

Math

27 QUESTIONS

DIRECTIONS

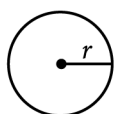
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

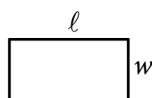
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

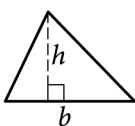


$$A = \pi r^2$$

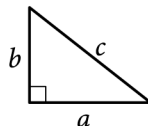
$$C = 2\pi r$$



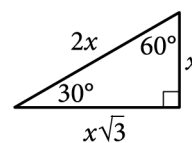
$$A = \ell w$$



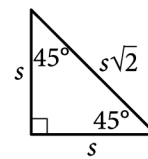
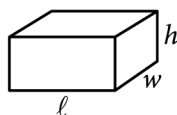
$$A = \frac{1}{2}bh$$



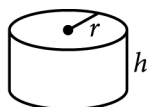
$$c^2 = a^2 + b^2$$



Special Right Triangles



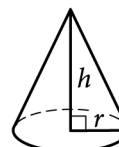
$$V = \ell wh$$



$$V = \pi r^2 h$$



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



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



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

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

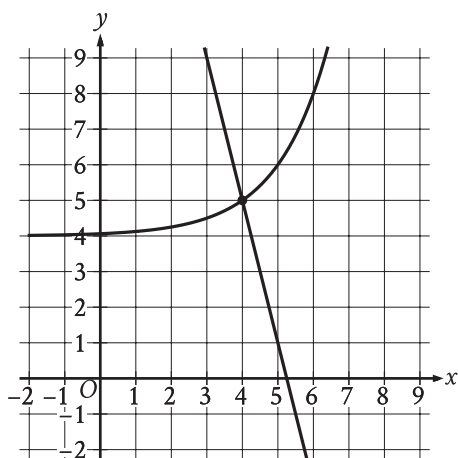
The sum of the measures in degrees of the angles of a triangle is 180.

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

For student-produced response questions, solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle, or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction ($\frac{7}{2}$) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

1



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution (x, y) to this system?

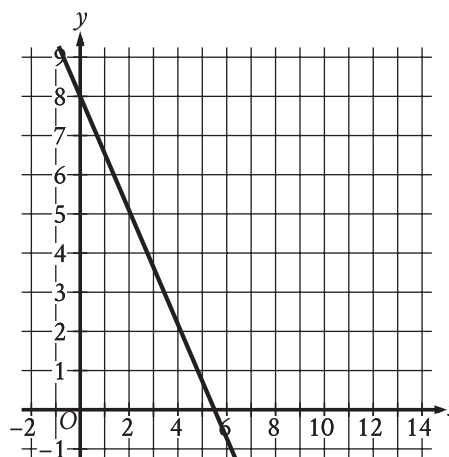
- A) $(0, 0)$
- B) $(0, 4)$
- C) $(4, 5)$
- D) $(5, 0)$

2

On the first day of a semester, a film club has 90 members. Each day after the first day of the semester, 10 new members join the film club. If no members leave the film club, how many total members will the film club have 4 days after the first day of the semester?

- A) 400
- B) 130
- C) 94
- D) 90

3



The graph of the linear function f is shown, where $y = f(x)$. What is the y -intercept of the graph of f ?

- A) $(0, 0)$
- B) $\left(0, -\frac{16}{11}\right)$
- C) $(0, -8)$
- D) $(0, 8)$

4

$$\begin{aligned}s + 7r &= 27 \\ r &= 3\end{aligned}$$

What is the solution (r, s) to the given system of equations?

- A) $(6, 3)$
- B) $(3, 6)$
- C) $(3, 27)$
- D) $(27, 3)$

5

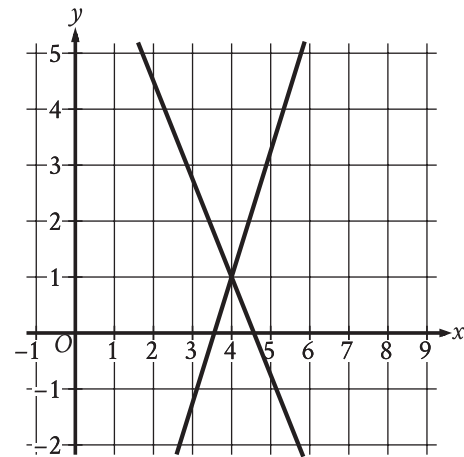
The table shows selected values from function f .

x	$f(x)$
-1	16
0	17
1	18
2	19

Which of the following is the best description of function f ?

- A) Decreasing linear
- B) Increasing linear
- C) Decreasing exponential
- D) Increasing exponential

6



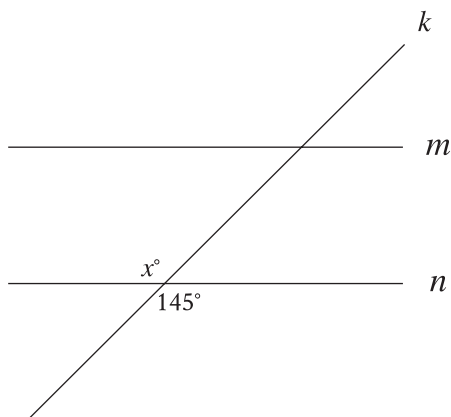
The graph of a system of linear equations is shown. The solution to the system is (x, y) . What is the value of x ?

7

23, 27, 27, 32, 35, 36, 52

What is the range of the 7 scores shown?

8



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n , and line k intersects both lines. Which of the following statements is true?

- A) The value of x is less than 145.
- B) The value of x is greater than 145.
- C) The value of x is equal to 145.
- D) The value of x cannot be determined.

9

The equation $x + y = 1,440$ represents the number of minutes of daylight (between sunrise and sunset), x , and the number of minutes of non-daylight, y , on a particular day in Oak Park, Illinois. If this day has 670 minutes of daylight, how many minutes of non-daylight does it have?

- A) 670
- B) 770
- C) 1,373
- D) 1,440

10

Scott selected 20 employees at random from all 400 employees at a company. He found that 16 of the employees in this sample are enrolled in exactly three professional development courses this year. Based on Scott's findings, which of the following is the best estimate of the number of employees at the company who are enrolled in exactly three professional development courses this year?

- A) 4
- B) 320
- C) 380
- D) 384

11

If $4x - 28 = -24$, what is the value of $x - 7$?

- A) -24
- B) -22
- C) -6
- D) -1

12

For a snowstorm in a certain town, the minimum rate of snowfall recorded was 0.6 inches per hour, and the maximum rate of snowfall recorded was 1.8 inches per hour. Which inequality is true for all values of s , where s represents a rate of snowfall, in inches per hour, recorded for this snowstorm?

- A) $s \geq 2.4$
- B) $s \geq 1.8$
- C) $0 \leq s \leq 0.6$
- D) $0.6 \leq s \leq 1.8$

13

$$y = 4x$$
$$y = x^2 - 12$$

A solution to the given system of equations is (x, y) , where $x > 0$. What is the value of x ?

14

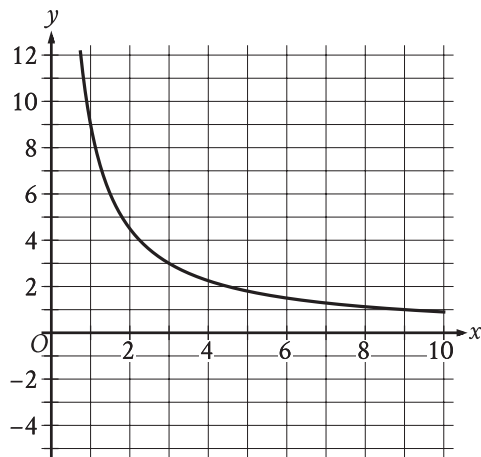
A store sells two different-sized containers of blueberries. The store's sales of these blueberries totaled 896.86 dollars last month. The equation $4.51x + 6.07y = 896.86$ represents this situation, where x is the number of smaller containers sold and y is the number of larger containers sold. According to the equation, what is the price, in dollars, of each smaller container?

15

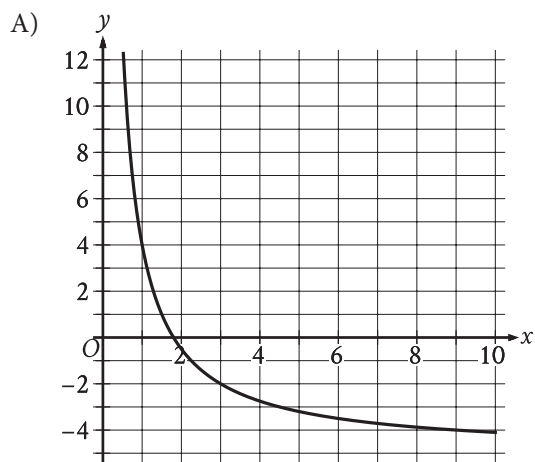
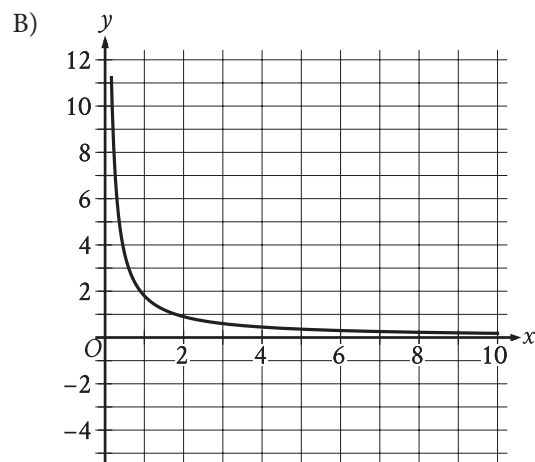
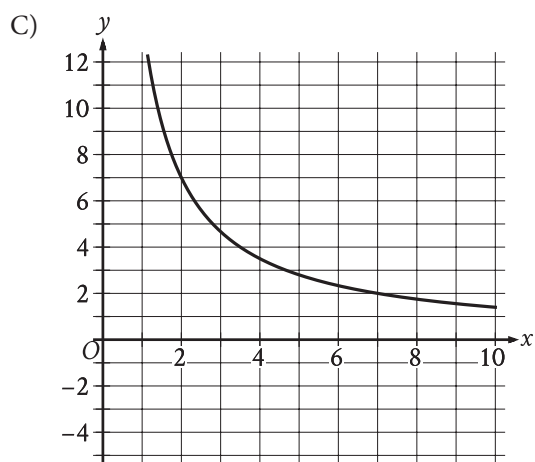
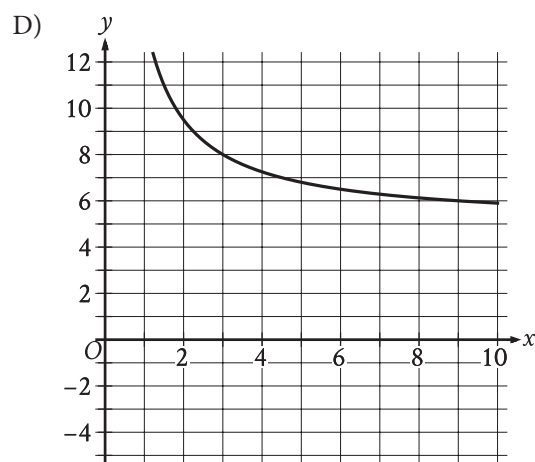
A right circular cylinder has a base diameter of 22 centimeters and a height of 6 centimeters. What is the volume, in cubic centimeters, of the cylinder?

- A) 132π
- B) 264π
- C) 726π
- D) $2,904\pi$

16



The graph of the rational function f is shown, where $y = f(x)$ and $x \geq 0$. Which of the following is the graph of $y = f(x) + 5$, where $x \geq 0$?



17

At a particular track meet, the ratio of coaches to athletes is 1 to 26. If there are x coaches at the track meet, which of the following expressions represents the number of athletes at the track meet?

- A) $\frac{x}{26}$
- B) $26x$
- C) $x + 26$
- D) $\frac{26}{x}$

18

Kaylani used fabric measuring 5 yards in length to make each suit for a men's choir. The relationship between the number of suits that Kaylani made, x , and the total length of fabric that she purchased y , in yards, is represented by the equation $y - 5x = 6$. What is the best interpretation of 6 in this context?

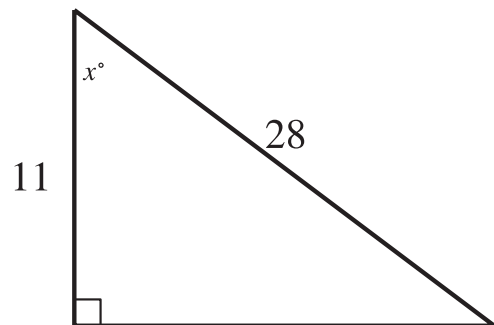
- A) Kaylani made 6 suits.
- B) Kaylani purchased a total of 6 yards of fabric.
- C) Kaylani used a total of 6 yards of fabric to make the suits.
- D) Kaylani purchased 6 yards more fabric than she used to make the suits.

19

What is the value of $\tan \frac{92\pi}{3}$?

- A) $-\sqrt{3}$
- B) $-\frac{\sqrt{3}}{3}$
- C) $\frac{\sqrt{3}}{3}$
- D) $\sqrt{3}$

20



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\cos x^\circ$?

21

The function g is defined by $g(x) = (x + 14)(t - x)$, where t is a constant. In the xy -plane, the graph of $y = g(x)$ passes through the point $(24, 0)$. What is the value of $g(0)$?

22

$$(x + 4)^2 + (y - 19)^2 = 121$$

The graph of the given equation is a circle in the xy -plane. The point (a, b) lies on the circle. Which of the following is a possible value for a ?

- A) -16
- B) -14
- C) 11
- D) 19

23

A right rectangular prism has a height of 9 inches. The length of the prism's base is x inches, which is 7 inches more than the width of the prism's base. Which function V gives the volume of the prism, in cubic inches, in terms of the length of the prism's base?

- A) $V(x) = x(x + 9)(x + 7)$
- B) $V(x) = x(x + 9)(x - 7)$
- C) $V(x) = 9x(x + 7)$
- D) $V(x) = 9x(x - 7)$

24

Which of the following functions has(have) a minimum value at -3 ?

I. $f(x) = -6(3)^x - 3$

II. $g(x) = -3(6)^x$

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

25

The result of increasing the quantity x by 400% is 60. What is the value of x ?

- A) 12
- B) 15
- C) 240
- D) 340

26

The function f is defined by $f(x) = ax^2 + bx + c$, where a , b , and c are constants. The graph of $y = f(x)$ in the xy -plane passes through the points $(7, 0)$ and $(-3, 0)$. If a is an integer greater than 1, which of the following could be the value of $a + b$?

- A) -6
- B) -3
- C) 4
- D) 5

27

The function g is defined by $g(x) = x(x - 2)(x + 6)^2$.

The value of $g(7 - w)$ is 0, where w is a constant.

What is the sum of all possible values of w ?

STOP

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