

15. Which of the following is a solution to the equation $x^2 - 36x = 0$?

- A. 72
- B. 36
- C. 18
- D. 6
- E. -6

$x^2 - 36x - 0 = 0$

a	b	c
1	-36	0

Mode: 5
3

0, 36

$x^2 - 36x = 0$
 $x(x - 36) = 0$
 $x = 0$ or $x - 36 = 0$
 $x = 36$

DO YOUR FIGURING HERE.

16. In the figure below, vertices D and F of $\triangle DEF$ lie on \overline{CG} , the measure of $\angle CDE$ is 148° , and the measure of $\angle EFG$ is 140° . What is the measure of $\angle DEF$?

$180 - (32 + 40) = 108$

$180 - 148 = 32$

$180 - 140 = 40$

- F. 72°
- G. 98°
- H. 100°
- J. 108°
- K. 116°

17. A company ships notepads in rectangular boxes that each have inside dimensions measuring 9 inches long, 9 inches wide, and 12 inches tall. Each notepad is in the shape of a cube with an edge length of 3 inches. What is the maximum number of notepads that will fit in 1 closed box?

- A. 10
- B. 11
- C. 12
- D. 22
- E. 36

v. big / v. small = $\frac{9 \times 9 \times 12}{3 \times 3 \times 3} = 36$

1 yard = 3 ft
1 ft = 12 inches

18. The function f is defined as $f(x) = -4x^3 - 4x^2$. What is $f(-4)$?

- F. -320
- G. -192
- H. 16
- J. 192
- K. 320

$-4(-4)^3 - 4(-4)^2 = 192$

19. Which of the following (x,y) pairs is the solution for the system of equations $x + 2y = 4$ and $-2x + y = 7$?

- A. $(-2,3)$
- B. $(-1,2.5)$
- C. $(1,1.5)$
- D. $(2,1)$
- E. $(4,0)$

Mode: 5
1

1	2	4
-2	1	7

20. Which of the following is a value of x that satisfies $\log_x 36 = 2$?

- F. 4
- G. 6
- H. 8
- J. 16
- K. 18

shift + solve

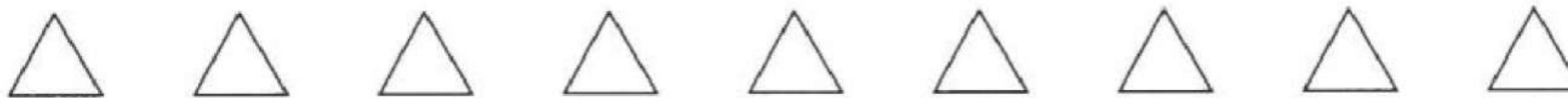
T&E

$\log_x 36 = 2$

$x^2 = 36$
 $x = \sqrt{36} = 6$

GO ON TO THE NEXT PAGE.

2



2

21. A 5-inch-by-7-inch photograph was cut to fit exactly into a 4-inch-by-6-inch frame. What is the area, in square inches, of the part of the photograph that was cut off?

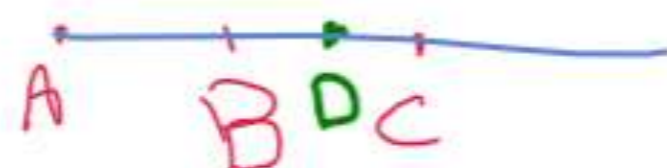
DO YOUR FIGURING HERE.

- A. 2
- B. 10
- C. 11
- D. 12
- E. 24

$5 \times 7 = 35$
 $4 \times 6 = 24$
 $35 - 24 = 11$

22. A line contains the points A, B, C, and D. Point B is between points A and C. Point D is between points C and B. Which of the following inequalities must be true about the lengths of these segments?

- F. $BC < AB$
- G. $BD < AB$
- H. $BD < CD$
- J. $CD < AB$
- K. $CD < BC$



23. If x and y are positive integers such that the greatest common factor of x^2y^2 and xy^3 is 45, then which of the following could y equal?

- A. 45
- B. 15
- C. 9
- D. 5
- E. 3

2, 3, 5, 7, 11, 13

$xy^2 = 45 \rightarrow$
 $x \cdot y \cdot y = 3 \cdot 3 \cdot 5$
 $x = 5, y = 3$



24. To test a new medicine, each of 300 volunteers was assigned a distinct number from 1 to 300. Next, a calculator was used to simulate drawing 150 balls from among 300 congruent balls. The balls were numbered the same way as the volunteers so that 150 volunteers to receive the new medication would be chosen without bias. The other volunteers received a placebo. Weeks later, the 2 groups were compared. Which of the following phrases best describes the company's testing?

- F. Randomized census
- G. Randomized experiment
- H. Nonrandomized experiment
- J. Randomized sample survey
- K. Nonrandomized sample survey

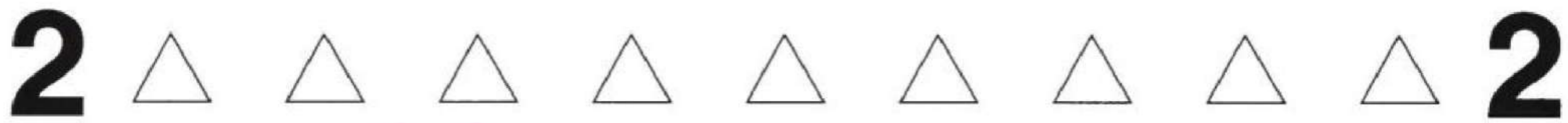
25. One caution sign flashes every 4 seconds, and another caution sign flashes every 10 seconds. At a certain instant, the 2 signs flash at the same time. How many seconds elapse until the 2 signs next flash at the same time?

- A. 6
- B. 7
- C. 14
- D. 20
- E. 40

$4, 8, 12, 16, 20, 24, 28, \dots$
 $10, 20$

GO ON TO THE NEXT PAGE.

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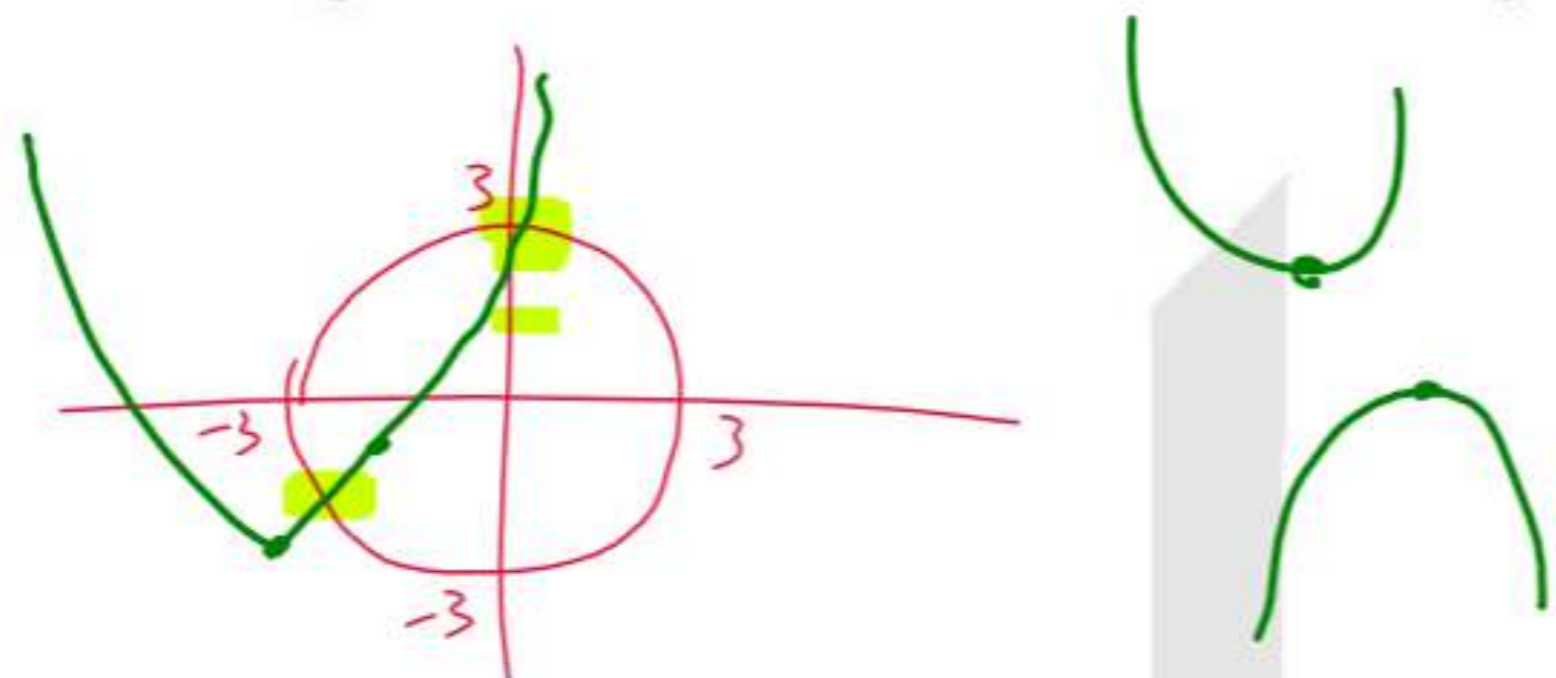
26. For all nonzero values of a and b , the value of which of the following expressions is always negative?

DO YOUR FIGURING HERE.

- F. $a - b$
- ~~G.~~ $-a - b$ $+5 + 2 = 7$
- H. $|a| + |b|$
- J. $|a| - |b|$
- K. $-|a| - |b|$
-ve

27. Graphed in the same standard (x,y) coordinate plane are a circle and a parabola. The circle has radius 3 and center $(0,0)$. The parabola has vertex $(-3,-2)$, has a vertical axis of symmetry, and passes through $(-2,-1)$. The circle and the parabola intersect at how many points?

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4



28. 40% of 250 is equal to 60% of what number?

- F. 150
- G. 160
- H. $166\frac{2}{3}$
- J. 270
- K. 375

shift solve

29. Which of the following inequalities is equivalent to $-2x - 6y > 2y - 4$?

- A. $x < -4y + 2$
- B. $x > -4y + 2$
- C. $x < 2y + 2$
- D. $x < 4y + 2$
- E. $x > 4y + 2$

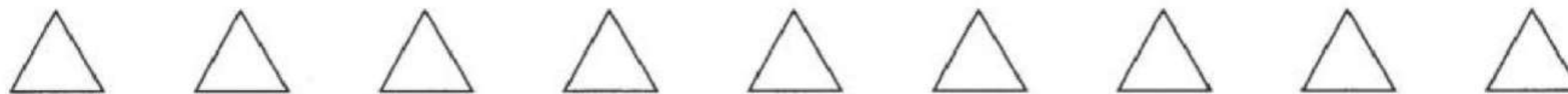
$$-2x > 2y + 6y - 4$$

$$-2x > \frac{8y}{-2} - \frac{4}{-2}$$

$$x < -4y + 2$$

GO ON TO THE NEXT PAGE.

2



2

30. For an angle with measure α in a right triangle,

$\sin \alpha = \frac{40}{41}$ and $\tan \alpha = \frac{40}{9}$. What is the value of $\cos \alpha$?

DO YOUR FIGURING HERE.

- F. $\frac{9}{41}$
- G. $\frac{41}{9}$
- H. $\frac{9}{40}$
- J. $\frac{9}{\sqrt{1,519}}$
- K. $\frac{9}{\sqrt{3,281}}$

$\cos \alpha = \frac{9}{41}$

Soh
Cah
Toa

$\sin x = \frac{o}{h}$
 $\cos x = \frac{a}{h}$
 $\tan x = \frac{o}{a}$

31. The perimeter of rectangle $ABCD$ is 96 cm. The ratio of the side lengths $AB:BC$ is 3:5. What is the length, in centimeters, of AB ?

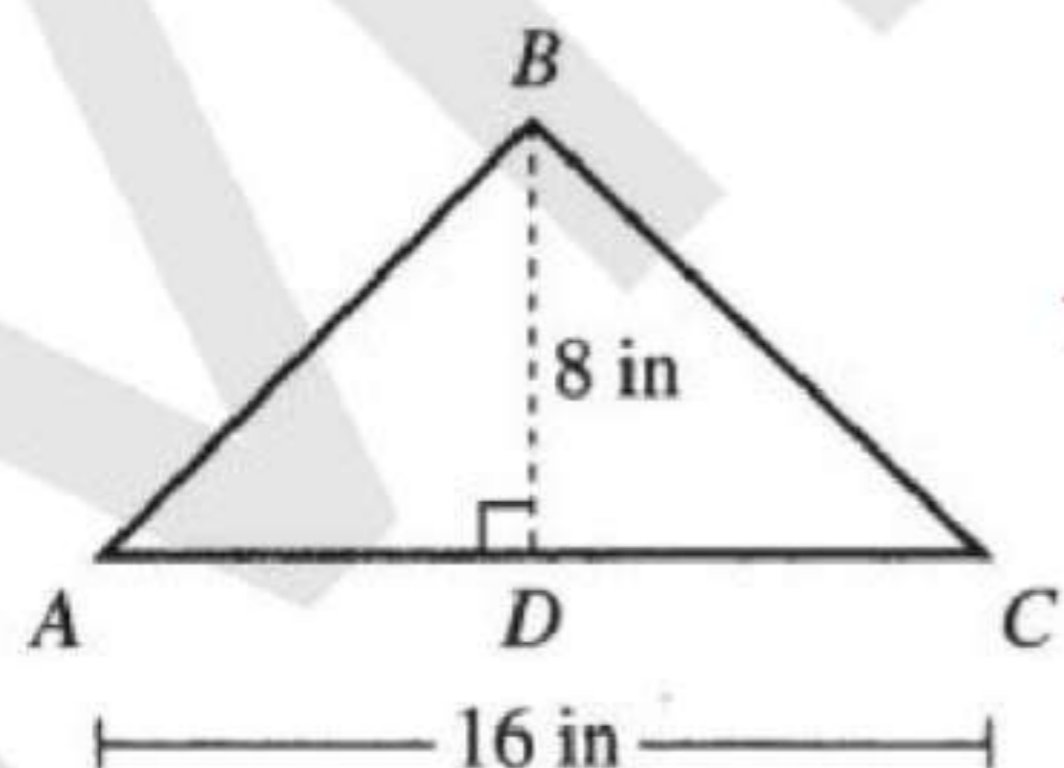
- A. 6
- B. 18
- C. 30
- D. 36
- E. 60

$3n + 3n + 5n + 5n = 96$

$n = 6$

$AB = 3 \times 6 = 18$

32. For $\triangle ABC$ shown below, base \overline{AC} has a length of 16 inches and altitude \overline{BD} has a length of 8 inches. The area of a certain square is equal to the area of $\triangle ABC$. What is the length, in inches, of a side of the square?



- E. 6
- G. 8
- H. 12
- J. 16
- K. 32

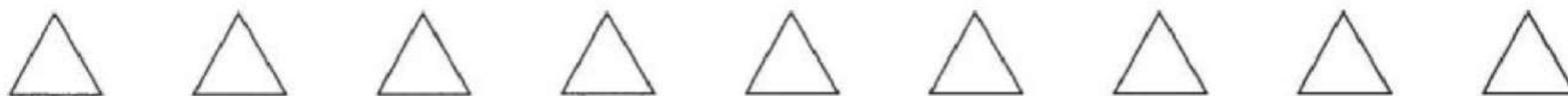
$\sqrt{\frac{1}{2}(16)(8)} = s^2$

$8 = s$

GO ON TO THE NEXT PAGE.

Taking and Evaluating Your First Practice Test

2

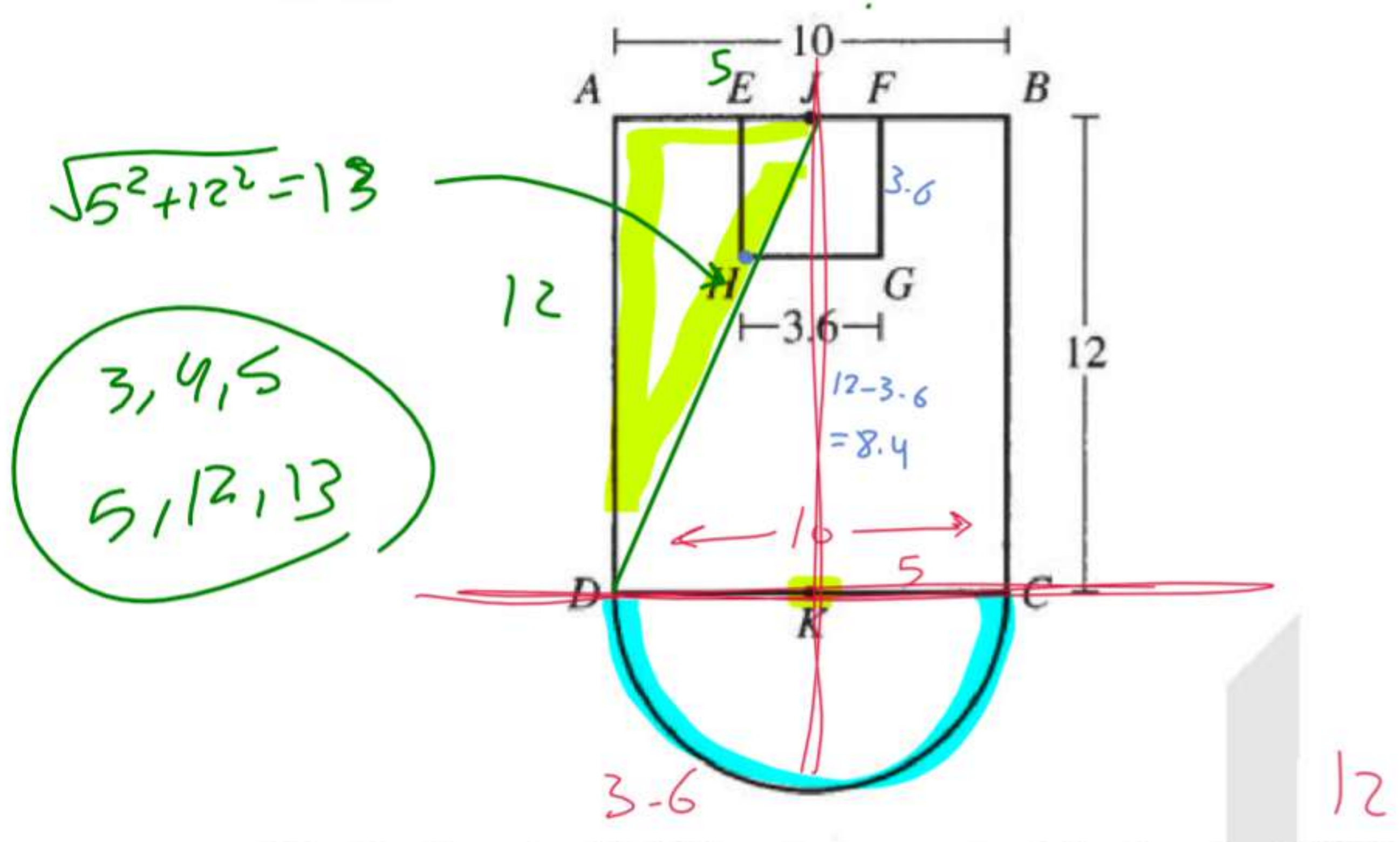


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Use the following information to answer questions 33–36.

DO YOUR FIGURING HERE.

In the figure shown below, $ABCD$ is a rectangle, $EFGH$ is a square, and \overline{CD} is the diameter of a semicircle. Point K is the midpoint of \overline{CD} . Point J is the midpoint of both \overline{AB} and \overline{EF} . Points E and F lie on \overline{AB} . The 3 given lengths are in meters.



33. The length of \overline{EH} is what percent of the length of \overline{AD} ?

- A. 15.6%
 - B. 30%
 - C. 36%
 - D. 43.2%
 - E. 50%
- Part / Total x 100*
 $\frac{3.6}{12} \times 100 = 30\%$

34. What is the length, in meters, of \overline{JD} ?

- F. 13
- G. 15.6
- H. 17
- J. $\sqrt{44}$
- K. $\sqrt{244}$

35. What is the length, in meters, of arc \overline{CD} ?

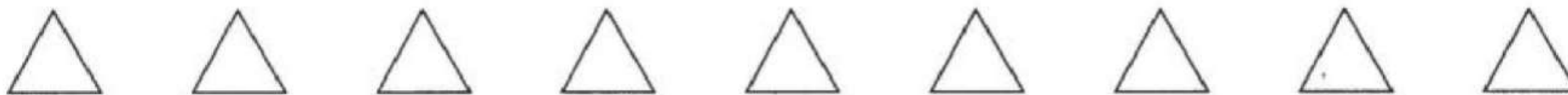
- A. 2.5π
 - B. 5π
 - C. 6.25π
 - D. 10π
 - E. 25π
- $\frac{2\pi r}{2} = \pi(5) = 5\pi$*

36. The figure will be placed in the standard (x,y) coordinate plane so that K is at the origin, \overline{AB} is parallel to the x -axis, and 1 meter equals 1 coordinate unit. Which of the following values could be the y -coordinate of H ?

- F. 1.8
- G. 3.6
- H. 8.4
- J. 10
- K. 12

GO ON TO THE NEXT PAGE.

2

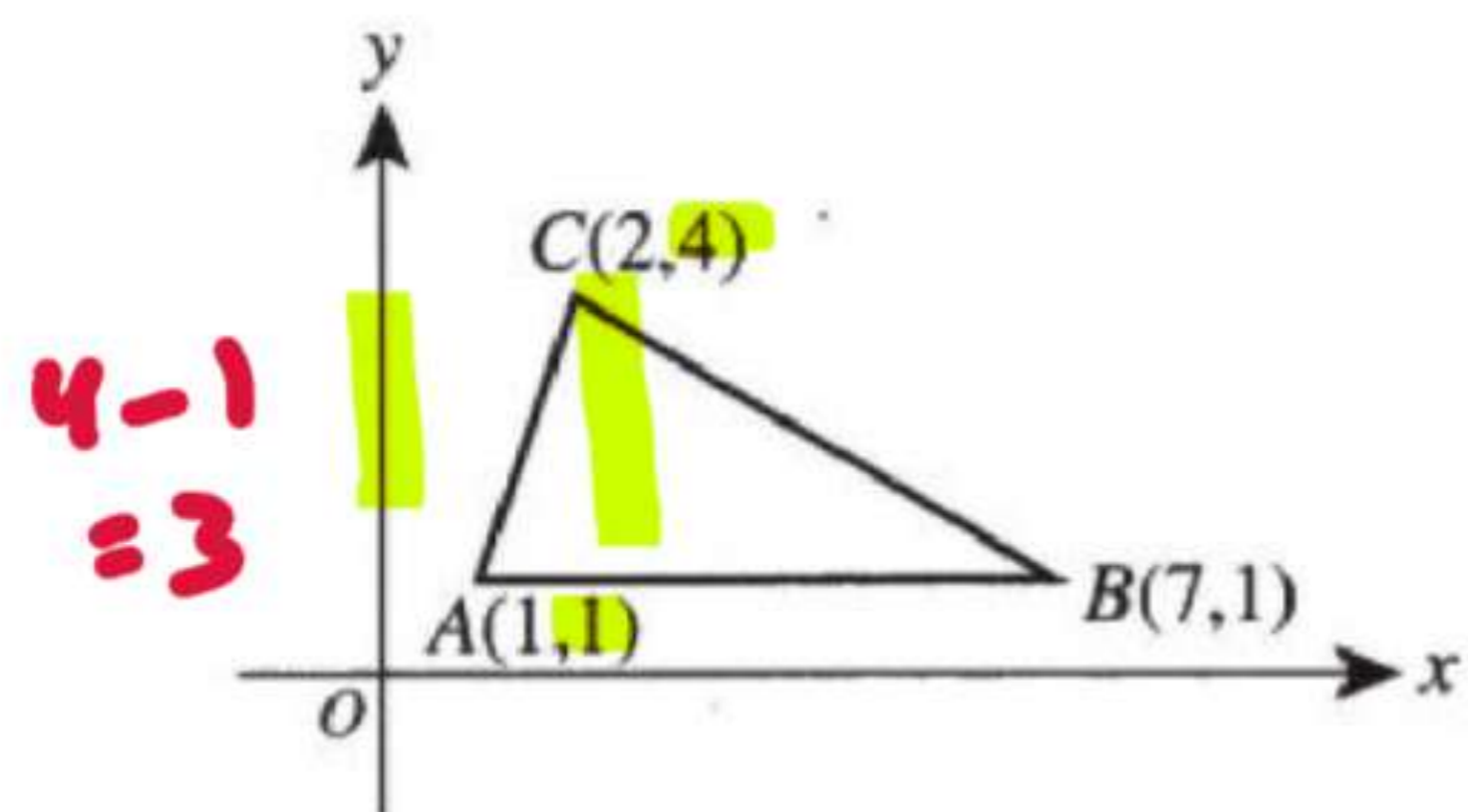


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37. What is the length, in coordinate units, of the altitude from C to \overline{AB} in $\triangle ABC$ shown in the standard (x,y) coordinate plane below?

DO YOUR FIGURING HERE.

- A. 3
- B. 5
- C. 6
- D. $\sqrt{10}$
- E. $\sqrt{13}$



38. At a local post office, on average, 3 customers are in line when the post office closes each day. The probability, P , that exactly n customers are in line when the post office closes can be modeled by the equation $P = \frac{3^n e^{-3}}{n!}$. Given that $e^{-3} = 0.05$, which of the following values is closest to the probability that exactly 2 customers are in line when the post office closes?

- F. 0.08
- G. 0.11
- H. 0.15
- J. 0.23
- K. 0.45

$\frac{3^2 e^{-3}}{2!} = 0.23$

39. What is the amplitude of the function

$f(x) = \frac{1}{2} \cos(3x + \pi)$?

- A. $\frac{1}{3}$
- B. $\frac{1}{2}$
- C. $\frac{3}{2}$
- D. 2
- E. 3

$a \sin bx$ } amp. = a
 $a \cos bx$ } Period = $\frac{2\pi}{b}$

40. License plates on cars in a certain state consist of 3 letters taken from the 26 letters, A through Z, followed by 3 digits taken from the 10 digits, 0 through 9. Which of the following expressions gives the number of distinct license plates that are possible given that repetition of both letters and digits is allowed?

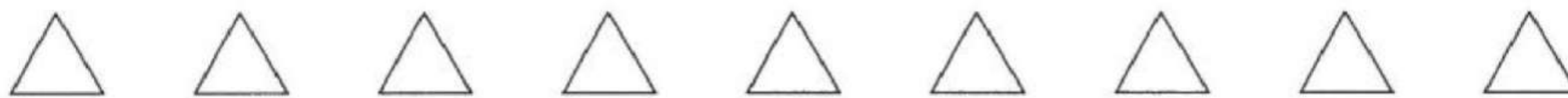
- F. $10^3 \cdot 26^3$
- G. $(10 + 26)^3$
- H. $2(26!)^3(10!)^3$
- J. $(3 + 3)^{26+10}$
- K. $(26! \cdot 10!)^3 + (26! \cdot 10!)^3$

$L \cdot L \cdot L \quad D \cdot D \cdot D$
 $26 \times 26 \times 26 \times 10 \times 10 \times 10$
 $26^3 \cdot 10^3$

GO ON TO THE NEXT PAGE.

Taking and Evaluating Your First Practice Test

2



2

41. For 20 quiz scores in a typing class, the table below gives the frequency of the scores in each score interval. Which score interval contains the median of the scores?

DO YOUR FIGURING HERE.

Score interval	Frequency
96-100	3
91-95	1
86-90	3
81-85	4
76-80	9

$\frac{20}{2} = 10$

- A. 96-100
- B. 91-95
- C. 86-90
- D. 81-85**
- E. 76-80

42. In the complex numbers, where $i^2 = -1$,

$\frac{1}{1+i} \cdot \frac{1-i}{1-i} = ?$

Modk
2

- F. $i - 1$
- G. $1 + i$
- H. $1 - i$
- J. $\frac{1-i}{2}$**
- K. $\frac{1+i}{2}$

$\frac{1}{2} - \frac{1}{2}i$
 $\frac{1-i}{2}$

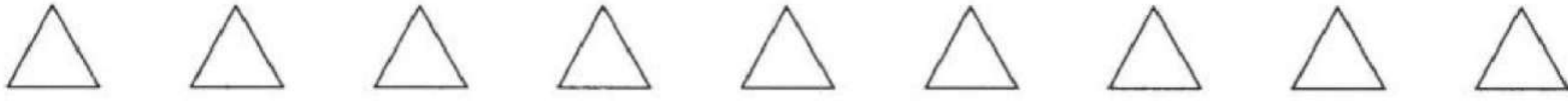
43. Temperatures measured in degrees Fahrenheit (F) are related to temperatures measured in degrees Celsius (C) by the formula $F = \frac{9}{5}C + 32$. There is 1 value of x for which x degrees Fahrenheit equals x degrees Celsius. What is that value?

- A. -72
- B. -40**
- C. -32
- D. 0
- E. 32

$x = \frac{9}{5}x + 32$
Shift
solve

GO ON TO THE NEXT PAGE.

2



2

44. The table below gives experimental data values for variables x and y . Theory predicts that y varies directly with x . Based on the experimental data, which of the following values is closest to the constant of variation?

DO YOUR FIGURING HERE.

(Note: The variable y varies directly with the variable x provided that $y = kx$ for some nonzero constant k , called the *constant of variation*.)

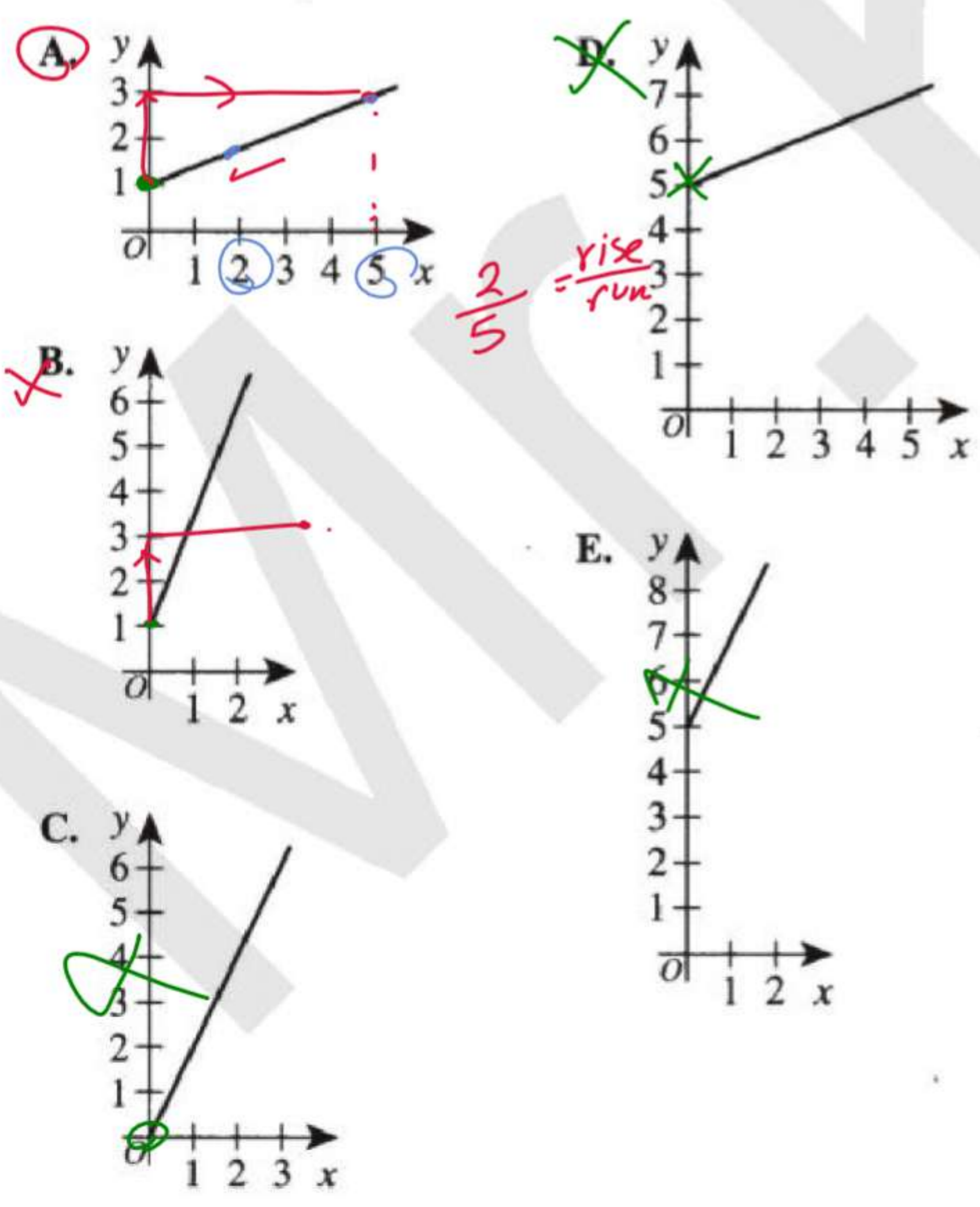
x	y
2.75	0.140
8.50	0.425
14.75	0.750
16.75	0.850
21.00	1.050

$y = kx$
 $0.140 = k(2.75)$
 $k = \frac{0.14}{2.75}$

- F. -2.61
- G. 0.05**
- H. 3.61
- J. 15.90
- K. 20.00

45. During a snowstorm, the relationship between the depth of accumulated snow, y inches, and the elapsed time, x hours, was modeled by the equation $2x - 5y = -5$. One of the following graphs in the standard (x, y) coordinate plane models the equation for positive values of x and y . Which one?

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



GO ON TO THE NEXT PAGE.

Taking and Evaluating Your First Practice Test