Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

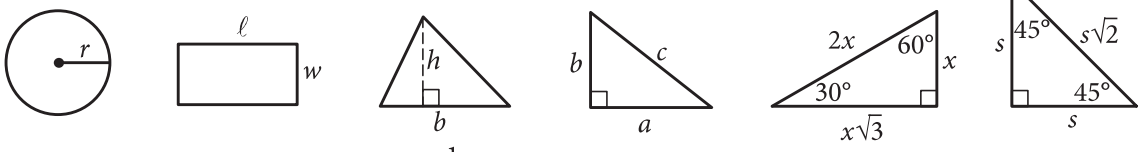
DIRECTIONS

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 the 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



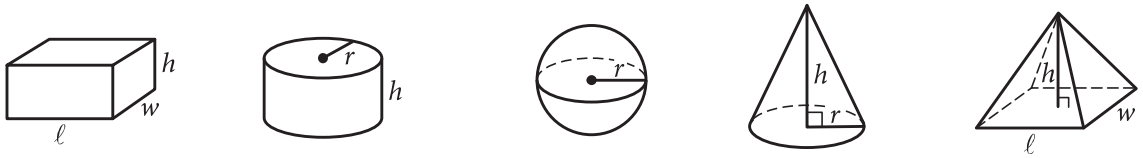
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

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

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

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 sum of the measures in degrees of the angles of a triangle is 180.

1

What is the solution to the equation $2x + 3 = 7$?

A) 1

B) 1.5

C) 2

D) 4

2

$$(2x^3 + 3x)(x^3 - 2x)$$

Which of the following is equivalent to the expression above?

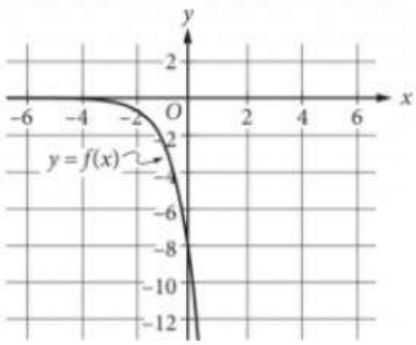
A) $x^3 + 5x$

B) $3x^3 + x$

C) $2x^6 - x^4 - 6x^2$

D) $3x^6 - x^4 - 6x^2$

3



The graph of $y = f(x)$ is shown in the xy-plane. What is the value of $f(0)$?

A) –8

B) –4

C) –1

D) 0

4

The City Transit bus line charges \$2 for an adult and \$1 for a child to ride one way. During a certain 4-hour shift, a bus driver collected \$1,171 from 617 riders. Which of the following systems of equations could be used to determine the number of adult riders, A, and the number of child riders, C, during this 4-hour shift?

A) $2A + C = 4(1{,}171)$
$A + C = 4(617)$

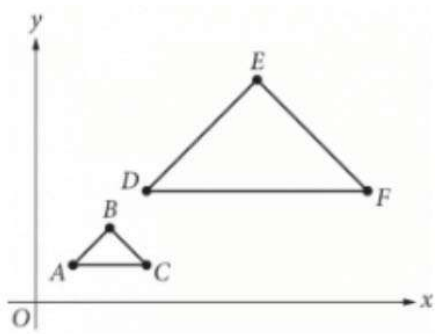
B) $4(2A) + 4C = 1{,}171$
$4(A + C) = 617$

C) $2A + C = 617$
$A + C = 1{,}171$

D) $2A + C = 1{,}171$
$A + C = 617$

CONTINUE

5



In the xy-plane above, a dilation with center O and scale factor 3 transforms triangle ABC to triangle DEF. Which of the following statements is NOT true?

A) The perimeter of triangle DEF is 3 times the perimeter of triangle ABC.

B) The measure of angle E is 3 times the measure of angle B.

C) The length of $\overline{AB}$ is $\frac{1}{3}$ the length of $\overline{DE}$.

D) Angle A is congruent to angle D.

6

In the xy-plane, the y-coordinate of the y-intercept of the graph of the function f is c. Which of the following must be equal to c ?

A) $f(0)$

B) $f(1)$

C) $f(2)$

D) $f(3)$

7

The length of a rectangular tile is 4 times the width of the tile. If the area of the tile is 144 square inches, what is the width of the tile, in inches?

A) 6

B) 12

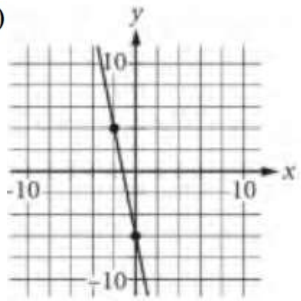
C) 24

D) 36

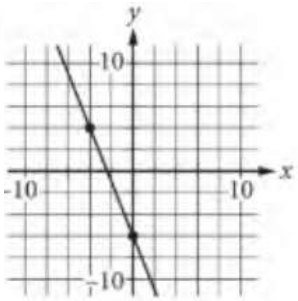
8

Which of the following is the graph of $y - 5x = -6$ in the xy-plane?

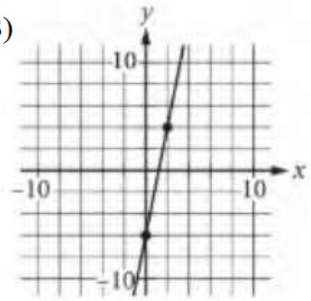
A)



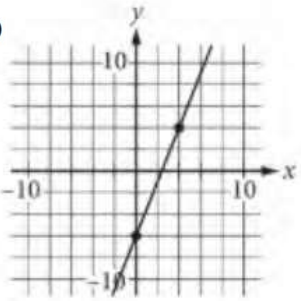
C)



B)



D)



9

x	$f(x)$
–1	–2
2	4

The table shown gives some values of x and the corresponding values of $f(x)$, where f is a linear function. If $y = f(x)$ is graphed in the xy-plane, what is the y-coordinate of the y-intercept of the graph?

A) 1

B) 0.5

C) 0

D) –1

10

$$A = 1{,}321 + 0.3433m$$

The equation above can be used to estimate the body surface area A, in square centimeters, of a child with mass m, in grams, where $3{,}000 \leq m \leq 30{,}000$. Which of the following statements is consistent with the equation?

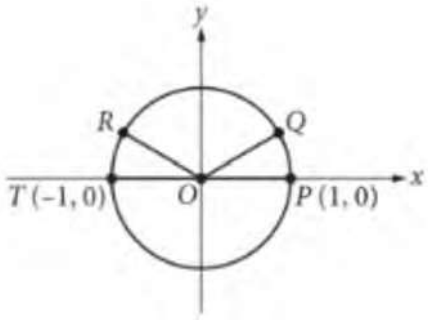
A) For each increase of 1 gram in mass, A increases by approximately 0.3433 square centimeter.

B) For each increase of 0.3433 gram in mass, A increases by approximately 1 square centimeter.

C) For each increase of 1 gram in mass, A increases by approximately 1,321 square centimeters.

D) For each increase of 1,321 grams in mass, A increases by approximately 1 square centimeter.

11



In the xy-plane above, points P, Q, R, and T lie on the circle with center O. The degree measures of angles POQ and ROT are each 30°. What is the radian measure of angle QOR ?

A) $\frac{5}{6}\pi$

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

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

D) $\frac{1}{3}\pi$

12

$$\frac{4x^2}{x^2-9} - \frac{2x}{x+3} = \frac{1}{x-3}$$

What value of x satisfies the equation above?

A) –3

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

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

D) 3

13

A right circular cone has a volume of $\frac{1}{3}\pi$ cubic feet and a height of 9 feet. What is the radius, in feet, of the base of the cone?

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

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

C) $\sqrt{3}$

D) 3

14

Which of the following is equivalent to $r^{\frac{2}{5}} \cdot \sqrt{r}$, where $r > 0$?

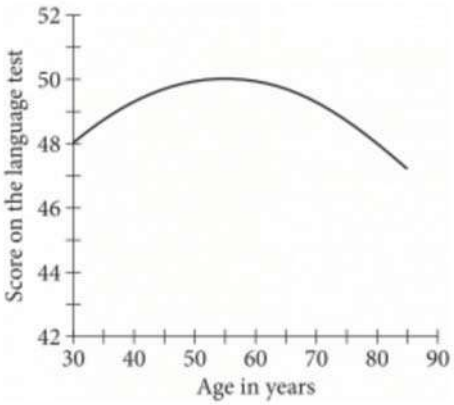
A) $r^{\frac{1}{5}}$

B) $r^{\frac{3}{10}}$

C) $r^{\frac{3}{7}}$

D) $r^{\frac{9}{10}}$

15



A scientist tested a group of adults aged 30 to 85. The graph shows the quadratic function S, which models their scores on a language test as a function of their age x, in years. Which of the following could define S?

A) $S(x) = -\frac{1}{320}(x-50)^2 + 55$

B) $S(x) = -\frac{1}{320}(x-55)^2 + 50$

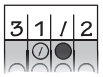
C) $S(x) = \frac{1}{320}(x-50)^2 + 55$

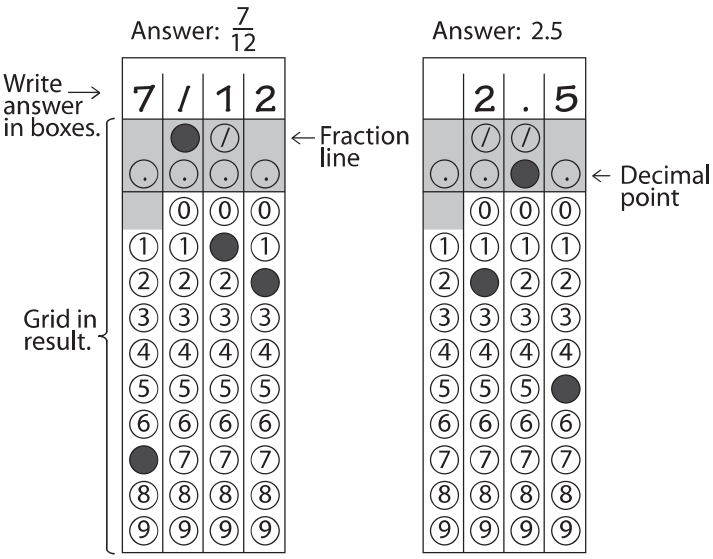
D) $S(x) = \frac{1}{320}(x-55)^2 + 50$

CONTINUE

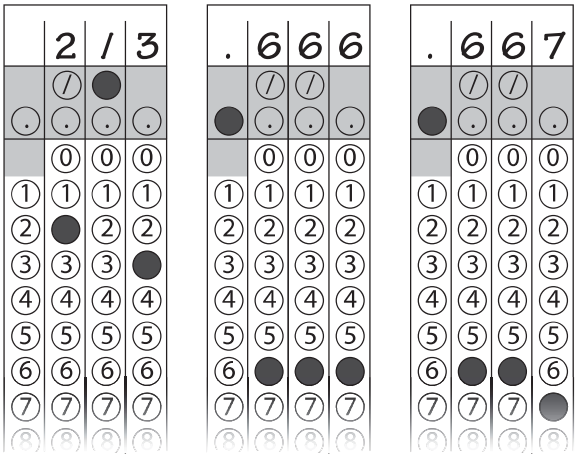
DIRECTIONS

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

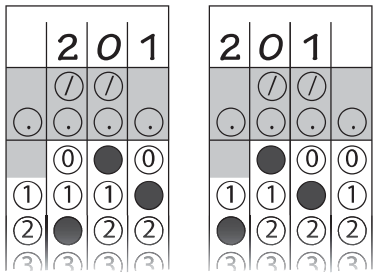
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only 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

On a 210-mile trip, Cameron drove at an average speed of 60 miles per hour for the first x hours. He then completed the trip, driving at an average speed of 50 miles per hour for the remaining y hours. If $x = 1$, what is the value of y ?

17

$$2zw^2 - 3w - 10 = 2z$$

In the equation above, what is the value of z when $w = 2$?

18

$$x - 2\sqrt{x} - 3 = 0$$

What value of x satisfies the equation above?

19

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

If (x, y) is the solution to the system of equations above, what is the value of x?

20

$$2k(x - 2) = x - 2$$

In the equation above, k is a constant. If the equation has infinitely many solutions, 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.