

Item	Answer	Standard	Item	Answer	Standard
1	B	SPI 3102.1.6	34	J	SPI 3102.2.2
2	H	SPI 3102.3.4	35	D	SPI 3102.5.1
3	B	SPI 3102.3.4	36	J	SPI 3102.3.3
4	G	SPI 3102.3.5	37	D	SPI 3102.1.5
5	C	SPI 3102.3.10	38	H	SPI 3102.3.9
6	G	SPI 3102.1.1	39	C	SPI 3102.3.11
7	A	SPI 3102.4.4	40	H	SPI 3102.3.7
8	G	SPI 3102.3.10	41	D	SPI 3102.3.2
9	B	SPI 3102.5.4	42	F	SPI 3102.1.4
10	J	SPI 3102.5.4	43	A	SPI 3102.3.6
11	A	SPI 3102.1.6	44	G	SPI 3102.3.4
12	J	SPI 3102.3.3	45	C	SPI 3102.1.2
13	C	SPI 3102.1.1	46	G	SPI 3102.5.5
14	G	SPI 3102.3.9	47	B	SPI 3102.4.3
15	D	SPI 3102.1.5	48	H	SPI 3102.2.1
16	G	SPI 3102.4.4	49	D	SPI 3102.4.2
17	D	SPI 3102.3.6	50	F	SPI 3102.3.1
18	H	SPI 3102.2.3	51	A	SPI 3102.2.2
19	B	SPI 3102.2.1	52	H	SPI 3102.3.2
20	F	SPI 3102.3.8	53	A	SPI 3102.3.3
21	C	SPI 3102.5.5	54	F	SPI 3102.5.2
22	F	SPI 3102.4.3	55	A	SPI 3102.1.5
23	C	SPI 3102.3.9	56	H	SPI 3102.1.3
24	F	SPI 3102.3.3	57	C	SPI 3102.4.1
25	C	SPI 3102.1.2	58	H	SPI 3102.5.1
26	J	SPI 3102.3.7	59	A	SPI 3102.3.8
27	A	SPI 3102.3.2	60	H	SPI 3102.3.1
28	G	SPI 3102.3.5	61	A	SPI 3102.5.3
29	B	SPI 3102.1.4	62	G	SPI 3102.1.3
30	G	SPI 3102.5.3	63	B	SPI 3102.5.2
31	A	SPI 3102.3.2	64	G	SPI 3102.2.3
32	F	SPI 3102.4.2	65	B	SPI 3102.4.1
33	A	SPI 3102.3.11			

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1 A power company charges a monthly water-service fee plus a charge for each unit of water a customer uses.

What is the charge for a unit of water?

A \$2
B \$4
C \$6
D \$12

2 What is $\frac{(x-1)^2(1-x)^5}{(1-x)^3(x-1)^4}$ in simplest form?

F $\frac{(1-x)^7}{(x-1)^7}$
G -1
H 1
J $\frac{(1-x)^2}{(x-1)^2}$

3 $\frac{2x^2y^3}{8xy^2} = ?$

A $\frac{x^3y}{4}$
B $\frac{x^2y}{4}$
C $\frac{x^2y}{6}$
D $\frac{x^4y^5}{6}$

4 Solve for y.

$|2 - 3y| + 4 = 7$

F $y = \frac{1}{3}$ or $y = \frac{5}{3}$
G $y = -\frac{1}{3}$ or $y = \frac{5}{3}$
H $y = -\frac{1}{3}$ or $y = \frac{1}{3}$
J $y = \frac{1}{3}$ or $y = -\frac{5}{3}$

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5 What are the solutions of the quadratic equation $-3y + 28 = y^2$?

A -7, -4
 B -4, 7
 C -7, 4
 D 4, 7

Handwritten notes: $y^2 + 3y - 28$
 $(x+7)(x-4) = 0$

6 Heidi ~~buys some pencils~~, then uses up the same number each week. The graph below shows how many pencils p Heidi has left after w weeks. Which equation describes the relationship between w and p in the graph?

Handwritten notes: $-\frac{25}{12} =$

F ~~$p = 25 + w$~~
 G $p = 25 - 2w$
 H ~~$p = 25 + 2w$~~
 J $p = 25 - w$

7 Oscar wants to fill a pond that irrigates his crops. One water source fills the pond 1.5 times faster than a second source. When both sources are used together, the pond is filled in 6 hours. Which equation describes how fast both sources can fill the pond together?

A $\frac{1}{r} + \frac{2}{3r} = \frac{1}{6}$
 B $\frac{1}{r} - \frac{3}{2r} = \frac{1}{6}$
 C $6 = 1.5r + r$
 D $6 = r + \frac{1}{2r}$

Handwritten notes: $x = \text{rate of 2nd source}$
 $1.5x = 2\text{nd source}$
 $1.5x + x = 6$
 $(8, -4)$

8 Which of the following quadratic equations has the solutions $x = 2 \pm 6i$?

F ~~$x^2 - 4x - 16$~~
 G ~~$x^2 - 4x - 32 = 0$~~
 H ~~$x^2 - 4x - 32$~~
 J ~~$x^2 - 4x + 16 = 0$~~

Handwritten notes: $y^2 - 4x - 16$
 $x^2 - 4x + 32$

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9 The scatter plot compares yearly income and age. Use the scatter plot to answer Questions 9 and 10.

Using the line of best fit, what is the age of a person who earns \$102,000?

A 58 years old
 B 60 years old
 C 66 years old
 D 70 years old

10 Which equation best describes the line of best fit?

F ~~$y = -2x + 20$~~
 G ~~$y = -2x - 20$~~
 H ~~$y = 2x + 20$~~
 J $y = 2x - 20$

11 The graph below compares the decrease in altitude along a water slide to its horizontal length. Which statement best describes the slope of the graph?

A The slide drops 3 feet for every 5 feet of horizontal length.
 B The slide drops 1 foot for every 5 feet of horizontal length.
 C The slide drops 1 foot for every 1 foot of horizontal length.
 D The slide drops 5 feet for every 3 feet of horizontal length.

Handwritten notes: Rise Run
 $-\frac{60}{100} = -\frac{3}{5}$

12 Which is a factor of $-4x^2 + 24x - 36$?

F $4x + 3$
 G $4x - 3$
 H $x + 3$
 J $x - 3$

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- 13 Which equation might represent the relationship between altitude a in miles and elapsed time t in seconds of a spaceship taking off from Earth at sea level?

- A $a = -3t$
- B $a = -5t + 5000$
- C $a = 10t$
- D $a = 2t - 2000$

$3\frac{1}{7}(.05x) / \frac{6}{7}x = .5$
 $4\frac{3}{7} + \frac{5}{7}$

- 14 What is the solution of the system shown below?

$$\begin{aligned} 4x - 5y &= 0 \\ 3x - 5y &= -5 \end{aligned}$$

- ~~F (5, 3)~~
- G (5, 4)**
- ~~H (3, 4)~~
- J (5, -4)

- 15 What happens to the graph of $y = -3x + 2$ when the y -intercept is decreased by 2?

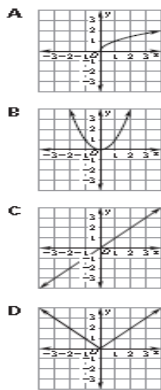
- A The new line is half as steep.
- B The graph rises left to right.
- C The graph is 2 units higher for every value of x .
- D The graph passes through the origin.

- 16 How much 5% maple syrup and water mixture must be added to 100% pure maple syrup to produce 5 quarts of syrup that is 10% maple syrup?

- F $3\frac{1}{7}$ quarts
 - G $4\frac{14}{19}$ quarts**
 - ~~H $4\frac{2}{7}$ quarts~~
 - J $5\frac{15}{19}$ quarts
- $.05(x)$
 $.05x + X = 5(.1)$
 $.05x + X = .5$
 $1.05x = .5$

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- 17 Which graph represents $y = |x|$?



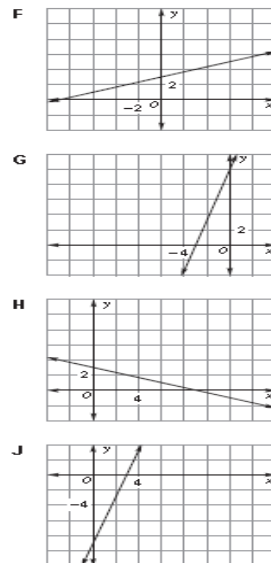
- 18 Which decimal value comes between $\frac{17}{10}$ and $\frac{43}{18}$?

- F 0.42
- G 0.60
- H 1.91
- J 2.50

- 19 Simplify $2\sqrt{9} - 5\sqrt[3]{8}$.

- A 22
- B -4
- C 16
- D -10

- 20 Which of the following is the graph of $y = \frac{1}{3}x + 3$?



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21 A spinner is divided into 4 equal sections of red, gold, blue, and green. The table shows the number of times the spinner lands on each color. Based on the results, which predicts the number of times the spinner will land on gold after 120 spins?

Color	Number of Times
Blue	3
Green	4
Gold	6
Red	3

A 23
B 30
C 45
D 75

22 The diameter of a circle has endpoints (2, 5) and (-6, 5). What are the coordinates of the center of the circle?

F (-2, 5)
G (-5, 2)
H (-5, 2)
J (-6, 2)

Handwritten notes for 21:
 $\frac{16}{16} = X$
 $\frac{720}{16} = X$
 $45 = X$

Handwritten work for 22:
 $\frac{2 + (-6)}{2} = \frac{-4}{2} = -2$
 $\frac{5 + 5}{2} = \frac{10}{2} = 5$
 Center: (-2, 5)

23 Which graph best represents the solution to this system of inequalities?
 $y > \frac{5}{3}x - 1$
 $y \leq -2x + 5$

A

B

C

D

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24 Which of the following is the greatest common factor of the terms of $2x^6 + 4x^5 - 3x^4$?

F x^4
G x^5
H $2x^4$
J $2x^5$

25 Seven more than twice a number is equal to eight less than five times the number. Which equation can be used to find the number?

A $7n + 2 = 8n - 5$
B $2n + 7 = 8n - 5$
C $2n + 7 = 5n - 8$
D $7 + 2n = 8 - 5n$

26 What is the range of the function $y = 4x + 2$ if the domain is {3, 2, -6, 4}?

F {10, 6, -26, 14}
G {3, 2, -6, 4}
H {-12, -10, 22, 18}
J {14, 10, -22, 18}

27 Which expression is equivalent to $(5y - 3)(5y + 3)$?

A $25y^2 - 9$
B $25y^3 - 9$
C $25y^2 - 15y^2 + 15y - 9$
D $25y^3 + 15y^2 - 15y - 9$

28 What is the solution of this inequality?
 $4 - 3x \geq 2(x - 1)$

F $\frac{5}{3} \leq x$
G $\frac{5}{3} \geq x$
H $\frac{6}{5} \leq x$
J $\frac{5}{6} \leq x$

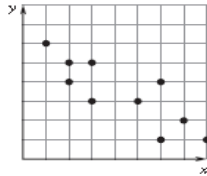
Handwritten work for 28:
 $4 - 3x \geq 2x - 2$
 $+2 + 3x \quad +3x + 2$
 $6 \geq 5x$
 $\frac{6}{5} \geq x$

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- 29 The formula for converting from Fahrenheit (F) degrees to Celsius (C) degrees is $C = \frac{5}{9}(F - 32)$. Find F if $C = 3$. Round your answer to the nearest degree.
- A 17
 B 37
 C 45
 D 62

$$3 = \frac{5}{9}(F - 32)$$

- 30 Based on the scatter plot, which statement is true?

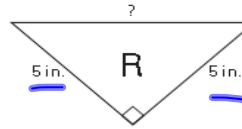


- F There is a positive correlation between x and y .
 G There is a negative correlation between x and y .
 H The dependent variable is x .
 J There is no correlation between x and y .

- 31 Simplify the algebraic expression.
 $2(3 - x) + 5(x - 1)$

- A $3x + 1$
 B $3x + 11$
 C $7x + 1$
 D $7x + 11$

- 32 Rachel creates a logo in the shape of a right triangle to print on T-shirts for her lawn-mowing business, as shown below.

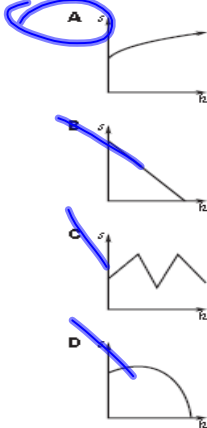


What is the length of the longest side in the triangle?

- F $5\sqrt{2}$ in.
 G $5\sqrt{5}$ in.
 H $5\sqrt{10}$ in.
 J 50 in.

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- 33 Which graph best represents a likely relationship between study time h in hours and a student's score s on a test?



- 34 Avogadro's number is 6.02×10^{23} and is equal to 1 mole. Which value is equivalent to 1 mole squared?

- F 1.204×10^{24}
 G 3.624×10^{24}
 H 6.02×10^{25}
 J 3.624×10^{47}

- 35 Jim's first three quiz scores are 90, 85, and 88. Which score will Jim have to earn on his next quiz to raise his mean quiz score to 90?

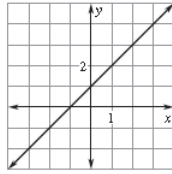
- A 90
 B 92
 C 95
 D 97

- 36 What is the factored form of $4x^3 - 2x^2 + 8x$?

- F $x(4x^2 - 2x + 8)$
 G $2x(2x^2 - x - 8)$
 H $2x(x^2 - 4)(x + 1)$
 J $2x(2x^2 - x + 4)$

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- 37 The graph of $y = x + 1$ is shown. Which point will lie on the graph if the slope of the line is doubled and the y -intercept stays the same?



- A $(-2, -2)$
- B $(0, 2)$
- C $(1, 2)$
- D $(2, 5)$**

- 38 What is the solution of the system shown below?

$$\begin{aligned} 7x + 5y &= -3 \\ y &= 9x - 11 \end{aligned}$$

- F $(-2, 3)$
- G $(-1, -2)$
- H $(1, -2)$**
- J $(-3, 2)$

$7(-2) + 5(3) = -3$

- 39 A rock is dropped from a bridge into a river. If the rock hits the water 5 seconds after it is dropped, what is the height h of the bridge above the water? Use the equation $h = -16t^2$ where t is the time in seconds.

- A 80 ft
- B 160 ft
- C 400 ft
- D 800 ft

(D, R)

- 40 Which of the following is *not* in the range of the set?

$\{(2, -3), (-2, 6), (4, -3), (4, -8)\}$

- I -8
- G -3
- H 5**
- J 6

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- 41 What is the simplified form of this expression?

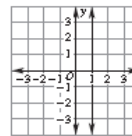
$$(-12x - 5y) - (6x + 7y)$$

- A $-6x + 2y$
- B $-6x - 12y$
- C $-18x + 12y$
- D $-18x - 12y$**

- 42 Use the formula $C = 2\pi r$ to find the radius, r , when the circumference, C , of a circle is 45 centimeters. Use 3.14 for π .

- F 7.17 centimeters
- G 8.26 centimeters
- H 14.33 centimeters
- J 22.25 centimeters

- 43 What is the equation of the graph shown?



- A $x = 1$
- B $y = x$
- C $y = 1$
- D $y = |x|$

- 44 What is the simplified form of this expression?

$\left(\frac{x}{3}\right) \frac{1}{3x} - \frac{2}{x^2} \left(\frac{2}{3}\right)$

$$\frac{x}{3x^2} - \frac{6}{3x^2} = \frac{x-6}{3x^2}$$

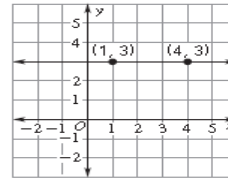
- F $\frac{1}{3x^2}$
- G $\frac{x-6}{3x^2}$
- H $\frac{6}{3x^2}$
- J $\frac{x-2}{3x^2}$

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- 45 Which phrase or sentence best represents the following?
- $$A = \frac{1}{2}(B + b)h$$
- ~~A~~ The area is half the sum of the bases and the height.
 - ~~B~~ The area is half the product of the bases and the height.
 - ~~C~~ The area is the product of the height and half the sum of the bases.
 - ~~D~~ The product of the height and half the sum of the bases.

- 46 Suppose the numbers below are written on separate pieces of paper and placed in a hat.
2, 18, 27, 11, 6, 45, 11, 39
If you are asked to blindly select a piece of paper from the hat, what is the theoretical probability of selecting a piece of paper with 11 on it?
- F $\frac{1}{8}$
 - G $\frac{1}{4}$
 - H $\frac{1}{2}$
 - J $\frac{3}{22}$

- 47 What is the distance between the points shown below?



- A 9 units
- B 3 units
- C $\sqrt{27}$ units
- D 5.04 units

B b b b b b b

- 48 Which expression is equivalent to $\sqrt[3]{a^2b^7}$ ($a > 0, b > 0$)?

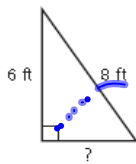
- ~~F~~ $b^3 \cdot \sqrt[3]{a^2b^4}$
- ~~G~~ $b^3 \cdot \sqrt[3]{a^2b^4}$
- H $b \cdot \sqrt[3]{a^2b^3}$
- ~~J~~ $b^3 \cdot \sqrt[3]{a^2b^3}$

b · $\sqrt[3]{a^2b^3}$

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- 49 Mr. Fry uses a straight piece of wood that is 8 feet long to prop up an old fence, as shown in the figure.

$$\begin{aligned} &\sqrt{6^2 + 7^2} \\ &\sqrt{36 + 49} \\ &\sqrt{85} \\ &\underline{\underline{9.22}} \end{aligned}$$



If the fence is 6 feet tall, how far from the fence is the bottom of the piece of wood?

- ~~A~~ 28 ft
- ~~B~~ 10 ft
- ~~C~~ 7 ft
- D $2\sqrt{7}$ ft

- 50 Which expression will generate the n th term of the sequence 2, 8, 18, 32, 50, ... ?

- F $2n^2$
- G $2n$
- H $n + 2$
- J n^2

2 + 6 = 8
8 + 10 = 18
18 + 14 = 32
32 + 18 = 50
6

- 51 What is the sum $(7.2 \times 10^5) + (4.6 \times 10^6)$?

- A 5.32×10^6
- B 1.18×10^6
- C 1.18×10^{12}
- D 7.66×10^{30}

- 52 Simplify $(3w^2 - w - 6) - (3w - 10)$.

- F $-w + 4$
- G $-w - 16$
- H $3w^2 - 4w + 4$
- J $3w^2 - 4w - 16$

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53 For which polynomial is the greatest common factor of the terms $5x$?

- A $25x^3 + 5x$
- ~~B $5x - 5$~~
- ~~C $15x^2 + 5$~~
- ~~D $30x^2 - 10$~~

$$\begin{array}{r} 7 \\ 10 \\ 9 \\ 12 \\ \hline 38 \\ 45 \end{array}$$

54 The distance a certain mail carrier walks each week varies. The distances she walked the last four weeks are 7 kilometers, 10 kilometers, 9 kilometers, and 12 kilometers. How will adding this week's value of 4 kilometers to this data set affect the mean?

- F It will decrease the mean.
- G It will increase the mean.
- H The mean will equal the median.
- J It will not change the mean.

9.5 $\underline{4}$

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55 The function $f(x) = x^2 - 1$ obtained by translating $g(x)$ one unit up. Which equation describes $g(x)$?

- A $y = x^2 - 2$
- ~~B $y = x^2$~~
- ~~C $y = x^2 + 1$~~
- ~~D $y = 1 - x^2$~~

$x^2 - 1$

$f(x)$
 $g(x)$

56 What is the value of $|4x + 2|$ for $x = -1$?

- ~~F 6~~
- ~~G -2~~
- H 2
- ~~J 6~~

$|4(-1) + 2|$
 $|-4 + 2|$
 $|-2|$

$4 + 2$
 6

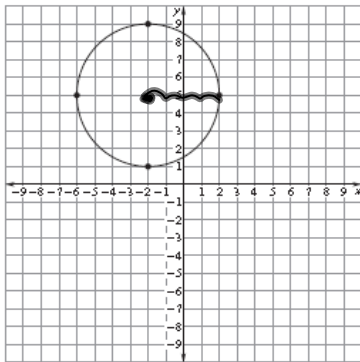
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57 What is the area of the circle shown below to the nearest hundredth? Use 3.14 for π .

$r = 4$

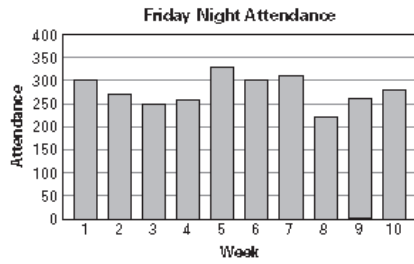
πr^2

$\pi 4^2$



- A 201.06 units²
- B 25.13 units²
- C 50.27 units²**
- D 12.57 units²

58 Which claim is supported by the data?



- F The movie shown on Friday night during week 5 received the best reviews.
- G Attendance for the movie shown on Friday night during week 8 was low because of a snowstorm.
- H The movie shown on Friday night during week 5 had the highest attendance.
- J The Friday night attendance during weeks 3 and 4 are similar because the movies shown those weeks attracted a younger audience.

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59 Which is an equation of the line through

(3, -1) with slope $-\frac{2}{3}$?

A $2x + 3y = 3$

B $3x + 2y = 7$

C $3x - y = 10$

~~D $x - 3y = 67$~~

$y = \frac{2}{3}x + 1$
 ~~$y = \frac{3}{4}x + \frac{7}{2}$~~
 ~~$y = 3x - 10$~~
 ~~$y = \frac{1}{3}x - \frac{67}{3}$~~

Method

$y - y_1 = m(x - x_1)$

$y + 1 = -\frac{2}{3}(x - 3)$

$y + 1 = -\frac{2}{3}x + 2$

$y = -\frac{2}{3}x + 1$

$\frac{2}{3}x + y = 1$

$2x + 3y = 3$

60 Which is the 12th term in the sequence

40, 29, 18, 7, -4, ... ?

G -70

H -81

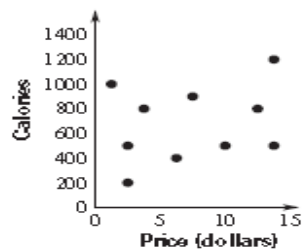
J -92

$40 + (12-1)(-11)$
 $40 + -121$

$40 + -11(12-1)$

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- 61** The scatter plot shows the relationship between the number of calories in a sandwich and the price of the sandwich.



Which statement is best supported by the scatter plot?

- A** There is little relationship between the number of calories and the price of a sandwich.
- B** The more calories in a sandwich, the greater the price.
- C** The more calories in a sandwich, the lower the price.
- D** The price of a sandwich remains constant.

- 62** Evaluate $9 - 8n$ for $n = 5$.

- F** -49
- G** -31
- H** 31
- J** 49

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- 63** The distances a bee flew to get nectar are 3 meters, 8 meters, 6 meters, and 7 meters. How will adding 4 meters to this data set affect the mean?

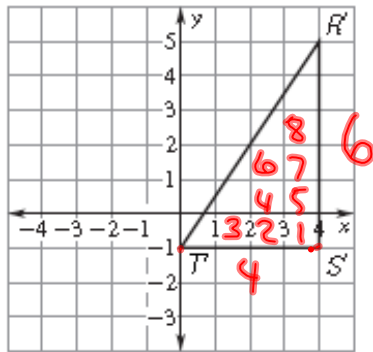
- A** It will increase the mean.
- B** It will decrease the mean.
- C** It will not change the mean.
- D** The mean will equal the median.

- 64** Which of the following has the least value?

- F** $\frac{1}{3}$
- G** $\frac{5}{21}$
- H** 0.28
- J** 0.42

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- 65 What is the area of the triangle shown below?



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

- A 24 units²
- B 12 units²
- C 10 units²
- D 20 units²

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