

ACT MATH PRACTICE PAPER 7

SET 1

1. If $pq + 12 = 3p + pr$, and $q - r = 7$, what is the value of p ?

A. -3

B. -4

C. $\frac{1}{3}$

D. $\frac{3}{5}$

E. $-\frac{6}{5}$

2. On his first day working out, Anthony did 30 push-ups. On each successive day, he did exactly 3 more push-ups than on the previous day. After completing his push-ups on the 30th day, how many push-ups had he completed on all 30 days?

F. fewer than 500

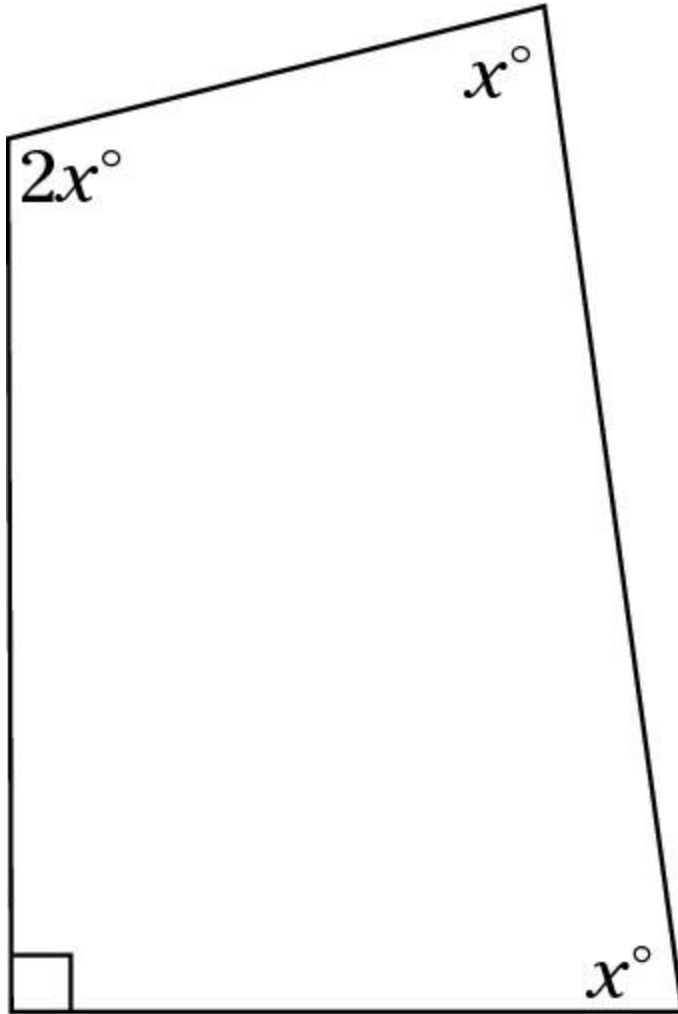
G. between 500 and 1,000

H. between 1,000 and 1,500

J. between 1,500 and 2,000

K. more than 2,000

3. The following figure is a quadrilateral with one right angle. The other angles are labeled. What is the value of x ?



- A. 54
- B. 56.25
- C. 60
- D. 67.5
- E. 72

4. If a cube has a volume of $k\text{cm}^3$ and a surface area of $10k\text{cm}^2$, what is its height in centimeters?

F. $\frac{1}{2}$

G. $\frac{3}{4}$

H. $\frac{3}{5}$

J. $\frac{4}{5}$

K. $\frac{3}{10}$

5. If $8^{n-1} = \sqrt{2}$, then $n =$

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

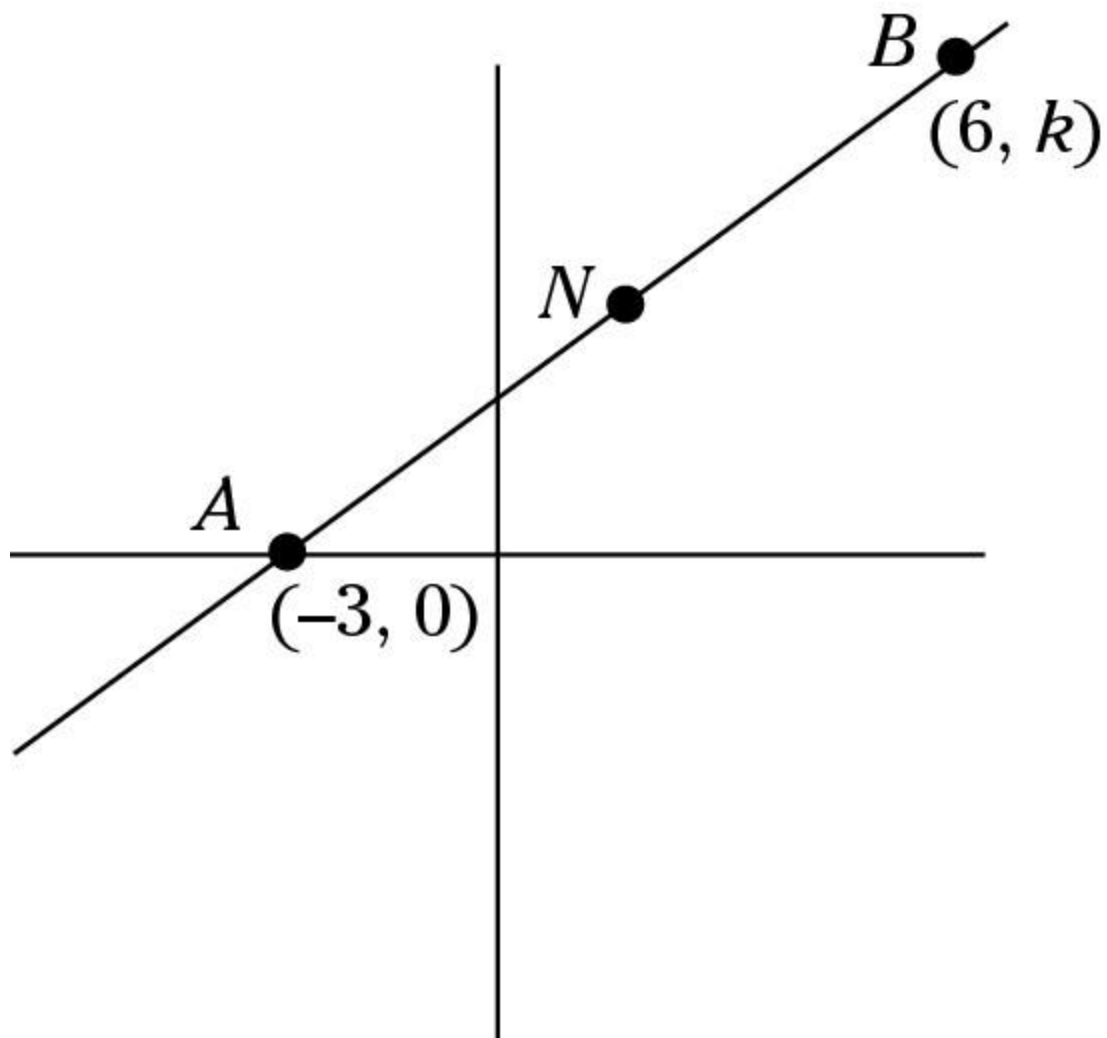
B. $\frac{4}{3}$

C. $\frac{5}{4}$

D. $\frac{7}{6}$

E. $\frac{11}{10}$

6. In the following graph, n is the midpoint of \overline{AB} . Which of the following answer choices are the coordinates of n ?



F. $(3, k)$

G. $(\frac{3}{2}, 3)$

H. $(\frac{3}{2}, k)$

J. $(\frac{3}{2}, \frac{k}{2})$

K. $(\frac{k}{2}, \frac{3}{3})$

7. If $\frac{a}{b} - \frac{c}{d} = 0$ and $bc = 7$, which of the following statements must be true?

A. a and b are directly proportional.

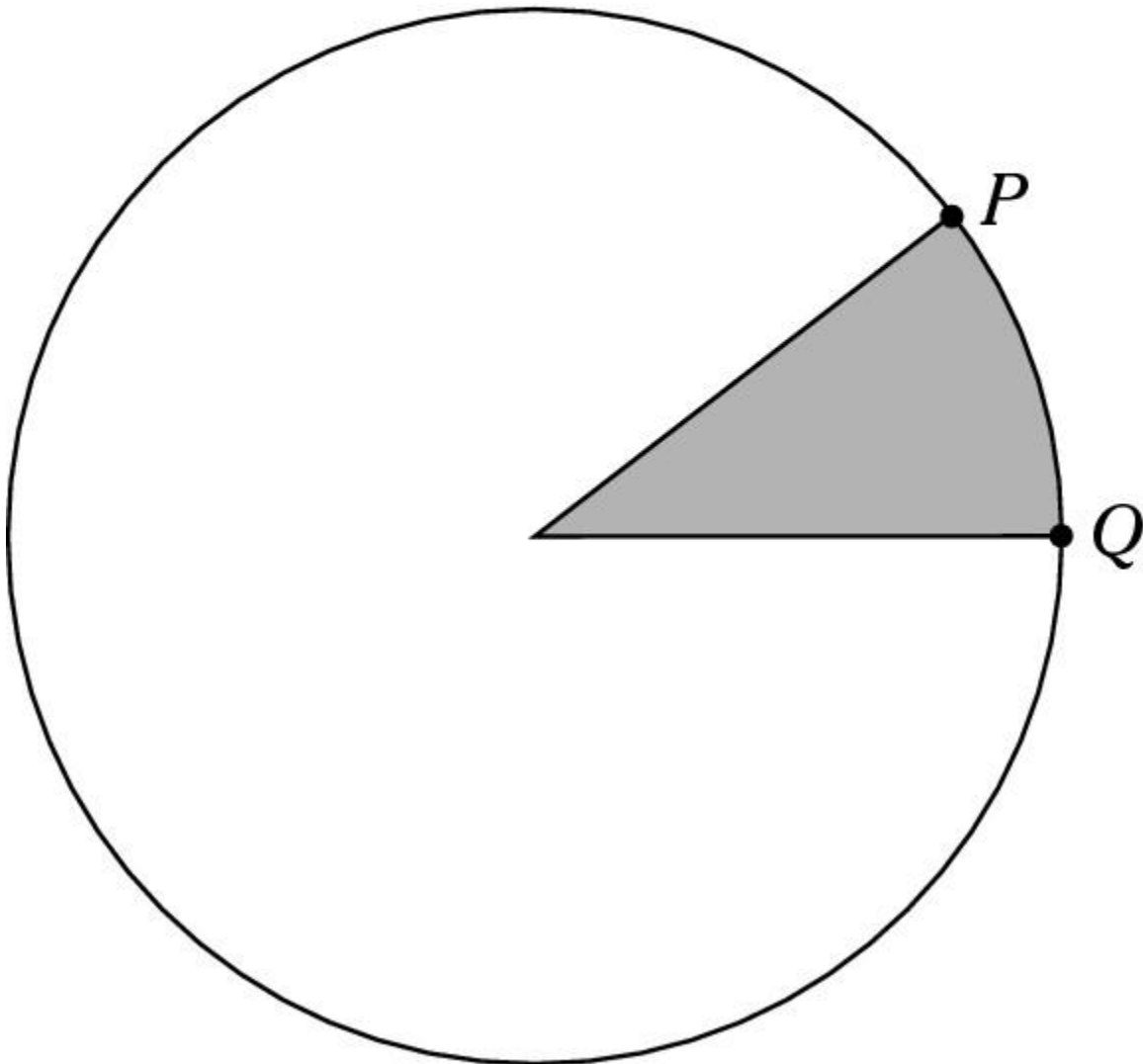
B. a and c are inversely proportional.

C. a and d are inversely proportional.

D. b and c are directly proportional.

E. c and d are inversely proportional.

8. In the following figure, the area of the shaded region is 10% of the area of the circle. If the radius of the circle is 10, what is the arc length from P to Q ?



F. π

G. 2π

H. 4π

J. 5π

K. 10π

9. Given that $i^2 = -1$, what is the value of $(4 + 2i)(4 - 2i)$?

A. 12

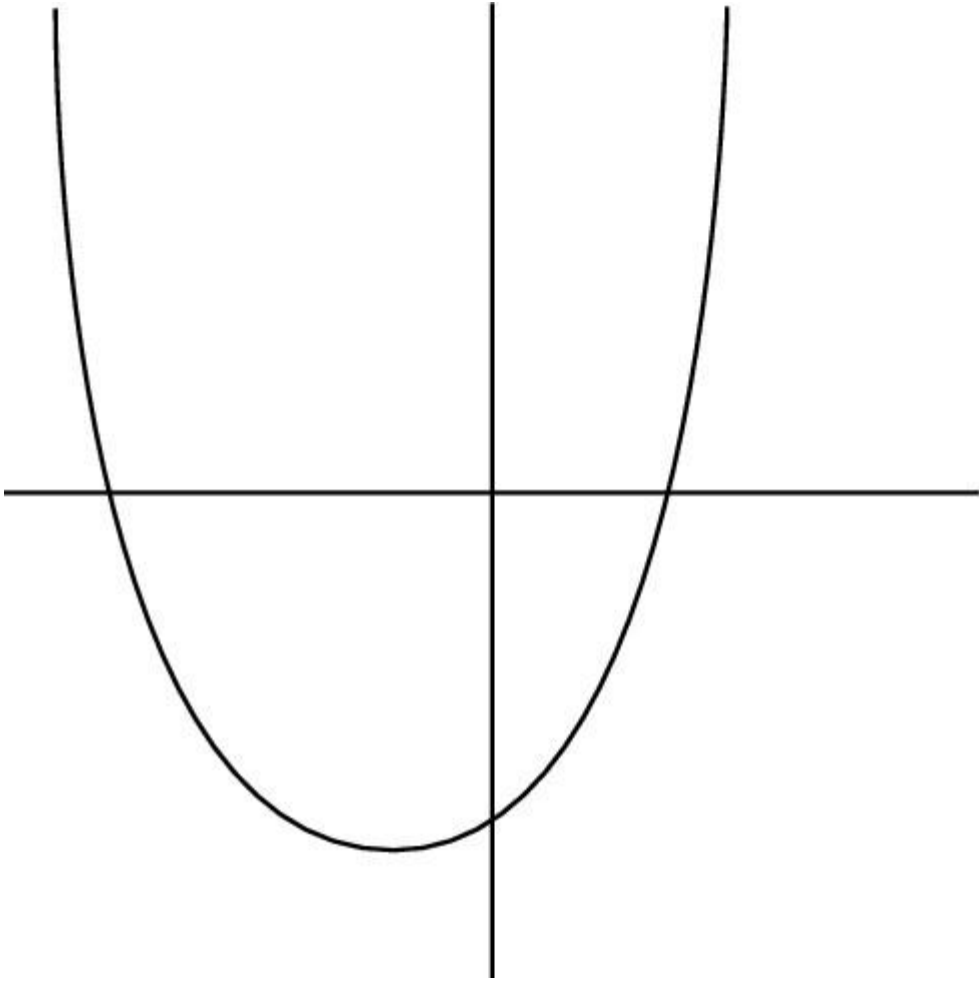
B. 20

C. $16 - 4i$

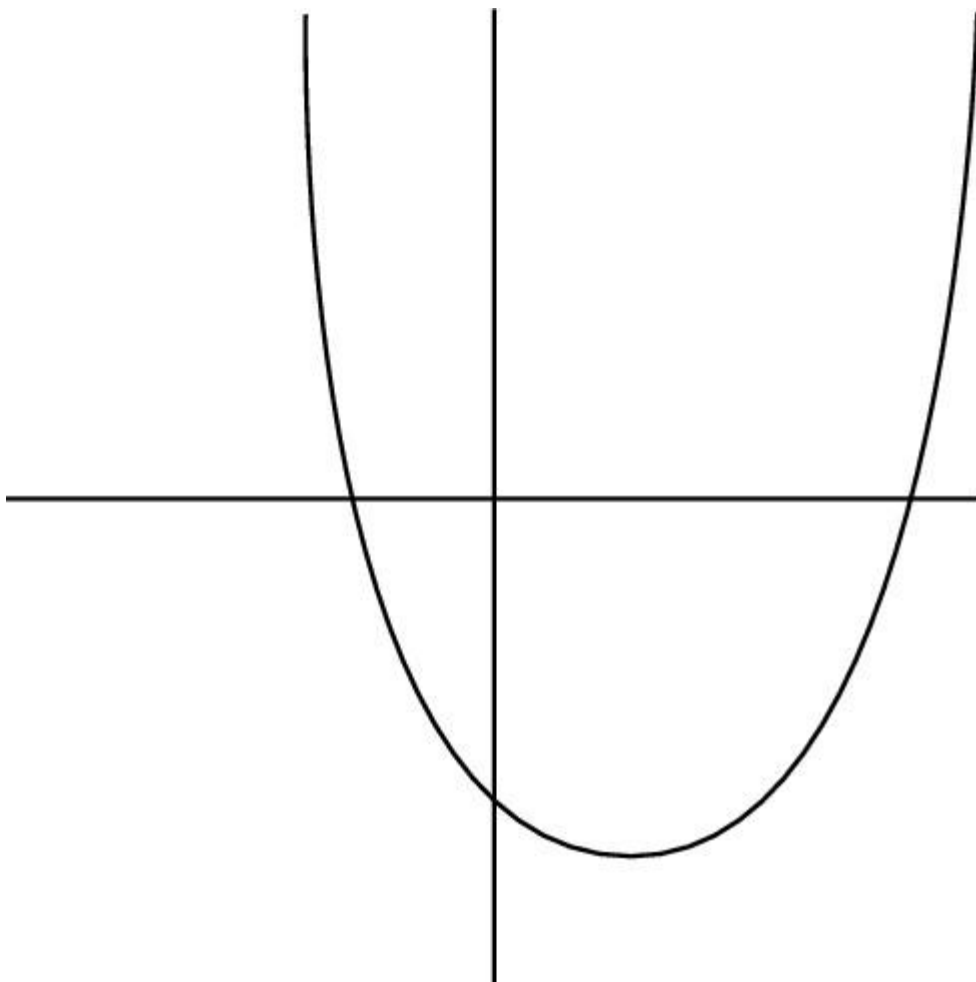
D. $4 + 16i$

E. $12 - 16i$

10. Which of the following could be the graph of the equation $y = 175x^2 - 33x - 2,000$?

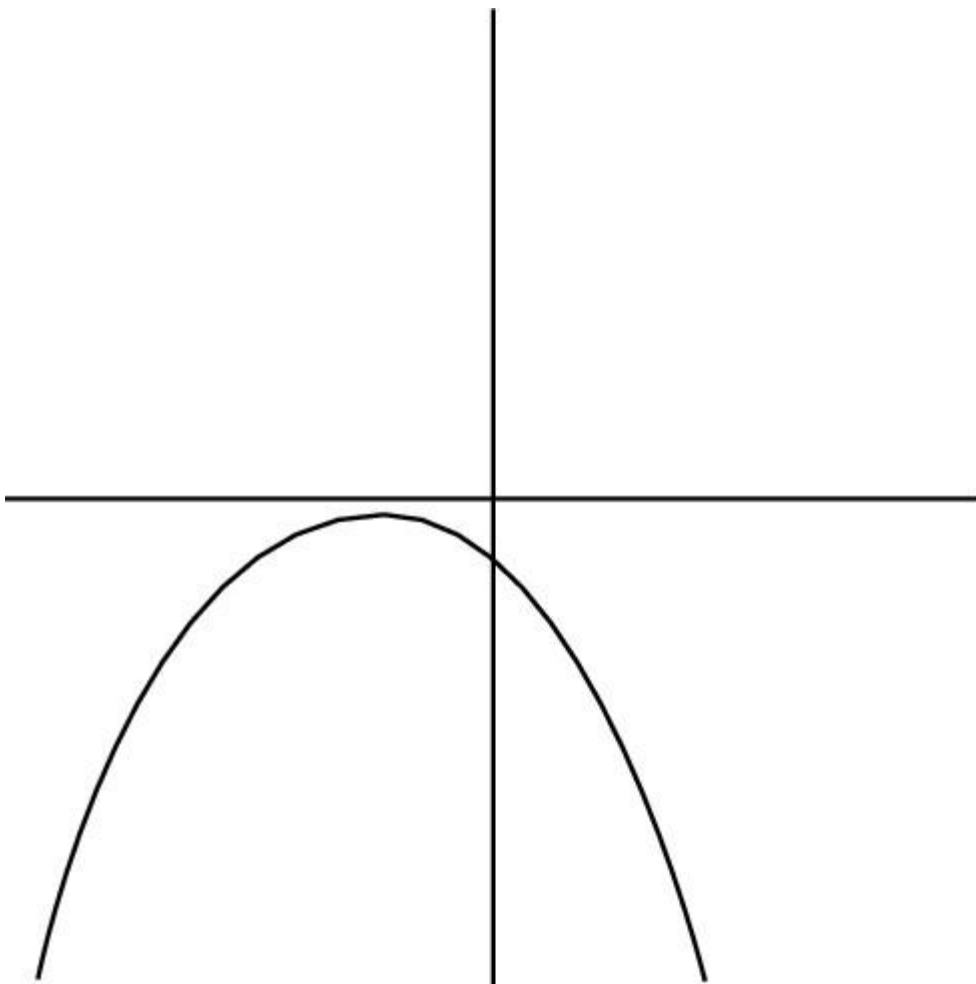


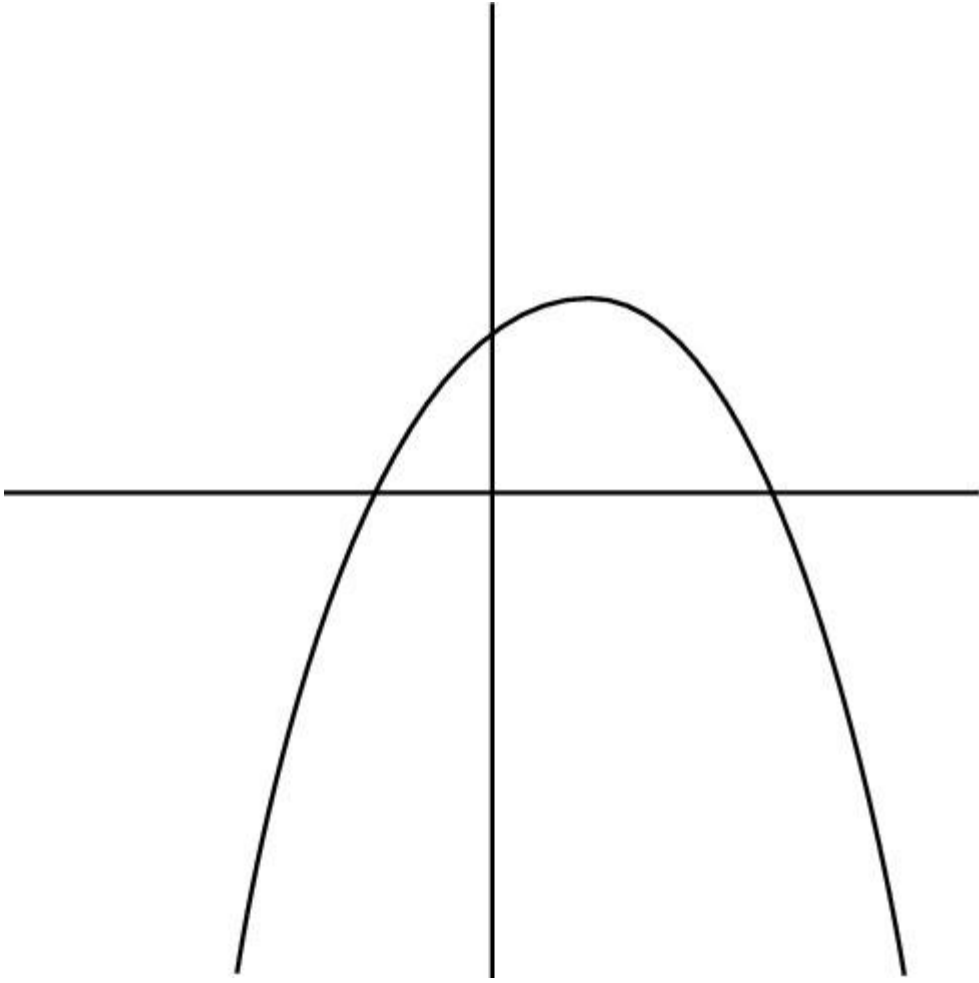
F.



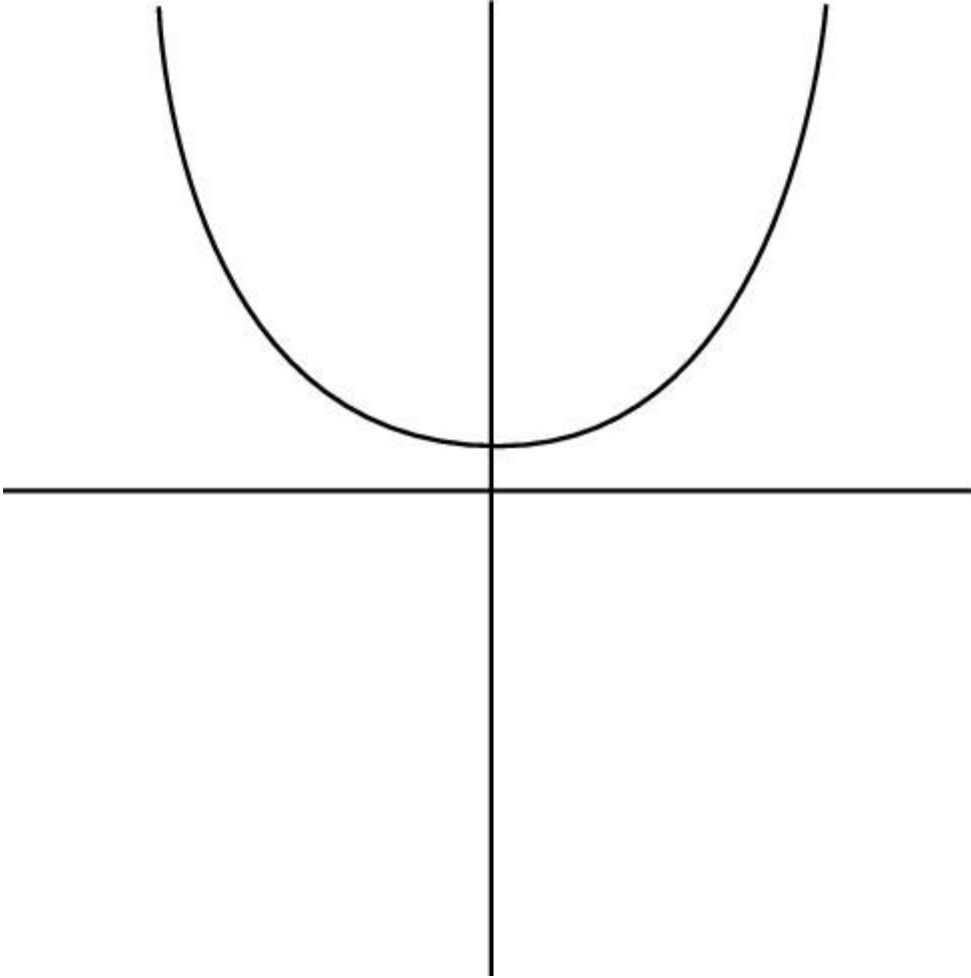
G.

H.





J.



K.

11. Sebastian bought a meal at a restaurant and left a 15% tip. With the tip, he paid exactly \$35.19. How much did the meal cost without the tip?

- A. \$28.98
- B. \$29.91
- C. \$30.15
- D. \$30.60
- E. \$30.85

12. If $\sin a = \frac{7}{8}$, what is the value of $\cos a$?

F. $\frac{8}{7}$

G. $\frac{\sqrt{15}}{7}$

H. $\frac{\sqrt{15}}{8}$

J. $\frac{7\sqrt{15}}{15}$

K. $\frac{8\sqrt{15}}{15}$

13. In the real numbers, which of the following is the domain of the function $f(x) = \frac{\sqrt{x-3}}{x-3}$?

A. $x \geq 3$

B. $x > 3$

C. $x < -3$

D. $-3 < x < 3$

E. $x < -3$ or $x > 3$

14. Andrea and Zach are both waiting for an appointment with a guidance counselor. When they arrived, each received a card from the secretary, telling the hour and minute of his or her arrival. Two minutes ago, Andrea had been waiting exactly $\frac{1}{2}$ as many minutes as Zach. Three minutes from now, Andrea will have been waiting exactly $\frac{2}{3}$ as long as Zach. If the time is now 11:30, at what time did Andrea arrive?

F. 11:16

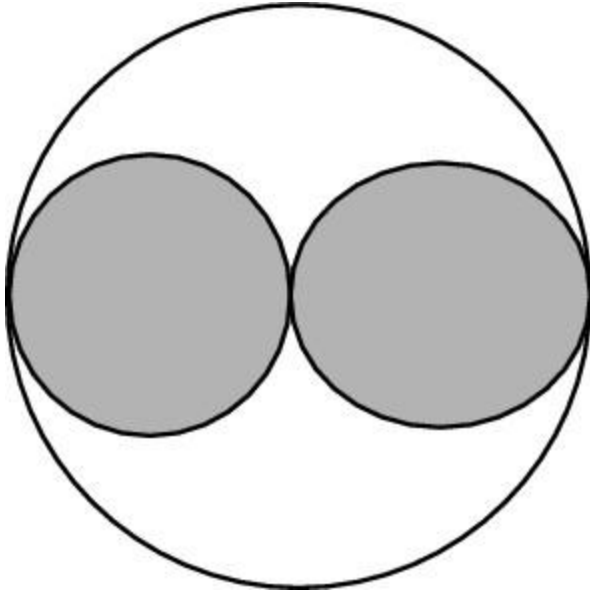
G. 11:18

H. 11:20

J. 11:23

K. 11:25

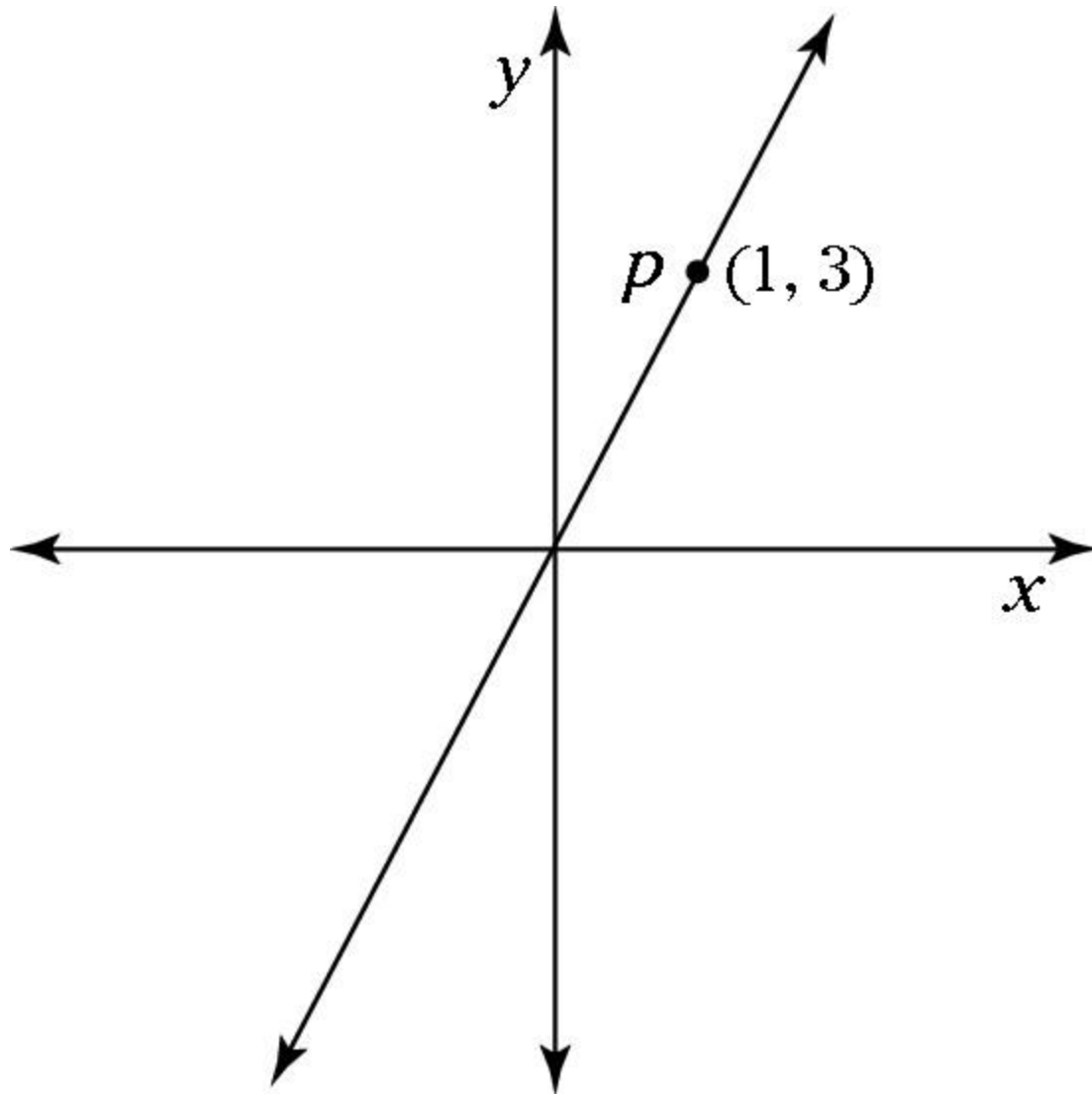
15. In the following figure, each circle is tangent to the other two circles, and the two shaded circles are identical to each other. What is the ratio of the shaded region to the nonshaded region?



- A. 1:01
- B. 4:05
- C. 5:04
- D. 4:π
- E. π:4

SET 2

1. In the following figure, the line passes through the origin and through $P = (1, 3)$. If you were to draw a new line perpendicular to the first that also passes through P , what would be the equation of this new line?



F. $y = 3x + 4$

G. $y = \frac{1}{3}x + 4$

H. $y = \frac{1}{3}x + \frac{10}{3}$

J. $y = -\frac{1}{3}x + 4$

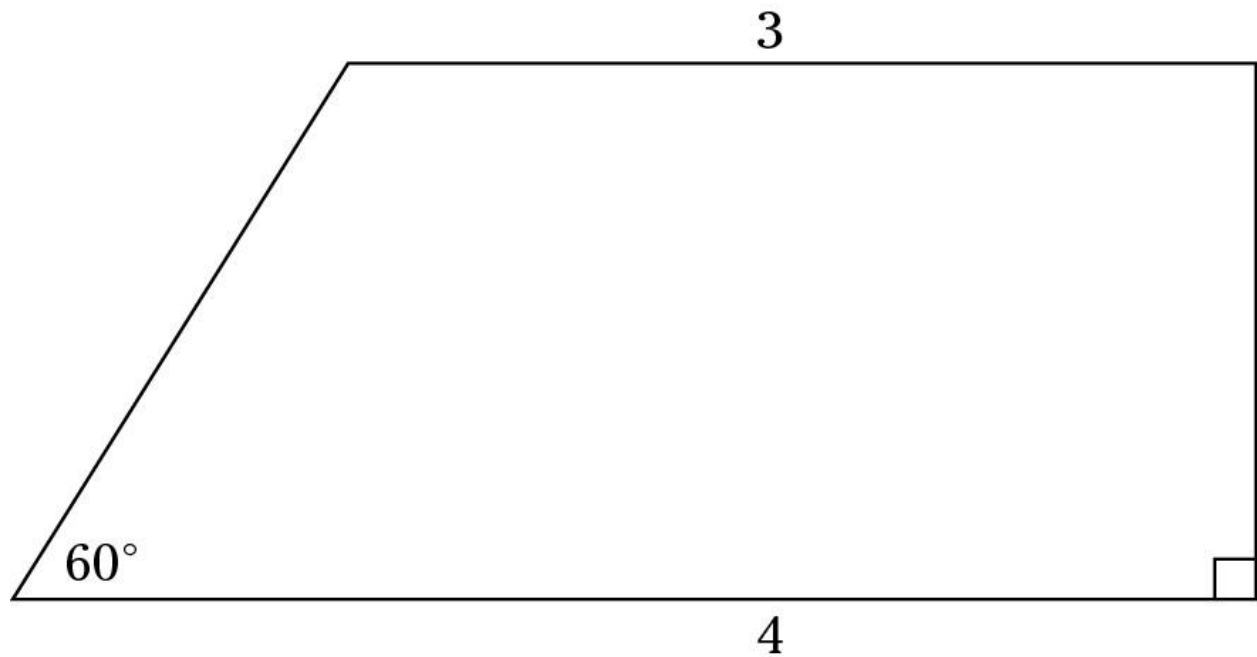
K. $y = -\frac{1}{3}x + \frac{10}{3}$

2. If $\begin{vmatrix} 6 & x & y \\ x & y & z \end{vmatrix} + \begin{vmatrix} x & y & z \\ 9 & 7 & 5 \end{vmatrix} = \begin{vmatrix} 9 & 7 & 5 \end{vmatrix}$, then $x+y+z =$

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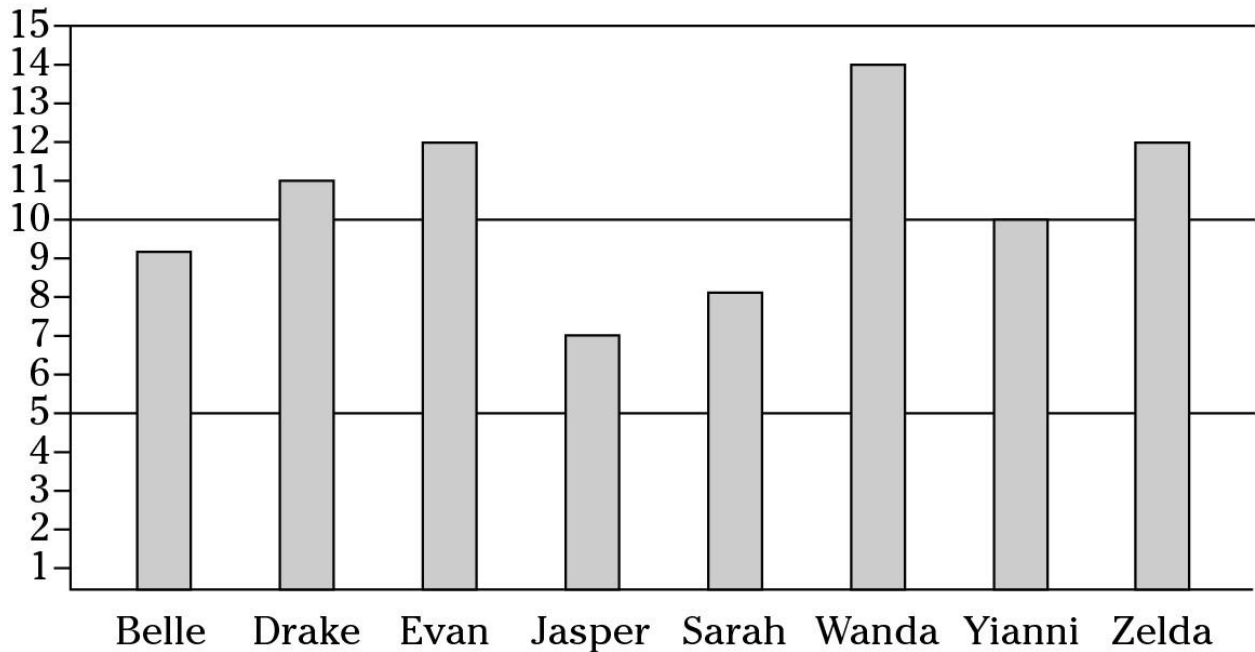
- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

3. What is the area of the trapezoid in the following figure?



- F. 7
- G. $7\sqrt{2}$
- H. $7\sqrt{3}$
- J. $\frac{7\sqrt{3}}{2}$
- K. $\frac{7\sqrt{3}}{4}$

4. The following graph shows the number of new bank accounts that eight account executives have opened so far this week. Which of the following answer choices is the median number of accounts opened among these eight people?

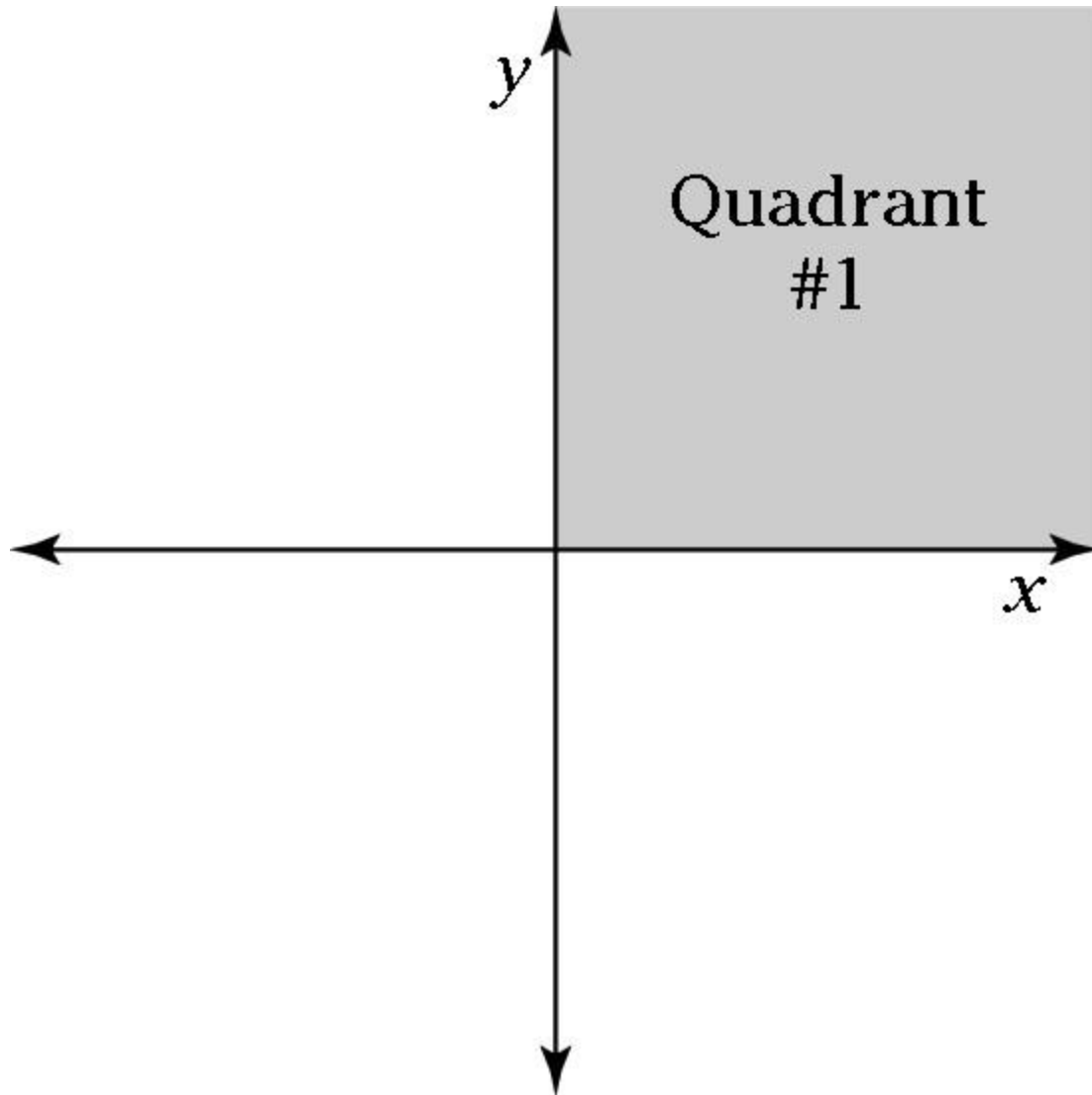


- A. 9.5
- B. 10
- C. 10.5
- D. 11
- E. 12

5. If $x^2 - x - 2 > 0$, which of the following is the solution set for x ?

- F. $x > -1$
- G. $x > 2$
- H. $-1 < x < 2$
- J. $x < -1$ or $x > 2$
- K. No solutions are possible.

6. If you plot the equation $x^2 + (y - 2)^2 = 4$ as a circle on a standard xy -graph, what is the area of the circle's region that will lie in Quadrant 1, as shown in the following figure?



- A. 0
- B. π
- C. 2π
- D. 4π
- E. 16π

7. If $a + 2b = 2$, what is the value of $\left(\frac{a}{b-1}\right) + \left(\frac{a}{b-1}\right)^2 + \left(\frac{a}{b-1}\right)^3$?

- F. -6
- G. 8
- H. 10

J. -12

K. 14

8. On an xy -graph, three corners of a parallelogram are located at $(3, 3)$, $(4, -4)$, and $(-2, -1)$. Which of the following points could be the remaining corner?

A. $(8, 0)$

B. $(8, -1)$

C. $(-1, 9)$

D. $(-3, 6)$

E. $(-5, 7)$

9. Doug, who runs track for his high school, was challenged to a race by his younger brother, Matt. Matt started running first, and Doug didn't start running until Matt had finished a quarter-mile lap on the school track. Doug passed Matt as they both finished their sixth lap. If both boys ran at a constant speed, with Doug running 2 miles an hour faster than Matt, what was Matt's speed?

F. 10.5 miles per hour

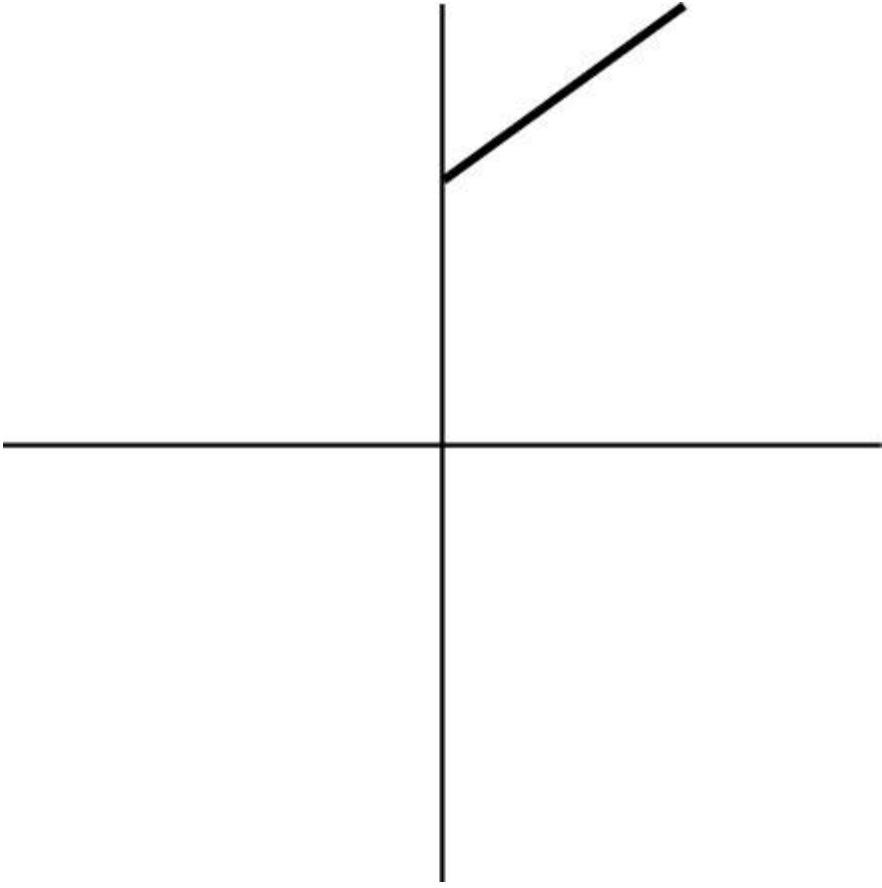
G. 10 miles per hour

H. 9 miles per hour

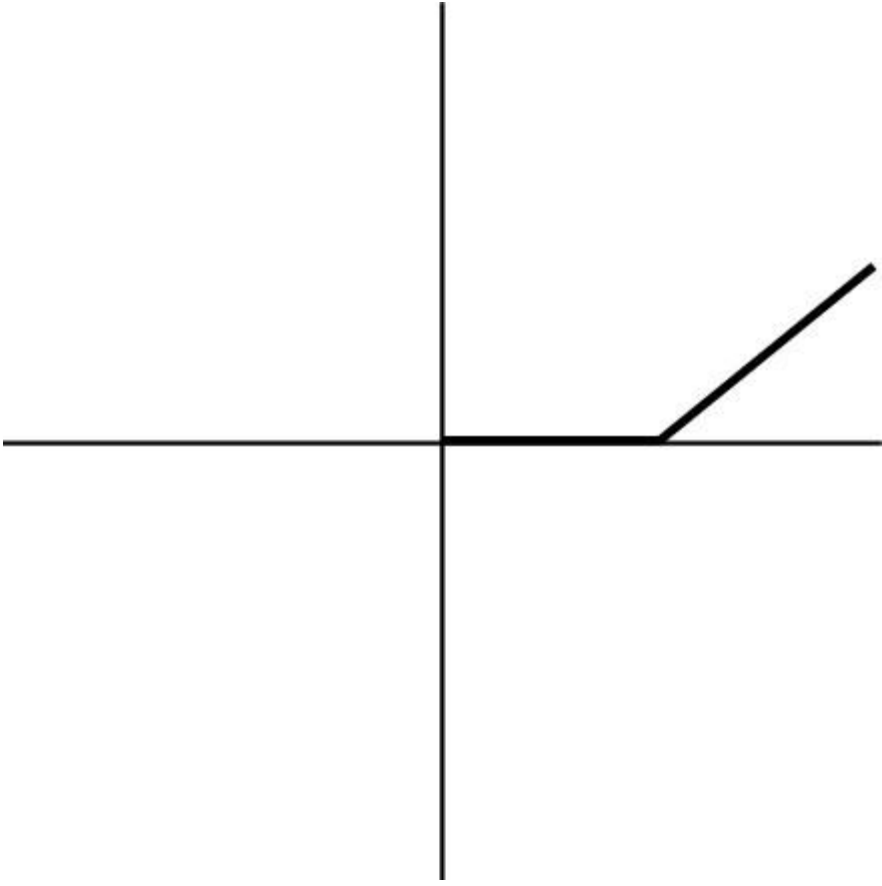
J. 8 miles per hour

K. 7.5 miles per hour

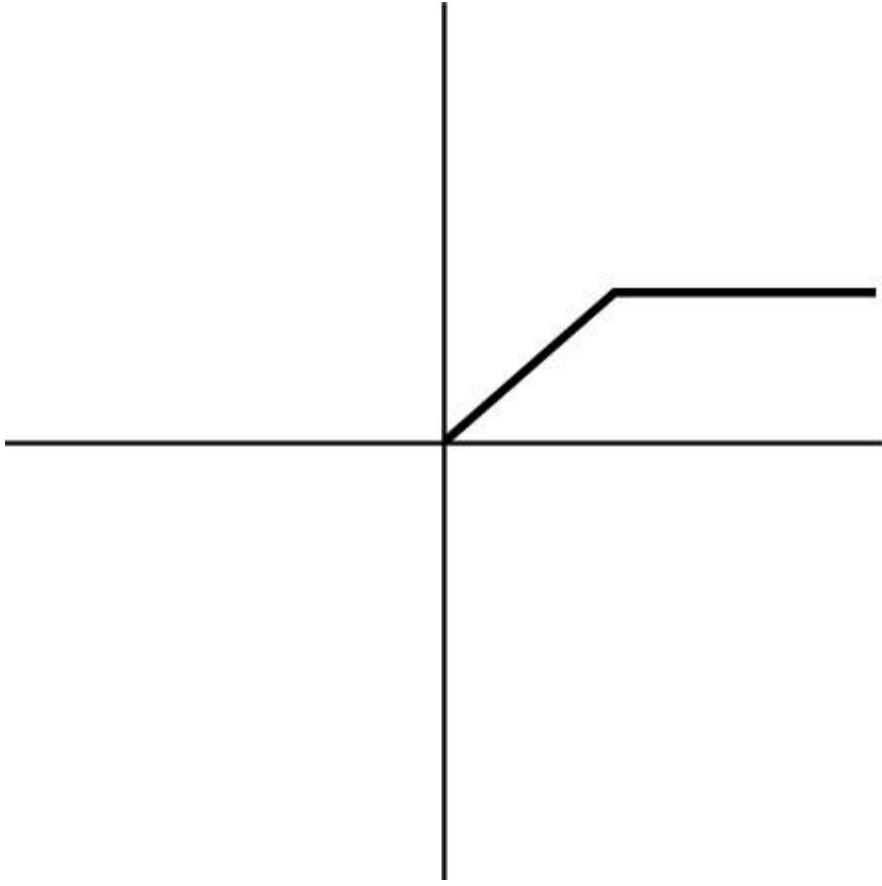
10. When calculating a certain tax, Simone found that no tax is due for all income up to p dollars, with $p > 0$. Income greater than p dollars is taxed at a rate of 15%. Which of the following graphs accurately represents this tax?



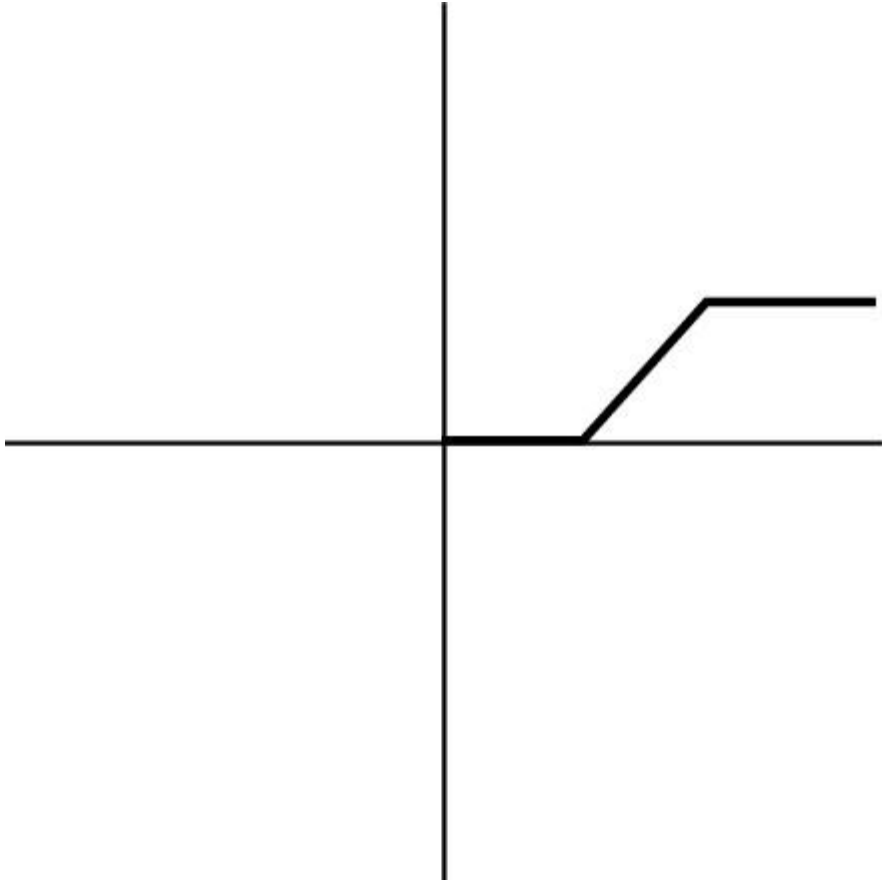
A.



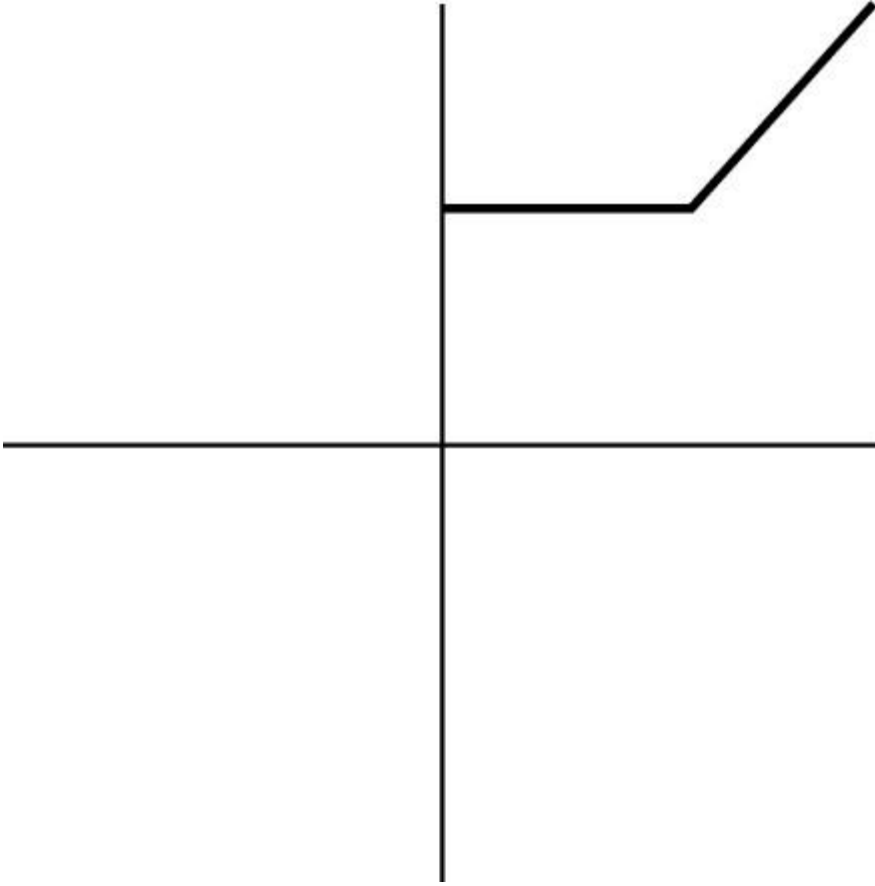
B.



c.

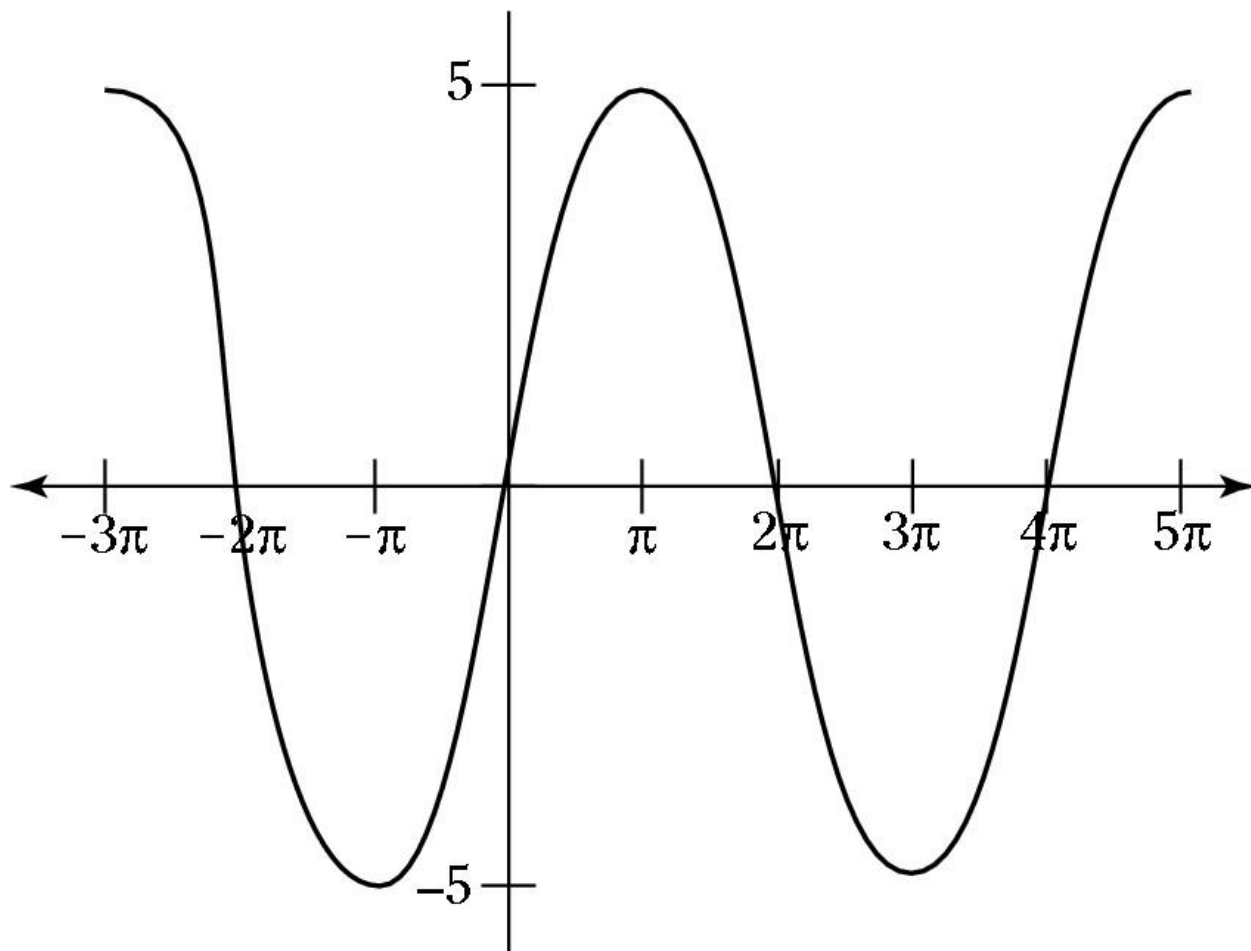


D.



E.

11. The following figure shows the graph of $y = 5 \sin \frac{x}{2}$. Which of the answer choices are the correct amplitude and period of this function?



- F. amplitude = 5, period = π
- G. amplitude = 5, period = 2π
- H. amplitude = 5, period = 4π
- J. amplitude = 10, period = 2π
- K. amplitude = 10, period = 4π

12. If the equation $x^2 + mx + n = 0$ has two solutions, $x = k$ and $x = 2k$, what is the value of mn in terms of k ?

- A. $2k^2$
- B. $-2k^2$
- C. $-2k^3$
- D. $6k^3$

E. $-6k^3$

13. When she chooses a password, Eloise always uses exactly ten different characters: five letters (A, B, C, D, and E) and five numbers (2, 3, 4, 5, and 6). Additionally, she always ensures that no pair of letters is consecutive and that no pair of numbers is consecutive. How many different passwords conform to these rules?

F. fewer than 1,000

G. between 1,000 and 10,000

H. between 10,000 and 100,000

J. between 100,000 and 1,000,000

K. more than 1,000,000

14. If the least common multiple of 9, 10, 12, and v is 540, which of the following could be v ?

A. 18

B. 24

C. 27

D. 36

E. 45

15. The equation $y = ax^b + c$ produces the following (x, y) coordinate pairs: $(0, 2)$, $(1, 7)$, and $(2, 42)$. What is the value of abc ?

F. 10

G. 20

H. 30

J. 40

K. 60