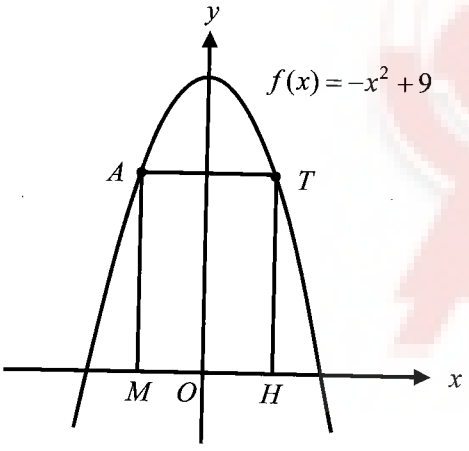
A) 25

B) 13

C) 11

D) 10

6



The graph of function f is shown in the xy-plane above. If length of $\overline{MA}$ of the rectangle $MATH$ is 5, what is the length of $\overline{AT}$?

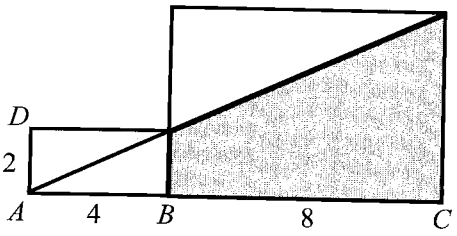
A) 2

B) 2.5

C) 3

D) 4

7



Two rectangles are shown in the figure above. If $AB=4$, $AD=2$, and $BC=8$, what is the area of the shaded region?

A) 32

B) 36

C) 48

D) 64

8

$$ax-by=9$$
$$3x+y=3$$

If the system of linear equations above has infinitely many solutions, what is the value of $a+b$?

A) −3

B) 6

C) 9

D) 12

CONTINUE

9

x	$g(x)$
-3	6
-2	0
0	-6
2	-2
3	0
4	6

The function g is defined by a polynomial. Some selected values of x and $g(x)$ are shown in the table above. Which of the following is true?

I. $(x-3)$ is a factor of $g(x)$.

II. $(x-2)$ is a factor of $g(x)$.

III. $(x+2)$ is a factor of $g(x)$.

A) I and II only

B) I and III only

C) II and III only

D) I, II, and III

10

If y is inversely proportional to x^2, and $y=10$ when $x=2$, what is the value of y when $x=10$?

A) $\frac{2}{5}$

B) 2

C) 50

D) 250

11

$$y=k(x-4)(x+2)$$

The graph of the quadratic equation above, where k is a constant, has a vertex at point (a, b) in the xy-plane. Which of the following is equal to a?

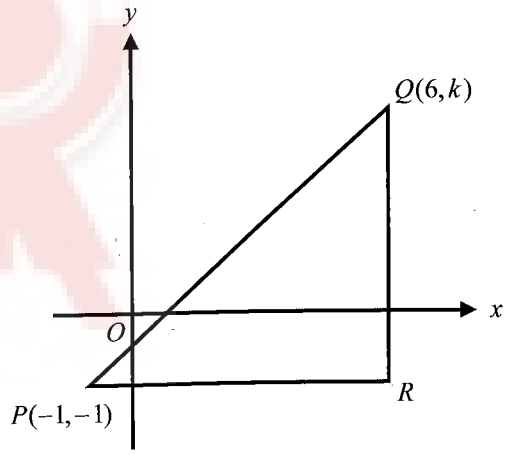
A) -1

B) 0

C) 1

D) 2

12



The figure PQR in the xy-plane is an isosceles right triangle. Which of the following is equal to k?

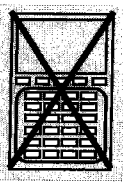
A) 6

B) 7

C) 8

D) 9

CONTINUE



13

$$\frac{2i}{1-i} = a + bi$$

If $i = \sqrt{-1}$ in the equation above, where a and b are constants, what is the value of a?

A) -1

B) 1

C) 2

D) 3

14

$$\frac{1}{x} = \frac{x}{2x+1}$$

What are the solutions to the equation above?

A) $x = -1 \pm \sqrt{2}$

B) $x = 1 \pm \sqrt{2}$

C) $x = 1 \pm \sqrt{3}$

D) $x = \frac{1 \pm \sqrt{2}}{2}$

15

$$P = \frac{9}{2}K + 40$$

The equation above shows how the value of P relates to the value of K. Based on the equation, which of the following must be true?

I. When the value of K increases by 1, the value of P increases by 40.
II. When the value of K increases by 2, the value of P increases by 9.
III. When the value of K increases by 4, the value of P increases by 18.

A) I and II only

B) I and III only

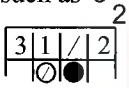
C) II and III only

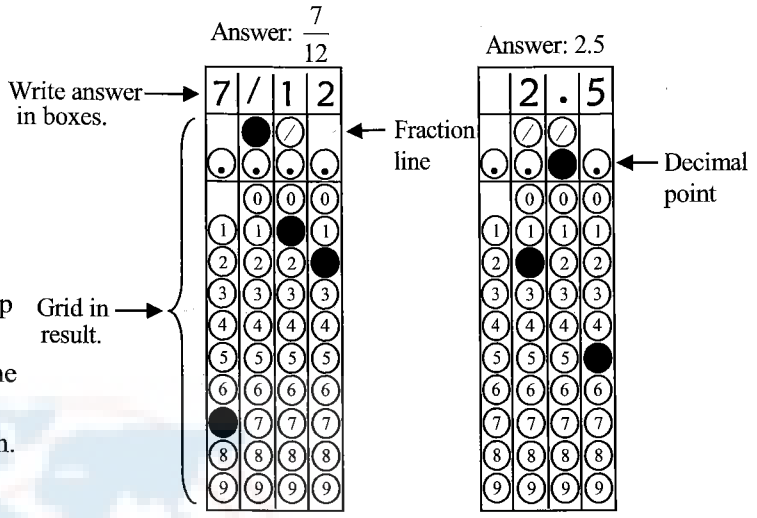
D) I, II, and III

CONTINUE

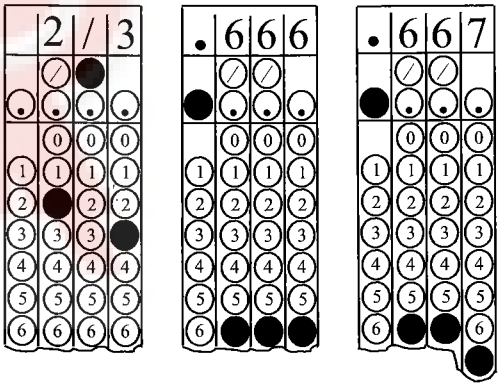
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

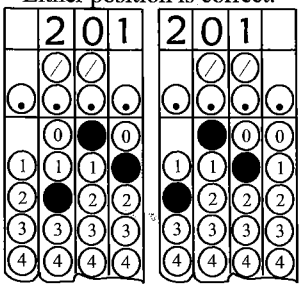
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16

$$x^2 - ax = -10$$

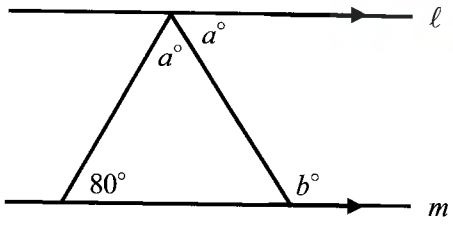
The quadratic equation above has two real solutions. If one of the solutions is 5 and a is a constant, what is the other solution?

17

$$\frac{15}{x-1} - 7 = 3 - \frac{5}{x-1}$$

If $x > 1$, what is the solution to the equation above?

18

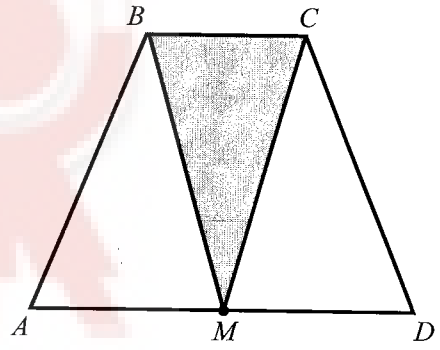


In the figure above, line ℓ is parallel to line m. What is the value of b?

19

At a certain party, an executive committee provided one soda for 8 people, one large bag of chips for 4 people, and one cheese cake for 6 people. If the total number of sodas, large bag of chips, and cheese cakes was 78, how many people were at the party?

20



The figure above shows trapezoid $ABCD$. If M is the midpoint of $\overline{AD}$ and $AD = 3 \cdot BC$, what fraction of the area of the trapezoid is shaded?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

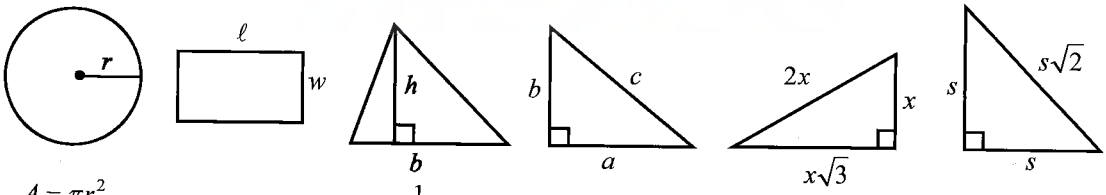
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

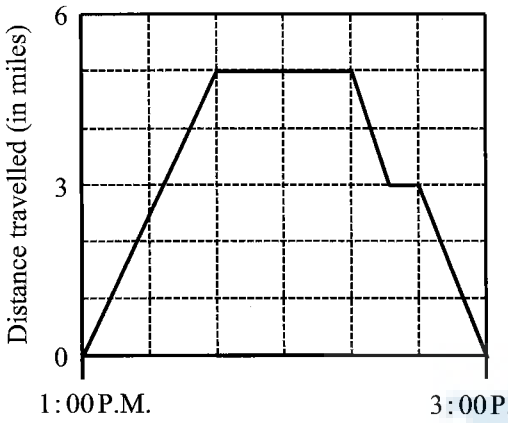
$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1



Bernard began to ride a bicycle to the town library, and then rode to the book store to buy a novel. After 10 minutes, he began to ride home again. If the graph above shows his trip, how long did he stay in the library?

A) 10 minutes

B) 20 minutes

C) 30 minutes

D) 40 minutes

2

If $\frac{2}{k} = 9$ and $9k + h = 20$, what is the value of h?

A) 9.5

B) 12

C) 15.5

D) 18

3

n	-1	0	1	2	a
$f(n)$	0	3	6	9	b

The table above shows some values of the linear function f. Which of the following defines b?

A) $b = a + 3$

B) $b = a + 5$

C) $b = 2a + 4$

D) $b = 3a + 3$

4

Gender	Subject		Total
	Art	Music	
Males	30		65
Females		20	
Total			100

The incomplete table above shows the results of a survey about subject preference given to 100 students. What is the probability of art students being females?

A) $\frac{7}{25}$

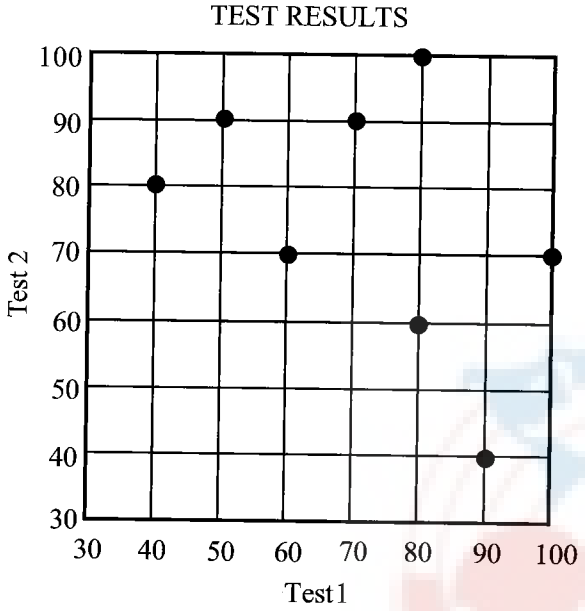
B) $\frac{1}{3}$

C) $\frac{1}{4}$

D) $\frac{2}{5}$

CONTINUE

Questions 5 and 6 refer to the following information.



The scatterplot above relates two sets of data on a graph and shows the results of a class of students' last two algebra tests. Both the vertical and horizontal axes show the scores.

5

What is the average (arithmetic mean) score for Test 1?

A) 68.35
B) 70.50
C) 71.25
D) 74.75

6

Which of the following is the greatest change in scores between test 1 and test 2?

A) 60
B) 50
C) 40
D) 30

7

$$L = 0.2(t - 2010) + 10$$

The lifespan of a certain bird has been tracked from the year 2010, and the average lifespan is modeled by the equation above. In 2010 the lifespan of the bird was 10 years. What is the meaning of the number 0.2 in the equation?

A) The lifespan in the year 2010
B) The life span increase each year from 2010
C) The lifespan increase every 10 year
D) The life span decrease each year from 2010

8

$$x^2 - 2x + y^2 + 2y - 3 = 0$$

The equation of a circle in the xy-plane is shown above. What is the diameter of the circle?

A) $\sqrt{5}$
B) $2\sqrt{5}$
C) 5
D) 10

CONTINUE

9

$$x - 4y = -3$$
$$4x - y = 12$$

In the system of equations above, what is the value of $x + y$?

A) 5

B) 6

C) 8

D) 9

10

$$\left(a^k\right)^{\frac{2}{3}} = \frac{1}{a^2}$$

In the equation above, if $a > 0$, what is the value of k?

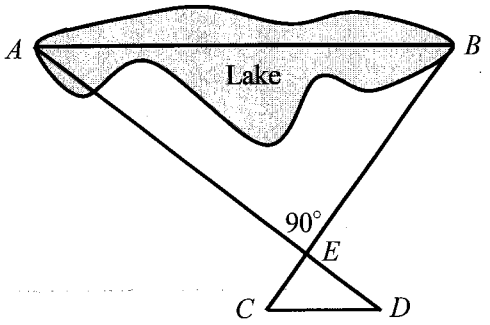
A) -3

B) -1

C) 1

D) 3

11



Jackson wants to measure the length AB of a lake. In the figure above, $\overline{AB}$ is parallel to $\overline{CD}$, $DE = 6$ feet, $CD = 10$ feet, and $BE = 300$ feet. What is the length of the lake?

A) 250 feet

B) 275 feet

C) 375 feet

D) 500 feet

12

$$2x^2y - 3xy^2 - xy(3x + 5y - 2)$$

Which of the following is equivalent to the expression above?

A) $xy(x - 8y - 2)$

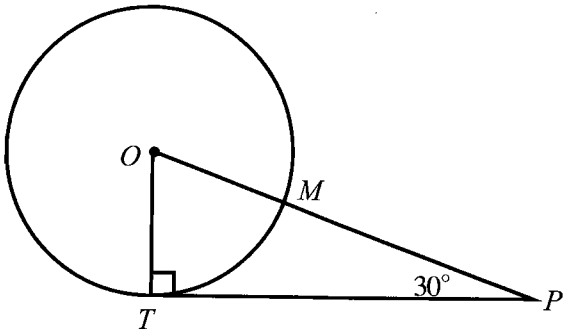
B) $xy(x + 8y - 2)$

C) $-xy(x - 8y + 2)$

D) $-xy(x + 8y - 2)$

CONTINUE

13



In the figure above, point O is the center of the circle. If the length of $\overline{TP}$ is $10\sqrt{3}$, what is the length of minor arc $\overset{\frown}{TM}$?

A) $\frac{5\pi}{3}$

B) $\frac{7\pi}{3}$

C) $\frac{8\pi}{3}$

D) $\frac{10\pi}{3}$

14

A certain number is proportional to another number in the ratio $3:7$. If 12 is subtracted from the sum of the numbers, the result is 38. What is the average (arithmetic mean) of the numbers?

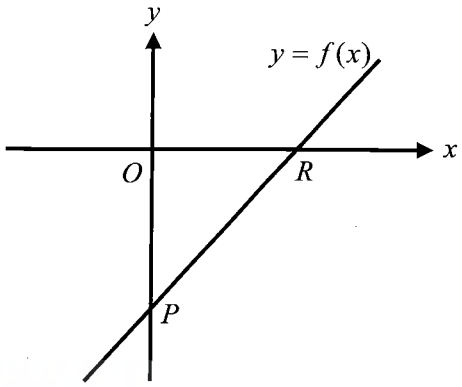
A) 10

B) 12

C) 25

D) 40

15



The function f, defined by $f(x) = mx - m$, is graphed in the xy-plane above. Which of the following expressions represents the area of triangle OPR?

A) $\frac{m}{2}$

B) m

C) $\frac{m^2}{2}$

D) m^2

16

If pipe S can fill a certain water tank in 3 hours and pipe U can empty it in 4 hours, how long, in hours, would it take to fill the empty tank when both pipes are open?

A) 6

B) 8

C) 10

D) 12

CONTINUE

17

$$\frac{1}{R}+\frac{1}{S}=\frac{1}{T}$$

When electrical circuits are connected in parallel, the reciprocal of the total resistance is found by adding the reciprocals of each resistance as shown above. Which of the following gives S in terms of R and T?

A) $S=\frac{R-T}{RT}$

B) $S=\frac{T-R}{RT}$

C) $S=\frac{RT}{R-T}$

D) $S=\frac{RT}{T-R}$

18

$$h(t)=36t-6t^2$$

The function h above shows the height, in feet, of an object thrown upward after t seconds. How long, in seconds, does the object stay in the air higher than 48 feet?

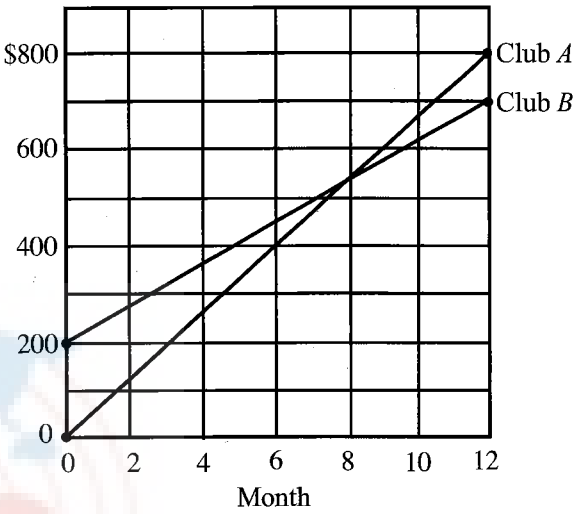
A) 2

B) 3

C) 4

D) 5

Questions 19 and 20 refer to the following information.



Two health clubs offer different membership plans. The graph above shows the yearly cost, including a membership fee plus a monthly charge, for each club.

19

Which of the following is closest to the monthly charge, in dollars, for club B?

A) 42

B) 67

C) 70

D) 72

20

Which of the following best approximates the total cost, in dollars, for club B when both plans are the same?

A) 510

B) 525

C) 533

D) 550

CONTINUE

21

$$y = a(x-2)^2 + b$$
$$y = 5$$

In the system of equations above, for which of the following values of a and b does the system have no solution?

A) $a = 1$ and $b = -4$
B) $a = 2$ and $b = 5$
C) $a = -1$ and $b = 6$
D) $a = -2$ and $b = 4$

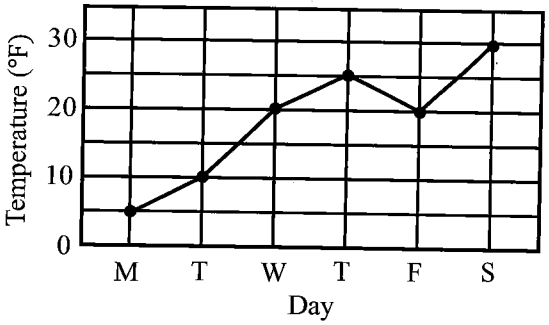
22

$$D(t) = 30 - at^2$$

An apple falls from the branch of a tree to the ground 30 feet below. The distance, D, the apple is from the ground is represented by the equation above, where a is a constant and t is time in seconds.
If $D(0.1) - D(0.2) = 6$, what is the value of a?

A) 160
B) 180
C) 200
D) 240

23

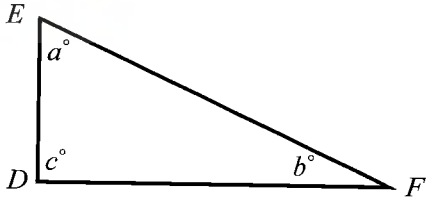


The graph above shows the daily high temperatures in Albany, New York, for 6 days in January. Which of the following describes the data?

I. mean = median
II. mean = mode
III. median = mode

A) I and II only
B) II and III only
C) III only
D) I, II, and III

24



Note: Figure not drawn to scale.

In the figure above, if $\sin(a^\circ) = \cos(b^\circ)$, which of the following must be true?

A) $a = b$
B) $a > b$
C) $a = 60$
D) $c = 90$

CONTINUE

25

In an art class, $\frac{2}{3}$ of the students are girls and $\frac{2}{5}$ of girls are seniors. If $\frac{1}{3}$ of senior girls have passed the final art test, which of the following could be the number of students in this class?

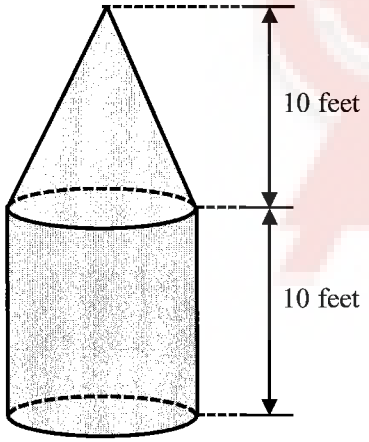
A) 20

B) 30

C) 45

D) 60

26



The figure above shows a silo built from a right circular cone and a right circular cylinder. If the volume of the cylinder is 1911 cubic feet, what is the volume of the silo, in cubic feet?

A) 2125

B) 2548

C) 2684

D) 3017

27

$$k = x^2 - 5x$$

In the equation above, for how many integers x is the number k negative?

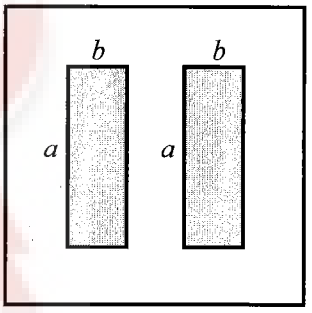
A) 2

B) 3

C) 4

D) 5

28



In figure above, two identical rectangles lie inside a square and the dimensions of the rectangle are a and b respectively. If the distance from the rectangles to the square and each other are 4 inches, and $a:b=5:2$. What is the area of the square in square inches?

A) 625

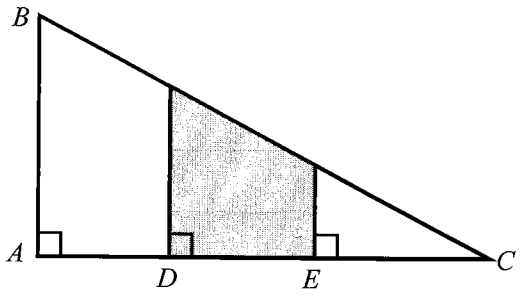
B) 676

C) 729

D) 784

CONTINUE

29



In the figure above, $AD = DE = EC$. If the area of triangle ABC is 81, what is the area of the shaded region?

A) 24

B) 27

C) 30

D) 40.5

30

$$a - b + 3i\sqrt{5} = \sqrt{5} + (a + b)i$$

In the equation above, a and b are constants. If $i = \sqrt{-1}$, what is the value of $a^2 - b^2$?

A) $8\sqrt{3}$

B) 12

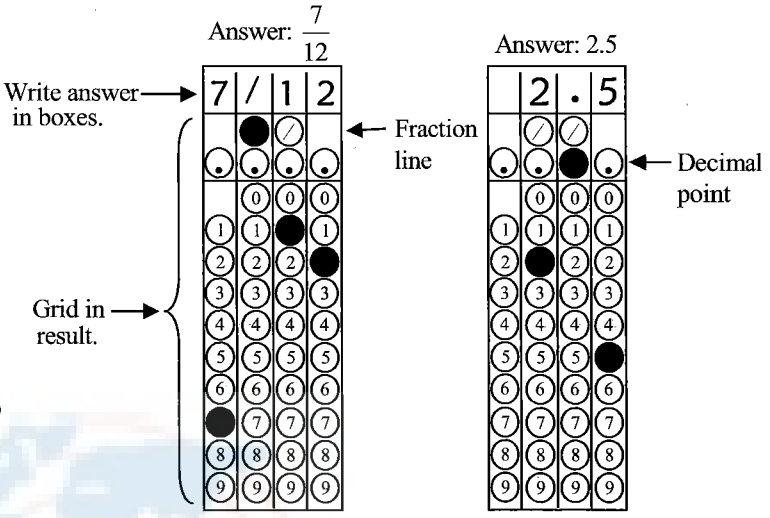
C) 15

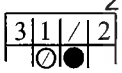
D) $12\sqrt{3}$

CONTINUE

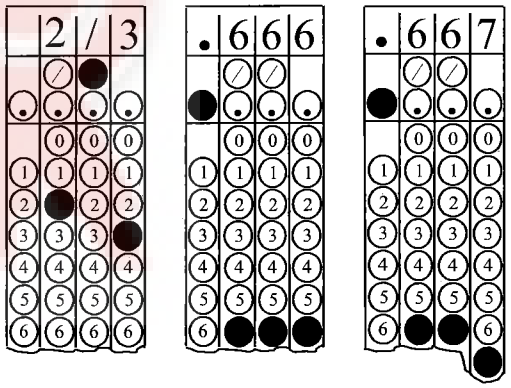
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

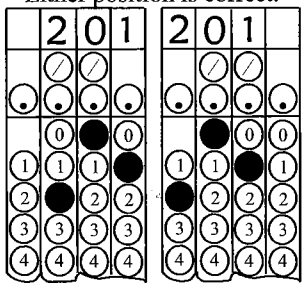


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31

x	$f(x)$
1	7
3	13
5	19
a	b

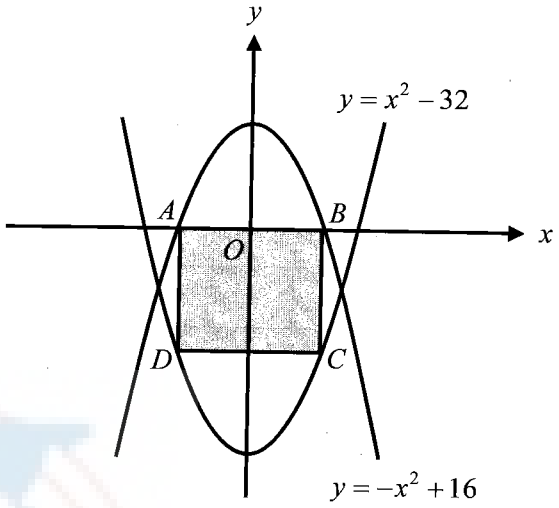
x	$g(x)$
0	12
1	14
2	16
a	b

The tables above show some values of the linear functions f and g. What is the value of $a+b$?

32

Mr. Benjamin has brought grammar work books to distribute to the students in his reading class. If he gives each student 5 books, he will have 10 books left over, and if he gives each student 7 books, he will need an additional 20 books. How many students are in the class?

33



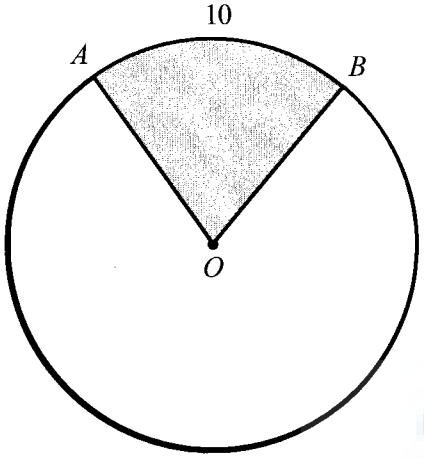
In the xy-plane above, what is the area of rectangle $ABCD$?

34

$$f(x) = x^2 + ax + b$$
$$g(x) = f(x-3)$$

In the functions above, a and b are constants. If $g(3) = 5$ and $g(4) = 10$, what is the value of a?

35



In the figure above, central angle AOB has a measure of $\frac{\pi}{3}$ radians. If the length of minor arc $\overset{\frown}{AB}$ is 10, what is the area of the shaded sector? (Round your answer to the nearest tenth.)

36

$$P(x) = x^2 + 4x - k$$

In the quadratic function above, if $P(0) = 5$, what is the minimum value of P?

Questions 5 and 6 refer to the following information.

$$R = 100x$$
$$C = 85x + 2000$$

A smartphone production company expressed a relationship between revenue (R) and cost (C) for selling x units of a product as shown above.

37

For what value of x will the product start to return a profit?

38

For what value of x, will the company achieve a profit of \$100,000?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 3 Answers and Explanations

SECTION 3	1	2	3	4	5	6	7	8	9	10
	C	B	D	A	D	D	A	B	B	A
	11	12	13	14	15	16	17	18	19	20
	C	A	A	B	C	2	3	130	144	1/4
SECTION 4	1	2	3	4	5	6	7	8	9	10
	D	D	D	B	C	B	B	B	A	A
	11	12	13	14	15	16	17	18	19	20
	C	D	D	C	A	D	C	A	A	C
	21	22	23	24	25	26	27	28	29	30
	D	C	C	D	C	B	C	D	B	C
	31	32	33	34	35	36	37	38		
	36	15	128	4	47.7	1	134	6800		

SAT

Test #4

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

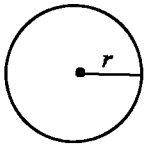
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

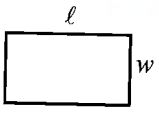
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENC

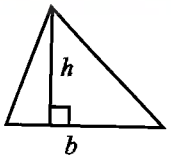


$A = \pi r^2$

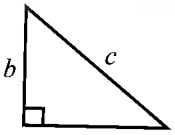
$C = 2\pi r$



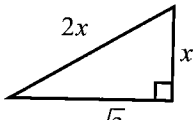
$A = \ell w$

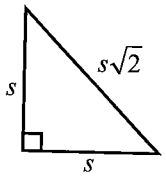


$A = \frac{1}{2}bh$

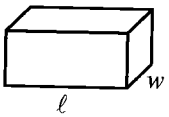


$c^2 = a^2 + b^2$

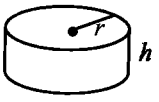




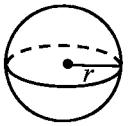
Special Right Triangles



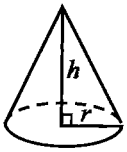
$V = \ell wh$



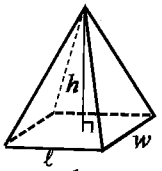
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$

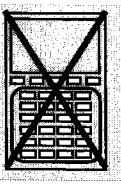


$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

65/215

CONTINUE



1

Which of the following expressions cannot be equal to 0 for some value of x?

A) $x^2 - 2$

B) $x^2 + 1$

C) $1 - x^2$

D) $2 - x^2$

2

$$f(x) = mx + b$$

In the function above, m and b are constants.

If $\frac{f(5) - f(2)}{3} = 2$, what is the values of m?

A) 2

B) 3

C) 4

D) 5

3

The line passing through the points $(a, 3)$ and $(b, -2)$ is parallel to the graph of $y = \frac{1}{2}x - 10$.

What is the value of $a - b$?

A) 5

B) 7

C) 8

D) 10

4

$$y = mx - \frac{2}{5}$$
$$2x + 3y = 4$$

In the system of equations, a is a constant. If the system has no solution, what is the value of m?

A) $-\frac{2}{3}$

B) $-\frac{3}{2}$

C) $\frac{2}{3}$

D) $\frac{3}{2}$

CONTINUE

5

If $f(x)=(x-1)^2-(x-1)-1$, which of the following expressions is equal to $f(1-x)$?

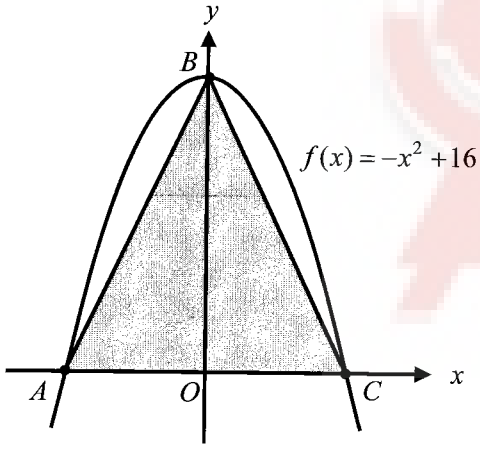
A) $f(1-x)=(x+1)^2-(x+1)-1$

B) $f(1-x)=(1-x)^2-(1-x)-1$

C) $f(1-x)=x^2-x-1$

D) $f(1-x)=x^2+x-1$

6



The graph of a function $f(x)$ is shown in the xy-plane above. What is the area of triangle ABC?

A) 16

B) 32

C) 64

D) 128

7

If $\frac{a-2b}{b}=\frac{2}{3}$, which of the following is equal to $\frac{a}{b}$?

A) $\frac{2}{3}$

B) $\frac{4}{3}$

C) $\frac{5}{3}$

D) $\frac{8}{3}$

8

$$y=m\sqrt{x}$$
$$y=mx-k$$

In the system of equations, m and k are constants. If $(4,16)$ is a solution to the system of equations above, what is the value of k?

A) 4

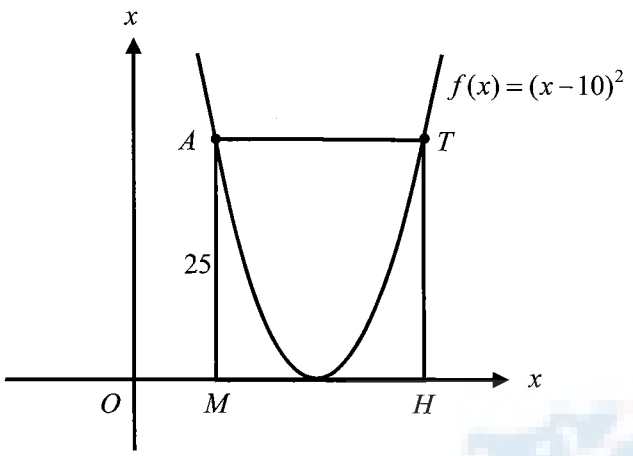
B) 8

C) 12

D) 16

CONTINUE

9



The graphs of f and rectangle $MATH$ are shown in the xy-plane above. If $MA = 25$, what is the length of $\overline{AT}$?

A) 5

B) 10

C) 15

D) 20

10

Which of the following equations has no solution?

A) $10x - 5x = 3$

B) $7x = 9x - 2x + 10$

C) $10x - 6 = 8x + 2x - 6$

D) $10x - 6 = 5x + 4x - 1$

11

$$f(x) = k(x+4)(x-10)$$

In the quadratic function f above, k is a constant. The graph of the function in the xy-plane is a parabola with vertex (a,b). If $b = -7$, which of the following is equal to k?

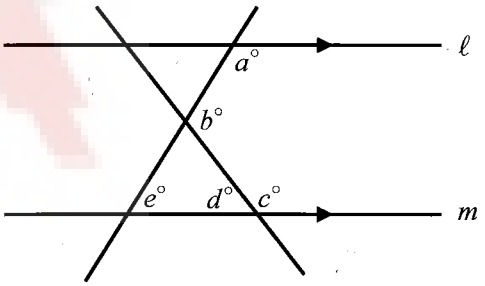
A) $\frac{1}{49}$

B) $\frac{1}{7}$

C) 7

D) 49

12



Note: Figure not drawn to scale.

In the figure above, if line ℓ and m are parallel, which of the following must be true?

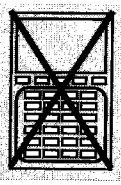
A) $a + b + c = 180$

B) $d + e = b$

C) $b + e = c$

D) $a + b = 180$

CONTINUE



13

$$\frac{5x^2+kx+1}{x-1}=ax+1+\frac{2}{x-1}$$

The equation above is true for all values of x except 1, where k and a are constants. What is the value of k?

A) -4

B) -2

C) 2

D) 4

14

What are the solutions to $4(x-2)^2-1=5$?

A) $x=2\pm\frac{\sqrt{6}}{4}$

B) $x=2\pm\frac{\sqrt{6}}{2}$

C) $x=\sqrt{2}\pm\frac{\sqrt{6}}{2}$

D) $x=2\pm\sqrt{6}$

15

Grade	For	Against	Total
Junior	60		
Senior			
Total	130		300

A supervisor surveyed students in his school to see if they were for or against building a fast-food restaurant in the school. The incomplete table above shows the results of his survey. If 40% of juniors are against it, how many seniors are in the school?

A) 100

B) 120

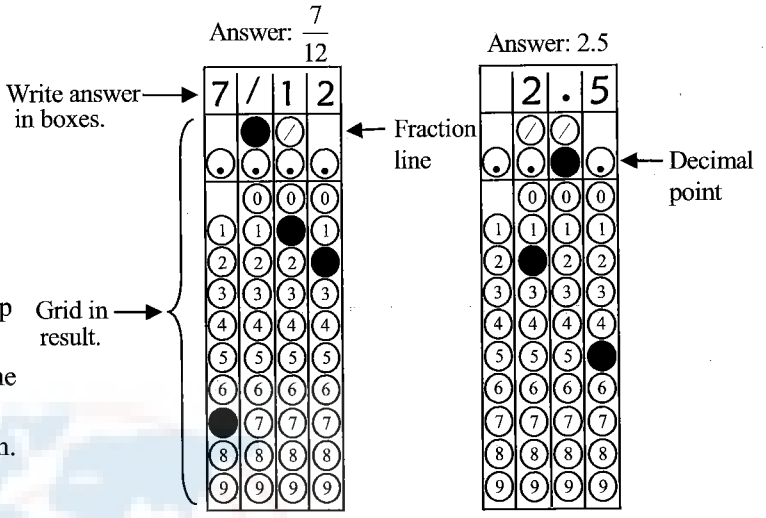
C) 170

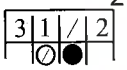
D) 200

CONTINUE

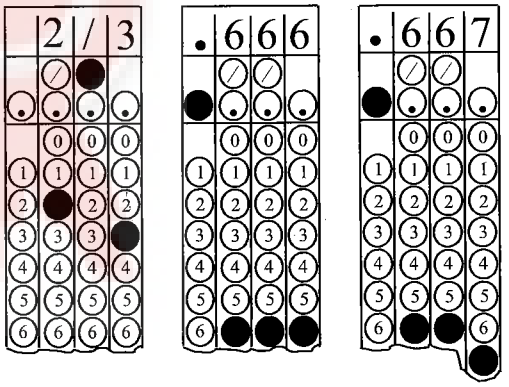
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

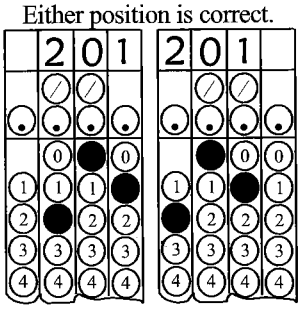


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:

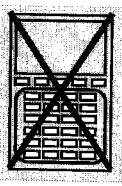


Answer: 201
Either position is correct.

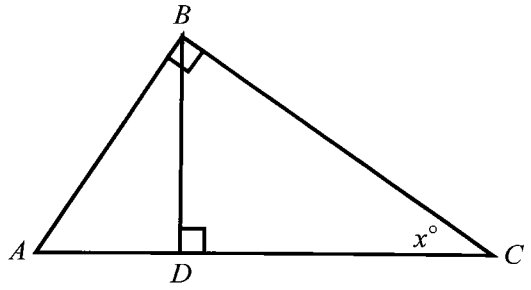


Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE



16



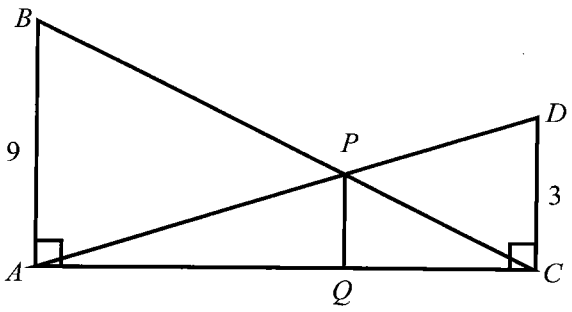
In the triangle above, the value of $\cos x^\circ$ is 0.8. If the length of $\overline{AC}$ is 20, what is the length of $\overline{BD}$?

17

$$2x^3 - 10x^2 + 5x - 25 = 0$$

For what real value of x is the equation above true?

18



Note: Figure not drawn to scale.

In the figure above, $AB = 9$, $CD = 3$, and $AC = 12$. What is the length of $\overline{PQ}$?

CONTINUE

Question 19 and 20 refer to the following information.

A T-Mobile telephone company offers domestic texting plans as follows.

Plan A	Plan B
\$0.25 per domestic text with no plan	Any 200 domestic texts for \$10 per month with an aditional cost of \$0.15 per text over 200.

19

For what number of texts do the two plans cost the same per month?

20

If Angela uses 400 texts per month, how much money, in dollars, will she save per month by using the less expensive plan? (Disregard the \$ sign when gridding your answer.)

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

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3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
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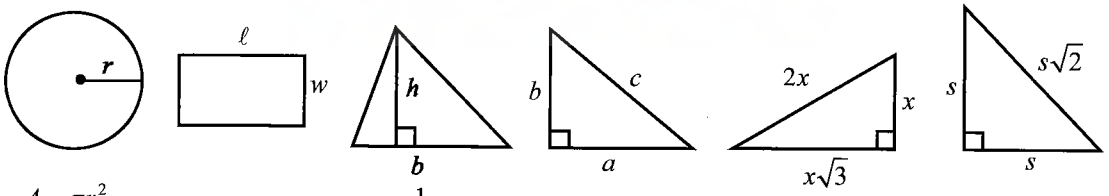
REFERENCE



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

At a local video store, Angel rented two movies and three games for a total of $20. The next day, she rented three movies and 2 games for a total of $15. How much money, in dollars, is needed to rent a combination of one movie and one game?

A) 7

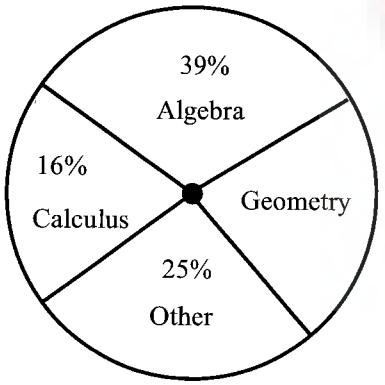
B) 10

C) 12

D) 16

2

CLASSES STUDENTS ARE TAKING



The circle graph above shows the percent of which 200 students are taking each subject. How many more students are taking Algebra than Geometry?

A) 30

B) 34

C) 36

D) 38

3

x	-1	0	1	2
$f(x)$	a	5	k	b

The table above shows some values of a linear function f. If $b-a=9$, what is the value of k?

A) 7

B) 8

C) 9

D) 12

4

Gender	For	Against	Total
Boys	35		
Girls		23	55
Total			100

Ted surveyed a random sample of 100 students in his high school to see if they were for or against purchasing an additional grand piano for the school music concert. The incomplete table above shows the results of his survey. Based on this information, about how many of the 800 students in the school would be expected to be against the purchasing the piano?

A) 200

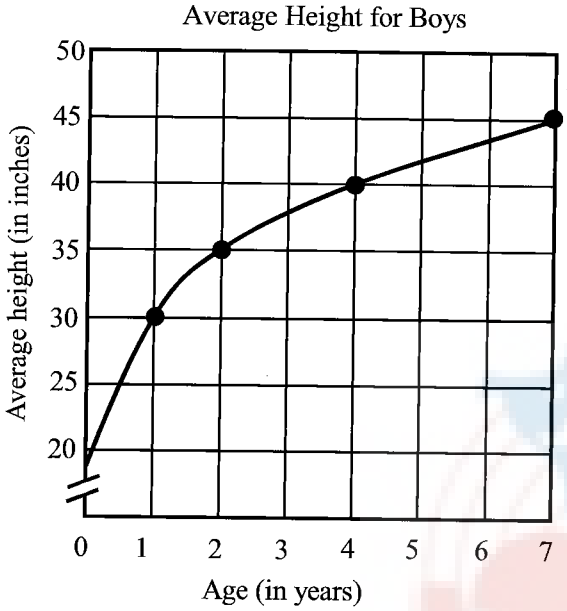
B) 264

C) 320

D) 350

CONTINUE

Questions 5 and 6 refer to the following information.



The graph above shows the average height for boys ages 0 to 7 in a certain state of the last year.

5

What is the annual average growth, in inches, between ages 2 and 7?

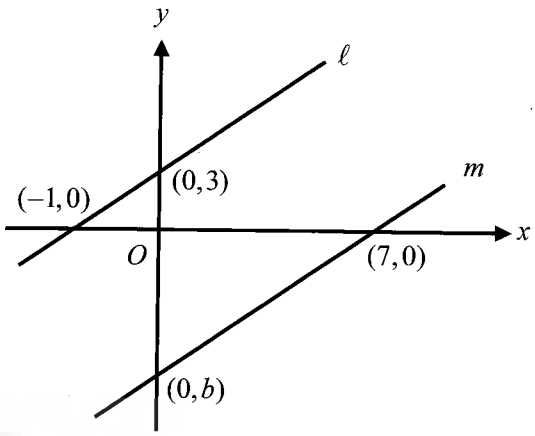
A) 2
B) 5
C) 10
D) 12

6

By what percent does the average height increase from age 1 to age 7?

A) 60
B) 50
C) 40
D) 30

7



Note: Figure not drawn to scale.

In the xy-plane above, line ℓ is parallel to line m. What is the value of b?

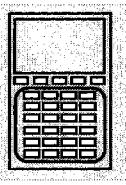
A) $-\frac{7}{3}$
B) -14
C) -21
D) -28

8

$$x^2 - 8x + y^2 = 0$$

The equation of a circle in the xy-plane is shown above. What is the area of the circle?

A) 2π
B) 4π
C) 8π
D) 16π



9

If $f(x-5)=3x-10$ for all values of x, what is the value of $f(-2)$?

A) -16

B) -10

C) -5

D) -1

10

Lee's family starts a trip with a supply of 20 pounds of coffee. When they arrive at their destination, 8 days later, they have found only 4 pounds left. They consume coffee at a constant rate per day. If T is amount of coffee remaining as a function of days d, which of the following represents the function $T(d)$?

A) $T(d)=8d$

B) $T(d)=2d+20$

C) $T(d)=20-8d$

D) $T(d)=20-2d$

11

$$8x+y=300$$

The elevator in a trade center is moving down from a height of 300 feet. The equation above can be used to model the height of the elevator, y, above the lobby, where x is the time in seconds. If the ordered pair (x,y) satisfies the equation, what does $(37.5, 0)$ mean?

A) The elevator stops at a height of 37.5 feet.

B) The elevator is moving down at a constant speed of 37.5 feet per second.

C) The elevator moves 37.5 feet from the lobby.

D) The elevator takes 37.5 seconds to move down to the lobby.

12

Thompson invested \$10,000 in stocks for two years. During the first year he suffered a 30 percent loss, but during the second year the remaining investment showed a 30 percent gain. Over the two-year period, how did Thompson's investment change?

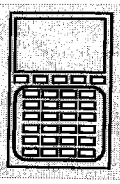
A) His investment did not change.

B) His investment increased by 10 percent.

C) His investment decreased by 10 percent.

D) His investment decreased by 9 percent.

CONTINUE



13

The graph of $ax + by = 5$ in the xy-plane contains points from each of Quadrants I, II, and III, but no points from Quadrant IV. Which of the following must be true?

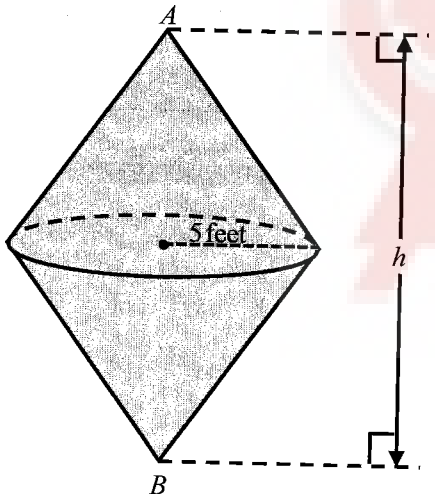
A) $a > 0$ and $b > 0$

B) $a > 0$ and $b < 0$

C) $a < 0$ and $b > 0$

D) $a < 0$ and $b < 0$

14



A water tank is built from two right circular cones with a radius 5 feet. If the volume of the tank is 200π cubic feet, what is the length h, in feet, from the bottom to the top of the tank?

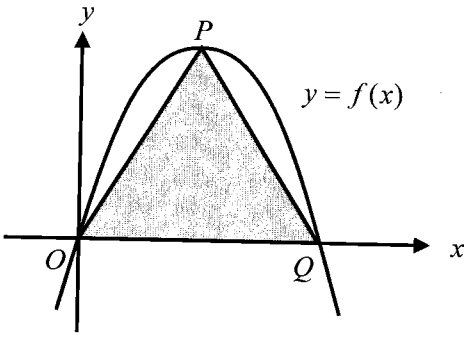
A) 6

B) 12

C) 18

D) 24

15



Note: Figure not drawn to scale.

The function f, defined by $f(x) = -x^2 + 6x$ is graphed in the xy-plane above. An isosceles triangle OPQ with $OP = PQ$ is built on the x-axis. What is the area of the triangle?

A) 13.5

B) 27

C) 40.5

D) 54

16

Cathy can do a job in 8 hours while Danny can do the same job in 6 hours. If Cathy and Danny work together for three hours, what fraction of the job is left to be finished?

A) $\frac{1}{12}$

B) $\frac{1}{8}$

C) $\frac{1}{6}$

D) $\frac{1}{4}$

CONTINUE

17

In a plane, the distance between points X and Y is 10, the distance between points X and P is 3, and the distance between points Y and Q is 4. Which of the following CANNOT be the length of $\overline{PQ}$?

A) 2

B) 3

C) 15

D) 17

18

The town library is planning to order student desks for the next school year. The costs to purchase student desks are as follows.

Two desks for \$50, four desks for \$80, six desks for \$110, eight desks for \$140, and so on.

If the town library wants to purchase 200 student desks, what would be the total cost in dollars?

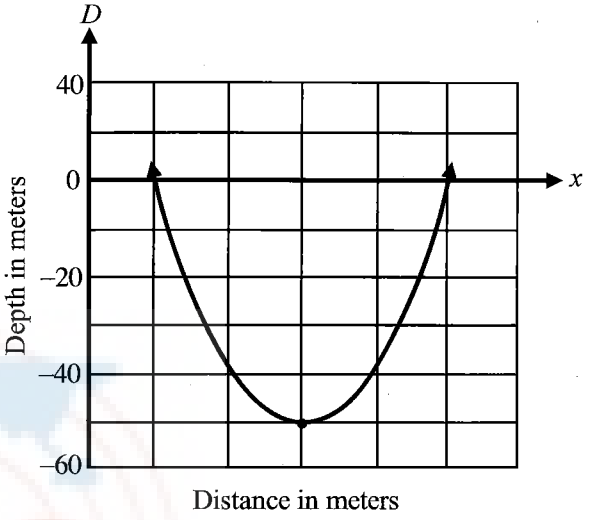
A) 5000

B) 3020

C) 2860

D) 2500

Questions 19 and 20 refer to the following information.



The cross-section view of a river in Los Angeles is modeled by the graph above. The equation represented by the graph is defined by $D(x) = k(x-10)(x-50)$, where k is a constant.

19

Based on the graph above, how wide is the river in meters?

A) 20

B) 25

C) 40

D) 60

20

Based on the equation above, what is the value of k ?

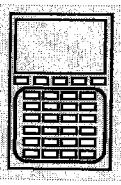
A) 8

B) 4

C) $\frac{1}{4}$

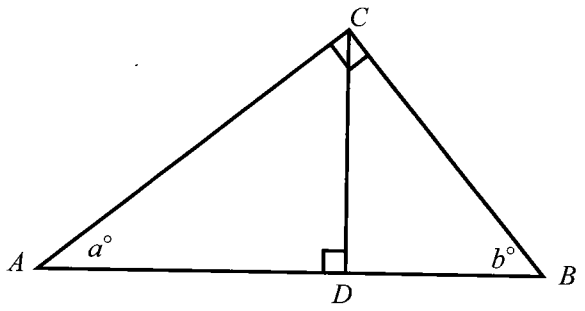
D) $\frac{1}{8}$

CONTINUE



4

21



In the right triangle ABC above, the length of $\overline{BC}$ is 20. If the value of $\sin(a^\circ)$ is 0.35, what is the length of $\overline{BD}$?

A) 5

B) 7

C) 8

D) 10

22

Which of the following polynomials has a factor of $x-1$?

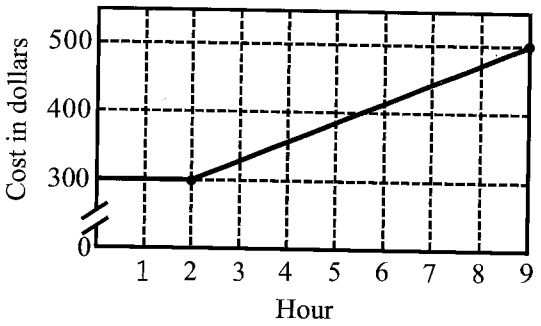
A) $p(x)=x^3+x^2-2x+1$

B) $q(x)=2x^3-x^2+x-1$

C) $r(x)=3x^3-x-2$

D) $s(x)=-3x^3+3x+1$

23



A decorating consultant charges consultation costs based on the graph above. If the consultant works for x hours $(x>2)$, for the consultation, which of the following represents the total cost?

A) $C(x)=300$

B) $C(x)=300+100x$

C) $C(x)=300+\frac{200}{7}x$

D) $C(x)=300+\frac{200}{7}(x-2)$

24

$$|x|=k$$

If the equation above has a real solution set, which of the following must be true?

I. $k\geq 0$
II. $k<0$
III. $x>0$

A) I only

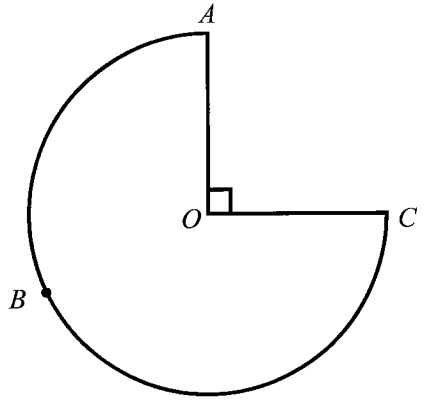
B) II only

C) I and II only

D) II and III only

CONTINUE

25



In the sector above, segment AO is a radius. If the length of arc $\overset{\frown}{ABC}$ is 12, what is the area of the sector?

A) 48π

B) 16π

C) $\frac{64}{\pi}$

D) $\frac{48}{\pi}$

26

$$(k-1)x+3k=ax+24$$

If the equation above is true for all real values of x, where k and a are constants, what is the value of a?

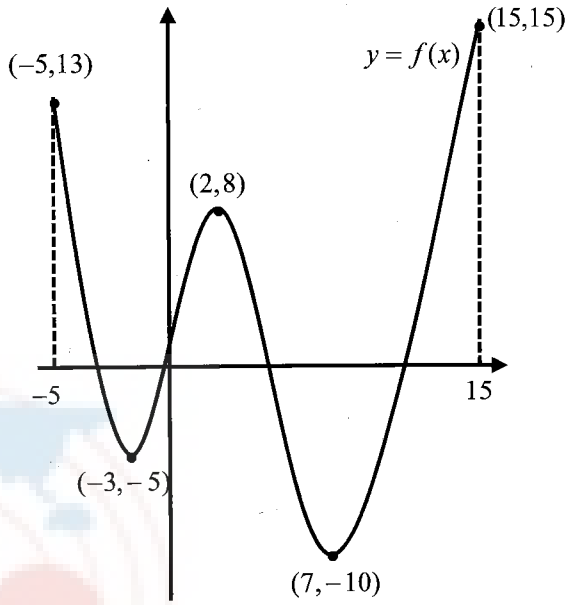
A) 1

B) 5

C) 7

D) 8

27



$y=f(x)$

$y=k$

The function f is graphed in the xy-plane above. If the system of equations above has exactly three real solutions for $-5 \le x \le 15$, which of the following could be the value of k?

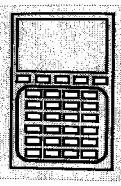
A) 10

B) 5

C) −5

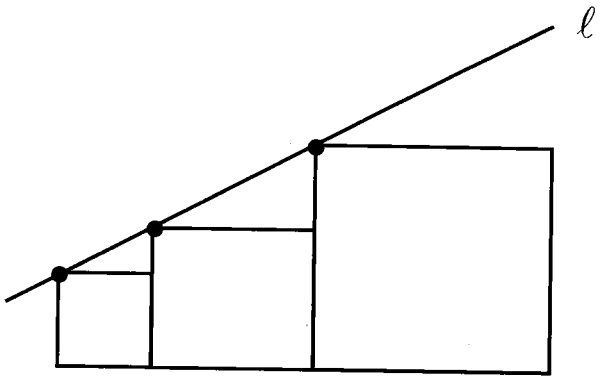
D) −8

CONTINUE



4

28



The figure above shows three squares with areas of 16, 64, and k respectively. If line ℓ passes through the vertex of each square, what is the value of k?

A) 81

B) 144

C) 196

D) 256

29

If the average of a and $2b$ is 26, the average of b and $2c$ is 41, and the average of c and $2a$ is 23, what is the average of a, b, and c?

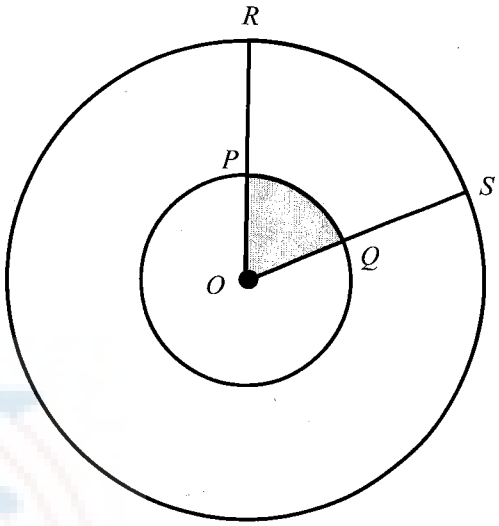
A) 12

B) 16

C) 20

D) 24

30



In the figure above, two circles have a common center O, and two rays from the center intercept the circles at points P, Q, R, and S. The measure of angle POQ is $\frac{2\pi}{5}$ and the area of the shaded region of sector OPQ is 20π. If $OP:PR = 2:3$, what is the length of minor arc $\overset{\frown}{RS}$?

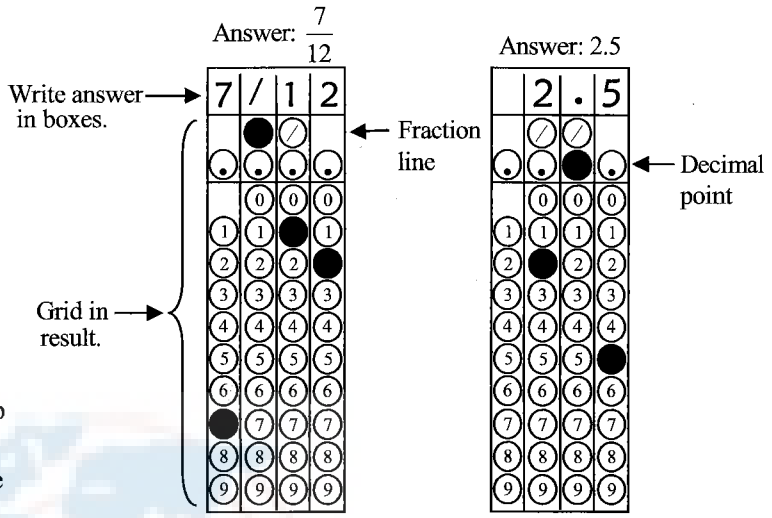
A) 5π

B) 10π

C) 15π

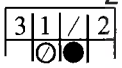
D) 20π

CONTINUE

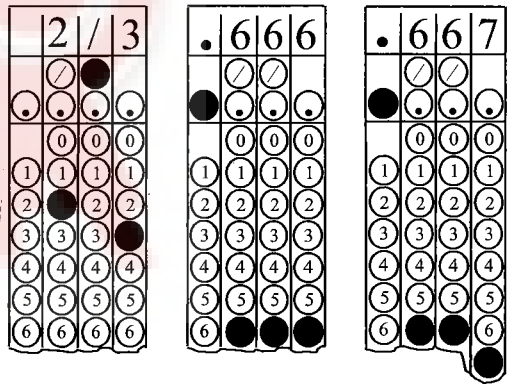


DIRECTIONS

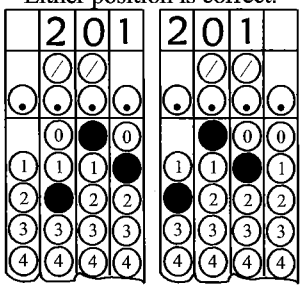
For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31

$$g(x) = 2f(x) - 1$$

In the equation above, if $g(1) = 3$, what is the value of $f(1)$?

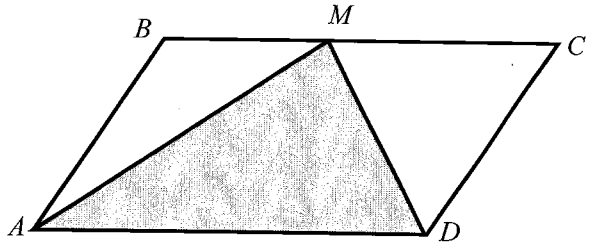
32

For all values of a and b, let $a \nabla b$ be defined by $a \nabla b = ab - a + 1$. If $k \nabla (k-2) = 2 \nabla 3$, what is the positive value of k?

33

If $4m + 5n$ is equal to 250 percent of $4n$, what is the value of $\dfrac{m+n}{m-n}$?

34



In the parallelogram above, $BM : MC = 2 : 3$. If the area of triangle ABM is 20, what is the area of the shaded region?

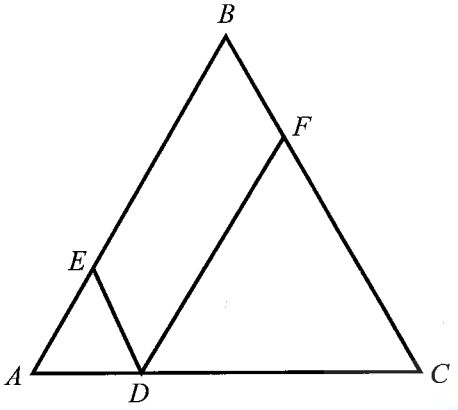
35

$$P(x) = 23{,}500 - 250x$$

The population of a certain town has been declining since the year 2,000. Scientists chose a linear decay model for the decline and arrived at the function above, where x is the number of years since 2,000. In how many years, will the population be decreased by 2,000?

CONTINUE

36



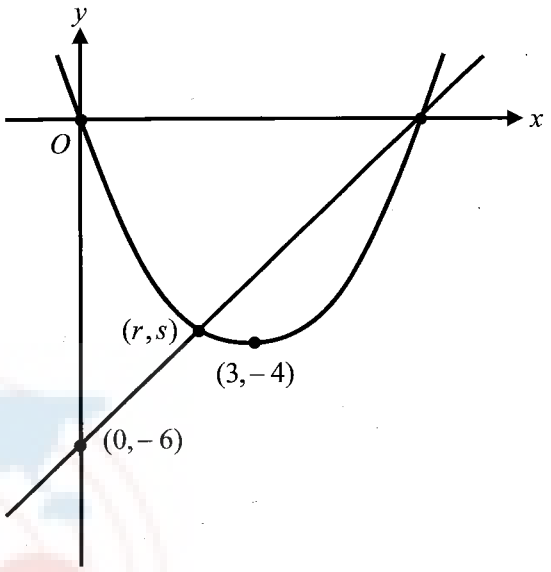
The length of a side of equilateral triangle ABC above is 10. In the figure, $\overline{ED} \parallel \overline{BC}$ and $\overline{DF} \parallel \overline{AB}$. If the ratio of DE to DF is 1:3, what is the perimeter of triangle CDF?

37

$$3x^2 - 8x + 4 = 0$$

If a and b are two solutions of the equation above, what is the value of $\frac{1}{a} + \frac{1}{b}$?

38



The xy-plane above shows two points of intersection of the graphs of a linear function and a quadratic function. The vertex of the graph of the quadratic function is at $(3, -4)$ and (r, s) is one of points of intersection of the graphs. What is the value of r?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 4 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
B	A	D	A	D	C	D	D	B	B
11	12	13	14	15	16	17	18	19	20
B	B	A	B	D	9.6	5	2.25	160	30

SECTION 4

1	2	3	4	5	6	7	8	9	10
A	D	D	B	A	B	C	D	D	D
11	12	13	14	15	16	17	18	19	20
D	D	C	D	B	B	A	B	C	D
21	22	23	24	25	26	27	28	29	30
B	C	D	A	D	C	C	D	C	B
31	32	33	34	35	36	37	38		
2	4	9/4	50	8	22.5	2	9/4		

SAT

Test #5

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

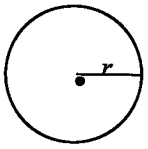
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

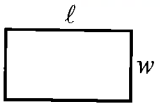
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENC

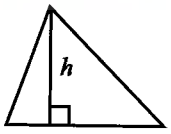


$A = \pi r^2$

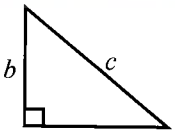
$C = 2\pi r$



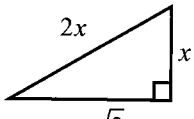
$A = \ell w$

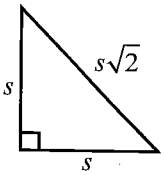


$A = \frac{1}{2}bh$

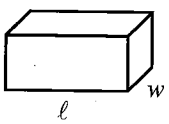


$c^2 = a^2 + b^2$

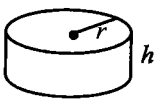




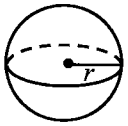
Special Right Triangles



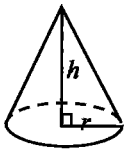
$V = \ell wh$



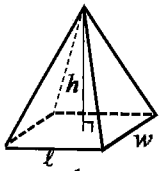
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

If $4r - 35 = 4s + 13$, what is the value of $r - s$?

A) 9

B) 10

C) 12

D) 16

2

$$x^2 - y^2 = 35$$
$$x + y = 5$$

In the system of equations above, which of the following is the value of x?

A) 5

B) 6

C) 7

D) 8

3

$$\left(x - \frac{1}{x}\right)^2 + 4$$

Which of the following is equivalent to the expression shown above?

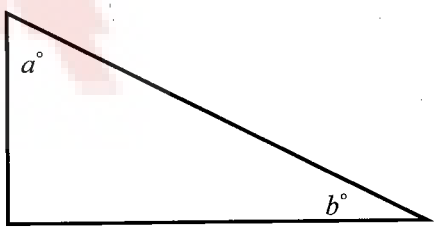
A) $x^2 - \frac{1}{x^2} + 4$

B) $x^2 + \frac{1}{x^2} + 4$

C) $\left(x + \frac{1}{x}\right)^2$

D) $\left(x + \frac{1}{x}\right)^2 - 4$

4



Note: Figure not drawn to scale.

In the triangle above, $a = 3x + 20$ and $b = x - 10$. If $\cos a^\circ = \sin b^\circ$, what is the value of x?

A) 20

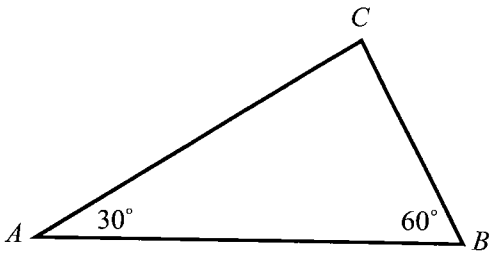
B) 25

C) 28

D) 30

CONTINUE

5



In the triangle above, the length of $\overline{AB}$ is 20. What is the area of triangle ABC?

A) $50\sqrt{3}$

B) $25\sqrt{3}$

C) $\frac{25\sqrt{3}}{2}$

D) $\frac{25\sqrt{3}}{2}$

6

$$\sqrt{-6}\cdot\sqrt{-24}$$

If $i=\sqrt{-1}$, which of the following is equivalent to the expression shown above?

A) 12

B) -12

C) $12i$

D) $-12i$

Questions 7 and 8 refer to the following information.

$$P(t)=b+at$$

Jessie purchased a micro oven for \$750. After 10 years, the value of the oven will be \$0. The value P of the oven during year t is modeled by the equation above, where a and b are constants.

7

Based on the information above, what is the value of a?

A) 75

B) 50

C) -10

D) -75

8

In how many years will the value of the micro oven be decreased by \$180?

A) 2.4

B) 4

C) 4.5

D) 5

9

$$P = \frac{A - d}{B + d}$$

A tire repair center uses the formula above to calculate the pressure of tire, where d is the diameter of the tire. Which of the following expresses d in terms of the other variables?

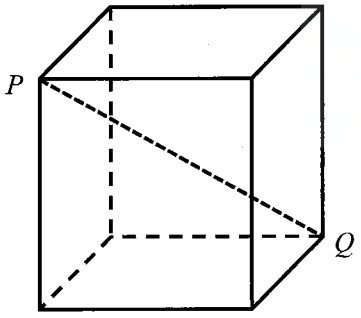
A) $d = \frac{P - PB}{A - 1}$

B) $d = \frac{A - P}{B - 1}$

C) $d = \frac{A - PB}{P + 1}$

D) $d = \frac{A - 1}{P - B}$

10



In the cube above, the length of diagonal $\overline{PQ}$ is 12. What is the surface area of the cube?

A) 27

B) 64

C) 150

D) 288

11

On a car trip Adam drove 50 miles more than half the number of miles Benjamin drove. If together they drove 500 miles, how many miles did Adam drive?

A) 200

B) 250

C) 300

D) 350

12

Plan	Monthly Fee	Cost/Minute
A	\$25	\$0.20
B	\$40	\$0.08

A cellular phone company offers two different phone plans shown in the table above. What is the number of minutes when the total cost is the same for both plans?

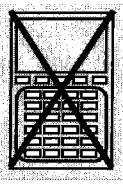
A) 80

B) 95

C) 100

D) 125

CONTINUE



13

$$\frac{10x+5}{x-1}$$

Which of the following is equivalent to the expression above?

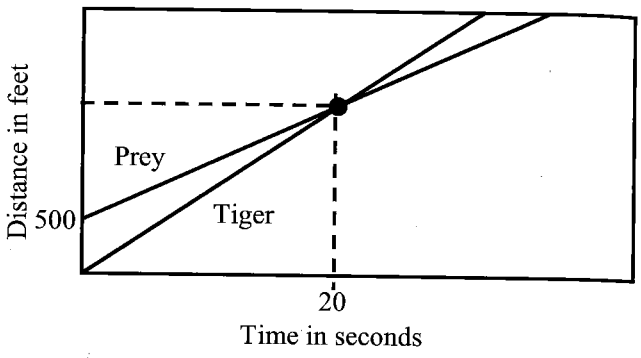
A) -15

B) $\frac{5}{x-1}-10$

C) $\frac{5}{x-1}+10$

D) $\frac{15}{x-1}+10$

14



A tiger is 500 feet from its prey. It starts to sprint toward its prey at 88 feet per second. At the same time, the prey starts to sprint in the same direction at p feet per second. The tiger catches its prey in 20 seconds. The graphs shown above represent this relationship. Based on the graphs, what is the value of p?

A) 50

B) 63

C) 70

D) 72

15

$$P(x)=(x-2)Q(x)+R$$

The equation above shows when $P(x)$ is divided by $(x-2)$, the remainder is R, where $Q(x)$ is the quotient. If $P(x)=5x^2-3x+4$, what is the value of R?

A) 4

B) 6

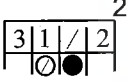
C) 12

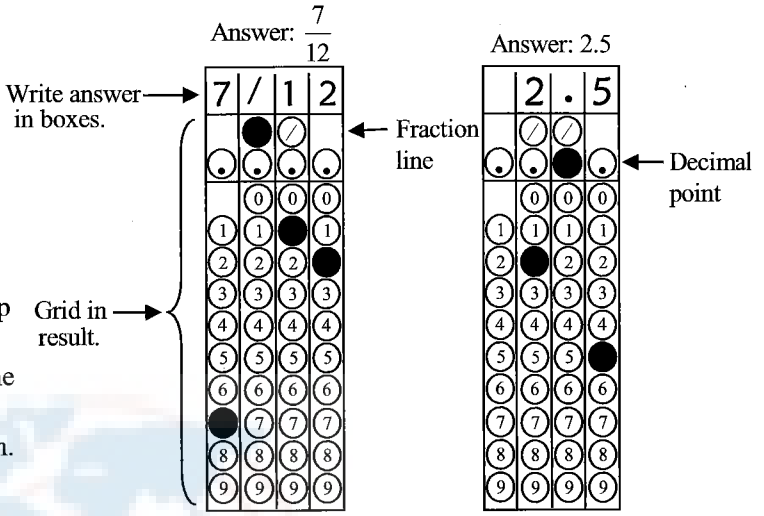
D) 18

CONTINUE

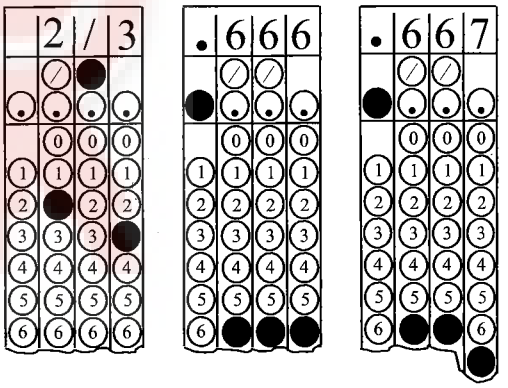
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

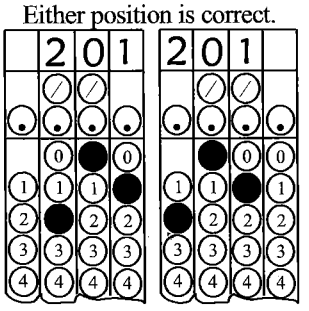
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16

$$R^2 - S^2 = 19$$

In the equation above, if R and S are positive integers, what is the value of R?

17

In reading group A with 90 students, there are 4 boys for every 5 girls. In the other reading group, B, there are 3 boys for every 2 girls. If these two groups are combined, the ratio of boys to girls will be 10:9. How many students are in the reading group B?

18

$$(a-1)x^2 + (b-2)x + c = 0$$

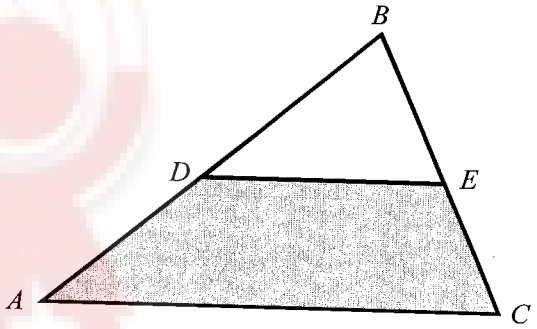
In the equation above, a, b, and c are constants. If the equation is true for all values of x, what is the value of $a+b+c$?

19

$$3x + py = 12$$
$$rx + 5y = 6$$

In the system of equations above, p and r are constants. If the system has infinitely many solutions, what is the value of $\frac{p}{r}$?

20



In the figure above, D and E are the midpoints of $\overline{AB}$ and $\overline{BC}$ respectively. If the area of the shaded region is 42, what is the area of triangle ABC?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

93/215

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

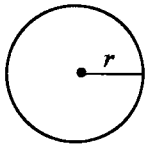
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

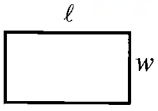
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

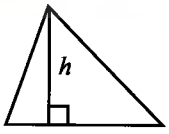


$A = \pi r^2$

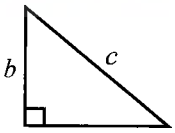
$C = 2\pi r$



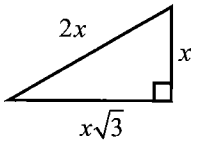
$A = \ell w$

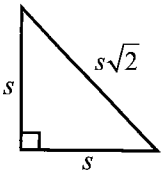


$A = \frac{1}{2}bh$

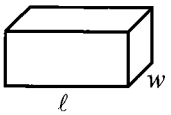


$c^2 = a^2 + b^2$

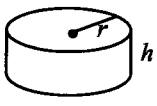




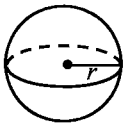
Special Right Triangles



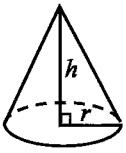
$V = \ell wh$



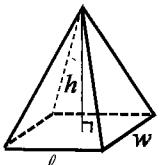
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

A local telephone company charges \$30 for the first 400 texts with additional texts over 400 costing \$0.08 per text. If Jessie uses n texts, $n > 400$, which of the following expressions represents her total cost in dollars?

A) $0.08n + 30$

B) $0.08n + 30(400)$

C) $0.08(n - 400) + 30$

D) $0.08(n - 400) + 30(400)$

2

Robert earns P dollars in 4 days. At this rate how many days will it take him to earn S dollars?

A) $4S$

B) $\frac{4P}{S}$

C) $\frac{S}{4P}$

D) $\frac{4S}{P}$

3

If $f(x-5) = 5x - 14$, which of the following is the value of $f(2)$?

A) -4

B) -3

C) 15

D) 21

4

Gender	Seniors	Juniors	Total
Boys	15		22
Girls		23	
Total	45		

A certain reading group consists of only senior and junior students. The incomplete table above shows the number of students. How many students are in the reading group?

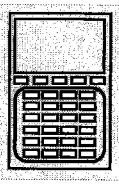
A) 68

B) 75

C) 79

D) 85

CONTINUE



4

Questions 5 and 6 refer to the following information.

The length of a spring varies directly as the amount of weight attached to it. When a weight of 10 grams is attached, the spring is stretched to 25 centimeters.

5

Which of the following is the equation that relates the weight W and the length L of the spring?

A) $L = 15W$

B) $L = 0.8W$

C) $L = 2.5W$

D) $L = 2.5W + 25$

6

What is the number of grams that stretches a spring 33 centimeters?

A) 12.8

B) 13.2

C) 15

D) 18

7

$$p(x) = 20x - k$$

The profit p, in dollars, from a car wash is given by the function above, where x is the number of cars washed and k is a constant. When 40 cars were washed today, the profit was \$500. If the owner wants to make a profit of at least \$650, how many more cars should be washed?

A) 7

B) 8

C) 23

D) 25

8

If $4^{a+b} = 8$ and $9^{a-b} = 81$, what is the value of $a^2 - b^2$?

A) 3

B) 8

C) 12

D) 15

CONTINUE

9

If $f(x-2)=3x-5$ for all values of x, which of the following is the expression for $f(x)$?

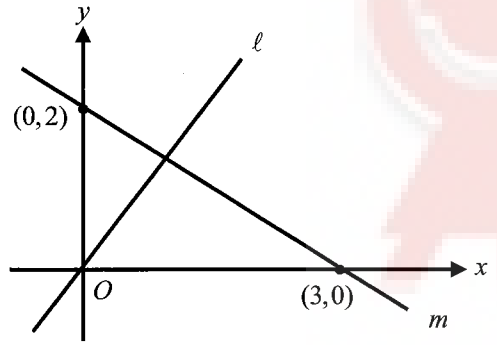
A) $f(x)=3x-1$

B) $f(x)=3x+1$

C) $f(x)=3x+2$

D) $f(x)=3x+3$

10



In the xy-plane above, line ℓ is perpendicular to line m. Which of the following points lies on line ℓ?

A) (1, 2)

B) (3, 4)

C) (5, 7)

D) (6, 9)

11

$$5a+b+4i=(a-2b)+ki$$

In the equation above, a, b, and k are constants. If $i=\sqrt{-1}$, what is the value of $\frac{a}{b}$?

A) $\frac{4}{3}$

B) $\frac{3}{4}$

C) $-\frac{3}{4}$

D) $-\frac{4}{3}$

12

$$v(t)=490-9.8t$$

A bullet is shot up into the air from ground level. The equation above shows the velocity, v, of the bullet, in meters per second, after t seconds. According to the model, what is the meaning of the 9.8 in the equation?

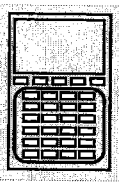
A) For every increase of 1 second, the velocity increases by 9.8 meters per second.

B) For every increase of 1 second, the velocity decreases by 9.8 meters per second.

C) For every decrease of 1 second, the velocity decreases by 9.8 meters per second.

D) For every decrease of 9.8 second, the velocity increases by 490 meters per second.

CONTINUE



4

13

$$ax + by = 5$$

In the equation above, a and b are non-zero constants. If $a + b = 0$, which of the following must be true about the graph in the xy-plane ?

A) The slope of the graph is negative.

B) The slope of the graph is positive.

C) The slope of the graph is zero.

D) The slope of the graph is undefined.

14

Claire first walked one third of the way from home to her friend's house for a birthday party. For the rest of the way to her friend's house, she ran 4 times as fast as she walked. If she took 14 minutes to walk one third of the way, how many minutes did it take her to get from home to her friend's house?

A) 21

B) 24

C) 28

D) 35

15

$$\frac{1}{8}x - \frac{1}{4}y = 1$$
$$\frac{1}{10}x + \frac{1}{5}y = 2$$

In the system of equations above, point (a, b) is the solution of the system. What is the value of $a + b$?

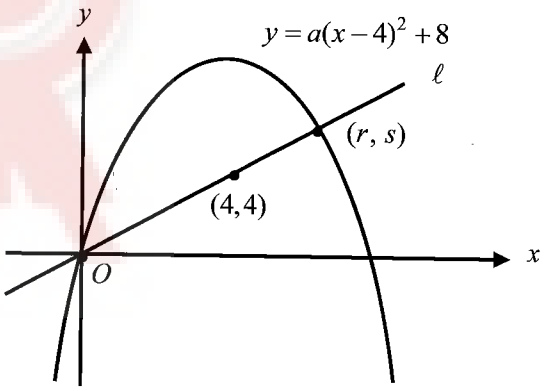
A) 10

B) 13

C) 17

D) 20

16



The xy-plane shows graphs of a linear function and a quadratic function, where a is a constant. If (r, s) is the point of intersection, what is the value of r ?

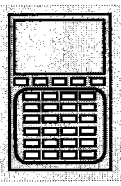
A) 6

B) 6.5

C) 7

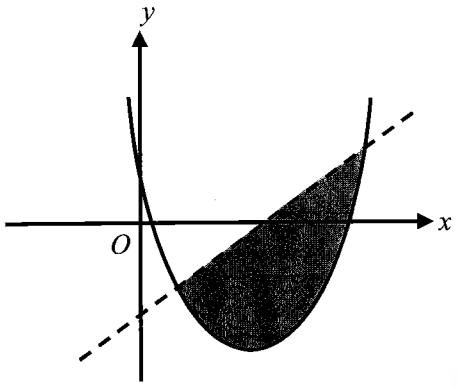
D) 7.5

CONTINUE



4

17



In the xy-plane above, the shaded region represents the solution set of a system of inequalities. Which of the following could be the system of inequalities?

A) $\begin{cases} 4x-5y-10 \geq 0 \\ y \geq x^2-6x+5 \end{cases}$

B) $\begin{cases} 4x-5y-10 > 0 \\ y \geq x^2+6x+5 \end{cases}$

C) $\begin{cases} 4x-5y-10 > 0 \\ y \geq x^2-6x+5 \end{cases}$

D) $\begin{cases} 4x+5y-10 > 0 \\ y \geq x^2-6x+5 \end{cases}$

18

$$\frac{x-1}{3} = kx+2$$

In the equation above, k is a constant. If the equation has no solution, what is the value of k?

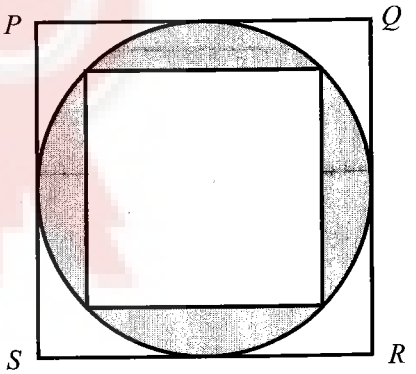
A) $\frac{1}{3}$

B) $\frac{1}{2}$

C) 2

D) 3

19



The figure above shows two squares and a circle. If the length of $\overline{PS}$ is a, what is the area of the shaded region?

A) $\frac{a^2(\pi-2)}{4}$

B) $\frac{a^2(\pi-4)}{4}$

C) $\frac{\pi a^2}{4}-4$

D) πa^2-8

CONTINUE

20

$$ax + by - 2 = 0$$

In the function above, a and b are constants. If the graph of the function has a negative slope and a negative y-intercept, which of the following is true?

A) $a = 0$

B) $a > 0$

C) $a < 0$

D) $a \geq 0$

21

$$R = \frac{f(b) - f(a)}{b - a}$$

The average rate of change, R, of function f between a and b is defined by the equation above.
If $f(2) = 5$ and $f(5) = -3$, what is the value of R?

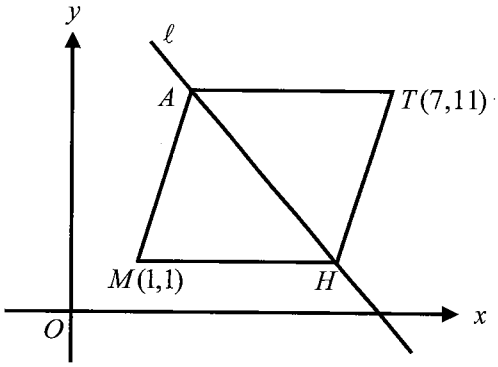
A) $-\frac{8}{3}$

B) $-\frac{3}{8}$

C) $\frac{3}{8}$

D) $\frac{8}{3}$

22



In the xy-plane above, $MATH$ is a rhombus and line ℓ passes through points A and H. Which of the following is the equation of line ℓ?

A) $y = -\frac{3}{5}x + 6$

B) $y = -\frac{5}{3}x + 6$

C) $y = -\frac{3}{5}x + \frac{36}{5}$

D) $y = -\frac{3}{5}x + \frac{42}{5}$

23

$$x^2 + y^2 - 2x - 2y = 7$$
$$y = k$$

In the system of equation above, k is a constant. For which of the following values of k does the system of equations have exactly two real solutions?

A) $k = 6$

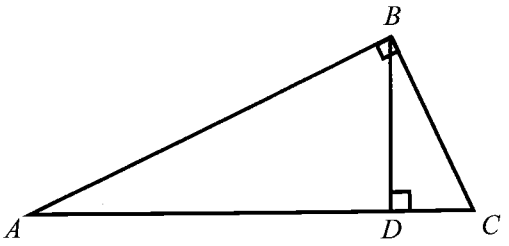
B) $k = 5$

C) $k = 4$

D) $k = 3$

CONTINUE

24



In the right triangle ABC above, $AC = 10$ and the value of $\sin A$ is 0.4. What is the length of $\overline{DC}$?

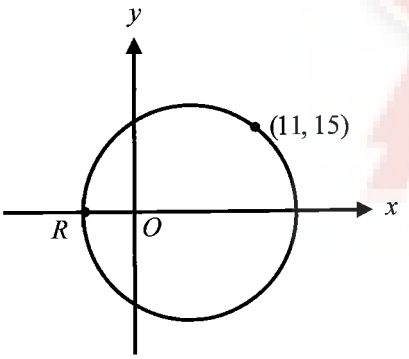
A) 1.6

B) 2.4

C) 2.5

D) 2.8

25



Note: Figure not drawn to scale.

The circle shown in the xy-plane above has a center at (3, 0). Which of the following are the coordinates of point R?

A) (−14, 0)

B) (−10, 0)

C) (−8, 0)

D) (−6, 0)

26

$$(a+b)x^2 + (a-2b)x + k = (k-1)x^2 + 5x + 3$$

In the equation above, a, b, and k are constants. If the equation is true for all real values of x, what is the value of a?

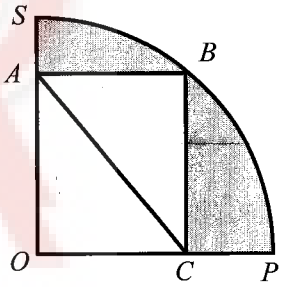
A) 2

B) 3

C) 5

D) 8

27



In the figure above, $\overline{OP}$ and $\overline{OS}$ of sector OSP are radii and the length of $\overline{AC}$ of rectangle $ABCO$ is 10. If the measure of angle ACO is 60°, which of the following is closest to the area of the shaded region?

A) 30

B) 32

C) 35

D) 40

CONTINUE

Questions 28 and 29 refer to the following information.

$$h = v_0 t - \frac{1}{2} g t^2 + 40$$

A rocket is launched from a height of 40 meters with an initial speed of 196 meters per second. The equation above describes the height h and the initial speed v_0 of the rocket, where t is the time elapsed since the rocket is launched and g is the acceleration due to gravity $(9.8\ m/s^2)$.

28

How long will it take for the rocket to reach its maximum height in seconds?

A) 15

B) 20

C) 25

D) 30

29

What is the maximum height, in meters, of the rocket from the ground?

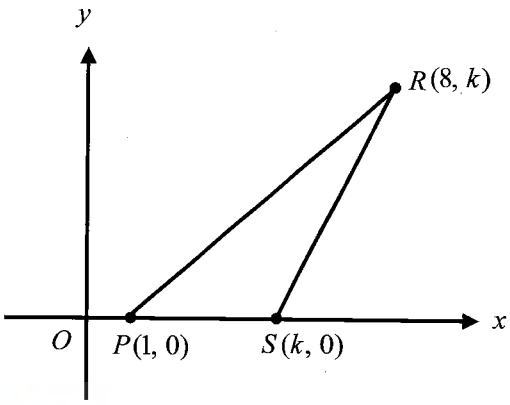
A) 1200

B) 1600

C) 2000

D) 2400

30



In the xy-plane above, the area of triangle PRS is 10. What is the value of k?

A) 4

B) 5

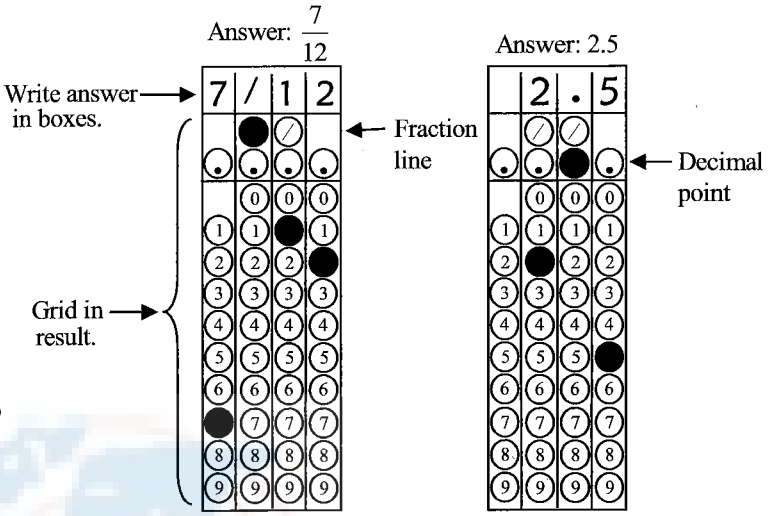
C) 6

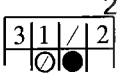
D) 7

CONTINUE

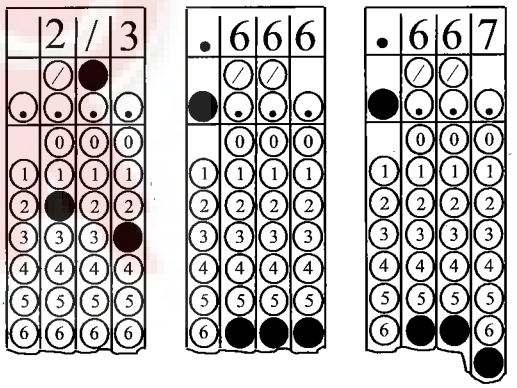
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

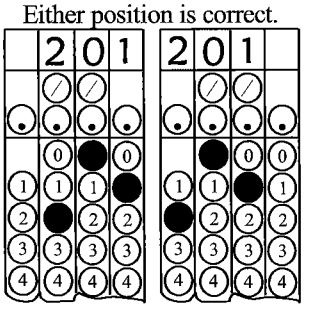


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



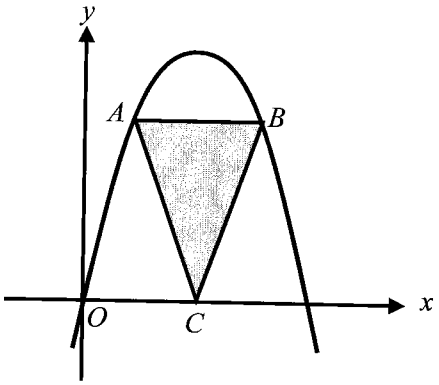
Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31



Note: Figure not drawn to scale.

The function $y = x(8 - x)$ is graphed in the xy-plane above. The length of $\overline{AB}$ of isosceles triangle ABC is 4 and $\overline{AB}$ is parallel to the x-axis. What is the area of the triangle?

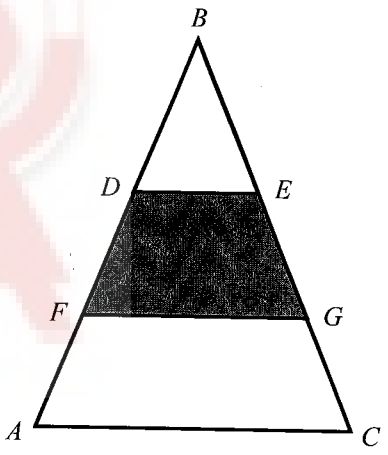
32

The magnitude of a complex number is the length of a vector from the origin to the terminal point. What is the magnitude of $3 - 4i$?

33

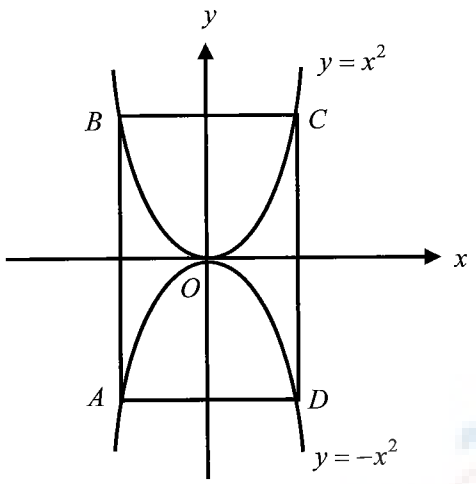
For how many ordered pairs of positive integers (x, y) is $4x + 5y < 15$?

34



In the figure above, $\overline{DE} \parallel \overline{FG} \parallel \overline{AC}$ and $AF = FD = DB$. If the area of $AFGC$ is 20, what is the area of the shaded region?

35



Note: Figure not drawn to scale.

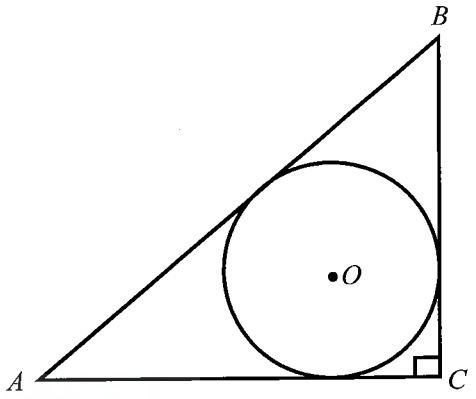
The xy-plane above shows the graphs of two quadratic functions and a rectangle. Points A, B, C, and D lie on the graphs of $y = x^2$ and $y = -x^2$ respectively. If the area of rectangle $ABCD$ is 108, what is the length of $\overline{BC}$?

36

$$5s - 2t - 1 = -a$$
$$-8s + bt - 2 = 2$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of a ?

37



In the figure above, circle O is tangent to the sides of triangle ABC. If $AB = 10$ and $BC = 6$, what is the circumference of the circle to the nearest tenth?

38

$$f(x) = 3x^3 - 8x^2 + 5x - k$$

In the polynomial function above, k is a constant. If $(x - 2)$ is a factor of $f(x)$, what is the value of k?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 5 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
C	B	C	A	A	B	D	A	C	D
11	12	13	14	15	16	17	18	19	20
A	D	D	B	D	10	100	3	20/3	56

SECTION 4

1	2	3	4	5	6	7	8	9	10
C	D	D	B	C	B	B	A	B	D
11	12	13	14	15	16	17	18	19	20
C	B	B	A	C	A	C	A	A	B
21	22	23	24	25	26	27	28	29	30
A	D	D	A	A	B	C	B	C	B
31	32	33	34	35	36	37	38		
24	5	3	12	6	7/2	12.6	2		

SAT

Test #6

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

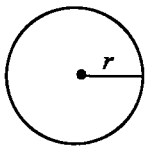
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

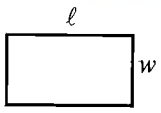
1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

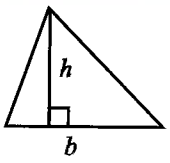


$A = \pi r^2$

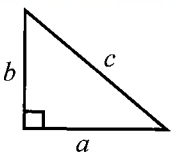
$C = 2\pi r$



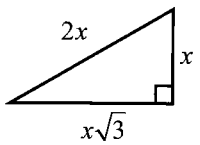
$A = \ell w$

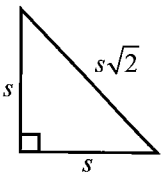


$A = \frac{1}{2}bh$

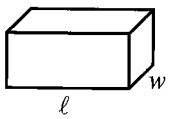


$c^2 = a^2 + b^2$



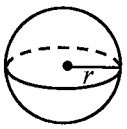


Special Right Triangles

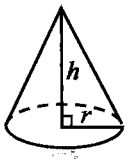


$V = \ell wh$

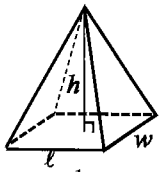
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



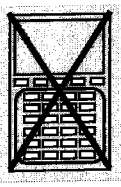
$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



3

1

If $10x - 5 = a$, what is the value of $2x - 1$?

A) $\frac{a}{5} - 1$

B) $\frac{a}{5}$

C) $\frac{a}{5} + 1$

D) $\frac{a}{5} + 5$

2

Claire is trying to get in shape for a town summer walking tour. She starts her exercise by walking on the treadmill for 20 minutes on the first day. She adds 5 minutes each day before the tour. At this rate how many minutes will she be walking on the treadmill on the 20th day?

A) 80

B) 100

C) 115

D) 120

3

$$|a - 1| < 3$$

In the absolute value inequality above, how many integers a satisfy the inequality?

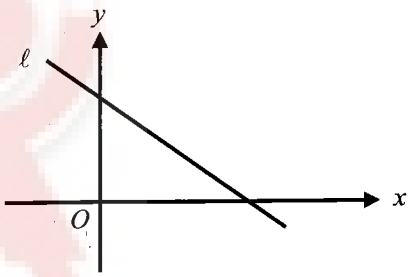
A) 2

B) 3

C) 4

D) 5

4



The graph of the line ℓ is shown in the xy-plane above. Which of the following could represent the graph of line ℓ?

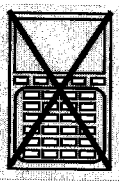
A) $x - y + 2 = 0$

B) $x + y - 2 = 0$

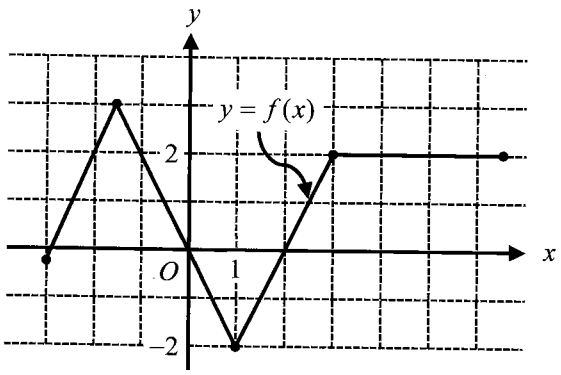
C) $x + y + 2 = 0$

D) $x - y - 2 = 0$

CONTINUE



5



The complete graph of the function f is shown above. Which of the following are equal to 2?

I. $f(-2)$
II. $|f(1)|$
III. $f(4.7)$

A) I only
B) I and III only
C) II and III only
D) I, II, and III

6

$$\left(\sqrt[3]{x^{15}}\right)\left(\sqrt[2]{x^{8}}\right)$$

If x is positive, which of the following is equivalent to the expression above?

A) $\sqrt[6]{x^{23}}$
B) $\sqrt[5]{x^{23}}$
C) x^{20}
D) x^{9}

Questions 7 and 8 refer to the following information.

	Juniors	Seniors	Total
Physics	80		180
Statistics		100	
Total			300

The partially completed table gives the enrollment for Physics and Statistics at Jade High School. Only juniors and seniors take these classes.

7

According to the table, what is the number of juniors who take Statistics?

A) 20
B) 40
C) 60
D) 80

8

What percent of juniors is taking Statistics?

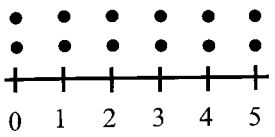
A) 6.7
B) 10
C) 20
D) 25

CONTINUE

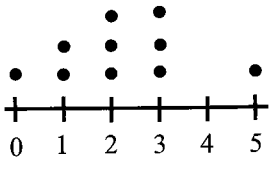
9

Which of the following data sets appears to have the smallest standard deviation?

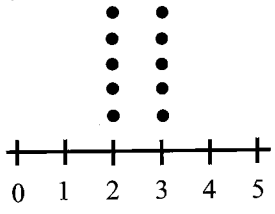
A)



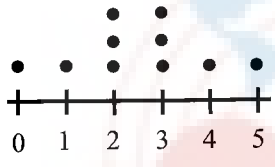
B)



C)



D)



10

$$\sqrt{x+10} = x-2$$

What is the solution set for the equation above?

A) $\{-1\}$

B) $\{6\}$

C) $\{-1, 6\}$

D) No solution

11

$$x^2 - 4x + 5 = (x-1)(x-2) + ax + b$$

In the equation above, a and b are constants. If the equation is true for all values of x, what are the values of a and b?

A) $a = -3, b = -1$

B) $a = 3, b = -1$

C) $a = -1, b = 3$

D) $a = 3, b = 1$

12

$$x^4 - \frac{1}{81}$$

Which of the following is equivalent to the expression above?

A) $\left(x^2 - \frac{1}{9}\right)^2$

B) $\left(x - \frac{1}{3}\right)^4$

C) $\left(x^2 + x + \frac{1}{9}\right)^2$

D) $\left(x^2 + \frac{1}{9}\right)\left(x + \frac{1}{3}\right)\left(x - \frac{1}{3}\right)$

CONTINUE

13

$$4(x^2 - 5x) = 16$$

What is the sum of the solutions of the equation above?

A) 5

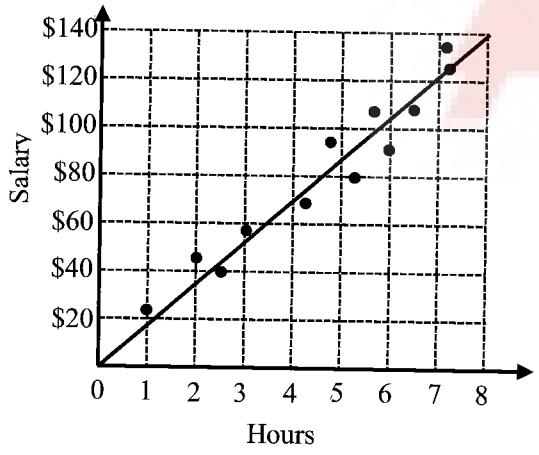
B) 10

C) $10 + \sqrt{41}$

D) $10 - \sqrt{41}$

Questions 14 and 15 refer to the following information.

STUDENTS' SALARIES



The scatterplot above shows the salary and hours worked by 12 students in the library after school, along with the line of best fit.

14

According to the line of best fit in the scatterplot, which of the following best approximates the average salary, in dollars per hour, of the 12 students?

A) 15

B) 16.2

C) 17.4

D) 20

15

Based on the information above, if a student works 20 hours, approximately how much will he be paid for the work?

A) 200

B) 300

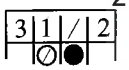
C) 350

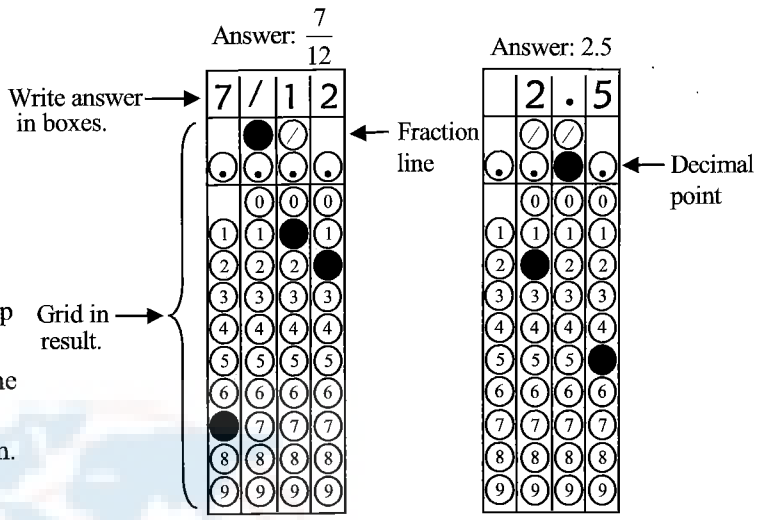
D) 500

CONTINUE

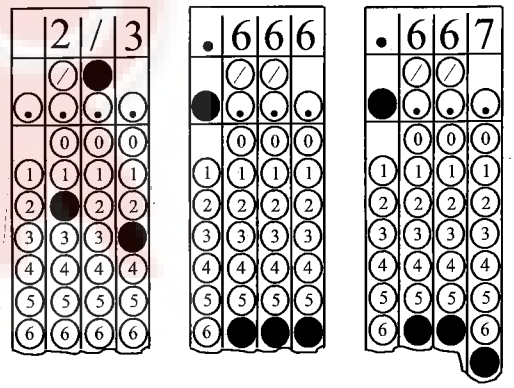
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

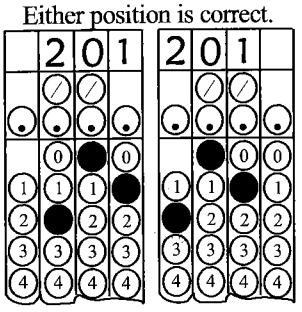
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:

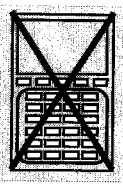


Answer: 201
Either position is correct.

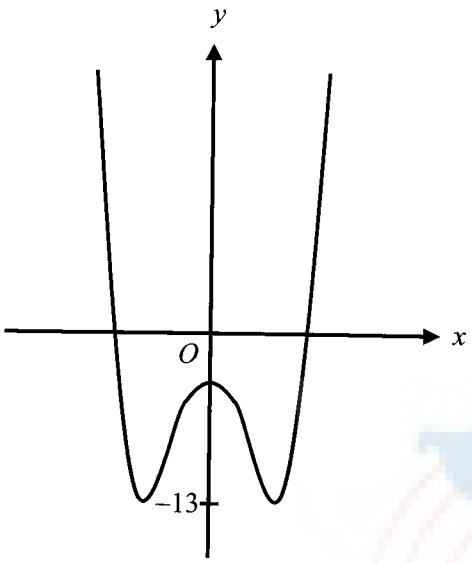


Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE



16



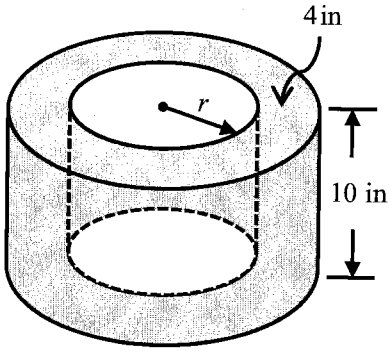
The function $f(x) = x^4 - 6x^2 - 4$ is graphed in the xy-plane as shown above. If the equation $y = -3$ is graphed in the plane, how many points of intersection with the function f are there?

17

$$f(x) = g(x) - k$$
$$g(x) = \sqrt{3x - 2}$$

In the system of equations above, k is a constant. If $f(2) = -3$, what is the value of k?

18



A water pipe is in the shape of a circular tube. The figure above shows the pipe with a portion cut out. The dimensions of the pipe above are height 10 inches with thickness 4 inches. If the volume of the figure above is 800π cubic inches, what is the radius r of the inner circle in inches?

CONTINUE

19

$$f(x) = g^2(x) - 7g(x) + 15$$

In the equation above, if $f(2) = 3$, what is one possible value of $g(2)$?

20

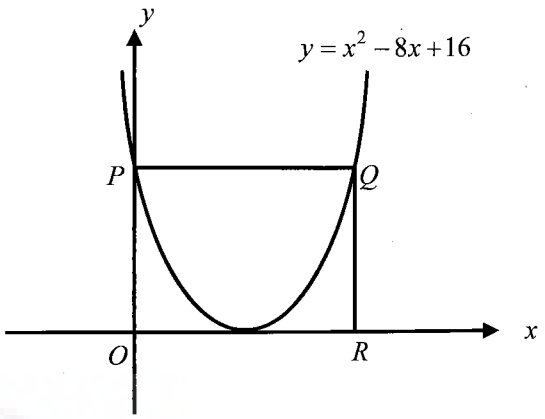


Figure not drawn to scale.

The graph of $y = x^2 - 8x + 16$ is shown in the xy-plane above. If point P is the y-intercept of the graph, what is the area of rectangle $OPQR$?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

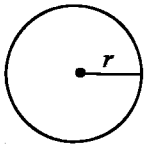
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

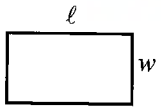
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

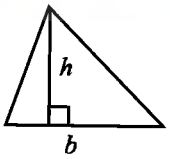


$A = \pi r^2$

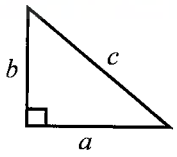
$C = 2\pi r$



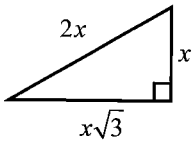
$A = \ell w$

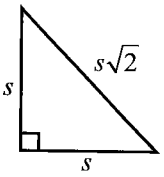


$A = \frac{1}{2}bh$

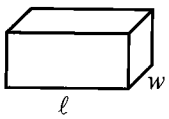


$c^2 = a^2 + b^2$

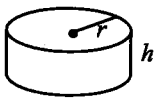




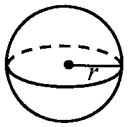
Special Right Triangles



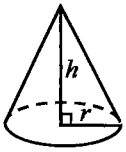
$V = \ell wh$



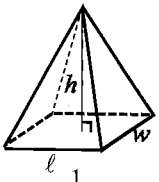
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



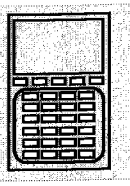
$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



1

If $(x+3)y = x^2 - x + 12$, what is the value of y when $x = 3$?

A) 3

B) 4

C) 6

D) 8

2

The total cost of 10 equally priced notebooks is k dollars. If the cost per book is reduced by \$1, how much will 2 of these notebooks cost at new rate?

A) $k - 1$

B) $2x - 2$

C) $\frac{k}{5} - 2$

D) $\frac{k}{10} - 2$

Questions 3 and 4 refer to the following information.

The cost C for maintenance on a heating system increases each year by 2.8%. If Mark paid \$250 this year for maintenance, the cost t years from now can be given by the function $C(t) = 250P^t$.

3

What is the value of P?

A) 0.28

B) 0.028

C) 1.028

D) 1.28

4

What is the approximate cost in 4 years?

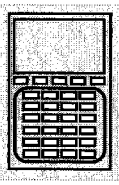
A) \$265

B) \$279

C) \$310

D) \$320

CONTINUE



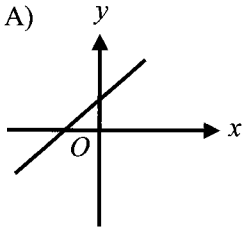
4

5

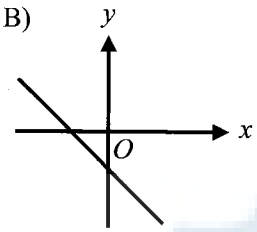
$$\frac{x}{4}-\frac{y}{4}=1$$

In the xy-plane, which of the following could be the graph of the function above?

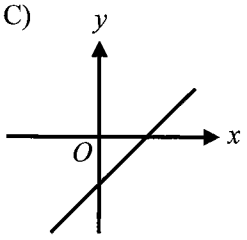
A)



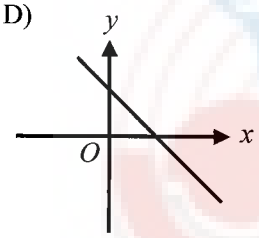
B)



C)



D)



6

$$ax+5=0.8x+b$$

In the equation above, a and b are constants. For which of the following values of a and b does the equation have no solution?

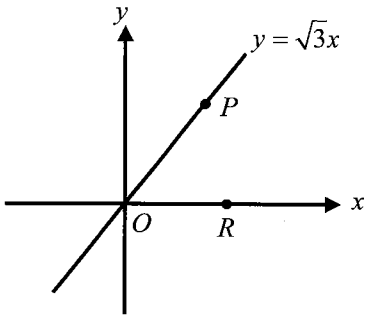
A) $a=10,\ b=5$

B) $a=5,\ b=0.8$

C) $a=0.8,\ b=5$

D) $a=0.8,\ b=0.8$

7



The graph of $y=\sqrt{3}x$ is shown in the xy-plane above. What is the measure, in radians, of angle POR?

A) $\frac{\pi}{6}$

B) $\frac{\pi}{4}$

C) $\frac{\pi}{3}$

D) $\frac{\pi}{2}$

8

If $i=\sqrt{-1}$, which of the following is equal to $\frac{1-i^2}{i}$?

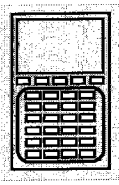
A) $-i$

B) $i+2$

C) $-2i$

D) $i+1$

CONTINUE



9

What is the remainder when $x^2 - 3x + 5$ is divided by $x - 1$?

A) 2

B) 3

C) 4

D) 5

10

$$\left(\sqrt[k]{16}\right)\left(\sqrt[k]{8}\right) = 2$$

In the equation above, what is the value of k?

A) 4

B) 5

C) 6

D) 7

11

$$ax - y = 1$$
$$x + 2y = 3$$

If the lines represented above are perpendicular, which of the following is the value of a?

A) 3

B) 2

C) –2

D) –3

12

Claire works one week and earns a dollars. If she had worked 5 more hours, she would have earned b dollars. If the hourly rate is constant, what is the hourly rate?

A) $\frac{b}{5}$ dollars

B) $\frac{a}{5}$ dollars

C) $\frac{a-b}{5}$ dollars

D) $\frac{b-a}{5}$ dollars

CONTINUE

Questions 13 and 14 refer to the following information.

		Holiday			
		Thanksgiving	Memorial Day	Labor Day	Total
Gender	Males	40		35	125
	Females	63			
	Total		140	109	352

A community group responded to a survey that asked which holiday is their favorite. The incomplete survey data are shown in the table above.

13

How many females responded to the survey that Memorial Day is their favorite holiday?

A) 50

B) 75

C) 90

D) 105

14

Which of the following categories accounts for approximately 21 percent of all the survey respondents?

A) Females choosing Memorial Day

B) Males choosing Labor Day

C) Females choosing Thanksgiving

D) Females choosing Labor Day

15

$$C = -1.5K + 300$$

The linear equation above shows the cost, C, of producing K toys. Based on the information, which of the following must be true?

I. There is a positive correlation between C and K.

II. When the company produces 20 toys, the cost is \$270.

III. As K increases by 10, C decreases by \$15.

A) II only

B) I and II only

C) I and III only

D) II and III only

16

If $x^2 + kx + k + 1 = (x + p)(x + 2)$ for all values of x and k and p are constants, what is the value of k?

A) 5

B) 4

C) 3

D) 2

17

$$f(x) = 2x^2 - 3$$

In the equation above, if $\frac{1}{3}f\left(\sqrt{k}\right) = 3$, what is the value of k?

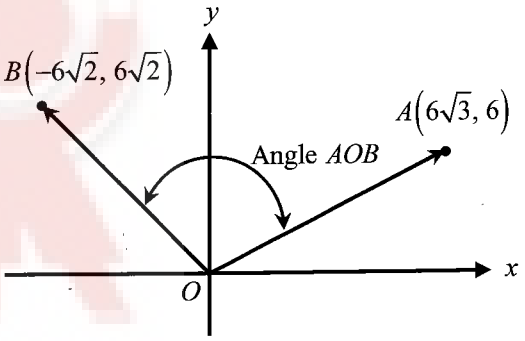
A) 3

B) 4

C) 5

D) 6

18



In the xy-plane above, what is the measure, in radians, of angle AOB?

A) $\frac{\pi}{3}$

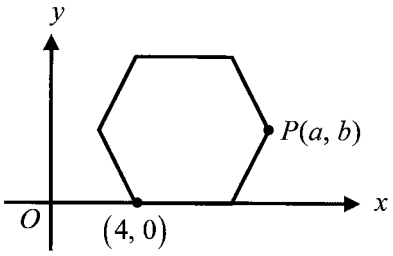
B) $\frac{\pi}{2}$

C) $\frac{5\pi}{12}$

D) $\frac{7\pi}{12}$

CONTINUE

19



In the xy-plane above, the figure shows a regular hexagon with side length of 5. What is the value of a?

A) 10.5

B) 11

C) 11.5

D) 12

20

$$y > -2x + a$$
$$y < 3x + b$$

In the system of inequalities, a and b are constants. In the xy-plane ,if $(0,1)$ is a solution to the system. Which of the following must be true?

A) $a > b$

B) $a = b$

C) $a < b$

D) $a = -b$

21

$$(x-1)(x^2+2x-1)=0$$

Which of the following is the solution set of the equation above?

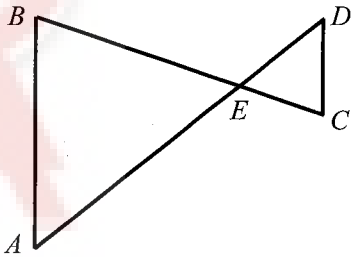
A) $\left\{1, \frac{1\pm\sqrt{5}}{2}\right\}$

B) $\left\{1, \frac{-2\pm\sqrt{5}}{2}\right\}$

C) $\left\{1, -2\pm2\sqrt{2}\right\}$

D) $\left\{1, -1\pm\sqrt{2}\right\}$

22



In the figure above, If $\overline{AB} \parallel \overline{CD}$, which of the following must be true?

A) $BE \cdot CE = AE \cdot DE$

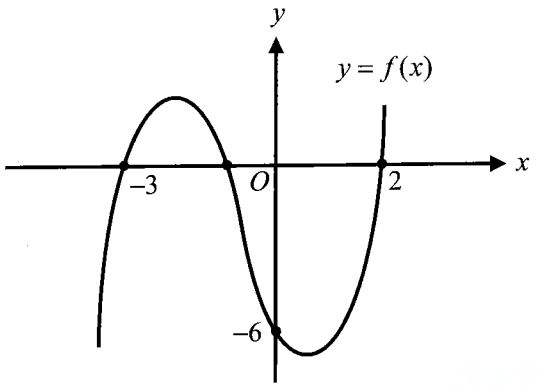
B) $\angle ABE = \angle CDE$

C) $\overline{BC} \perp \overline{AD}$

D) $\frac{AB}{CD} = \frac{BE}{CE}$

CONTINUE

23



In the xy-plane above, the function f is defined by $f(x) = 2x^3 + 3x^2 + ax + b$, where a and b are constants. If the graph of f intersects the x-axis at three points, what is the value of a?

A) 11

B) 5

C) −5

D) −11

24

$$g(x) = f(x-3) - 10$$

If the slope of the linear function f is $\frac{2}{5}$, what is the slope of the function g shown above?

A) $-\frac{2}{5}$

B) $-\frac{5}{2}$

C) $\frac{2}{5}$

D) $\frac{5}{2}$

25

A certain dancing group does not receive applicants whose height is less than 5 feet or more than 6 feet. Which of the following inequalities can be used to determine the height h, in feet, of applicants who are not accepted in the group?

A) $|h-5| > 6$

B) $|h-6| > 5$

C) $|h-5.5| < 0.5$

D) $|h-5.5| > 0.5$

26

$$a^{-2} + 3a^{-1} - 10 = 0$$

In the equation above, $a > 0$. What is the value of a?

A) $\frac{1}{2}$

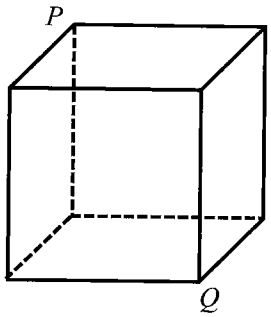
B) 2

C) 3

D) 4

CONTINUE

27



In the figure above, if the volume of the cube is 64, what is the length of diagonal $\overline{PQ}$?

A) 4

B) $4\sqrt{2}$

C) $4\sqrt{3}$

D) $8\sqrt{2}$

28

$$F = k\frac{v^2}{r}$$

In the equation above, k is a constant. If v is tripled and r is halved, which of the following is true?

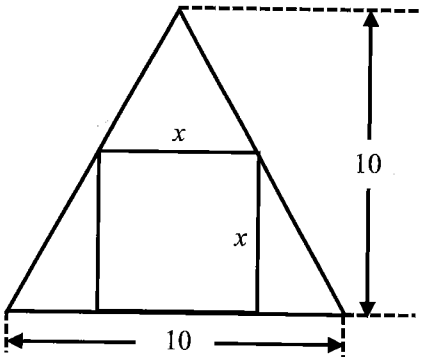
A) F is tripled.

B) F is multiplied by 8.

C) F is multiplied by 12.

D) F is multiplied by 18.

29



Note: Figure not drawn to scale.

In an isosceles triangle with a height 10 and a base 10, a square is inscribed with side x along the base of the triangle as shown above. What is the area of the square?

A) 16

B) 25

C) 26.25

D) 36

30

$$|k-3| = 10$$
$$|m+3| = 6$$

In the system of equation above, what is the greatest value of $k-m$?

A) 10

B) 16

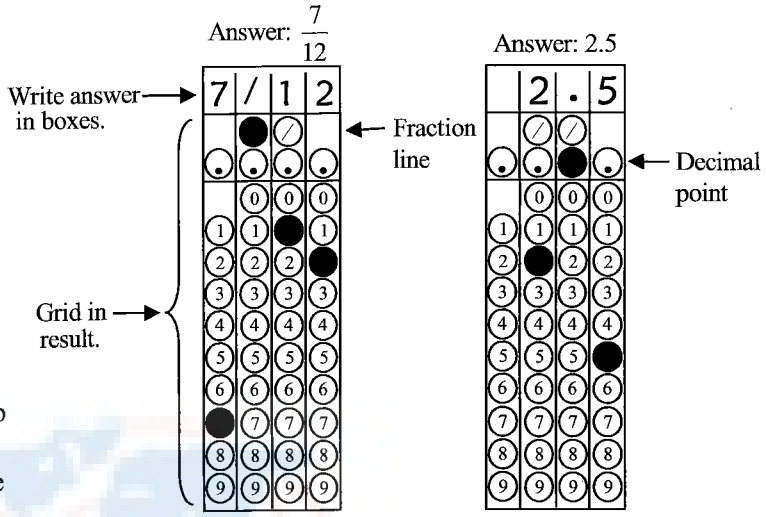
C) 22

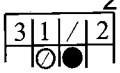
D) 24

CONTINUE

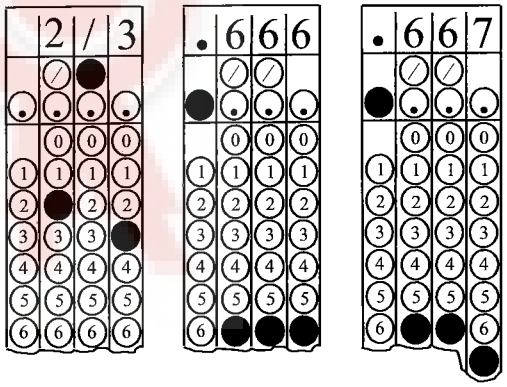
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

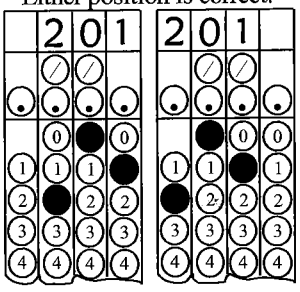


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:

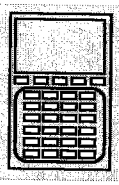


Answer: 201
Either position is correct.



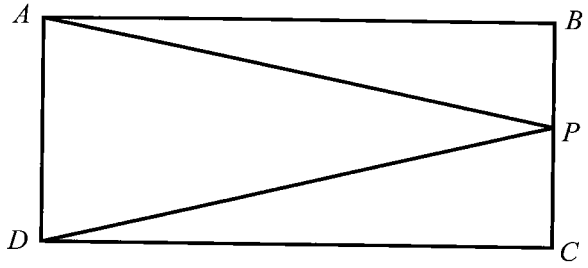
Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE



4

31



Note: Figure not drawn to scale.

In the rectangle above, $\tan\angle BAP = \frac{1}{3}$ and $\tan\angle CDP = \frac{2}{5}$. What is the value of $\frac{BP}{CP}$?

32

$$a^{(x+1)^2} = \left(\frac{1}{a}\right)^{-4x}$$

In the equation above, $a > 0$. What is the value of x?

33

$$\text{Kinetic energy} = \frac{1}{2}mv^2$$

In the equation above, kinetic energy is the energy of motion, where m is the mass and v is the speed of an object. If a k-kg roller coaster car is moving 16 meters per second and the other $2k$-kg roller coaster is moving 8 meters per second, what is the ratio of the kinetic energy of the k-kg roller coaster to the kinetic energy of the $2k$-kg roller coaster?

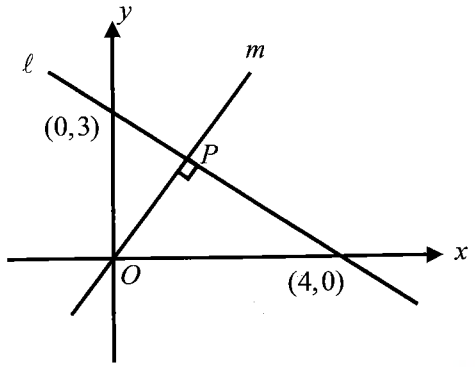
34

$$h = 3t(18 - t)$$

An arrow is shot upward on the moon with an initial velocity of 54 meters per second and returns to the surface. If the height is given by the equation above, what is the maximum height, in meters, that the arrow can reach?

CONTINUE

35



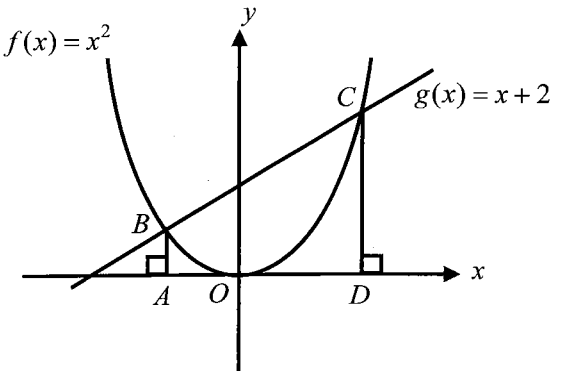
In the xy-plane above, the graphs of line ℓ and line m intersect at point P. If line ℓ is perpendicular to line m, what is the length of $\overline{OP}$?

36

$$15x + 9y = b$$
$$ax + by = 1$$

In the system of equations above, a and b are constants, where $b > 0$. If the system has infinitely many solutions, what is the value of a?

37



In the xy-plane above, the graphs of functions f and g intersect at points B and C. What is the area of quadrilateral $ABCD$?

38

$$g(x) = 2f(x) + k$$

In the equation above, $f(x)$ is a linear function and k is a constant. If $g(2) = 10$ and $g(5) = 18$, what is the slope of the function $f(x)$?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Test 6 Answers and Explanations

SECTION 3	1	2	3	4	5	6	7	8	9	10
	B	C	D	B	D	D	A	C	C	B
	11	12	13	14	15	16	17	18	19	20
	C	D	A	C	C	2	5	8	3, 4	128
SECTION 4	1	2	3	4	5	6	7	8	9	10
	A	C	C	B	C	D	C	C	B	D
	11	12	13	14	15	16	17	18	19	20
	B	D	C	D	D	A	D	D	C	C
	21	22	23	24	25	26	27	28	29	30
	D	D	D	C	D	A	C	D	B	C
	31	32	33	34	35	36	37	38		
	5/6	1	2	243	2.4	5	7.5	4/3		

SAT

Test #7

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

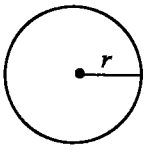
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

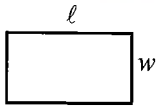
NOTE

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

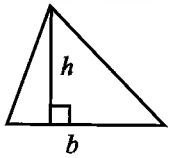
REFERENCE



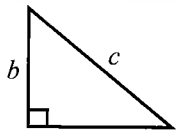
$A = \pi r^2$
$C = 2\pi r$



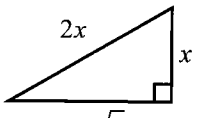
$A = \ell w$

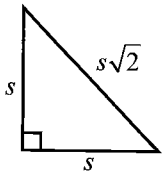


$A = \frac{1}{2}bh$

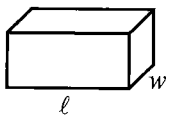


$c^2 = a^2 + b^2$

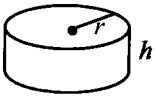




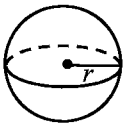
Special Right Triangles



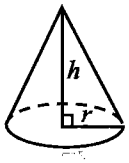
$V = \ell wh$



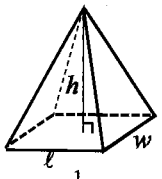
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

$$2 \le x \le 10$$

Which of the following is equivalent to the expression above?

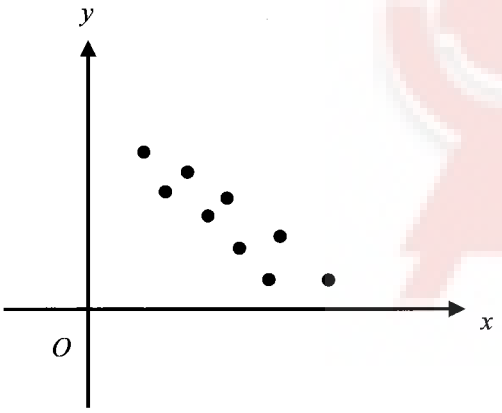
A) $|x+6| \ge 4$

B) $|x+6| \le 4$

C) $|x-6| \ge 4$

D) $|x-6| \le 4$

2



In the scatter plot above, what correlation coefficient best fits the data?

A) -1

B) -0.95

C) 0.95

D) 1

3

$$f(x) = -\frac{5}{3}x + b$$

In the function above, b is a constant. If $f(9) = 5$, what is the value of $f(3)$?

A) 15

B) 10

C) -15

D) -25

4

$$x^{-2}\left(\frac{1}{\sqrt{x}}\right)$$

Which of the following is equivalent to the expression shown above?

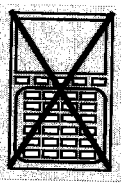
A) $\frac{1}{\sqrt{x^5}}$

B) $\frac{\sqrt{x^5}}{2}$

C) $\frac{1}{\sqrt{x^3}}$

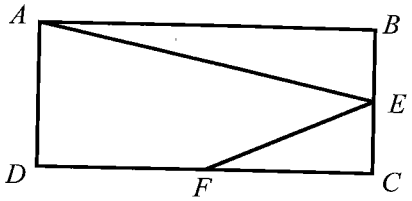
D) $\frac{1}{x^3}$

CONTINUE



3

5



In the rectangle above, E and F are the midpoints of $\overline{BC}$ and $\overline{CD}$ respectively. If the value of $\sin\angle BAE$ is 0.6, what is the value of $\tan\angle EFC$?

A) $\frac{1}{2}$

B) $\frac{2}{3}$

C) $\frac{3}{5}$

D) $\frac{3}{2}$

6

If $f(2x)=3x+1$, which of the following represents $f(x)$?

A) $\frac{1}{2}(3x+1)$

B) $\frac{1}{2}x+1$

C) $\frac{3}{2}x+1$

D) $\frac{3}{2}x+2$

7

$$\left(a-\frac{1}{a}\right)^2$$

Which of the following is equivalent to the expression above?

A) $a^2-\frac{1}{a^2}$

B) $a^2+\frac{1}{a^2}$

C) $a^2+\frac{1}{a^2}+2$

D) $a^2+\frac{1}{a^2}-2$

CONTINUE

Questions 8 and 9 refer to the following information.

The price of a smart phone in 2015 is \$300. The product will decrease in value at a rate of \$20 per year. P is the dollar value of the smart phone and t $(0 \le t \le 10)$ is the number of years from 2015.

8

Based on the information above, which of the following represents the price, in dollars, in terms of t?

A) $P = 300(1 + 0.15)^t$

B) $P = 300 - 20t$

C) $P = 300 + 20t$

D) $P = 300(1 - 0.15)^t$

9

In how many years will the value of the smart phone be \$200?

A) 3

B) 4

C) 5

D) 6

10

$$\frac{1}{3}x - \frac{1}{6}y = 10$$

Which of the following equations represents a line that is parallel to the graph of the equation above?

A) $4x + y = 5$

B) $2x + 4y = 9$

C) $5x - 10y = 9$

D) $10x - 5y = 11$

11

$$\sqrt{\frac{x-2}{x}} = 2$$

Which of the following is the solution to the equation above?

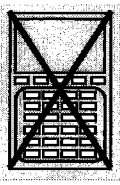
A) $\frac{2}{3}$

B) $\frac{3}{2}$

C) $-\frac{2}{3}$

D) Undefined

CONTINUE



3

12

$$y = k$$
$$y = (x+5)(x-5)$$

In the system of equations above, k is a constant. If the system has no solution, which of the following could be the value of k?

A) 50

B) 25

C) –25

D) –50

13

$$f(x) = 2(x-a)^2 + b$$

In the function above, a and b are constants. If $f(x) = 2x^2 - 4x + 27$ is equivalent to the expression above, what is the value of b?

A) 25

B) 26

C) 28

D) 32

14

If $a > 1$, which of the following is equivalent to $\dfrac{1-\dfrac{2}{3a}}{a-\dfrac{4}{9a}}$?

A) $\dfrac{3a-2}{3a+2}$

B) $\dfrac{3}{3a-2}$

C) $\dfrac{3}{3a+2}$

D) $\dfrac{3a-2}{3}$

15

If $4x - y = \dfrac{2}{3}$, what is the value of $\dfrac{81^{3x}}{27^{y}}$?

A) 3

B) 9

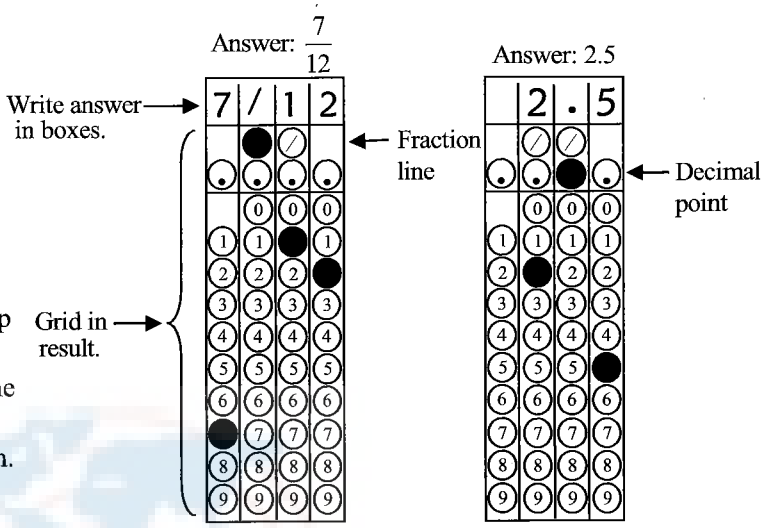
C) 27

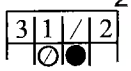
D) 81

CONTINUE

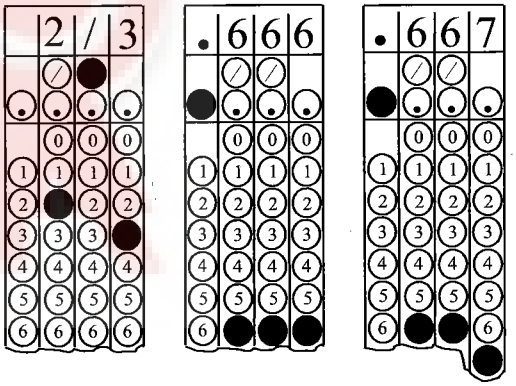
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

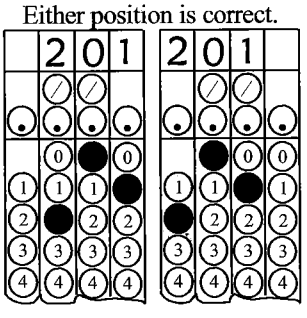


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:

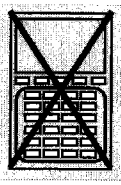


Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

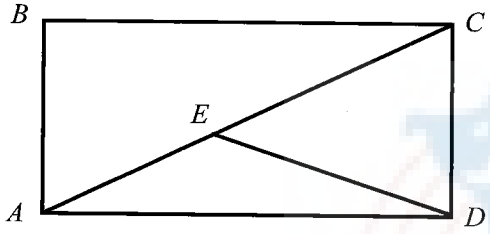
CONTINUE



16

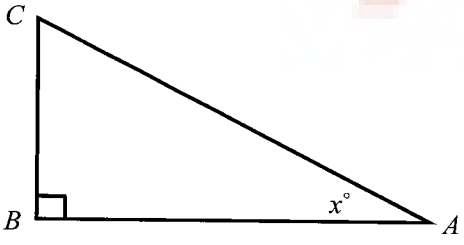
For the function f, $y = f(x)$ is inversely proportional to x. If $f(5) = 24$, what is the value of $f(10)$?

17



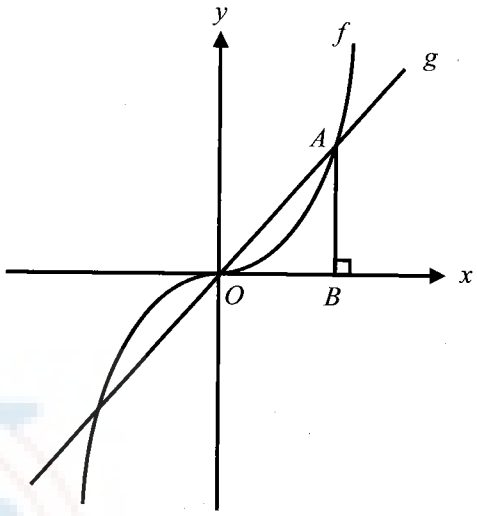
In the rectangle above, the length of $\overline{AE}$ is $\frac{2}{5}$ of the length of $\overline{AC}$. If the area of $\triangle AED$ is 18, what is the area of $\triangle CED$?

18



In the figure above, the value of $\sin x$ is 0.6 and the length of $\overline{AB}$ is 12. What is the area of ΔABC?

19



The graphs of $f(x) = ax^3$ and $g(x) = x$ are shown in the xy-plane above, where a is a constant. If the area of ΔAOB is $\frac{1}{8}$, what is the value of a?

20

$$\frac{14}{x^2 - 3x - 10} = \frac{a}{x - 5} + \frac{b}{x + 2}$$

In the equation above, a and b are constants. If the equation is true for all values of x except 5 and -2, what is the value of a?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

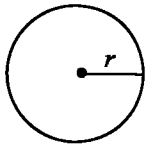
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

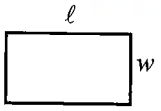
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

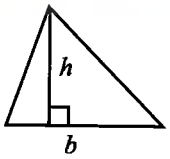


$A = \pi r^2$

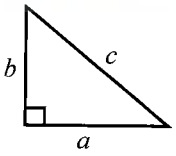
$C = 2\pi r$



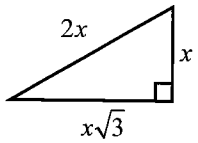
$A = \ell w$

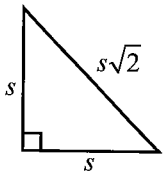


$A = \frac{1}{2}bh$

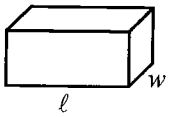


$c^2 = a^2 + b^2$

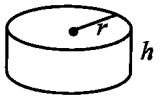




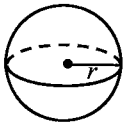
Special Right Triangle



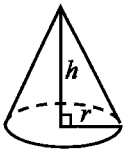
$V = \ell wh$



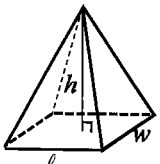
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$

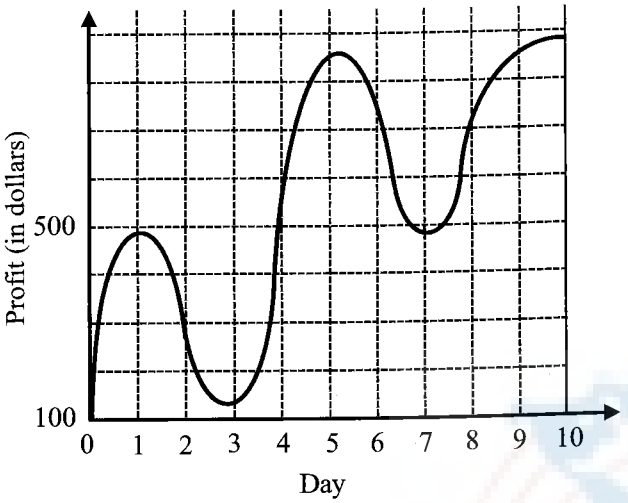


$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1



Peter opened a hardware store recently. The graph above shows the profit during the first 10 business days. On which interval is the profit strictly increasing?

A) Between day 1 and 3

B) Between day 3 and 4

C) Between day 4 and 6

D) Between day 6 and 10

2

If $\frac{x}{y} = 2$, what is the value of $6\left(\frac{x^2}{y}\right)\left(\frac{3}{2x}\right)$?

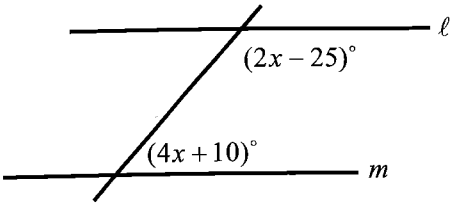
A) 18

B) 15

C) 12

D) 9

3



In the figure above, lines ℓ and m are parallel. What is the value of x?

A) 30

B) 32.5

C) 35

D) 37.5

4

If $x + y = 12$ and $x - y = 4$, what is the value of $\frac{x^2 - y^2}{2x}$?

A) 3

B) 6

C) 8

D) 9

CONTINUE

5

$$C(t) = 110t + 300$$

The cost C, in dollars, of renting a town party room is modeled by the function above, where t is the number of hours used. Claire rented the room for 5 hours, but she wants to add two more hours. How much more will she pay for using additional hours?

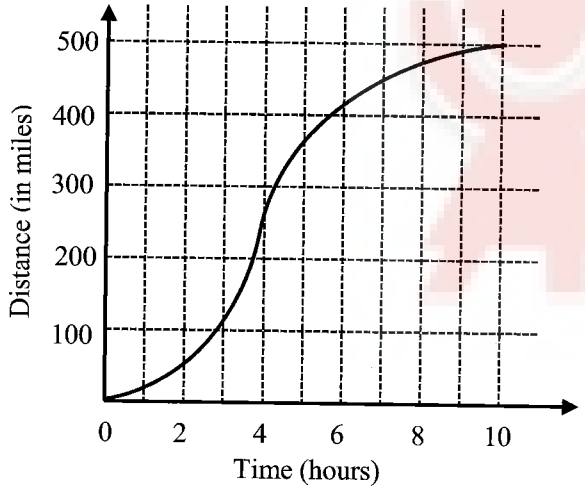
A) $200

B) $220

C) $500

D) $520

6



Jessica is travelling to Washington D.C. The graph above shows the distance she traveled during the first 10 hours. In which time interval did the graph show the greatest average rate of change?

A) Between 0 and 2

B) Between 2 and 4

C) Between 4 and 6

D) Between 8 and 10

7

For what value of n is $|n-10| < 0$?

A) -5

B) 5

C) 15

D) There is no such value of n.

8

$$f(x) = x^2 + kx - 5$$

In the equation above, k is a constant. If $f(-2) = 3$, what is the value of $f(2)$?

A) -5

B) -3

C) 3

D) 5

Questions 9 and 10 refer to the following information.

$$C(n) = 40n + 800$$
$$n(t) = 30t$$

A company produces a smartphone for which the weekly cost C, in dollars, of producing n units. The weekly cost C and the number of units n produced in t hours are given by the equations above.

9

What will be the increase in cost if the number of units increases by 100?

A) $800

B) $2000

C) $4000

D) $4800

10

If the weekly cost increases to $20,000, how many hours will it take to produce the units?

A) 16

B) 20

C) 40

D) 48

11

$$\left(\frac{3+i}{2-i}\right)(a+bi) = 1$$

In the equation above, a and b are constants. If $i = \sqrt{-1}$, what is the value of a?

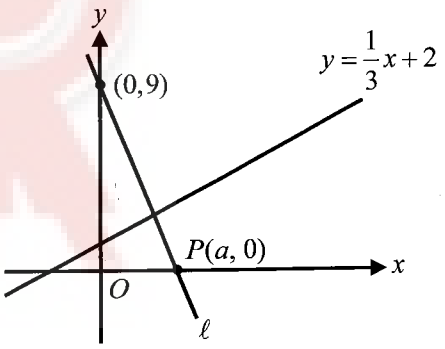
A) $-\frac{1}{2}$

B) $-\frac{1}{5}$

C) $\frac{1}{5}$

D) $\frac{1}{2}$

12



Note: Figure not drawn to scale.

In the xy-plane above, the graph of $y = \frac{1}{3}x + 2$ is perpendicular to the graph of line ℓ. What is the value of a?

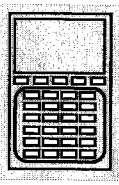
A) 2

B) 3

C) 4

D) 4.5

CONTINUE



4

13

Boy's Shoe Size	7	7.5	8	8.5
Foot Length (in)	9.25	9.5	9.75	10

The table shows the relationship of a boy's shoe size and the length of a boy's foot, in inches. What is the correlation coefficient?

A) -1

B) -0.95

C) 0.95

D) 1

14

In triangle RST, if $\cos\angle R = \sin\angle T$, which of the following must be true?

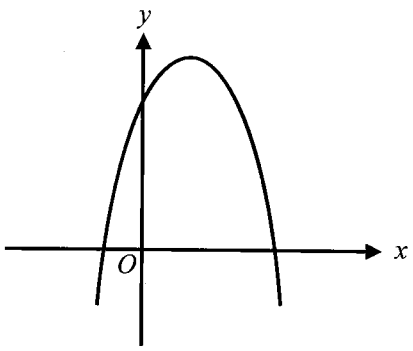
A) Triangle RST is equilateral.

B) Triangle RST is isosceles.

C) Triangle RST is an obtuse triangle.

D) Triangle RST is a right triangle.

15



The graph of a quadratic function $f(x) = ax^2 + bx + c$ is shown in the xy-plane above. Which of the following must be true?

I. $a > 0$
II. $b > 0$
III. $c > 0$

A) I only

B) I and II only

C) II and III only

D) I, II, and III

16

$$\frac{1}{12}x - \frac{1}{24}y = \frac{1}{8}$$

$$5x + 3y = 2$$

If (a, b) is the solution to the system of equations above, what is the value of a?

A) -2

B) -1

C) 1

D) 2

CONTINUE

Questions 17 and 18 refer to the following information

Survey Results

Number of pets	East Village	West Village
0	10	25
1	40	20
2	35	35
3	10	15
4	5	5

A statistician chose 100 families at random from each of two towns and asked how many pets they own. The results are shown in the table above. There is a total of 10,000 families in East village and 15,000 families in West village.

17

What is the median number of pets for all families surveyed?

A) 1

B) 1.5

C) 2

D) 3

18

What is the expected total number of families, who own 3 pets in the two villages?

A) 25

B) 1,000

C) 2,000

D) 3,125

19

$$x^2 + y^2 - 6x - 8y = 0$$

The equation of a circle in the xy-plane is shown above. What is the area of the circle?

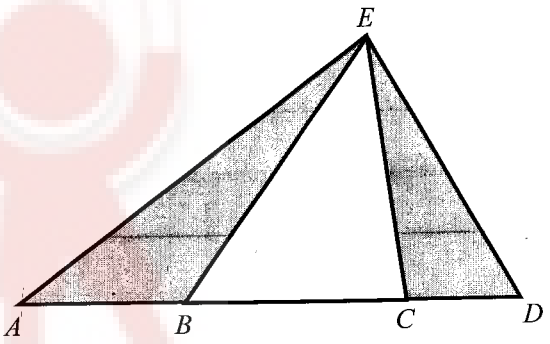
A) 15.7

B) 31.4

C) 62.8

D) 78.5

20



Note: Figure not drawn to scale.

In the figure above, $AB : BC : CD = 3 : 5 : 2$. If the sum of the areas of the shaded regions is 13, what is the area of ΔEBC?

A) 13

B) 17

C) 20

D) 25

21

$K \leq -6$ or $K \geq 14$

Which of the following is equivalent to the expression of inequalities above?

A) $|K+4| \leq 10$

B) $|K+4| \geq 10$

C) $|K-4| \leq 10$

D) $|K-4| \geq 10$

22

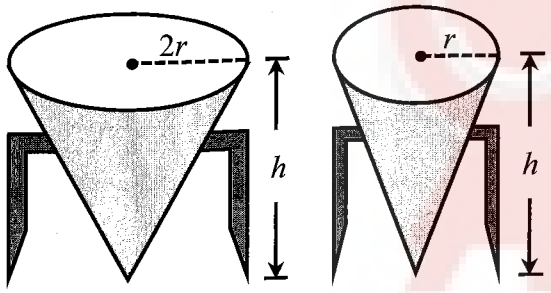


Figure 1 Figure 2

In the figures above, both of the water tanks are in the shape of a right circular cone. If the larger tank can hold 125 gallons of water, how many gallons of water can the smaller tank hold?

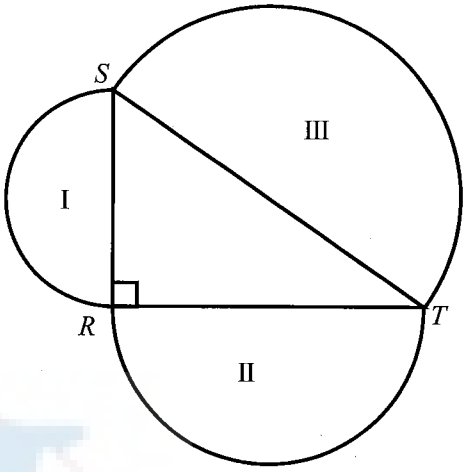
A) 5

B) 25

C) 31.25

D) 62.5

23



In the figure above, right triangle RST bordered by three semicircles on each side. If the area of semicircle I is 8 and the area of semicircle II is 24, what is the length of $\overline{ST}$?

A) $\frac{16}{\sqrt{\pi}}$

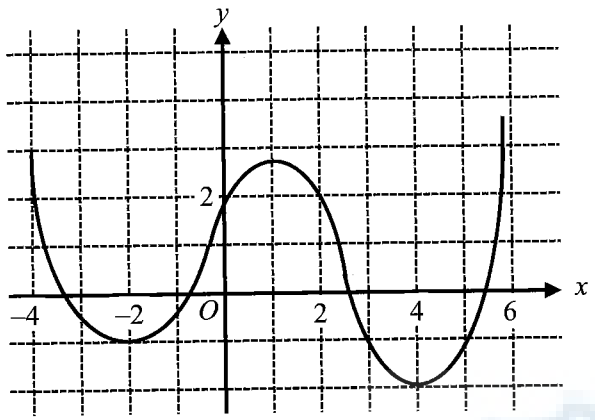
B) $\frac{16}{\pi}$

C) $\frac{8}{\sqrt{\pi}}$

D) $\frac{8}{\pi}$

CONTINUE

24



The graph of g is shown in the xy-plane above. If $f(x) = 2g(x) - 5$, what is the average rate of change of $f(x)$ between -2 and 4?

A) $\frac{1}{2}$

B) $\frac{1}{3}$

C) $-\frac{1}{4}$

D) $-\frac{1}{3}$

25

If the value of k^{-5} is twice the value of $4k^{-2}$, what is the value of k?

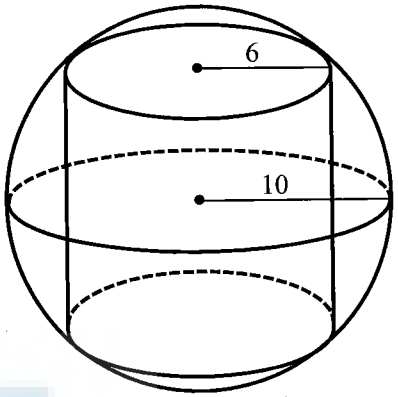
A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) 2

D) 4

26



In the figure above, a right cylinder is inscribed in a sphere with radius 10. If the radius of the circular base of the cylinder is 6, what is the volume of the cylinder?

A) 144π

B) 288π

C) 576π

D) 720π

27

A carton contains k boxes of paper cups and each box contains 100 paper cups. If the carton cost d dollars, what is the cost per paper cup in cents?

A) kd

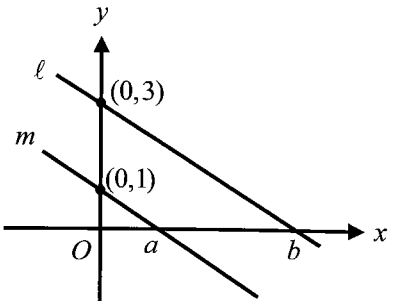
B) $\frac{d}{k}$

C) $\frac{d}{100k}$

D) $\frac{100k}{d}$

CONTINUE

28



In the xy-plane above, lines ℓ and m are parallel and intersect the x-axis at $x = a$ and $x = b$ respectively. If $a + b = 8$, what is the value of a?

A) 1.5

B) 2

C) 2.5

D) 3

29

$$(k - 2a)x + k - 11 = 5$$

In the equation above, a and k are constants. If the equation has infinitely many solutions, what is the value of a?

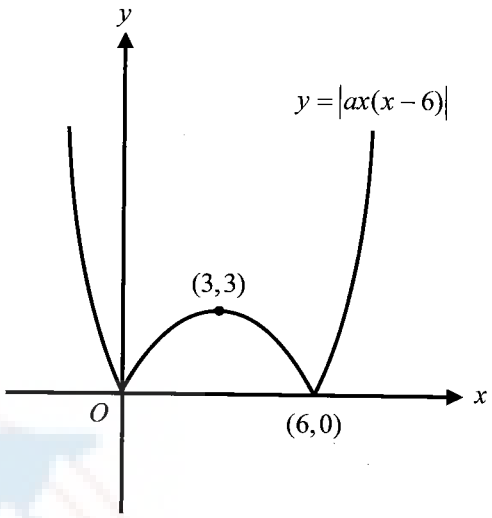
A) 8

B) 16

C) 20

D) 24

30



The graph of $y = |ax(x - 6)|$ is shown in the xy-plane above. Which of the following could be the value of a?

A) $-\frac{1}{2}$

B) $-\frac{1}{3}$

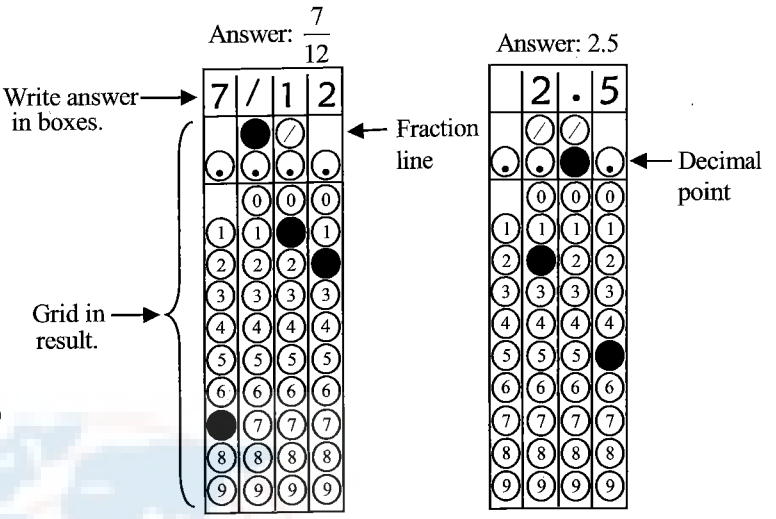
C) 2

D) 3

CONTINUE

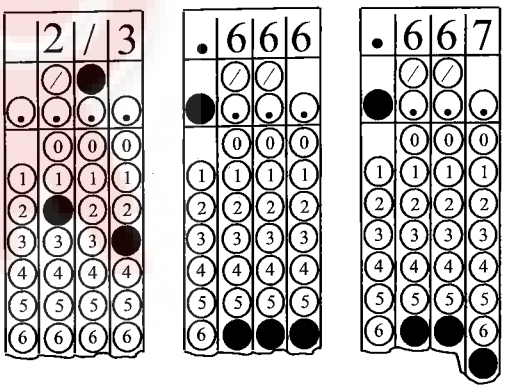
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

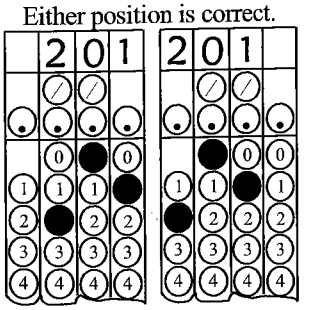


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



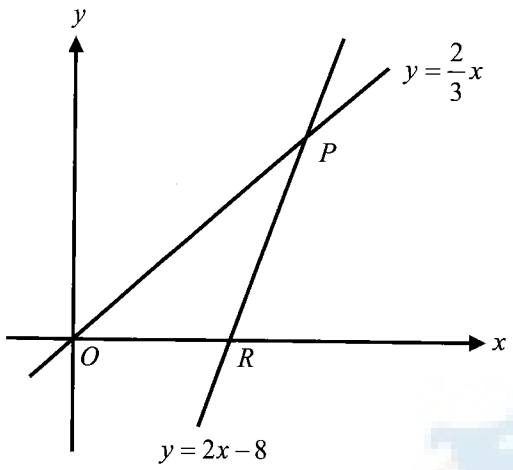
Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

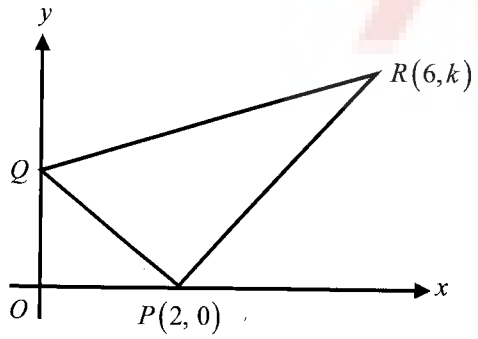
CONTINUE

31



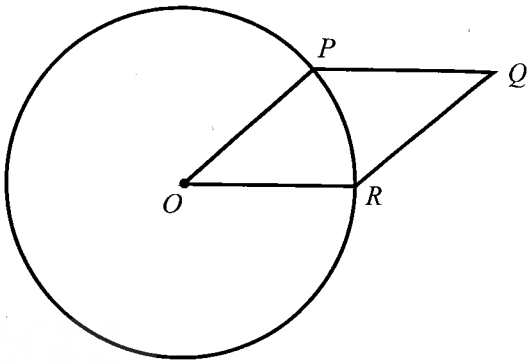
The lines with equations $y = \frac{2}{3}x$ and $y = 2x - 8$ are shown in the xy-plane above. What is the area of triangle OPR?

32



In the xy-plane above, the slope of $\overline{PQ}$ is -1 and the slope of $\overline{QR}$ is $\frac{1}{2}$. What is the slope of $\overline{PR}$?

33



In the figure above, O is the center of the circle. If the area of the circle is 100π and measure of angle POR is $\frac{\pi}{6}$ radians, what is the area of parallelogram $OPQR$?

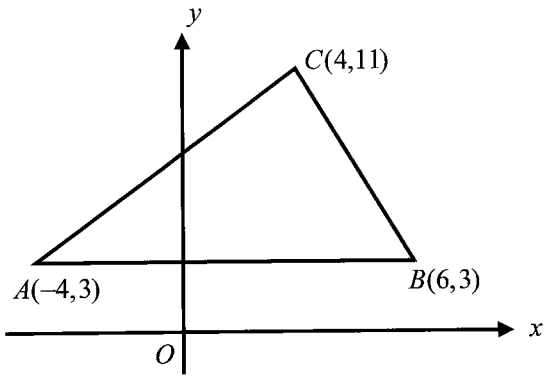
34

$$y \geq -3x + 1200$$
$$y \geq 15x + 300$$

In the xy-plane above, a point with coordinates (r, s) lies in the solution set of the system of inequalities above. What is the minimum possible value of s?

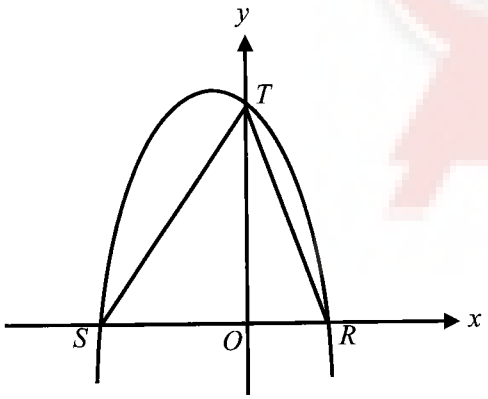
CONTINUE

35



In the xy-plane above, what is the area of triangle ABC?

36



The graph of $y = -(x-2)(x+5)$ is shown in the xy-plane above. What is the area of triangle STR?

A consumer analyst believes that a new car will lose 18 percent of its value every year. After n years, the value of a new car that costs \$20,000 is modeled by $V(t) = 20{,}000 \cdot C^n$, where V is the value of the car after n years.

37

Based on the information above, what is the value of C?

38

To the nearest dollar, what is the value of the car 5 years after it was purchased? (Note: Disregard the \$ sign when gridding your answer.)

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 7 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
D	B	A	A	D	C	D	B	C	D
11	12	13	14	15	16	17	18	19	20
C	D	A	C	B	12	27	54	4	2

SECTION 4

1	2	3	4	5	6	7	8	9	10
B	A	B	A	B	B	D	A	C	A
11	12	13	14	15	16	17	18	19	20
D	B	D	D	C	C	C	D	D	A
21	22	23	24	25	26	27	28	29	30
D	C	A	D	B	C	B	B	A	B
31	32	33	34	35	36	37	38		
8	5/4	50	1050	40	35	0.82	7415		

SAT

Test #8

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

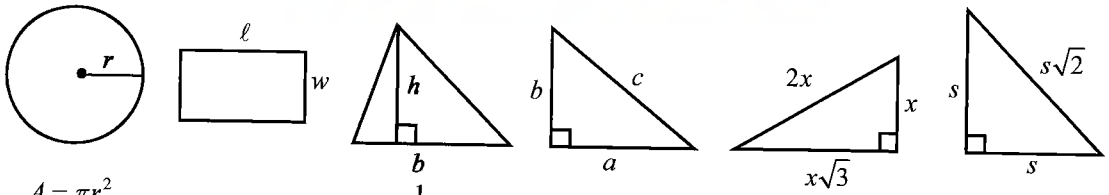
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

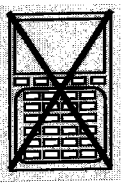
$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



3

1

If $\frac{3}{x-1} = x+1$ and $x \neq 1$, what is the value of x^2?

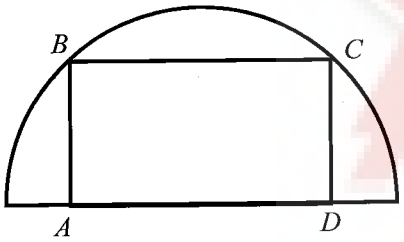
A) 1

B) 2

C) 4

D) 8

2



In the figure above, the diameter of the semicircle is 10 and the length of $\overline{CD}$ of rectangle $ABCD$ is 3. What is the length of $\overline{BC}$?

A) 4

B) 6

C) 7

D) 8

3

If $16 = \left(\frac{1}{4}\right)^{\frac{-1}{m}}$, what is the value of m?

A) $-\frac{1}{4}$

B) $-\frac{1}{2}$

C) $\frac{1}{4}$

D) $\frac{1}{2}$

4

Alex spends \$2.25 per gallon on gasoline. If Alex uses one gallon of gasoline to travel 30 miles, how many dollars will he spend to travel 240 miles?

A) 18

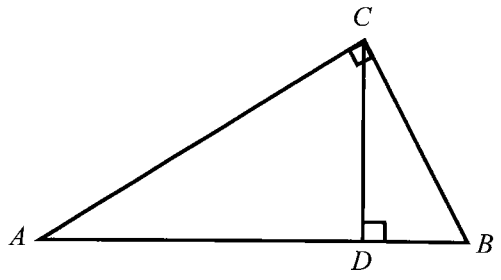
B) 20

C) 24

D) 28

CONTINUE

5



In the triangle above, the length of $\overline{DB}$ is 4 and the length of $\overline{CD}$ is 6. What is the area of triangle ACD?

A) 24

B) 27

C) 30

D) 39

6

If a and b are positive numbers, and 125 percent of a^2 is equal to 5 percent of b^2, what is the value of $\frac{a}{b}$?

A) $\frac{1}{5}$

B) $\frac{2}{5}$

C) 2

D) 5

Questions 7 and 8 refer to the following information.

$$C(t) = 15 + 0.15(T - K)$$

The cost of using a smart phone is \$15 for the first 200 minutes and \$0.15 for additional minute. The cost C is modeled by the equation above, where T is the length of time in minutes and K is a constant.

7

Based on the information above, what is the value of K?

A) 0.15

B) 1

C) 100

D) 200

8

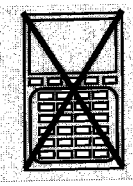
If a customer paid \$36 for using his phone, how many minutes did he use?

A) 210

B) 340

C) 450

D) 500



9

If $x+1$ is a factor of x^4-3x^3-ax+a, where a is a constant, what is the value of a?

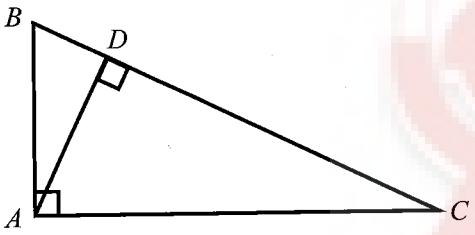
A) -4

B) -2

C) 2

D) 4

10



In the right triangle above, the value of $\sin C$ is 0.6 and the length of $\overline{BC}$ is 20. What is the length of $\overline{AD}$?

A) 7.2

B) 8.0

C) 9.6

D) 10

11

If $a(x+b)=3x-15$ for all real values of x, what is the value of b?

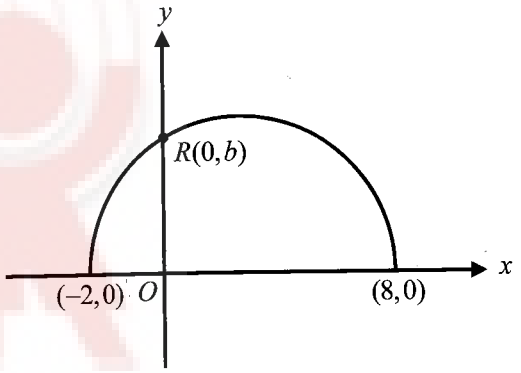
A) -5

B) -3

C) 3

D) 5

12



A semicircle is shown in the xy-plane above. If the semicircle intersects the y-axis at point R, what is the value of b?

A) 3

B) 4

C) 5

D) 6

CONTINUE

13

$$\frac{3+i}{3-i} = a+bi$$

In the equation above, a and b are real numbers. If $i = \sqrt{-1}$, what is the value of a?

A) 0.2

B) 0.4

C) 0.6

D) 0.8

Questions 14 and 15 refer to the following information.

Gender	Algebra	Geometry	Total
Male	80		
Female			90
Total	120		200

The incomplete table above shows the results of a survey about elective subject preferences given to 200 students.

14

What is the probability that a randomly selected female student prefer geometry?

A) 0.2

B) 0.25

C) 0.3

D) 0.4

15

What fraction of male students prefer geometry?

A) $\frac{3}{20}$

B) $\frac{3}{11}$

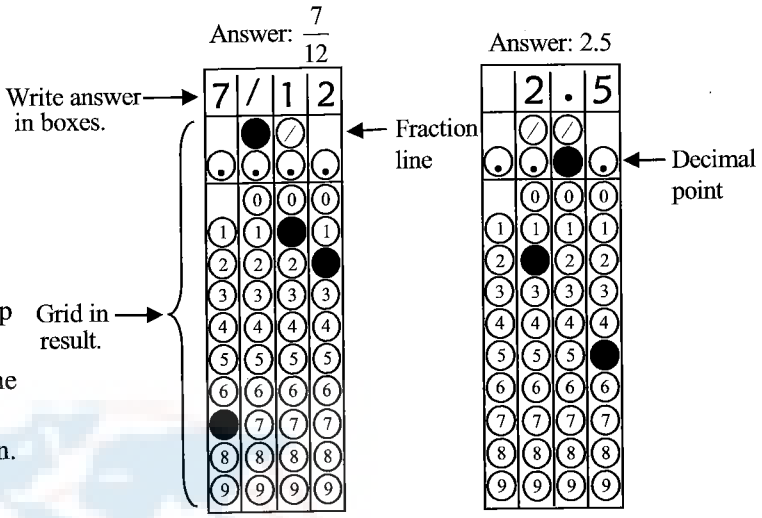
C) $\frac{8}{11}$

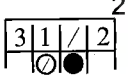
D) $\frac{3}{8}$

CONTINUE

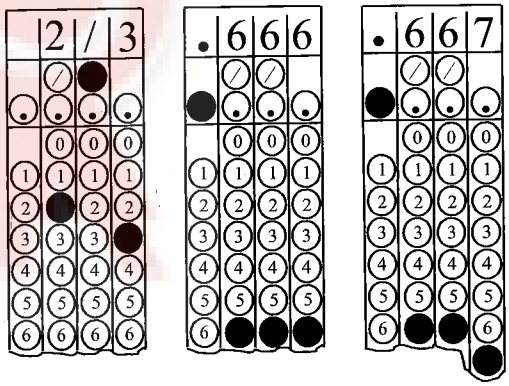
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

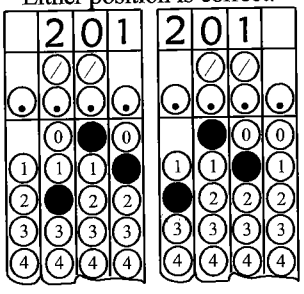


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



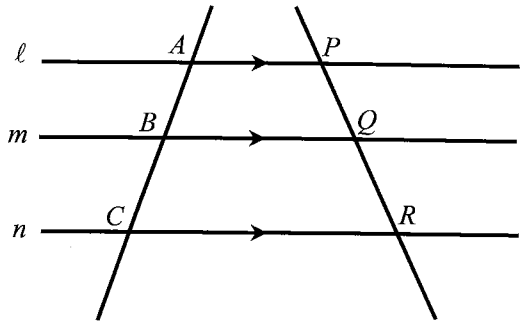
Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16



Note: Figure not drawn to scale.

In the figure above, line ℓ, m, and n are parallel. If $AB = 8$, $BC = 12$, and $PQ = 10$, what is the length of $\overline{QR}$?

17

Nigel drove from city A to city B at the speed of 60 miles per hour, and returned along the same route at the speed of 40 miles per hour. If it took $4\frac{1}{2}$ hours for the round trip, what is the distance, in miles, between city A and city B?

18

$$x^3 - 3x^2 + 5x = 15$$

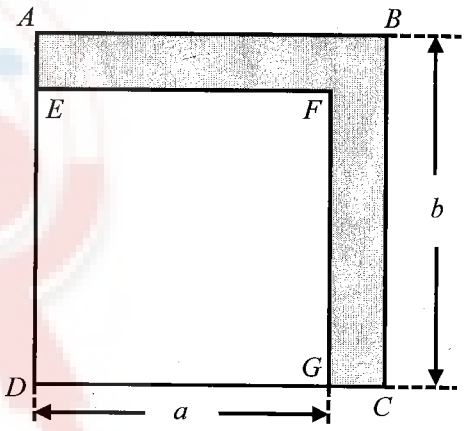
For what real value of x is the equation above true?

19

$$x^2 + (k+1)x + 16 = (x+h)^2$$

In the equation above, k and h are positive constants. If the equation is true for all real numbers of x, what is the value of k?

20



Squares $ABCD$ and $DEFG$ with integer-length sides of b and a respectively are shown in the figure above. If the area of the shaded region is 28, what is the area of square $ABCD$?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

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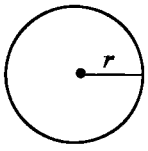
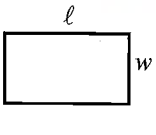
REFERENCE

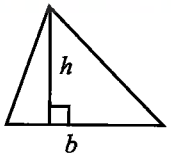


$A = \pi r^2$

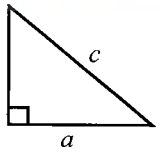
$C = 2\pi r$



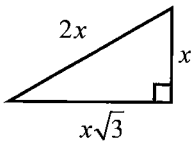
$A = \ell w$

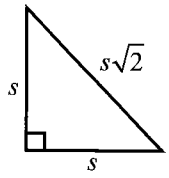


$A = \frac{1}{2}bh$

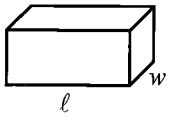


$c^2 = a^2 + b^2$

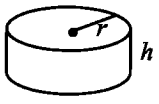




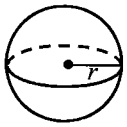
Special Right Triangles



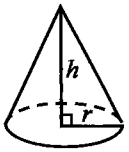
$V = \ell wh$



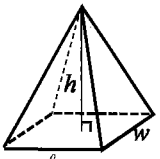
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



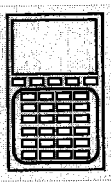
$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



4

1

If $ax + bx = 48$, what is the value of $2a + 2b$ when $x = 4$?

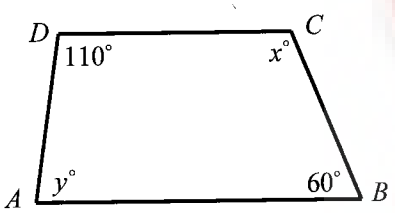
A) 12

B) 18

C) 24

D) 48

2



In the figure above, $\overline{AB}$ and $\overline{CD}$ are parallel. What is the value of $x - y$?

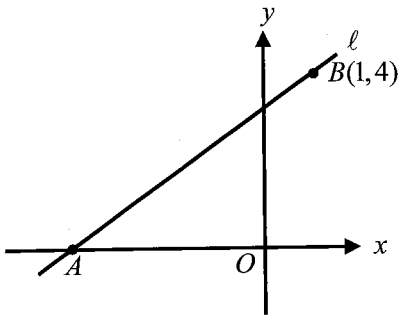
A) 50

B) 55

C) 60

D) 65

3



In the xy-plane above, points A and B lie on line ℓ. If $AB = 5$, what is the y-intercept of the line?

A) $\left(0, \frac{5}{2}\right)$

B) $\left(0, \frac{8}{3}\right)$

C) $(0, 3)$

D) $\left(0, \frac{10}{3}\right)$

4

In the xy-plane, line ℓ is parallel to the x-axis and passes through point $(-4, -8)$. What is the equation of the line?

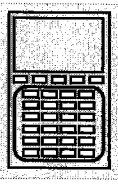
A) $x = -4$

B) $y = -4$

C) $x = -8$

D) $y = -8$

CONTINUE



5

If $\left(\sqrt[4]{10}\right)\left(\sqrt[3]{10}\right)=100^k$, what is the value of k?

A) $\frac{7}{24}$

B) $\frac{7}{12}$

C) 6

D) 12

6

$$F=\frac{9}{5}C+32$$

The relationship between the temperature F, in degrees Fahrenheit, and the temperature C, in degrees Celsius, is given by the formula above. A student uses the approximate formula $F=2C+30$ to convert from degrees Celsius to degrees Fahrenheit. For what temperature in degrees Celsius does the student's approximate formula give the correct temperature in degrees Fahrenheit?

A) 0

B) 5

C) 10

D) 15

7

The graph of the function f in the xy-plane is a parabola that has a maximum at point $(5, 10)$. If the graph has one x-intercept at $(1, 0)$, what is the other x-intercept of f?

A) $(-1, 0)$

B) $(8, 0)$

C) $(9, 0)$

D) $(10, 0)$

8

$$a^2=4b^2$$
$$a=1+2b$$

In the system of equations above, what is the value of a?

A) $-\frac{1}{2}$

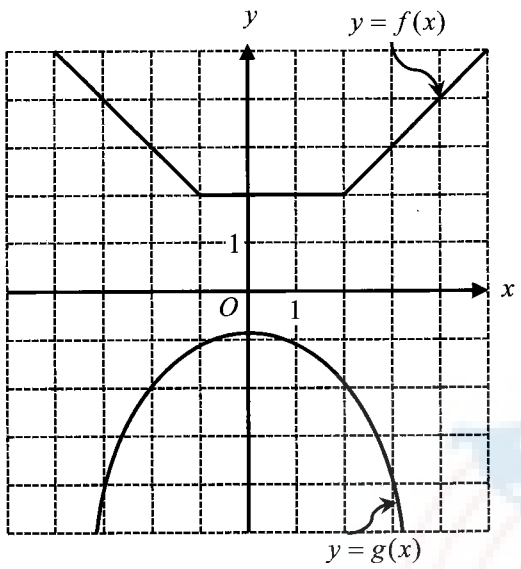
B) $-\frac{1}{4}$

C) $\frac{1}{4}$

D) $\frac{1}{2}$

CONTINUE

9



The graphs of the functions f and g are shown above in the xy-plane. If $f(1.5) = k$, what is the value of $g(k)$?

A) 2

B) -1

C) -2

D) -4

10

$$|2x - 6| < 10$$

Which of the following intervals is a subset of the values of x that satisfy the inequality above?

A) $-4 < x < 10$

B) $-2 < x < 9$

C) $-4 < x < 8$

D) $-1 < x < 7$

11

There are 20 black marbles and 16 white marbles in a container and no others. How many black marbles must be removed from the container so that the probability of randomly selecting a black marble from the container is $\frac{1}{3}$?

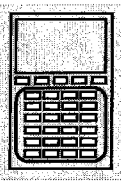
A) 8

B) 12

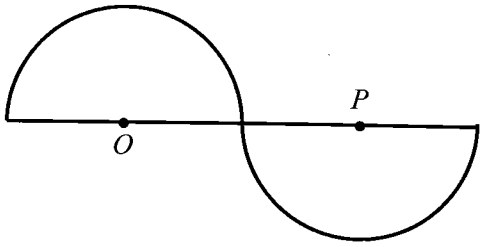
C) 16

D) 20

CONTINUE



12



In the figure above, O and P are the centers of two semicircles of radius r. If the length of the perimeter is $8\pi + 16$, what is the value of r?

A) 2

B) 4

C) 6

D) 8

13

If $x^{12} = 5000$ and $\frac{x^{11}}{y} = 10$, what is the value of xy?

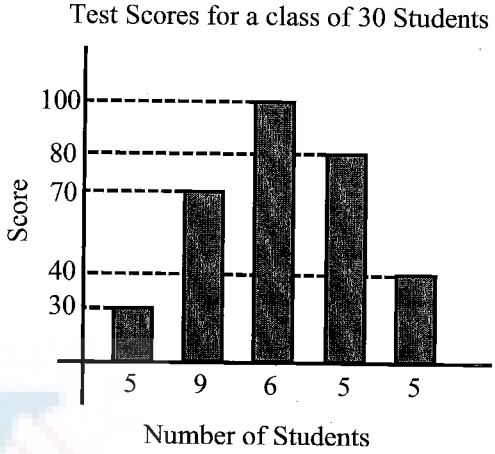
A) 500

B) 100

C) 50

D) 10

14



The graph above shows the test scores of 30 students. Based on the histogram above, what is the median score of the test?

A) 80

B) 70.5

C) 70

D) 40

CONTINUE

Question 15 and 16 refer to the following information.

An audio recording studio's fee consists of a setup charge of \$100 plus a charge for session time at an hourly rate. The total fee for a session of 8 hours is \$ 480.

15

Which of the following functions f gives the total fee, in dollars, for a session of t hours in the studio?

A) $100+60t$

B) $480+100t$

C) $100+48t$

D) $100+47.5t$

16

Jackson spent 10 hours recording his favorite pop songs in the studio. How much did he pay for his recording, in dollars?

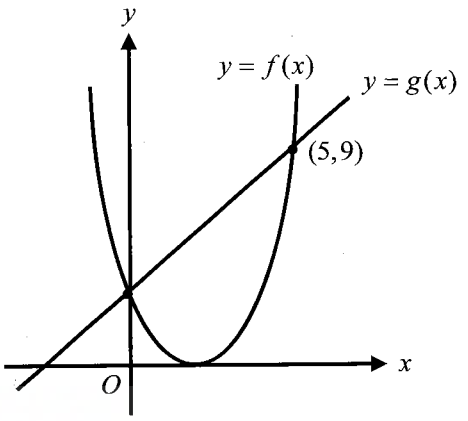
A) 525.5

B) 565

C) 585.6

D) 600

17



The graphs of $f(x)=(x-2)^2$ and $g(x)$ are shown in the xy-plane above. If the graphs intersect at point $(5, 9)$, which of the following is the equation of $g(x)$?

A) $y=\frac{1}{2}x+\frac{13}{2}$

B) $y=\frac{2}{5}x+7$

C) $y=\frac{3}{5}x+6$

D) $y=x+4$

18

If $x^2+y^2=85$ and $xy=5$, what is the value of $\left(\frac{1}{x}-\frac{1}{y}\right)^2$?

A) 3

B) 5

C) 75

D) 80

CONTINUE

19

$$\frac{1}{x(x+1)} = \frac{a}{x} - \frac{b}{x+1}$$

In the equation above, a and b are constants. If the equation is true for all positive values of x, what is the value of b?

A) -1

B) 1

C) 2

D) 4

20

The linear function $2x + y = -5$ in the xy-plane is to be reflected about the y-axis. Which of the following ordered pairs CANNOT be the coordinates of the resulting graph?

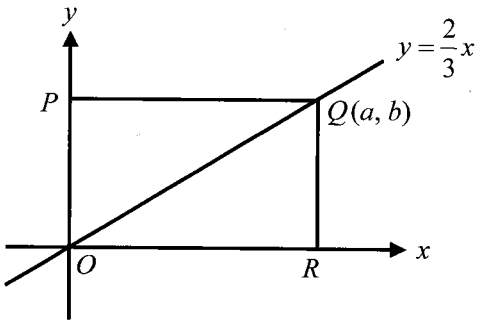
A) $(0, -5)$

B) $(2, -1)$

C) $(3, 1)$

D) $(4, 0)$

21



In the xy-plane above, the point Q is on the line $y = \frac{2}{3}x$. If the area of rectangle $OPQR$ is 54, what is the value of b?

A) 3

B) 6

C) 9

D) 12

22

Harry bought a 10 pound bag of flour for \$80, a 25 pound bag of flour for \$150, and a 50 pound bag of flour. If the average (arithmetic mean) cost per pound of all three bags is \$6.00, what was the price of the 50 pound bag of flour?

A) \$200

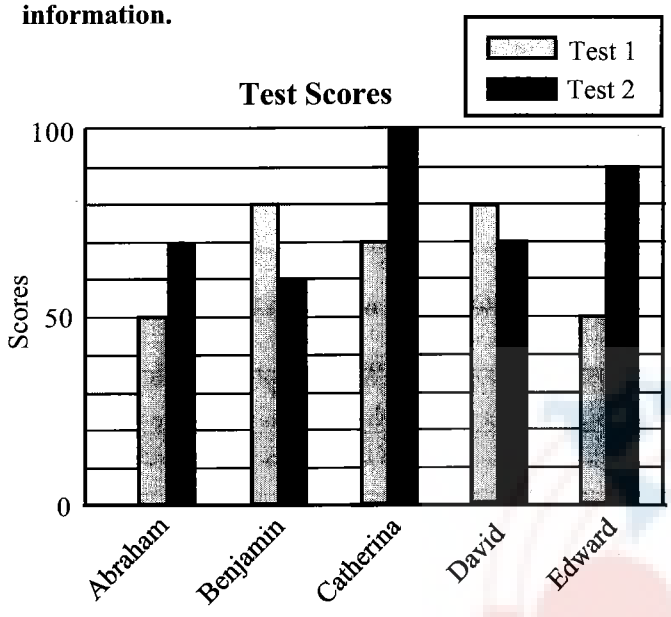
B) \$240

C) \$280

D) \$320

CONTINUE

Questions 23 and 24 refer to the following information.



The bar graph shows the scores on the algebra tests for five students in Mrs. Lee's class.

23

Of the following, who has the greatest percent of increase in scores from test 1 to test 2?

A) Abraham

B) Benjamin

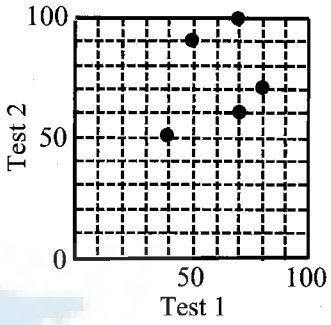
C) Catherina

D) Edward

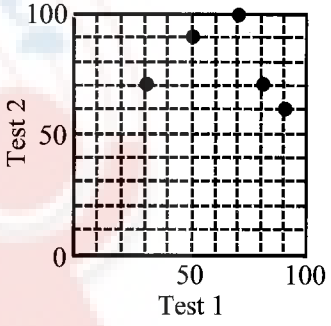
24

Which of the following scatterplots represents the data on the bar graph?

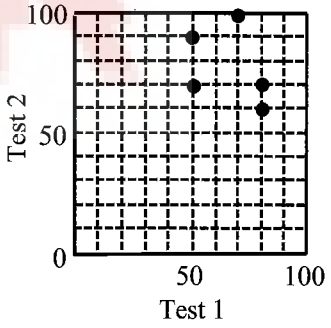
A)



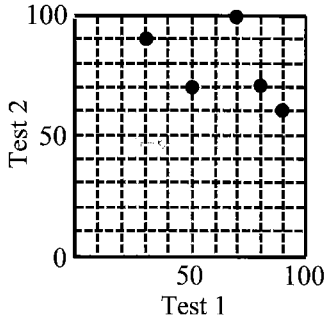
B)



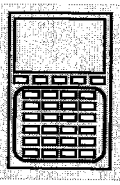
C)



D)



CONTINUE



25

City	Spring	Summer	Autumn	Winter
Amber	26	30	25	22
Buner	24	35	20	18

The table above gives high temperatures in degrees Celsius (C°) for Amber City and Buner City over the four seasons. Which of the following is true about the data shown for the four seasons?

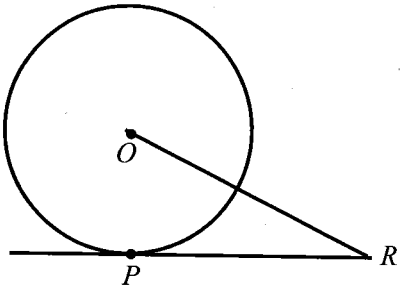
A) The standard deviation of high temperatures in Amber City is larger than Buner City.

B) The standard deviation of high temperatures in Buner City is larger than Amber City.

C) The standard deviation of high temperatures in Amber City is the same as that of Buner City.

D) Based on the data above, the standard deviation of high temperatures in these cities cannot be determined.

26



Note: Figure not drawn to scale.

In the figure above, $\overline{PR}$ is tangent to circle O at point P and the length of $\overline{PR}$ is 12. If the value of $\sin\angle R$ is 0.8, what is the radius of the circle?

A) 8

B) 12

C) 16

D) 20

27

$$2^{(x+2y)} = 16$$
$$3^{(2x+y)} = 81$$

In the system of equations, what is the value of x?

A) 4

B) 3

C) $\frac{4}{3}$

D) $\frac{3}{4}$

CONTINUE

28

$$(x+y)^2-(x-y)^2=72$$

In the equation above, x and y are positive integers. Which of the following CANNOT be the value of $x+y$?

A) 9

B) 11

C) 19

D) 24

29

P = The average of a and b

Q = The average of b and c

R = The average of c and a

The various averages (arithmetic mean) of two of the three numbers a, b, and c are calculated and arranged as shown above. If $P>Q>R$, which of the following is true?

A) $a=b=c$

B) $a>b>c$

C) $c>b>a$

D) $b>a>c$

30

Peter sets up a lemonade stand. He paid a set-up cost of \$120 and each cup of lemonade costs him \$0.30 to make. He sells each cup of lemonade for \$0.75. Which of the following represents the profit P as a function of the number of cups n of lemonade sold?

A) $P(n)=0.75n-120$

B) $P(n)=0.75n+120$

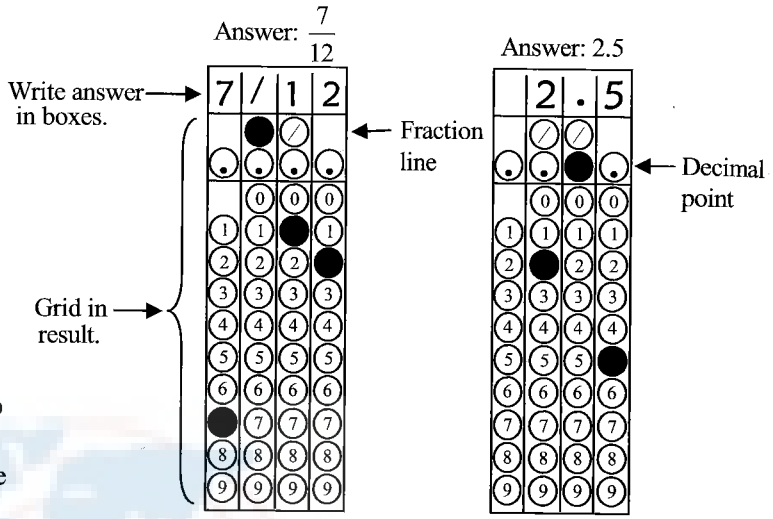
C) $P(n)=0.45n-120$

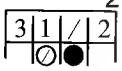
D) $P(n)=0.45n+120$

CONTINUE

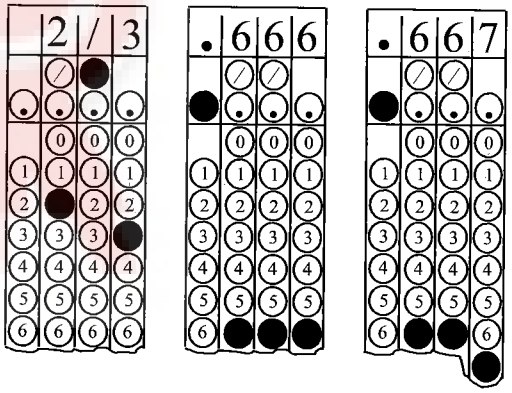
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

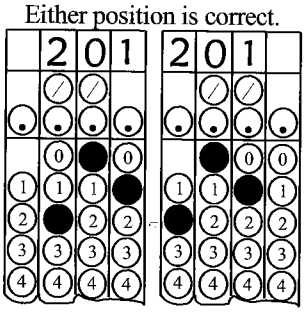


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31

$$x^2 - 4x + y^2 + 4x = 0$$

The equation of a circle in the xy-plane is shown above. To the nearest tenth, what is the area of the circle?

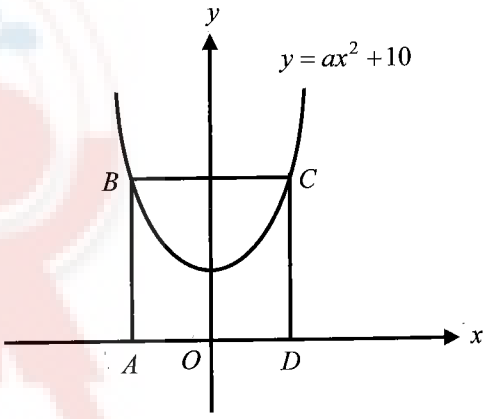
32

The cost C, in dollars, of producing x units of a certain product can be modeled by the equation $C = \frac{198.4x + 1097}{16}$. According to the model, for every increase of 1 unit, by how many dollars will the cost increase? (Disregard the $ sign when gridding your answer.)

33

If f is a linear function for which $f(10) - f(5) = 10$, what is the value of $f(20) - f(8)$?

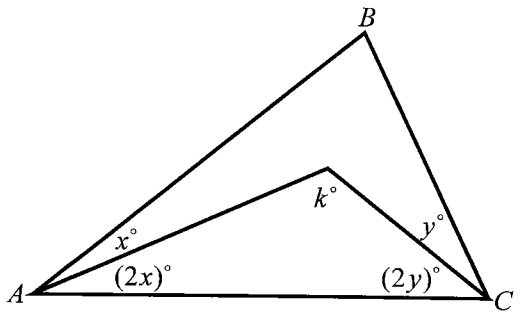
34



The graph of $y = ax^2 + 10$ is shown in the xy-plane above. If the area of square $ABCD$ is 400, what is the value of a?

CONTINUE

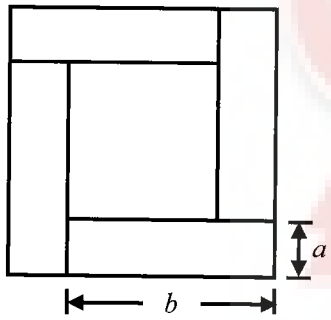
35



Note: Figure not drawn to scale.

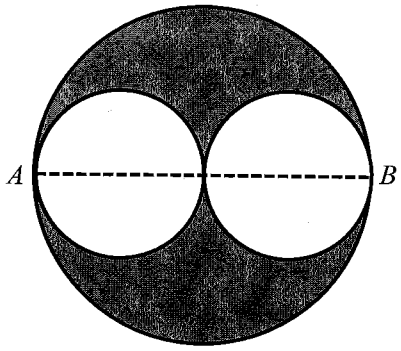
In the figure above, if the measure of $\angle ABC$ is 30°, what is the value of k?

36



In the figure above, four congruent rectangles and a square are put together to form a larger square. The perimeter of each rectangle is 24, and the area of the smaller square is 36. If the dimensions of each rectangle are a and b as shown above, what is the value of b?

37



In the figure above, two congruent circles are tangent to each other and are internally tangent to the larger circle. Line segment AB is the diameter of the larger circle. If the area of each smaller circle is 10, what is the area of the shaded region?

38

$$f(x) = x^2 - 6x + 12$$
$$g(x) = k$$

In the equations above, $f(x) \geq g(x)$ for all real numbers x. If k is a constant, what is the maximum value of k?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 8 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
C	D	B	A	D	A	D	B	B	C
11	12	13	14	15	16	17	18	19	20
A	B	D	B	B	15	108	3	7	64

SECTION 4

1	2	3	4	5	6	7	8	9	10
C	A	B	D	A	C	C	D	C	D
11	12	13	14	15	16	17	18	19	20
B	B	A	C	D	C	D	A	B	D
21	22	23	24	25	26	27	28	29	30
B	C	D	C	B	C	C	D	D	C
31	32	33	34	35	36	37	38		
25.1	12.4	24	0.1	80	9	20	3		

SAT

Test #9

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

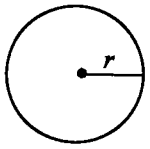
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

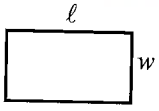
1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

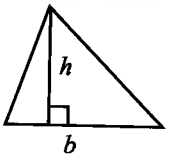


$A = \pi r^2$

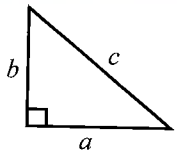
$C = 2\pi r$



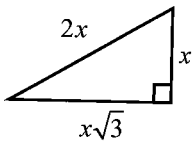
$A = \ell w$

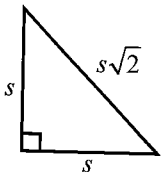


$A = \frac{1}{2}bh$

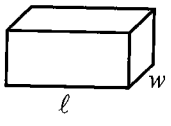


$c^2 = a^2 + b^2$

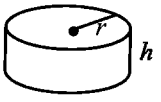




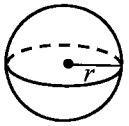
Special Right Triangles



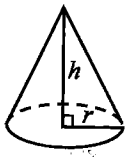
$V = \ell wh$



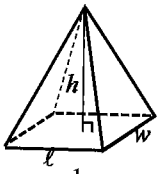
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

If $|k-5| \leq 8$, which of the following CANNOT be the value of k?

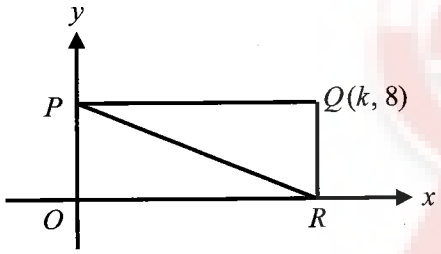
A) 8

B) 2

C) -3

D) -4

2



In the xy-plane above, $\overline{PR}$ is the diagonal of rectangle $OPQR$. If the length of $\overline{PR}$ is 17, what is the value of k?

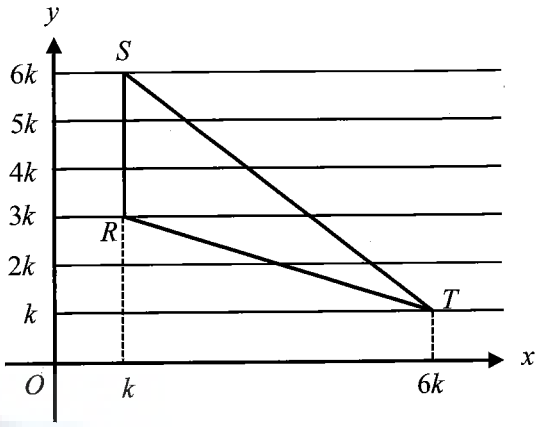
A) 12

B) 15

C) 16

D) 20

3



In the xy-plane above, the area of triangle RST is 30. What is the value of k?

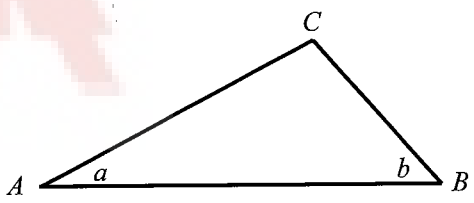
A) -2

B) 2

C) 3.5

C) 4

4



Note: Figure not drawn to scale.

In the triangle above, $\cos a = \sin b$. If the length of $\overline{AB}$ is 20 and the measure of angle b is $\frac{\pi}{3}$ radians, what is the area of the triangle?

A) $40\sqrt{2}$

B) $40\sqrt{3}$

C) $50\sqrt{3}$

D) $100\sqrt{3}$

CONTINUE

5

$$f(x) = x - p$$

In the function above, p is a constant. If $f(2) = 5$, what is the value of $f(2p)$?

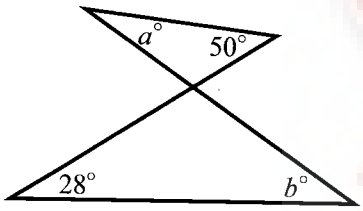
A) -3

B) -1

C) 3

D) 6

6



Note: Figure not drawn to scale.

In the figure above, what is the value of $|a - b|$?

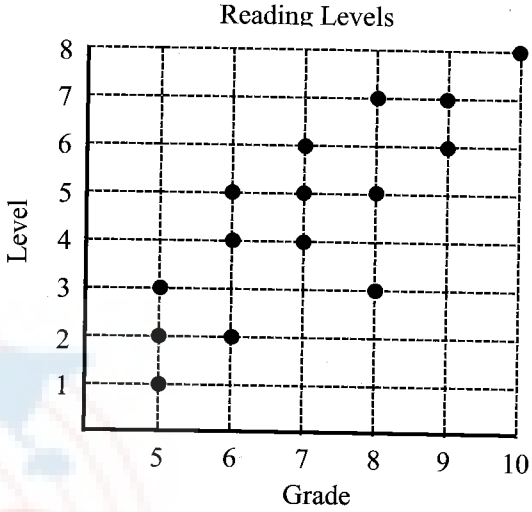
A) 20

B) 22

C) 24

D) 26

Questions 7 and 8 refer to the following information.



The scatterplot above shows the reading levels by grade for 15 students in the J.H book-reading club.

7

Based on the data above, what is the median reading level for the 15 students?

A) 4

B) 5

C) 5.5

D) 6

8

What is the average reading level of 7th and 8th grade students?

A) 4

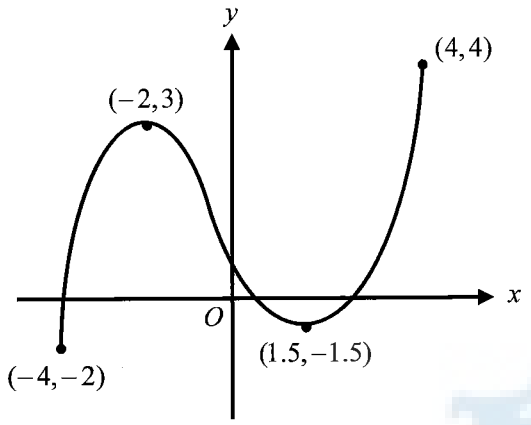
B) 5

C) 6

D) 6.5

CONTINUE

9



In the xy-plane above, the graph of f is shown in $-4 \le x \le 4$. If $f(k) = 3$, how many values of k are there in the interval?

A) 1

B) 2

C) 3

D) 4

10

$$P = \frac{50n - 200}{n} + k$$

The profit P from a car wash is modeled by the equation above, where n is the number of cars and k is a constant. Which of the following expressions represents n?

A) $n = \dfrac{200 + k}{50 - p}$

B) $n = \dfrac{200 - k}{50 + p}$

C) $n = \dfrac{200}{50 + k - p}$

D) $n = \dfrac{200}{k + p - 50}$

11

$$P(x) = 3x^3 + ax - 2$$

In the function above, a is a constant. If the remainder when $P(x)$ is divided by $x + 1$ is 2, what is the value of a?

A) -7

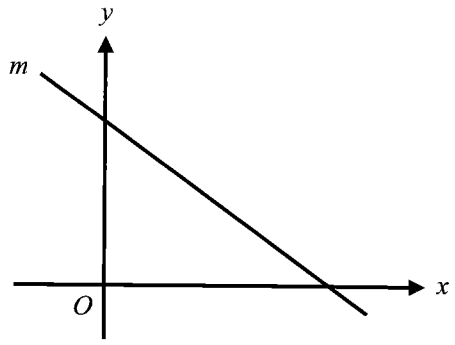
B) -5

C) 5

D) 7

CONTINUE

12



The graph of $ax + by = 5$ is shown in the xy-plane above. Which of the following must be true?

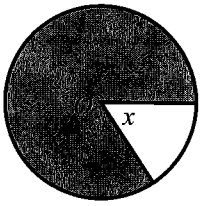
A) $a < 0$ and $b < 0$

B) $a > 0$ and $b < 0$

C) $a < 0$ and $b > 0$

D) $a > 0$ and $b > 0$

13



In the figure above, the center of the circle is O. The area of the shaded region is 80π and the measure of x is $\frac{2\pi}{5}$ radians. What is the radius of the circle?

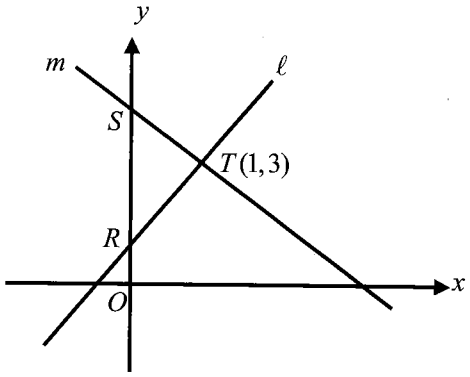
A) 6

B) 8

C) 9

D) 10

14



Note: Figure not drawn to scale.

Lines ℓ and m are perpendicular and intersect at point $T(1,3)$ as shown in the xy-plane above. If the slope of line ℓ is 1, what is the area of $\triangle RST$?

A) 1

B) 1.5

C) 2

D) 2.5

15

$$\frac{x^2+3}{x-1}$$

Which of the following is equivalent to the expression above?

A) $x+1$

B) $x(x+1)+3$

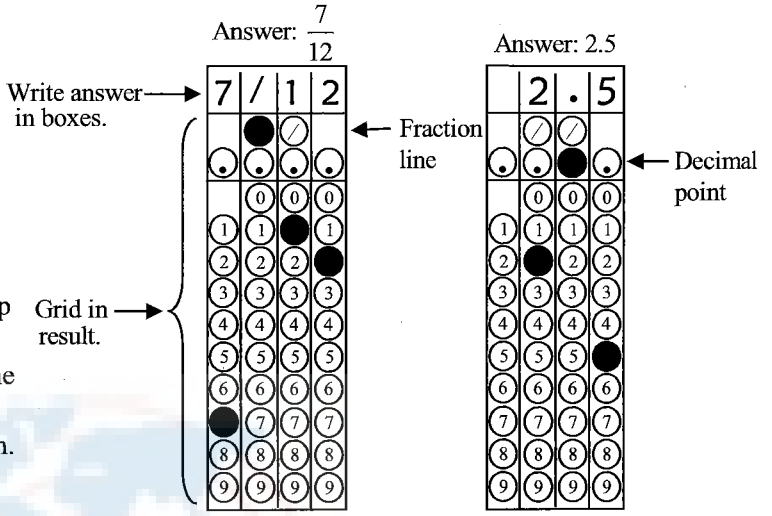
C) $x+1+\frac{4}{x-1}$

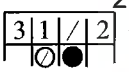
D) $\frac{x}{x-1}+x$

CONTINUE

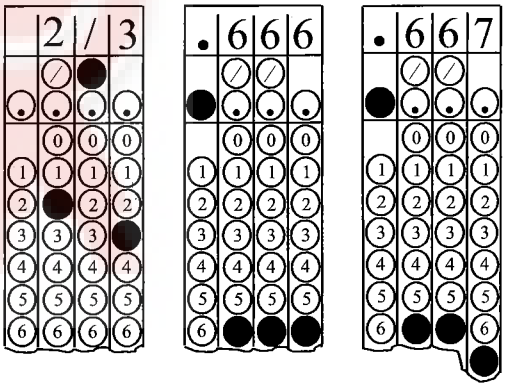
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

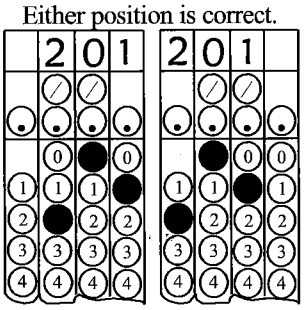


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:

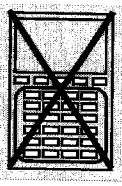


Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

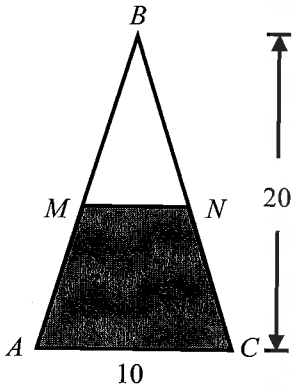
CONTINUE



16

If $\frac{1}{x-1}+\frac{1}{2x-2}=\frac{1}{4}$, what is the value of $x-1$?

17



The figure above shows triangle ABC. The length of $\overline{AC}$ is 10 and the altitude of the triangle is 20. If M and N are the midpoints of $\overline{AB}$ and $\overline{BC}$ respectively, what is the area of the shaded region?

18

$$(a-1)x^2+(b-2)x+ab=4x^2+5x+k$$

In the equation above, a, b, and k are constants. If the equation is true for all values of x, what is the value of k?

19

If $P(x)=2\sqrt{x-5}+3x$, what is the minimum value of P?

20

$$x^2+y^2=8$$
$$y=\sqrt{2x}$$

In the system of equations above, what is the value of y?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

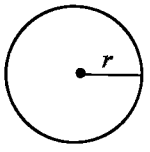
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

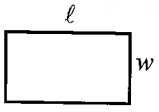
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

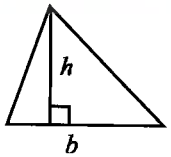


$A = \pi r^2$

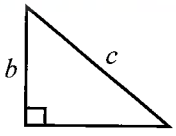
$C = 2\pi r$



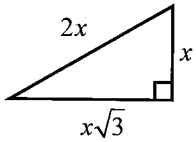
$A = \ell w$

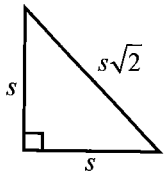


$A = \frac{1}{2}bh$

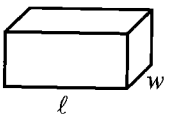


$c^2 = a^2 + b^2$

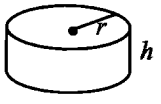




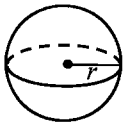
Special Right Triangles



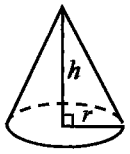
$V = \ell wh$



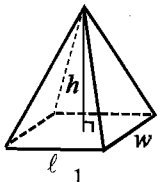
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



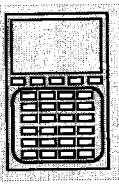
$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



1

The Sky Telephone Company charges a cents for the first 3 minutes of a call and charges at the rate of r cents for each additional minute. If Jackson uses t minutes, where $t > 3$, how much, in dollars, is his call?

A) $a + rt$

B) $a + r(t - 3)$

C) $0.01(a + r(t - 3))$

D) $0.01(a + rt - 3)$

2

If Sally drives m miles from her house to her office in f hours, and drives back to her house in g hours, what is her average speed of the entire trip, in miles per hour?

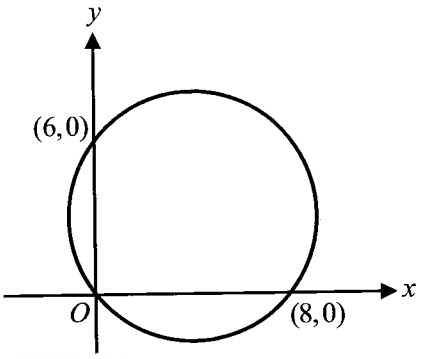
A) $\frac{f+g}{2}$

B) $\frac{m}{f+g}$

C) $\frac{2m}{f+g}$

D) $\frac{m}{f}+\frac{m}{g}$

3



The graph of a circle shown in the xy-plane above, intersects the x-axis and y-axis at three points. What is the radius of the circle?

A) 4

B) 5

C) 6

D) 7

4

$$f(x) = (x + a)^2 + 5$$

In the equation above, a is a constant. If a is increased by 4 units, which of the following is true about the resulting graph?

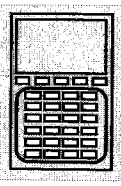
A) The resulting graph would be shifted by 4 units right.

B) The resulting graph would be shifted by 4 units left.

C) The resulting graph would be shifted by 4 units up.

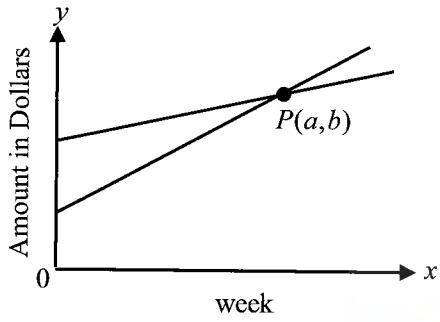
D) The resulting graph would be shifted by 4 units down

CONTINUE



Questions 5 and 6 refer to the following information.

Claire has \$40 in her own savings jar and puts in \$10 every week. David has \$80 in his own savings jar and puts in \$8 every week. Each of the graphs below shows the amount in the jar over time.



5

If the graphs intersect at the point $P(a,b)$, what is the value of b?

A) 200

B) 220

C) 240

D) 260

6

When Claire has \$200 in her savings jar, how many dollars does David have in his savings jar?

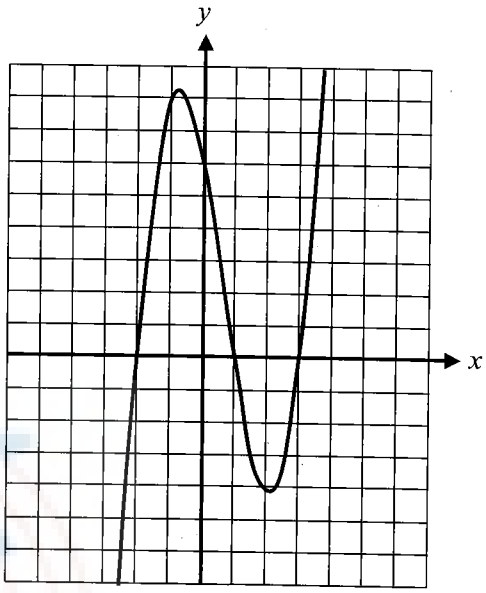
A) 208

B) 220

C) 246

D) 252

7



Which of the following functions could represent the graph of $f(x)$ shown in the xy-plane above?

A) $f(x)=(x-2)(x^2+4x-3)$

B) $f(x)=(x-2)(x^2-4x-3)$

C) $f(x)=(x+2)(x^2+4x+3)$

D) $f(x)=(x+2)(x^2-4x+3)$

8

The cost of a notebook is \$1.25. The cost of a pencil is \$0.30. Grace has \$35.00 to spend on notebooks and pencils for her study club. If she must buy fifteen notebooks, what is the maximum number of pencils she can buy?

A) 54

B) 55

C) 70

D) 116

CONTINUE

9

$$x + y > 3$$
$$ax + 2y < -2$$

In the system of inequalities, a is a constant. If the system has no solution, what is the value of a?

A) -2

B) -1

C) 1

D) 2

10

$$f(x) = ax^2 - 4x + b$$

In the function f above, a and b are constants. If the zeros of the function $f(x)$ are -2 and 3, what is the value of b?

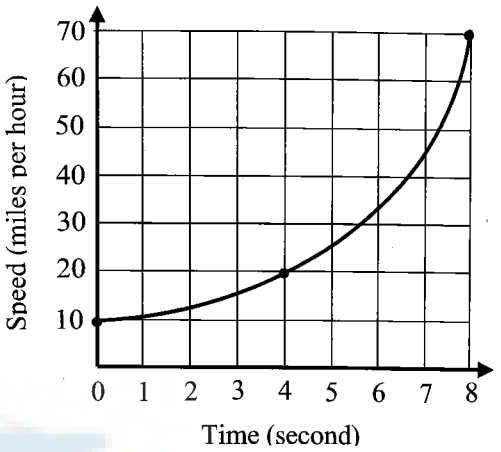
A) -24

B) -6

C) 6

D) 24

11



Jackie is driving a car at 10 miles per hour. The graph above shows the speed of his car over 8 seconds. During which of the following time intervals did the speed show the greatest average rate of change?

A) 0 to 2 seconds

B) 2 to 4 seconds

C) 4 to 6 seconds

D) 6 to 8 seconds

12

$$P(x) = x^2 + ax + b$$

In the function above, if the value of $P(0)$ is 1, which of the following must be true?

A) x is a factor of $P(x)$.

B) $x - 1$ is a factor of $P(x)$.

C) The remainder when $P(x)$ is divided by $x - 1$ is 0.

D) The remainder when $P(x)$ is divided by x is 1.

CONTINUE

13

$$f(x) = 2x^2 - 16x + 18$$

If $f(x) = a(x+b)^2 + c$ is equivalent to the function above, what is the value of c for $f(x)$?

A) -48

B) -14

C) 2

D) 50

14

$$\frac{5-10x}{2x+1}$$

Which of the following is equivalent to the expression above?

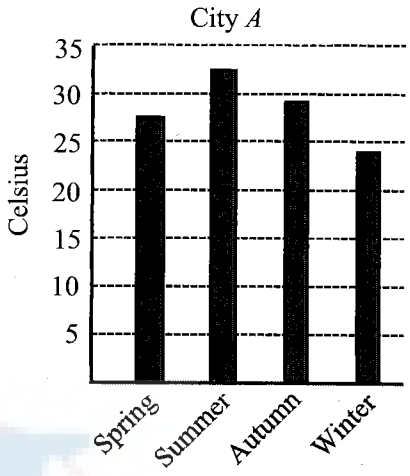
A) -5

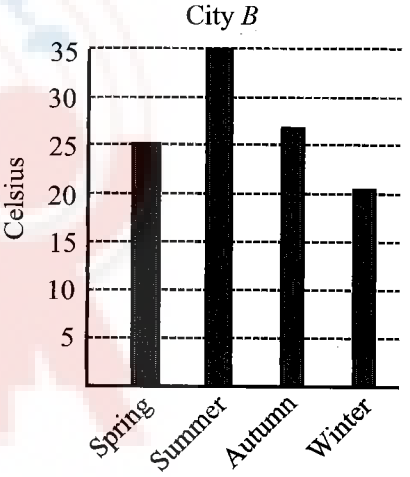
B) $\frac{5}{2x+1} - 5$

C) $\frac{10}{2x+1} + 5$

D) $\frac{10}{2x+1} - 5$

15





The bar graphs above show the average temperatures in degrees Celsius for City A and City B over the four seasons. Based on the graphs above, which of the following is true?

A) The standard deviation of the average temperatures in City A is larger than City B.

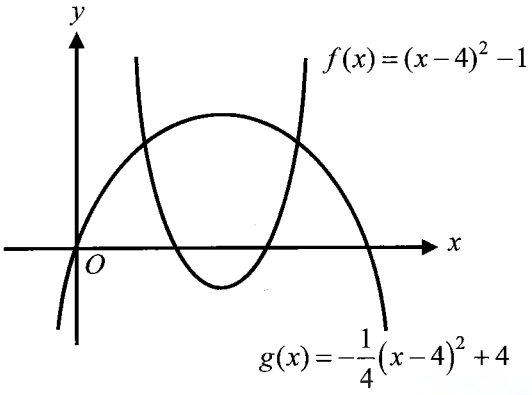
B) The standard deviation of the average temperatures in City B is larger than City A.

C) The standard deviation of the average temperatures in City B is the same as that of City A.

D) Based on graphs above, the standard deviation of the average temperatures in these cities cannot be determined.

CONTINUE

16



The graphs of the functions f and g are shown in the xy-plane above. For which of the following values of x does $f(x)-g(x)=0$?

A) 1

B) 3

C) 6

D) 8

17

$$x^2+y^2-4x+4y=k$$

The equation of a circle in the xy-plane, where k is an constant, is shown above. If the radius of the circle is 6, what is the value of k?

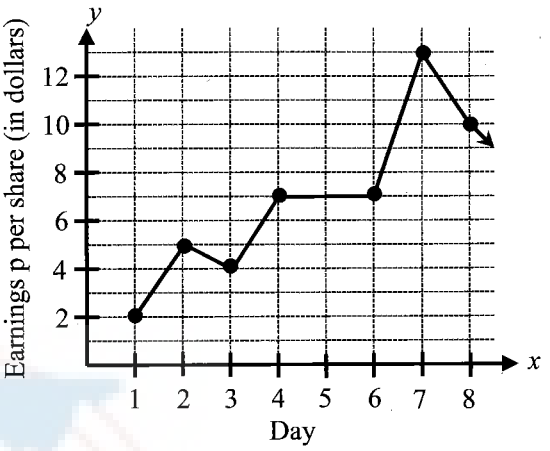
A) –28

B) –2

C) 14

D) 28

Questions 18 and 19 refer to the following information.



The graph above shows the earnings per share of stock for Milly Electronics for the first 8 days in March this year.

18

What is the average rate of change between days 1 and 8?

A) $\frac{3}{4}$ dollars per day

B) $\frac{7}{8}$ dollars per day

C) $\frac{8}{7}$ dollars per day

D) It cannot be determined based on the information given.

19

What is the equation of the line between day 2 and day 7?

A) $y=x+3$

B) $y=1.6x+1.8$

C) $y=2.4x+0.2$

D) $y=3x-1$

CONTINUE

20

$$f(x) = 2^{x+2}$$

In the function above, which of the following is equivalent to $f(a+b)$?

A) $2\left(2^a + 2^b\right)$

B) $4\left(2^a + 2^b\right)$

C) $4\left(2^a \times 2^b\right)$

D) $4 + \left(2^a \times 2^b\right)$

21

The sum of four numbers is 783. One of the numbers a, is 25% more than the sum of the other three numbers. What is the value of a?

A) 348

B) 435

C) 520

D) 585

22

Mr. Lee brought reading books to his class. If each student takes 5 books, there will be 15 books left. If 5 students do not take a book and the rest of the students take 7 books each, there will be no books left. How many books were brought to the class?

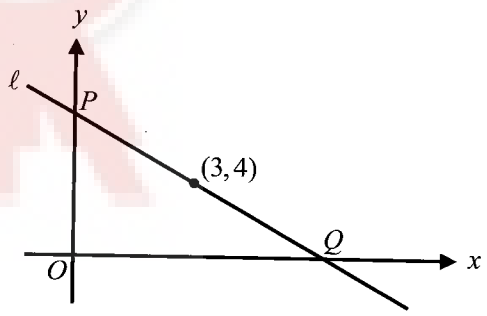
A) 140

B) 125

C) 120

D) 104

23



In the xy-plane above, if line ℓ has a slope of $-\frac{1}{3}$, what is the area of triangle OPQ?

A) 37.5

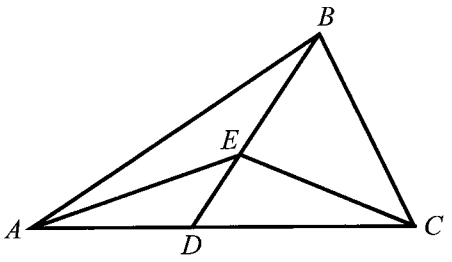
B) 60

C) 62.5

D) 75

CONTINUE

24



In the figure above, $BE:ED=3:2$. The area of $\triangle BEC$ is 15 and the area of $\triangle BEA$ is 12. What is the area of $\triangle AEC$?

A) 15

B) 18

C) 20

D) 24

25

$$f(x)=a(x-b)^2+k$$

In the function above, a, b, and k are constants. If a and k are negative numbers, which of the following CANNOT be true?

A) $f(5)=-1$

B) $f(1)=k$

C) $f(2)=b$

D) $f(3)=1$

26

$$(a-2)x+(b+2)y=8$$
$$bx+ay=4$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of a?

A) $-\frac{4}{3}$

B) $-\frac{2}{3}$

C) $\frac{2}{3}$

D) $\frac{4}{3}$

27

A cylinder was altered by increasing the radius of its circle base by 10 percent and decreasing its height by k percent. If the volume of the resulting cylinder is 8.9% greater than the volume of the original cylinder, what is the value of k?

A) 8.9

B) 10

C) 12

D) 15

CONTINUE

Questions 28 and 29 refer to the following information.

When Albert starts walking, Kimberly is 60 yards ahead of him. They are moving in the same direction on the same straight path. Albert walks 8 yards for every 4 yards that Kimberly walks. Albert walks 3 yards per second.

28

At these relative rates, in how many seconds will Albert catch up with Kimberly?

A) 20

B) 25

C) 30

D) 40

29

How many yards will Albert have to walk in order to catch up with Kimberly?

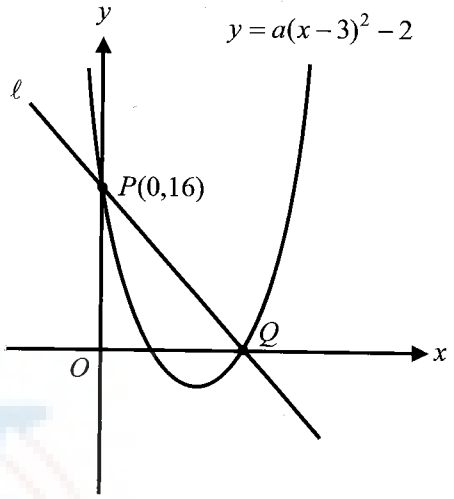
A) 100

B) 120

C) 240

D) 320

30



Note: Figure not drawn to scale.

In the xy-plane above, the graph of $y = a(x-3)^2 - 2$, where a is a constant, intersects line ℓ at points $P(0,16)$ and Q. What is the equation of line ℓ?

A) $y = -8x + 16$

B) $y = -4x + 16$

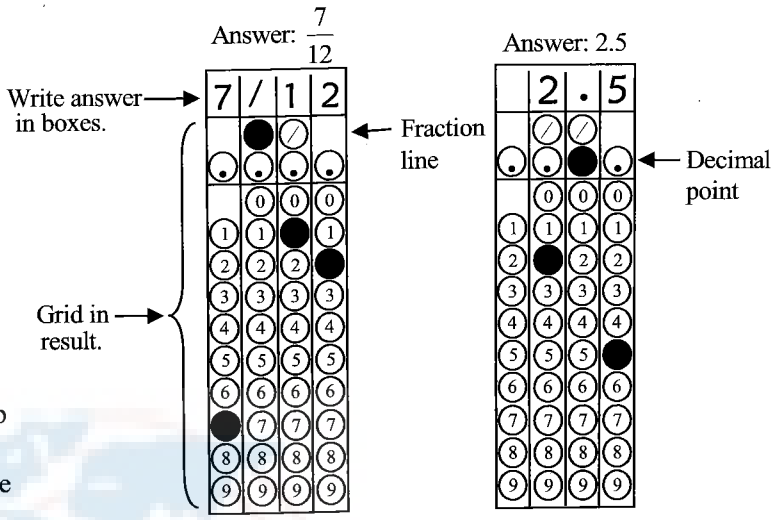
C) $y = -3x + 16$

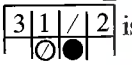
D) $y = -2x + 16$

CONTINUE

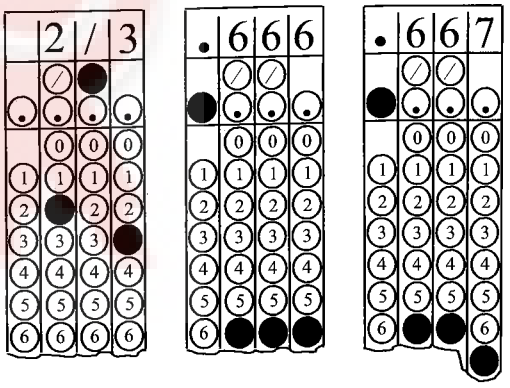
DIRECTION

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

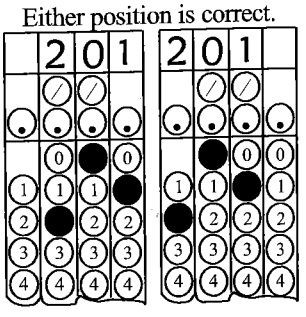


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:

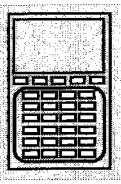


Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE



4

31

$$h(x)=\frac{x-3}{x^3-3x^2+x-3}$$

For what value of x is the function h above undefined?

32

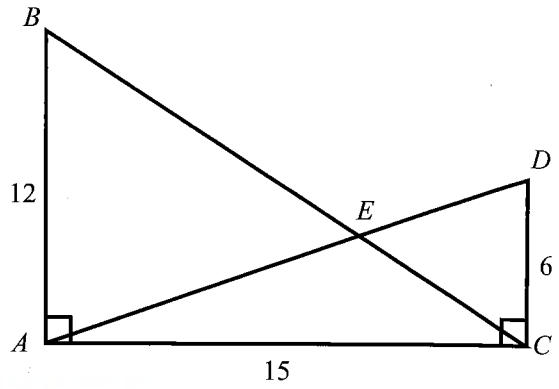
The state income tax where Alison lives is levied at the rate of $k\%$ of the first \$30,000 of annual income plus $(k+4)\%$ of any amount above \$30,000. This year Alison's income was \$65,000 and she paid \$9,850 for the income tax. What is the value of k?

33

$$b-3+(a-5)i=a+8i$$

In the equation above, a and b are real numbers. If $i=\sqrt{-1}$, what is the value of b?

34



In the figure above, $AB=12$, $AC=15$, and $CD=6$. Both $\overline{AB}$ and $\overline{CD}$ are perpendicular to $\overline{AC}$. If the area of $\triangle ABE$ is p and the area of $\triangle CDE$ is q, then what is the value of $p-q$?

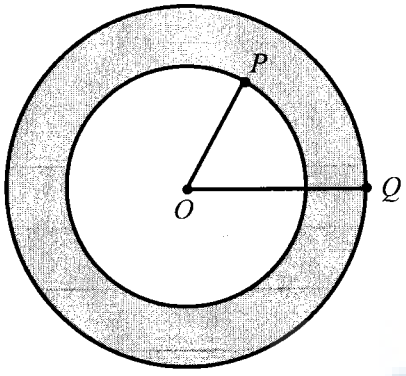
35

$$h=-16t^2+at$$

A football game begins with a kickoff. The formula for the kickoff is modeled by the equation above, where h is the height in feet of the football at t seconds and a is a constant. If the kickoff is in the air for 5 seconds, what is the value of a?

CONTINUE

36



In the figure above, each of two circles has the same center O. If $OP:OQ=3:5$ and the area of the shaded region is 40, what is the area of the larger circle?

37

$$f(x)=ax^2+bx+c$$

In the function f above, $f(0)=10$ and $f(-1)=18$. What is the value of $a-b$?

38

In the xy-plane, the graphs of $y=-x^2+12$ and line ℓ intersect at points $P(p, 3)$ and $Q(q,-4)$. What is the greatest possible value of the slope of line ℓ?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 9 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
D	B	B	C	A	B	B	B	B	C
11	12	13	14	15	16	17	18	19	20
A	D	D	A	C	6	75	35	10	2

SECTION 4

1	2	3	4	5	6	7	8	9	10
C	C	B	B	C	A	D	A	D	A
11	12	13	14	15	16	17	18	19	20
D	D	C	D	B	C	D	C	B	C
21	22	23	24	25	26	27	28	29	30
B	A	A	B	D	C	B	D	B	B
31	32	33	34	35	36	37	38		
3	13	16	45	80	62.5	8	7		

SAT

Test #10

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

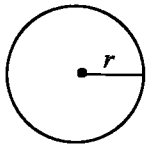
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

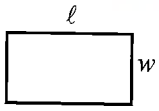
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

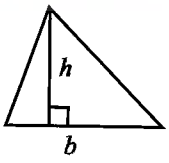


$A = \pi r^2$

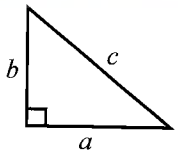
$C = 2\pi r$



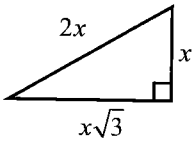
$A = \ell w$

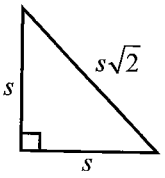


$A = \frac{1}{2}bh$

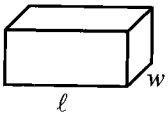


$c^2 = a^2 + b^2$

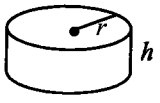




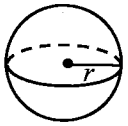
Special Right Triangles



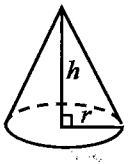
$V = \ell wh$



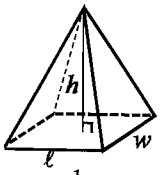
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



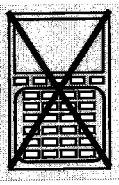
$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



3

1

If $\frac{5}{2x-3}=\frac{5}{x}$, what is the value of $2x-3$?

A) 0

B) 1

C) 3

D) 5

2

$$2x+y\leq 3$$
$$x-y<-3$$

Which of the following ordered pairs (x, y) satisfies the system of inequalities above?

A) $(-1, 0)$

B) $(-1, -1)$

C) $(-2, 4)$

D) $(-3, 0)$

3

A salesman's commission is k percent of the selling price of a car. This week Peter, a salesman, sold 10 cars for \$20,000 each. Which of the following represents the commission this week?

A) $200k$

B) $2,000k$

C) $\frac{20,000}{k}$

D) $\frac{20,000k}{100+k}$

4

Emily is walking a trail. After walking k percent of the length of the trail, she has 10 km left to go. Which of the following represents the length of the trail?

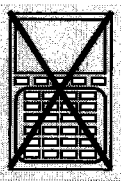
A) $10(100-k)$

B) $\frac{100-k}{10}$

C) $\frac{10k}{100-k}$

D) $\frac{1000}{100-k}$

CONTINUE



3

5

$$C(x) = 140{,}000 + 85x$$

A company that produces smart phones pays a start-up cost and a certain amount of money to produce each smart phone. The cost of producing x smart phones is given by the function above. What is the meaning of the value 85 in the function?

A) the start-up cost

B) the selling price of one smart phone

C) the amount spent to produce each smart phone

D) the profit earned from the sale of one smart phone

6

Which of the following equations has the same solution as $2x^2 + 12x - 32 = 0$?

A) $2(x+3)^2 = 32$

B) $2(x-3)^2 = 25$

C) $(x+3)^2 = 25$

D) $(x+3)^2 = 32$

7

The marketing department of a company estimates the price P, in dollars, of a smart phone by the equation $P = 500 - 25x$ over 10 years, where x is the number of years. What is the estimated decrease, in dollars, each year?

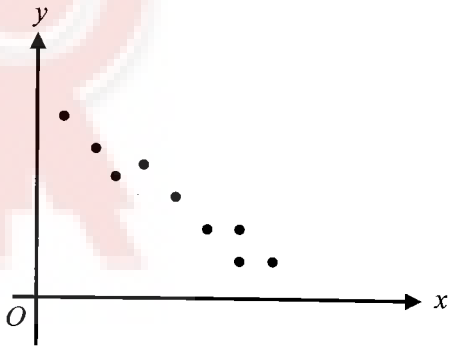
A) 20

B) 25

C) 100

D) 500

8



Which of the following best represents the correlation coefficient of the linear fit of the data shown above?

A) 0.95

B) −0.95

C) −1.00

D) −1.05

CONTINUE

9

$$2x - 3y = 6$$
$$y = x - 4$$

What is the solution (x, y) to the system of equations above?

A) $(3, -1)$

B) $(4, 0)$

C) $(5, 1)$

D) $(6, 2)$

10

Which of the following equations has a graph in the xy-plane for which y is always greater than 0?

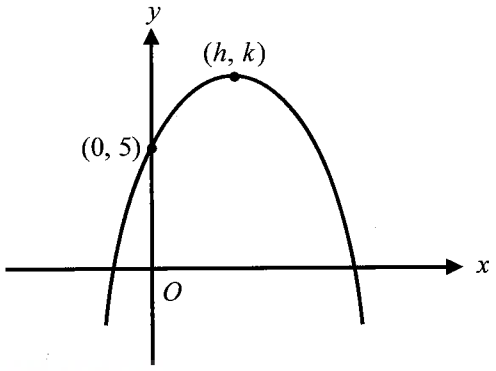
A) $y = x + 2$

B) $y = (x - 2)^2$

C) $y = x^3 + 2$

D) $y = |x| + 2$

11



Note: Figure not drawn to scale.

The graph of $y = a(x + 1)(x - 5)$ is shown in the xy-plane above, where a is a constant. If the graph with vertex (h, k) intersects the y-axis at point $(0, 5)$, which of the following is equal to k?

A) 7

B) 8

C) 9

D) 10

12

If $k = \dfrac{(x+1)(x-1)}{3}$ and $k \neq 0$, what does $3x^2$ equal in terms of k?

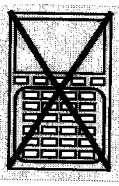
A) $3k$

B) $9k$

C) $3k + 1$

D) $9k + 3$

CONTINUE



13

The average (arithmetic mean) of three positive numbers, a, b, and c is 15. When the greatest of these numbers is subtracted from the sum of the other two, the result is 5. If $a < b < c$, what is the value of $a + b$?

A) 20

B) 25

C) 30

D) 40

14

$$\frac{a(x+1)+b(x-1)}{x-2} = 2 + \frac{1}{x-2}$$

The equation above is true for all values of $x \neq 2$, where a and b are constants. What is the value of a?

A) $-\frac{1}{2}$

B) 2

C) 3

D) 4

15

What are the solutions to $3(x-3)^2 - 6 = 14$?

A) $x = 3 \pm \sqrt{20}$

B) $x = \frac{3 \pm \sqrt{20}}{3}$

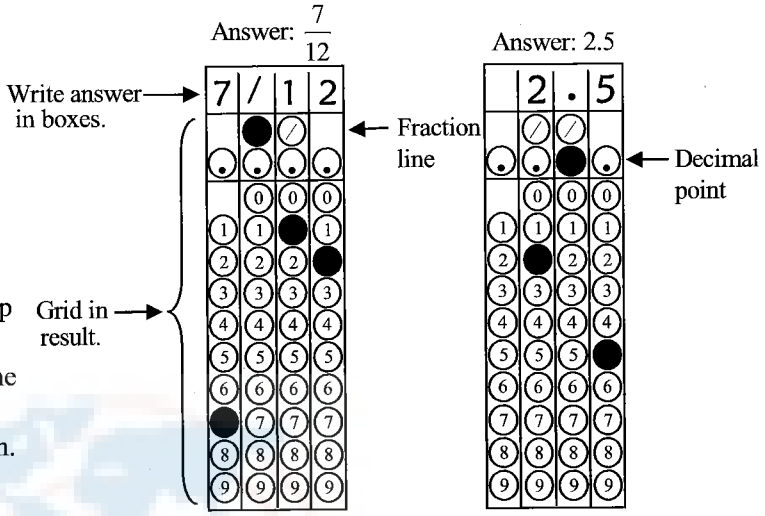
C) $x = 3 \pm \frac{\sqrt{20}}{3}$

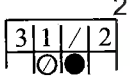
D) $x = 3 \pm \frac{\sqrt{60}}{3}$

CONTINUE

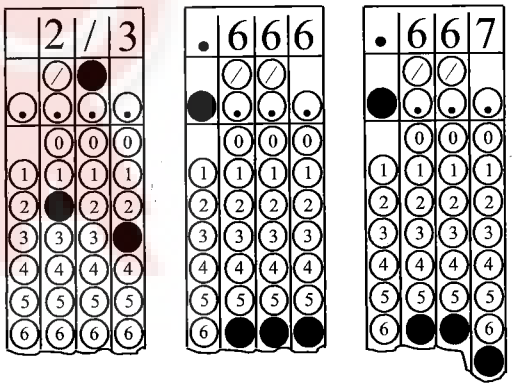
DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

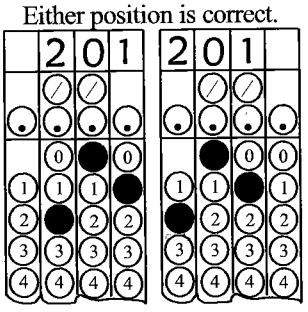


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16

$$|x-5| \leq \frac{1}{2}$$

What is the least value of x that satisfies the inequality above?

17

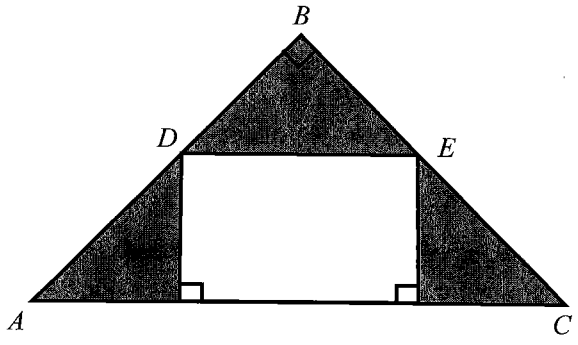
If the diameter of a cylindrical jar is increased by 100% without altering the volume, by what percent must the height be decreased? (Note: Disregard the % sign when gridding your answer.)

18

$$f(x) = \frac{x^2}{2} - 20x + k$$

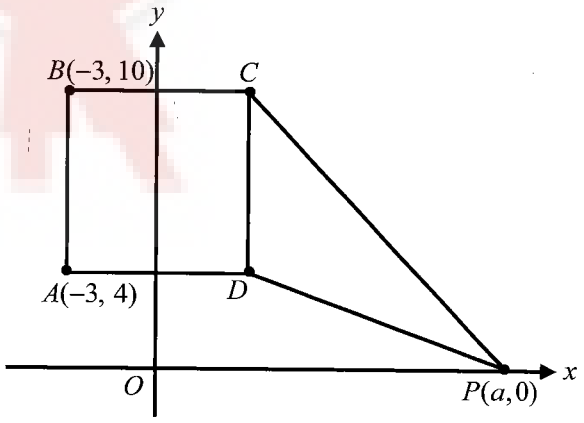
In the function f above, k is a constant. In the xy-plane, for what value of x does $f(x)$ have the same value of $f(10)$?

19



In the isosceles right triangle above, $AB = BC = 10\sqrt{2}$. Points D and E are the midpoints of $\overline{AB}$ and $\overline{BC}$ respectively. What is the area of the shaded region?

20



In the xy-plane above, the area of square $ABCD$ is equal to the area of triangle CDP. What is the value of a?

STOP

If you finish before time is called, you may check your work on this section only. 200/215
Do not turn to any other section in the test.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

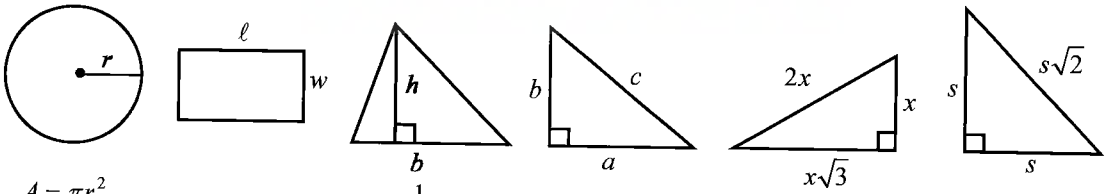
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on your answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTE

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



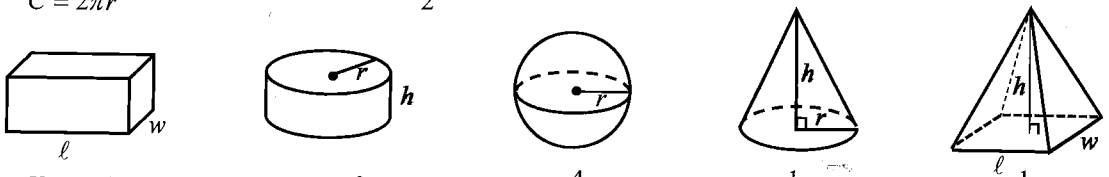
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

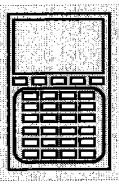
$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The number of the measures in degrees of the angles of a triangle is 180.

CONTINUE



4

1

An advertising medium charges d dollars for a basic fixed fee plus c cents for every 10 letters for an advertising campaign. If 300 letters are used for an advertising campaign, which of the following expressions represents the total amount, in dollars, of the advertisement?

A) $\frac{3c}{10} + d$

B) $3c + d$

C) $30c + d$

D) $300c + d$

2

$$f(x) = ax + b$$

In the function above, a and b are constants. If $f(0) = 3$ and $f(3) = -8$, what is the value of $f(6)$?

A) -22

B) -19

C) -16

D) -12

3

$$y = 2^x$$
$$y = x + 5$$

If ordered pair (x, y) is the solution to the system of equations above, what is the value of y?

A) 2

B) 8

C) 16

D) 32

4

If $f(x-5) = x^2 - 5$, which of the following is equal to $f(-2)$?

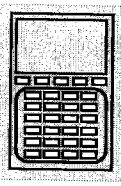
A) 4

B) 1

C) -1

D) -4

CONTINUE



5

If $a+b=10$ and $\frac{1}{a}+\frac{1}{b}=20$, what is the value of ab?

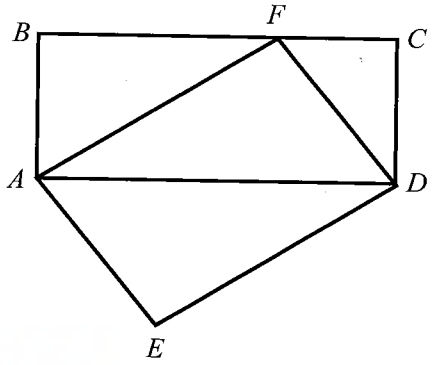
A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) 2

D) 4

6



In the figure above, the area of rectangle $ABCD$ is 25. What is the area of parallelogram $AFDE$?

A) 12.5

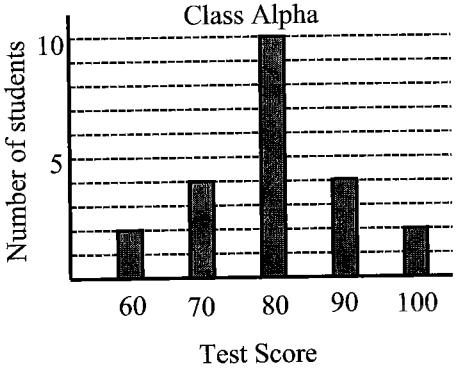
B) 18

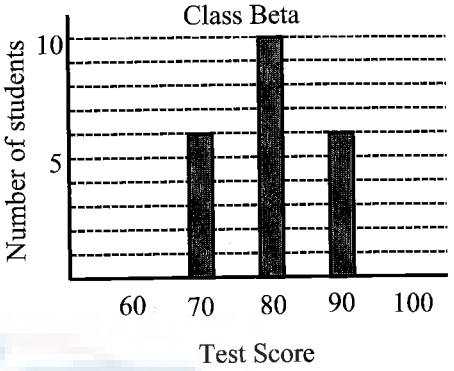
C) 25

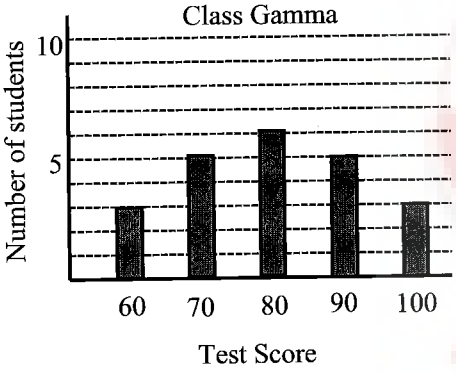
D) 27.5

CONTINUE

Questions 7 and 8 refer to the following information.







The scores on a final reading test of three junior classes in a certain high school were shown on the bar graphs above.

7

Which class has the least standard deviation?

A) Class Alpha

B) Class Beta

C) Class Gamma

D) Based on the data, it cannot be determined.

8

What is the overall average score of these three combined classes?

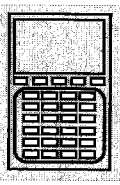
A) 78

B) 80

C) 82

D) 84

CONTINUE



4

9

$$f(x) = x^2 - 8x + 12.$$

The function f is shown above. In the xy-plane, what are the coordinates of the vertex of the parabola defined by $g(x) = f(x-3)$?

A) $(-4, 7)$

B) $(4, 12)$

C) $(7, -4)$

D) $(7, 12)$

10

If a total of \$9,000 is invested at an annual interest rate of 2% compounded monthly, which of the following expressions shows the amount of interest after 10 years?

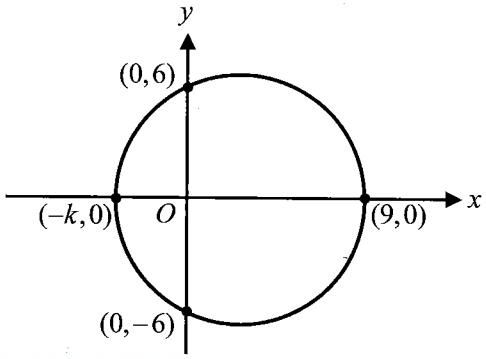
A) $9000\left(1+\frac{2}{12}\right)^{10} - 9000$

B) $9000\left(1+\frac{2}{120}\right)^{10} - 9000$

C) $9000\left(1+\frac{2}{120}\right)^{120} - 9000$

D) $9000\left(1+\frac{2}{1200}\right)^{120} - 9000$

11



The graph of a circle in the xy-plane above intersects at four points with the x-axis and the y-axis. What is the value of k?

A) 4

B) 5

C) 6

D) 7

12

If $f(x-3) = x^2 + x + 1$, which of the following represents $f(x)$?

A) $f(x) = x^2 + x - 4$

B) $f(x) = (x-3)^2 + (x-3) + 1$

C) $f(x) = (x+3)^2 + (x+3) + 1$

D) $f(x) = (x+3)^2 + (x+3) + 3$

CONTINUE

13

If $3p+5 \leq 15$, what is the greatest possible value of $6p-5$?

A) 15

B) 25

C) 35

D) 85

14

Which of the following polynomials is divisible by $(x+1)$?

A) x^3-1

B) x^3-x^2-x-1

C) x^3+x^2-x+1

D) x^3+x^2-x-1

15

Week	1	2	3	4	5	6	7
Height (feet)	1.5	1.7	1.8	2.2	2.9	3.7	4.8

Students in a science class observed the growth of a plant over 7 weeks. The table above shows their observations. What is the average rate of change, in feet per week, of the plant from weeks 1 to 7?

A) 0.42

B) 0.47

C) 0.55

D) 0.58

16

Ashley and Bernard work at an electronic appliance store. Ashley is paid \$200 per week plus 5% of her total sales. Bernard is paid \$325 per week plus 2.5% of his total sales. If their weekly pay is the same, what is the dollar amount of their sales?

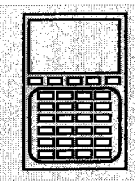
A) 5,000

B) 6,200

C) 7,500

D) 8,400

CONTINUE



4

17

How does the graph of $f(x) = x^2 - 4x + 5$ compare with the graph of $g(x) = x^2$?

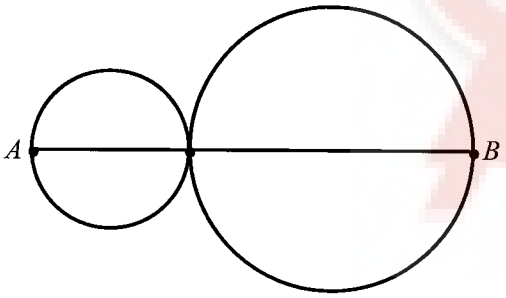
A) The graph of $g(x)$ is moved to the left 4 units and up 5 units.

B) The graph of $g(x)$ is moved to the right 4 units and up 5 units.

C) The graph of $g(x)$ is moved to the left 2 units and up 5 units.

D) The graph of $g(x)$ is moved to the right 2 units and up 1 unit.

18



In the figure above, the circles are tangent each other and the radii are in a ratio of 1:2. If the sum of their areas is 80π, what is the length of $\overline{AB}$?

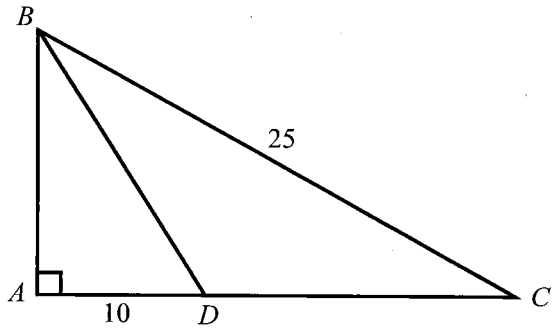
A) 12

B) 16

C) 18

D) 24

19



In right triangle ABC above, $AD = 10$ and $BC = 25$. If the value of $\sin \angle BCD$ is 0.6, what is the area of triangle BCD?

A) 50

B) 75

C) 100

D) 150

20

If $p = a^2 - 4a + 8$, what is the least possible value of $p + 6$?

A) 2

B) 4

C) 8

D) 10

CONTINUE

21

$$80 \le x \le 100$$
$$40 \le y \le 60$$

The intervals of x and y are shown above. If $z = x - y$, which of the following represents all possible values of z?

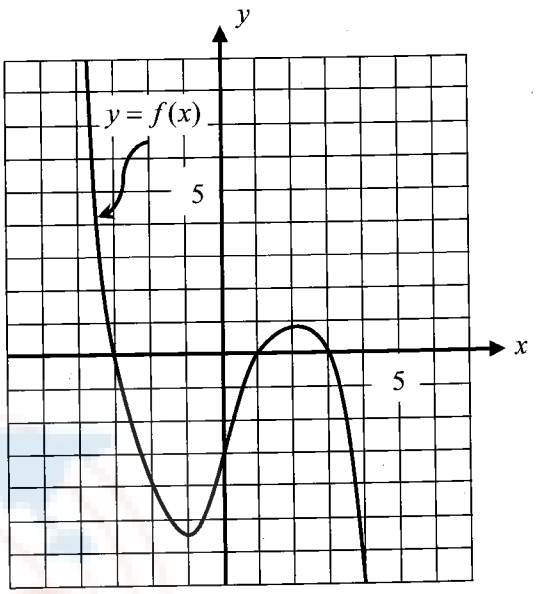
A) $|z - 40| \le 20$

B) $|z - 40| \ge 20$

C) $|z - 20| \le 40$

D) $|z - 20| \ge 40$

22



Which of the following functions could represent the graph of $f(x)$ shown in the xy-plane above?

A) $f(x) = \frac{1}{3}(x-3)(x^2 - 4x + 3)$

B) $f(x) = -\frac{1}{3}(x-3)(x^2 - 2x - 3)$

C) $f(x) = \frac{1}{3}(x+3)(x^2 - 4x + 3)$

D) $f(x) = -\frac{1}{3}(x+3)(x^2 + 4x + 3)$

CONTINUE

23

$$f(x) = (x-4)^2 - 64$$

Which of the following is an equivalent form of the function above?

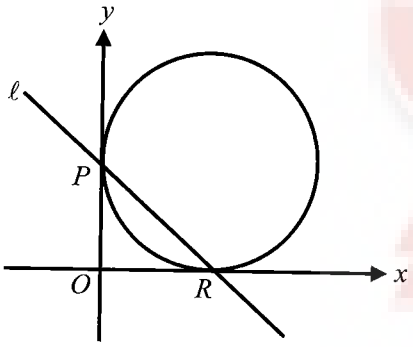
A) $f(x) = (x+3)(x-11)$

B) $f(x) = (x+6)(x-14)$

C) $f(x) = (x+4)(x-12)$

D) $f(x) = (x+6)(x-8)$

24



In the xy-plane above, a circle is tangent to the x-axis at R and the y-axis at P, and line ℓ passes through the points of tangency. If the area of the circle is 100π, what is the equation of line ℓ?

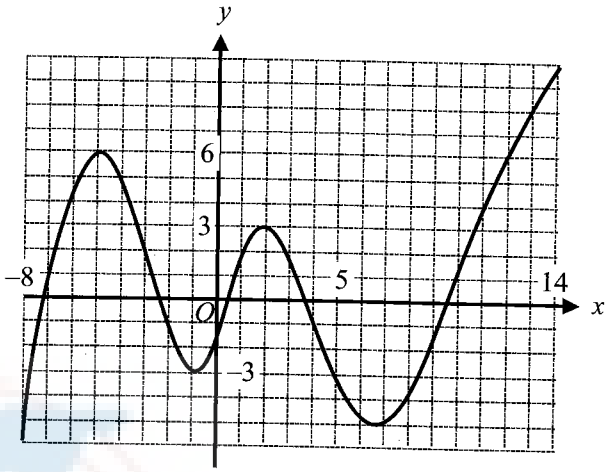
A) $y = -x + 5$

B) $y = -x + 10$

C) $y = -x + 50$

D) $y = -x + 100$

25



$y = f(x)$

$y = k$

In the system of equations above, k is a constant. The function $y = f(x)$ is shown in the xy-plane above for $-8 \le x \le 14$. On this closed interval, for how many values of k does the system have exactly 4 solutions?

A) 1

B) 2

C) 3

D) 4

26

Let the function f be defined by $f(x) = \sqrt{50 - 2x^2}$. What are all the values of x for which $f(x)$ is a real number?

A) $x \ge 5$

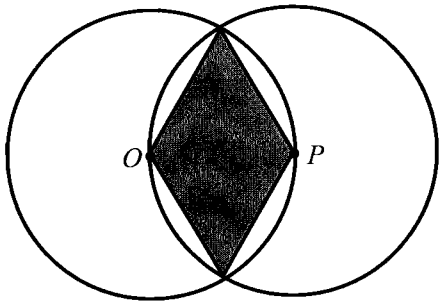
B) $x \le 5$

C) $-25 \le x \le 25$

D) $-5 \le x \le 5$

CONTINUE

27



In the figure above, O and P are the centers of the circles. If the lengths of radii of the circles are each 10, what is the area of the shaded region?

A) $50\sqrt{3}$

B) $25\sqrt{3}$

C) $\frac{25\sqrt{3}}{2}$

D) $\frac{25\sqrt{3}}{4}$

28

In the xy-plane, the graph of the function is a line with a slope of 5. If $f(a) = -4$ and $f(b) = 32$, what is the value of $b - a$?

A) 6

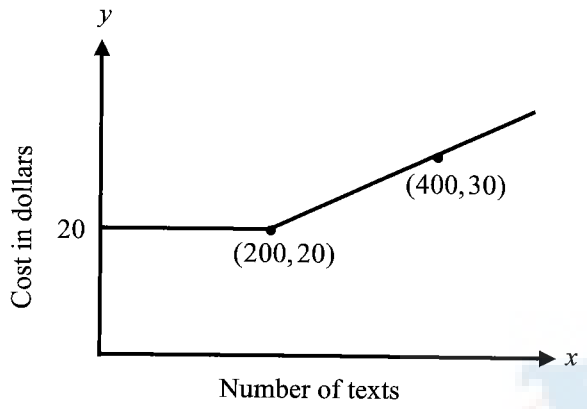
B) 7.2

C) 8

D) 8.4

CONTINUE

Questions 29 and 30 refer to the following information.



The domestic texting plan of an E-mobile telephone company is modeled by the graph in the xy-plane above.

29

Which of the following pairs of equations represents the graph of the domestic texting plan?

A) $\begin{cases} y = 20, & x \le 200 \\ y = 0.05x, & x > 200 \end{cases}$

B) $\begin{cases} y = 20, & x \le 200 \\ y = 20 + 0.05x, & x > 200 \end{cases}$

C) $\begin{cases} y = 20, & x \le 200 \\ y = 20 + 0.05(x - 200), & x > 200 \end{cases}$

D) $\begin{cases} y = 20, & x \le 200 \\ y = 30, & x > 200 \end{cases}$

30

If Jennifer uses 550 texts this month, what is her amount of money, in dollars, does she have to pay?

A) 20.00

B) 25.00

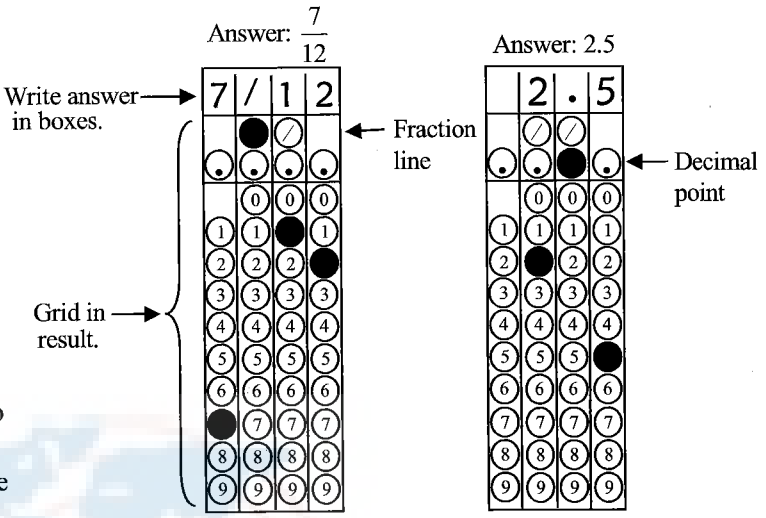
C) 32.50

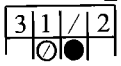
D) 37.50

CONTINUE

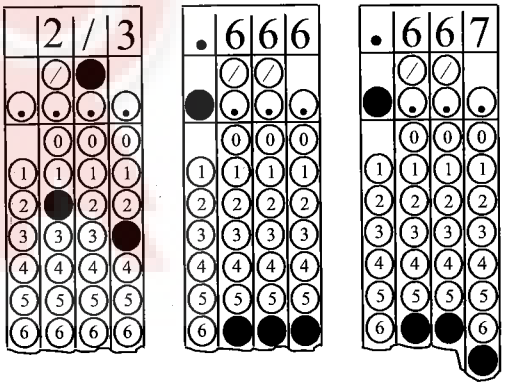
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

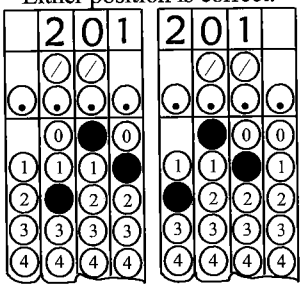


1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Acceptable ways to grid $\frac{2}{3}$ are:



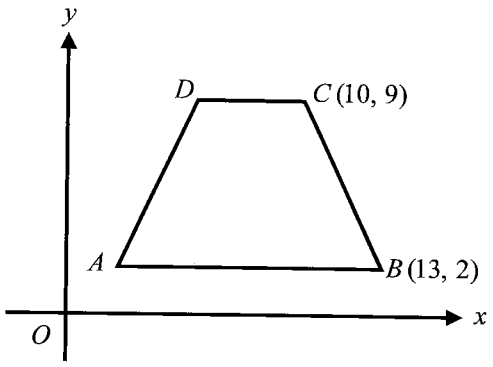
Answer: 201
Either position is correct.



Note: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31



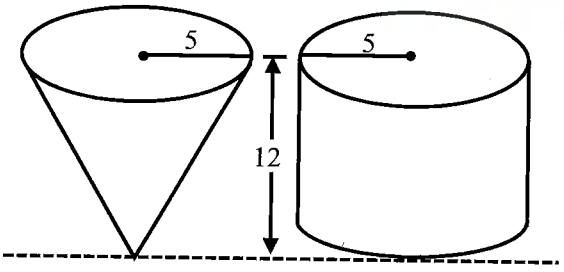
A trapezoid ADCB is in the xy-plane above. If $AD = BC$, what is the slope of $\overline{AD}$?

32

If a and b are positive integers such that $\frac{a}{b} = 0.48$.

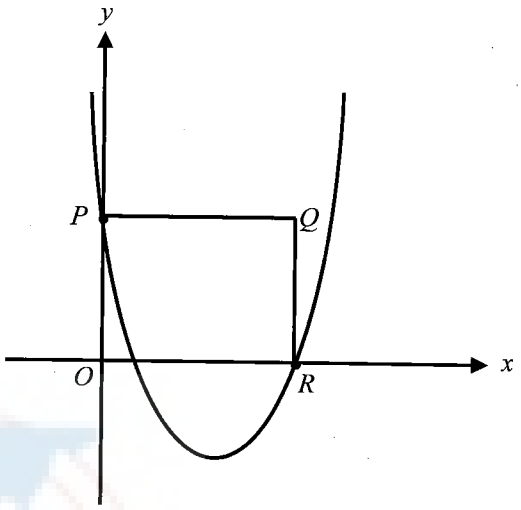
If $150 < b < 200$, what is the value of $a + b$?

33



In the figure above, the cylindrical and cone-shaped containers have the same height of 10 inches and the same radius of 5 inches. If the cone-shaped container filled with water and then the water is poured into the empty cylindrical container, what will be the depth, in inches, of the water in the cylindrical container?

34



Note: Figure not drawn to scale.

In the xy-plane above, the graph of $y = 2x^2 - 19x + 9$ intersects the y-axis at P and the x-axis at R. What is the area of rectangle $OPQR$?

35

$$y \geq x^2 - 8x$$
$$y \leq 2x$$

In the xy-plane, ordered pair (a, b) is the solution of the system of inequalities above. What is the maximum possible value of b?

CONTINUE

36

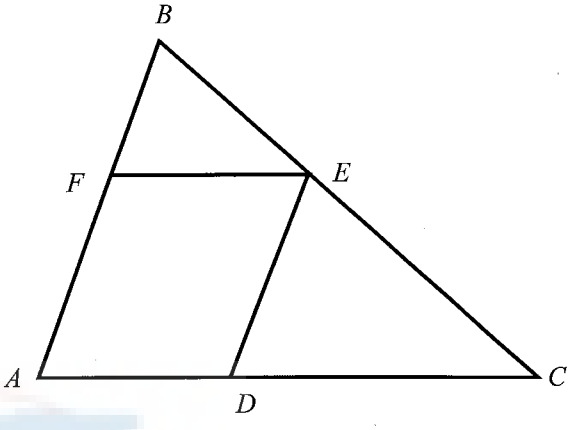
$$-6 \le x \le 20$$

If the interval above is rewritten in the form $|x - a| \le k$, what is the value of k?

37

Mr. Trump drove to work in the morning at the average speed of 60 miles per hour. He returned home in the evening along the same route and averaged 45 miles per hour. To the nearest tenth, what is his average speed, in miles per hour, for the entire trip?

38



In the figure above, quadrilateral $AFED$ is a parallelogram and $\frac{BF}{EC} = \frac{1}{2}$. If the area of the parallelogram is 10, what is the area of triangle ABC?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

Test 10 Answers and Explanations

SECTION 3

1	2	3	4	5	6	7	8	9	10
C	C	B	D	C	C	B	B	D	D
11	12	13	14	15	16	17	18	19	20
C	D	B	A	D	4.5	75	30	50	18

SECTION 4

1	2	3	4	5	6	7	8	9	10
A	B	B	A	B	C	B	B	C	D
11	12	13	14	15	16	17	18	19	20
A	C	A	D	C	A	D	D	B	D
21	22	23	24	25	26	27	28	29	30
A	C	C	B	B	D	A	B	C	D
31	32	33	34	35	36	37	38		
$\frac{7}{3}$	259	4	81	20	13	51.4	22.5		