Math Test – No Calculator

25 MINUTES, 17 QUESTIONS

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

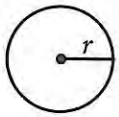
DIRECTIONS

For questions 1-13, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 14-17**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 14 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

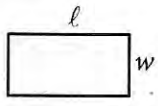
NOTES

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.

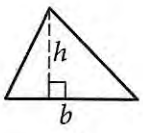
REFERENCE



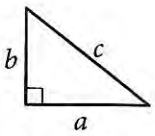
$A = \pi r^2$
$C = 2\pi r$



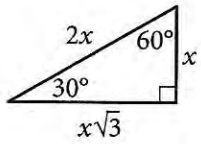
$A = \ell w$

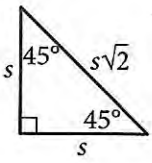


$A = \frac{1}{2}bh$

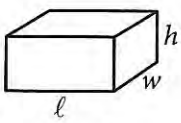


$c^2 = a^2 + b^2$

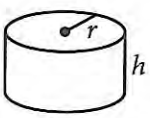




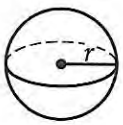
Special Right Triangles



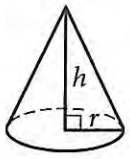
$V = \ell wh$



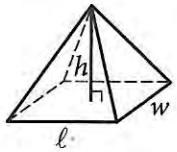
$V = \pi r^2 h$



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



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



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

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.

CONTINUE

1

$$51 = 7 + 2x$$

What value of x satisfies the equation above?

A) 58

B) 44

C) 29

D) 22

2

$$3a + 4b = 25$$

A shipping company charged a customer \$25 to ship some small boxes and some large boxes. The equation above represents the relationship between a, the number of small boxes, and b, the number of large boxes, the customer had shipped. If the customer had 3 small boxes shipped, how many large boxes were shipped?

A) 3

B) 4

C) 5

D) 6

3

On January 1, 2015, a city's minimum hourly wage was \$9.25. It will increase by \$0.50 on the first day of the year for the next 5 years. Which of the following functions best models the minimum hourly wage, in dollars, x years after January 1, 2015, where $x = 1, 2, 3, 4, 5$?

A) $f(x) = 9.25 - 0.50x$

B) $f(x) = 9.25x - 0.50$

C) $f(x) = 9.25 + 0.50x$

D) $f(x) = 9.25x + 0.50$

4

$$F = 2.50x + 7.00y$$

In the equation above, F represents the total amount of money, in dollars, a food truck charges for x drinks and y salads. The price, in dollars, of each drink is the same, and the price, in dollars, of each salad is the same. Which of the following is the best interpretation for the number 7.00 in this context?

A) The price, in dollars, of one drink

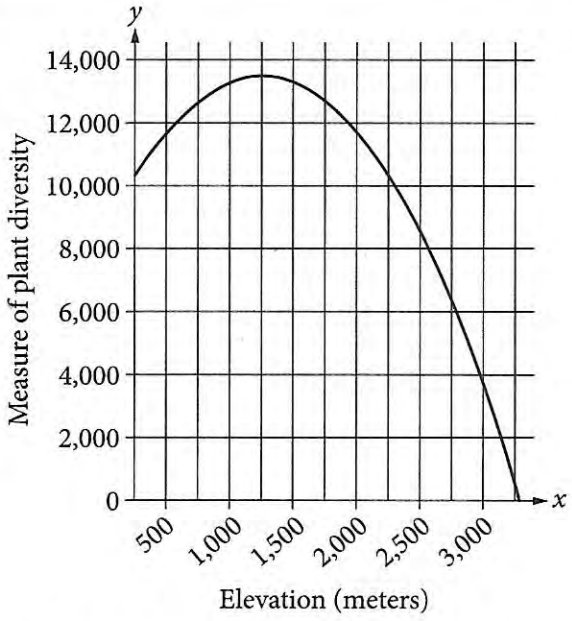
B) The price, in dollars, of one salad

C) The number of drinks bought during the day

D) The number of salads bought during the day

CONTINUE

5



The quadratic function graphed above models a particular measure of plant diversity as a function of the elevation in a region of Switzerland. According to the model, which of the following is closest to the elevation, in meters, at which plant diversity is greatest?

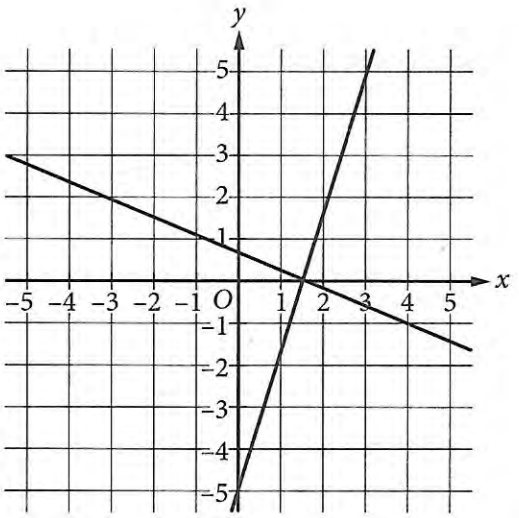
A) 13,500

B) 3,000

C) 1,250

D) 250

6



Which of the following systems of equations has the same solution as the system of equations graphed above?

A) $y = 0$
$x = \frac{3}{2}$

B) $y = \frac{3}{2}$
$x = 0$

C) $y = 0$
$x = 1$

D) $y = 1$
$x = 0$

CONTINUE

7

The function f defined by $f(x) = x^2$ is graphed in the xy-plane. The graph of the function g in the xy-plane is the graph of f shifted 4 units upward. Which of the following defines $g(x)$?

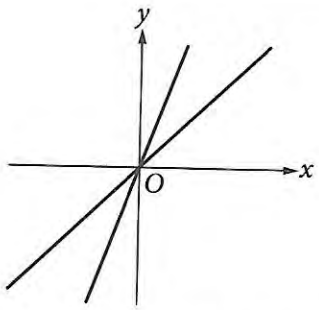
A) $g(x) = f(x + 4)$

B) $g(x) = f(x - 4)$

C) $g(x) = f(x) + 4$

D) $g(x) = f(x) - 4$

8



In the xy-plane above, two lines intersect at the origin. Which of the following pairs of equations could represent these lines, where a and b are positive constants?

A) $y = ax$
$y = bx$

B) $y = ax$
$y = -bx$

C) $y = -ax$
$y = -bx$

D) $y = ax$
$y = ax + b$

9

$$3x^2 + 4x - 2 - (x^2 + 2x - 1)$$

Which of the following is equivalent to the expression above?

A) $2x^2 + 2x - 1$

B) $2x^2 + 6x - 3$

C) $4x^2 + 2x - 1$

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

10

Which of the following expressions is equivalent to the sum of $(r^3 + 5r^2 + 7)$ and $(r^2 + 8r + 12)$?

A) $r^5 + 13r^3 + 19$

B) $2r^3 + 13r^2 + 19$

C) $r^3 + 5r^2 + 7r + 12$

D) $r^3 + 6r^2 + 8r + 19$

CONTINUE

11

According to Moore's law, the number of transistors included on microprocessors doubles every 2 years. In 1985, a microprocessor was introduced that had 275,000 transistors. Based on this information, in which of the following years does Moore's law estimate the number of transistors to reach 1.1 million?

A) 1987

B) 1989

C) 1991

D) 1994

12

x	$f(x)$
2	7
3	5
4	7

For the quadratic function f, the table above gives some values of x and their corresponding values of $f(x)$. Which of the following could define f?

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

B) $f(x) = (x-3)^2 + 9$

C) $f(x) = 2(x-2)^2 + 7$

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

13

$$3(x-5)^2 + 11 = 59$$

What is the smallest value of x that satisfies the equation above?

A) 9

B) 7

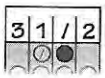
C) 5

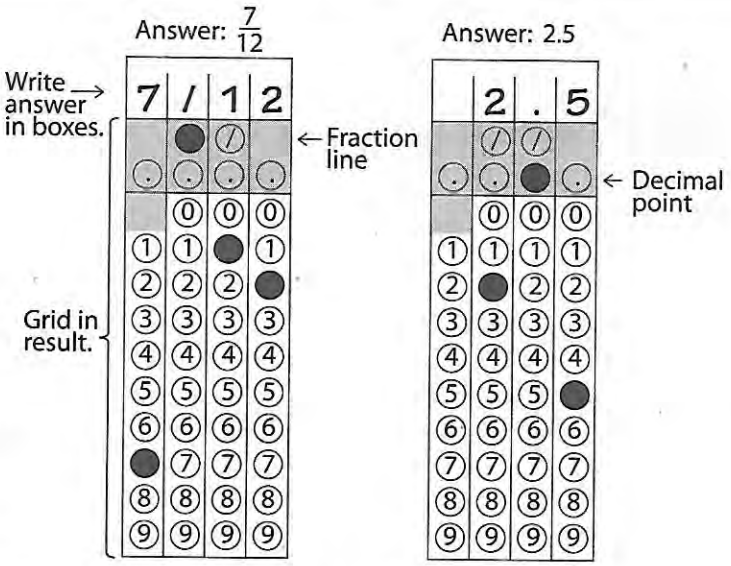
D) 1

CONTINUE

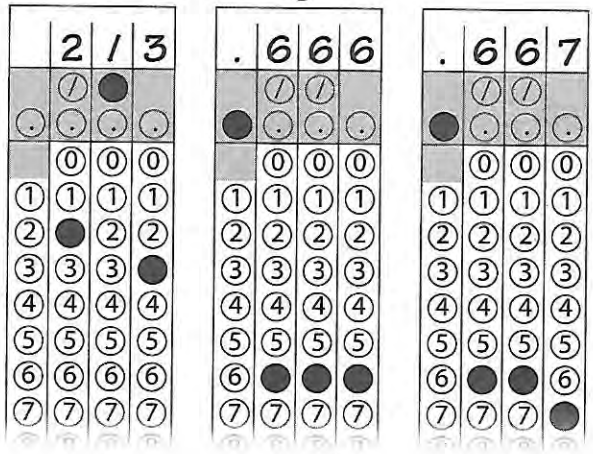
DIRECTIONS

For questions 14-17, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

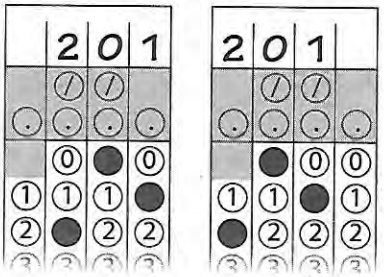
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.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

14

$$x + y = 17$$
$$xy = 72$$

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

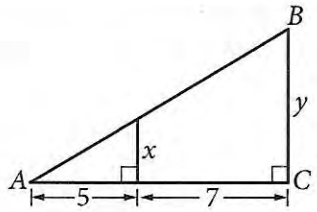
15

If $\frac{3x + 3x}{6} = 24$, what is the value of $6x$?

16

According to a model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to four times the body weight of the bee, in grams. According to the model, what would be the head width, in millimeters, of a worker bumblebee that has a body weight of 0.5 grams?

17



Note: Figure not drawn to scale.

The area of triangle ABC above is at least 48 but no more than 60. If y is an integer, what is one possible 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.