

# JEFFERSON MATH PROJECT REGENTS AT RANDOM

The NY Integrated Algebra Regents Exams  
Fall, 2007-August, 2009

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*Dear Sir*

*I have to acknowledge the receipt of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensable as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.*

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

1. 080816ia, P.I. A.N.8

John is going to line up his four golf trophies on a shelf in his bedroom. How many different possible arrangements can he make?

- [A] 16 [B] 24 [C] 10 [D] 4

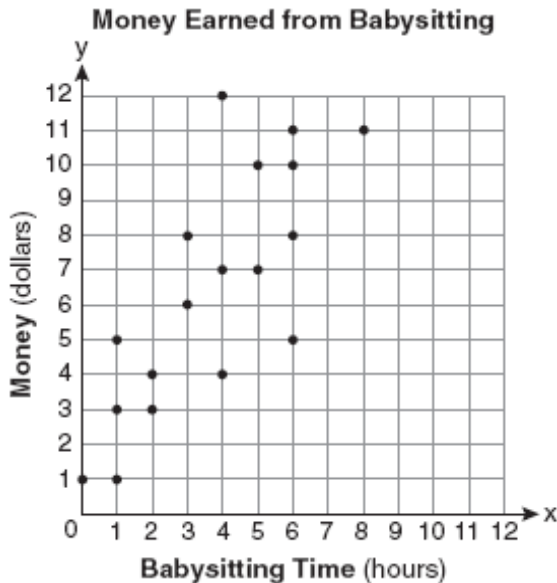
2. fall0729ia, P.I. A.A.2

Which verbal expression represents  $2(n - 6)$ ?

- [A] two times the quantity six less than  $n$   
 [B] two times  $n$  minus six  
 [C] two times the quantity  $n$  less than six  
 [D] two times six minus  $n$

3. 080822ia, P.I. A.S.8

Which equation most closely represents the line of best fit for the scatter plot below?



[A]  $y = \frac{3}{2}x + 4$  [B]  $y = \frac{2}{3}x + 1$

[C]  $y = x$  [D]  $y = \frac{3}{2}x + 1$

4. 080820ia, P.I. A.A.26

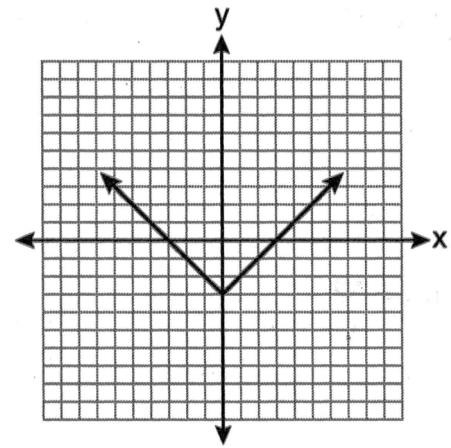
Which value of  $x$  is the solution of

$$\frac{2x}{5} + \frac{1}{3} = \frac{7x - 2}{15}?$$

- [A] 3 [B]  $\frac{31}{26}$  [C] 7 [D]  $\frac{3}{5}$

5. 080925ia, P.I. A.G.4

Which equation is represented by the graph below?



[A]  $y = |x - 3|$  [B]  $y = |x| - 3$

[C]  $y = (x - 3)^2$  [D]  $y = x^2 - 3$

6. 080933ia, P.I. A.S.19

Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.

7. 080904ia, P.I. A.A.6

An online music club has a one-time registration fee of \$13.95 and charges \$0.49 to buy each song. If Emma has \$50.00 to join the club and buy songs, what is the maximum number of songs she can buy?

- [A] 131 [B] 74 [C] 130 [D] 73

8. 080803ia, P.I. A.A.4

Mrs. Smith wrote "Eight less than three times a number is greater than fifteen" on the board. If  $x$  represents the number, which inequality is a correct translation of this statement?

- [A]  $8 - 3x > 15$       [B]  $3x - 8 < 15$   
[C]  $8 - 3x < 15$       [D]  $3x - 8 > 15$

9. 060921ia, P.I. A.A.16

Which expression represents  $\frac{x^2 - 2x - 15}{x^2 + 3x}$  in simplest form?

- [A]  $\frac{-2x - 5}{x}$       [B]  $\frac{-2x - 15}{3x}$   
[C]  $-5$       [D]  $\frac{x - 5}{x}$

10. 010922ia, P.I. A.A.11

Which ordered pair is a solution of the system of equations  $y = x^2 - x - 20$  and  $y = 3x - 15$ ?

- [A] (5, -1)      [B] (-5, -30)  
[C] (-1, -18)      [D] (0, 5)

11. 060910ia, P.I. A.N.2

What is  $\sqrt{32}$  expressed in simplest radical form?

- [A]  $4\sqrt{8}$       [B]  $4\sqrt{2}$   
[C]  $16\sqrt{2}$       [D]  $2\sqrt{8}$

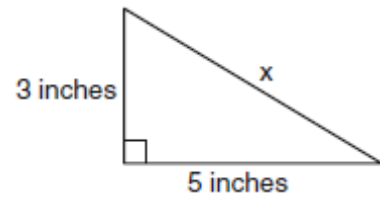
12. 010901ia, P.I. A.M.2

On a certain day in Toronto, Canada, the temperature was  $15^\circ$  Celsius (C). Using the formula  $F = \frac{9}{5}C + 32$ , Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents  $15^\circ$ C in degrees Fahrenheit?

- [A] 59      [B] -9      [C] 35      [D] 85

13. 060909ia, P.I. A.A.45

What is the value of  $x$ , in inches, in the right triangle below?



- [A]  $\sqrt{15}$       [B]  $\sqrt{34}$       [C] 8      [D] 4

14. fall0703ia, P.I. A.A.12

Which expression represents  $\frac{(2x^3)(8x^5)}{4x^6}$  in simplest form?

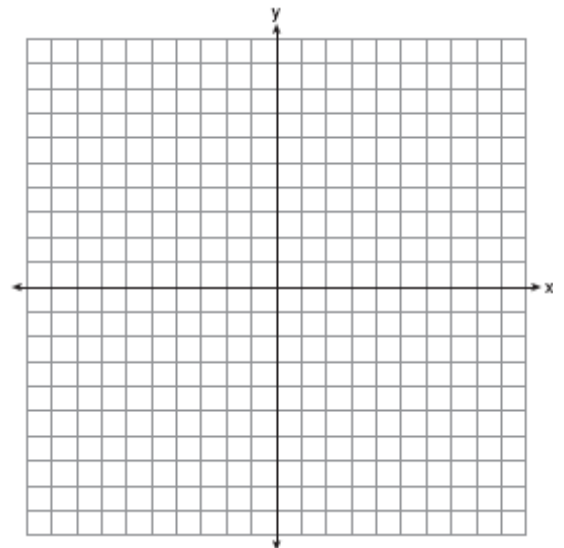
- [A]  $4x^2$       [B]  $x^2$       [C]  $4x^9$       [D]  $x^9$

15. 060939ia, P.I. A.G.9

On the set of axes below, solve the following system of equations graphically for all values of  $x$  and  $y$ .

$$y = x^2 - 6x + 1$$

$$y + 2x = 6$$



16. 060929ia, P.I. A.A.17

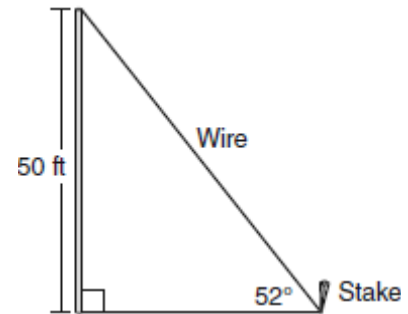
What is  $\frac{6}{4a} - \frac{2}{3a}$  expressed in simplest form?

- [A]  $\frac{10}{12a}$       [B]  $\frac{5}{6a}$       [C]  $\frac{8}{7a}$       [D]  $\frac{4}{a}$

17. 010913ia, P.I. A.A.33  
What is the slope of the line that passes through the points (2,5) and (7,3)?  
[A]  $-\frac{2}{5}$  [B]  $\frac{9}{8}$  [C]  $-\frac{5}{2}$  [D]  $\frac{8}{9}$
18. 010909ia, P.I. A.A.19  
The expression  $9x^2 - 100$  is equivalent to  
[A]  $(9x - 100)(x + 1)$   
[B]  $(3x - 10)(3x + 10)$   
[C]  $(9x - 10)(x + 10)$  [D]  $(3x - 100)(3x - 1)$
19. 060926ia, P.I. A.N.1  
What is the additive inverse of the expression  $a - b$ ?  
[A]  $-a + b$  [B]  $a + b$   
[C]  $a - b$  [D]  $-a - b$
20. 080935ia, P.I. A.N.5  
At the end of week one, a stock had increased in value from \$5.75 a share to \$7.50 a share. Find the percent of increase at the end of week one to the *nearest tenth of a percent*. At the end of week two, the same stock had decreased in value from \$7.50 to \$5.75. Is the percent of decrease at the end of week two the same as the percent of increase at the end of week one? Justify your answer.
21. 080805ia, P.I. A.A.21  
Which value of  $x$  is in the solution set of the inequality  $-4x + 2 > 10$ ?  
[A] -4 [B] -2 [C] 3 [D] 2
22. 080910ia, P.I. A.S.3  
Erica is conducting a survey about the proposed increase in the sports budget in the Hometown School District. Which survey method would likely contain the most bias?  
[A] Erica asks every third person entering the Hometown Grocery Store.  
[B] Erica asks every third person leaving the Hometown Shopping Mall this weekend.  
[C] Erica asks every fifth person leaving Saturday's Hometown High School football game.  
[D] Erica asks every fifth student entering Hometown High School on Monday morning.
23. 060807ia, P.I. A.A.13  
What is the product of  $-3x^2y$  and  $(5xy^2 + xy)$ ?  
[A]  $-15x^3y^3 - 3x^3y$   
[B]  $-15x^3y^3 - 3x^3y^2$   
[C]  $-15x^3y^3 + xy$  [D]  $-15x^2y^2 - 3x^2y$
24. fall0705ia, P.I. A.N.1  
Which property is illustrated by the equation  $ax + ay = a(x + y)$ ?  
[A] distributive [B] identity  
[C] commutative [D] associative
25. 010910ia, P.I. A.A.35  
What is an equation of the line that passes through the points (3,-3) and (-3,-3)?  
[A]  $x = y$  [B]  $x = -3$   
[C]  $y = 3$  [D]  $y = -3$

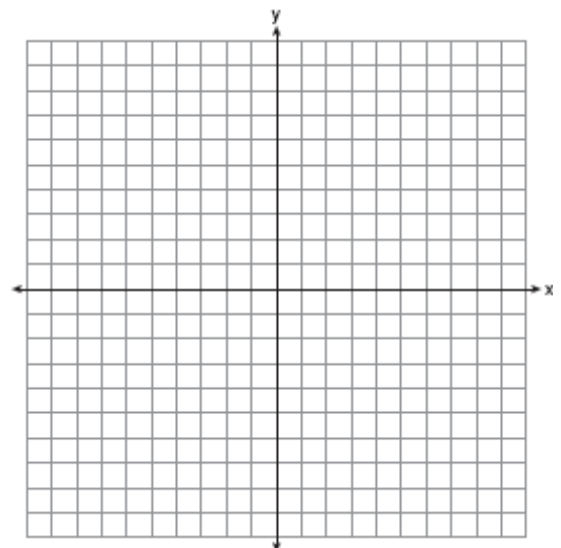
26. 060930ia, P.I. A.A.29  
The set  $\{11, 12\}$  is equivalent to  
 [A]  $\{x | 11 < x \leq 12, \text{ where } x \text{ is an integer}\}$   
 [B]  $\{x | 10 \leq x < 12, \text{ where } x \text{ is an integer}\}$   
 [C]  $\{x | 11 < x < 12, \text{ where } x \text{ is an integer}\}$   
 [D]  $\{x | 10 < x \leq 12, \text{ where } x \text{ is an integer}\}$
27. 010927ia, P.I. A.N.4  
What is the product of  $8.4 \times 10^8$  and  $4.2 \times 10^3$  written in scientific notation?  
 [A]  $3.528 \times 10^{12}$  [B]  $35.28 \times 10^{11}$   
 [C]  $12.6 \times 10^{11}$  [D]  $2.0 \times 10^5$
28. 010921ia, P.I. A.A.17  
What is  $\frac{6}{5x} - \frac{2}{3x}$  in simplest form?  
 [A]  $\frac{4}{2x}$  [B]  $\frac{4}{15x}$  [C]  $\frac{8}{15x^2}$  [D]  $\frac{8}{15x}$
29. 060806ia, P.I. A.A.7  
Jack bought 3 slices of cheese pizza and 4 slices of mushroom pizza for a total cost of \$12.50. Grace bought 3 slices of cheese pizza and 2 slices of mushroom pizza for a total cost of \$8.50. What is the cost of one slice of mushroom pizza?  
 [A] \$3.50 [B] \$3.00  
 [C] \$2.00 [D] \$1.50
30. 080928ia, P.I. A.A.6  
The ages of three brothers are consecutive even integers. Three times the age of the youngest brother exceeds the oldest brother's age by 48 years. What is the age of the youngest brother?  
 [A] 14 [B] 26 [C] 22 [D] 18

31. 060937ia, P.I. A.A.44  
A stake is to be driven into the ground away from the base of a 50-foot pole, as shown in the diagram below. A wire from the stake on the ground to the top of the pole is to be installed at an angle of elevation of  $52^\circ$ .



How far away from the base of the pole should the stake be driven in, to the *nearest foot*? What will be the length of the wire from the stake to the top of the pole, to the *nearest foot*?

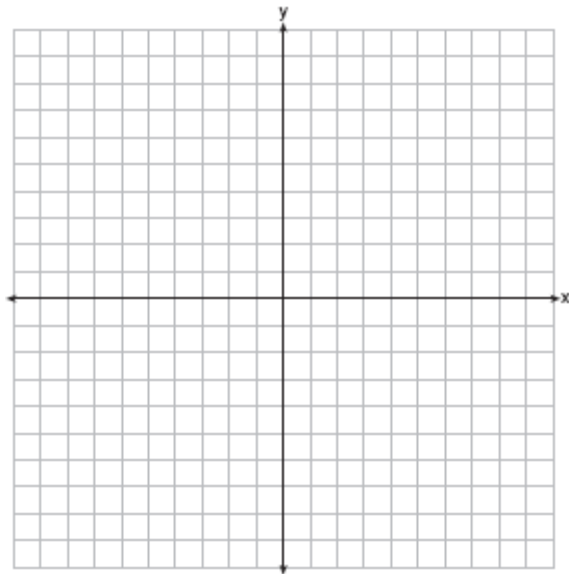
32. 060836ia, P.I. A.G.8  
Graph the equation  $y = x^2 - 2x - 3$  on the accompanying set of axes. Using the graph, determine the roots of the equation  $x^2 - 2x - 3 = 0$ .



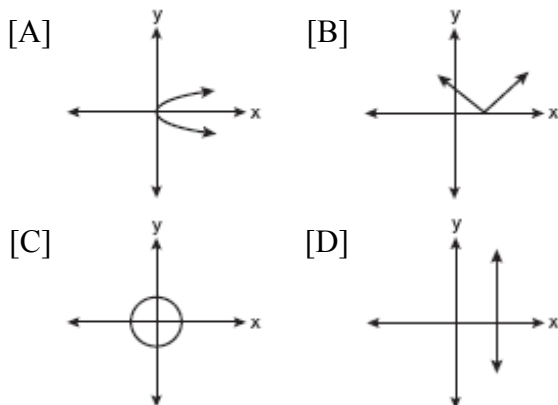
33. 010938ia, P.I. A.G.7  
On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

$$2x - y \geq 6$$

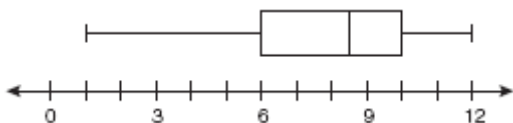
$$x > 2$$



34. 010930ia, P.I. A.G.3  
Which graph represents a function?



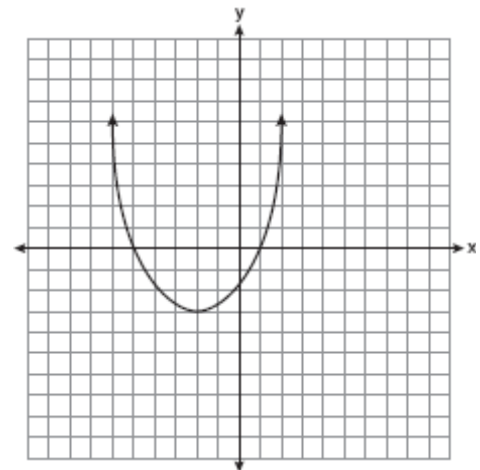
35. 080818ia, P.I. A.S.6  
What is the value of the third quartile shown on the box-and-whisker plot below?



- [A] 10 [B] 8.5 [C] 6 [D] 12

36. 010917ia, P.I. A.A.29  
The set  $\{1,2,3,4\}$  is equivalent to
- [A]  $\{x|0 < x < 4, \text{ where } x \text{ is a whole number}\}$   
 [B]  $\{x|0 < x \leq 4, \text{ where } x \text{ is a whole number}\}$   
 [C]  $\{x|1 < x \leq 4, \text{ where } x \text{ is a whole number}\}$   
 [D]  $\{x|1 < x < 4, \text{ where } x \text{ is a whole number}\}$

37. 060811ia, P.I. A.G.10  
What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



- [A] The vertex is  $(-2,-3)$ , and the axis of symmetry is  $x = -2$ .  
 [B] The vertex is  $(-3,-2)$ , and the axis of symmetry is  $x = -2$ .  
 [C] The vertex is  $(-2,-3)$ , and the axis of symmetry is  $y = -2$ .  
 [D] The vertex is  $(-3,-2)$ , and the axis of symmetry is  $y = -2$ .

38. 060831ia, P.I. A.M.1  
Tom drove 290 miles from his college to home and used 23.2 gallons of gasoline. His sister, Ann, drove 225 miles from her college to home and used 15 gallons of gasoline. Whose vehicle had better gas mileage? Justify your answer.

39. 080804ia, P.I. A.S.4  
Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?

[A] mean = median    [B] mean = mode  
[C] mean > mode    [D] mean < median

40. 060827ia, P.I. A.G.2  
Mrs. Ayer is painting the outside of her son's toy box, including the top and bottom. The toy box measures 3 feet long, 1.5 feet wide, and 2 feet high. What is the total surface area she will paint?

[A] 27.0 ft<sup>2</sup>                      [B] 9.0 ft<sup>2</sup>  
[C] 22.5 ft<sup>2</sup>                      [D] 13.5 ft<sup>2</sup>

41. 060917ia, P.I. A.A.7  
At Genesee High School, the sophomore class has 60 more students than the freshman class. The junior class has 50 fewer students than twice the students in the freshman class. The senior class is three times as large as the freshman class. If there are a total of 1,424 students at Genesee High School, how many students are in the freshman class?

[A] 205    [B] 236    [C] 202    [D] 235

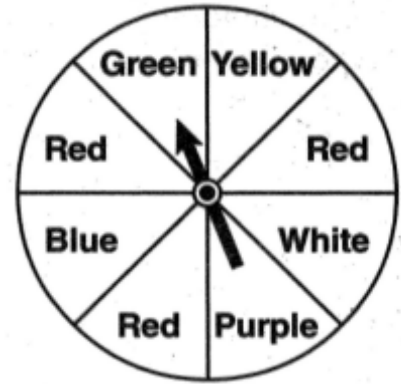
42. 060818ia, P.I. A.A.30  
Consider the set of integers greater than -2 and less than 6. A subset of this set is the positive factors of 5. What is the complement of this subset?

[A] {-2, -1, 0, 1, 2, 3, 4, 5, 6}  
[B] {0, 2, 3, 4}                      [C] {-1, 0, 2, 3, 4}  
[D] {-2, -1, 0, 2, 3, 4, 6}

43. 060907ia, P.I. A.A.25  
Which value of  $x$  is the solution of the equation  $\frac{2x}{3} + \frac{x}{6} = 5$ ?

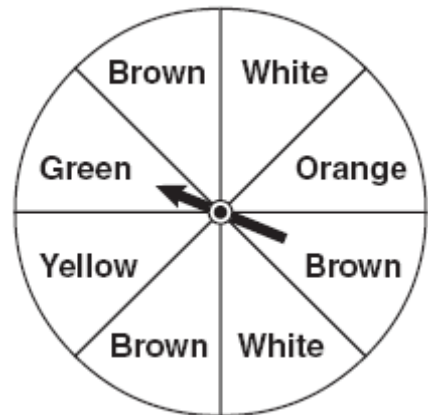
[A] 10    [B] 6    [C] 15    [D] 30

44. 080907ia, P.I. A.S.20  
The spinner below is divided into eight equal regions and is spun once. What is the probability of not getting red?



[A]  $\frac{3}{5}$     [B]  $\frac{3}{8}$     [C]  $\frac{5}{8}$     [D]  $\frac{7}{8}$

45. 010928ia, P.I. A.S.23  
Keisha is playing a game using a wheel divided into eight equal sectors, as shown in the diagram below. Each time the spinner lands on orange, she will win a prize.



If Keisha spins this wheel twice, what is the probability she will win a prize on *both* spins?

[A]  $\frac{1}{64}$     [B]  $\frac{1}{4}$     [C]  $\frac{1}{56}$     [D]  $\frac{1}{16}$

46. 010939ia, P.I. A.S.19

A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

**Kids' Meal Choices**

Main Course	Side Dish	Drink
hamburger	French fries	milk
chicken nuggets	applesauce	juice
turkey sandwich		soda

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order? Jose does not drink juice. Determine the number of different kids' meals that do *not* include juice. Jose's sister will eat *only* chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.

47. 060925ia, P.I. A.A.10

What is the value of the  $y$ -coordinate of the solution to the system of equations  $x + 2y = 9$  and  $x - y = 3$ ?

- [A] 2      [B] 3      [C] 5      [D] 6

48. 080811ia, P.I. A.A.7

Sam and Odel have been selling frozen pizzas for a class fundraiser. Sam has sold half as many pizzas as Odel. Together they have sold a total of 126 pizzas. How many pizzas did Sam sell?

- [A] 63      [B] 21      [C] 42      [D] 84

49. 080918ia, P.I. A.A.15

Which value of  $x$  makes the expression

$$\frac{x^2 - 9}{x^2 + 7x + 10} \text{ undefined?}$$

- [A] 3      [B] -5      [C] 2      [D] -3

50. 080838ia, P.I. A.S.5

Twenty students were surveyed about the number of days they played outside in one week. The results of this survey are shown below.

{6,5,4,5,0,7,1,5,4,4,3,2,2,3,2,4,3,4,0,7}

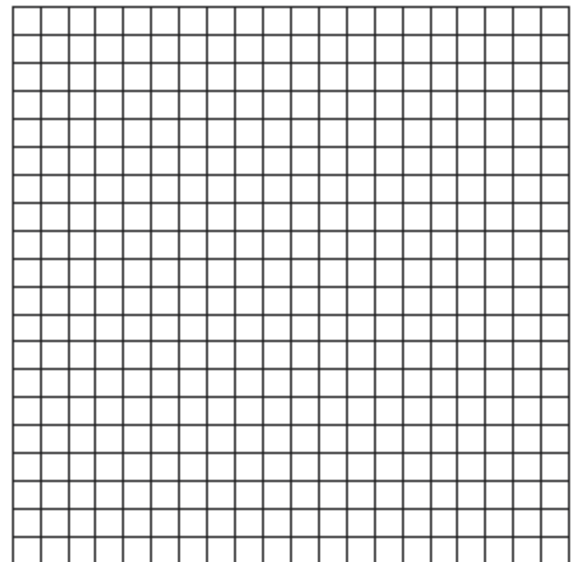
Complete the frequency table and cumulative frequency table below for these data. Create a cumulative frequency histogram based upon the table you made.

**Number of Days Outside**

Interval	Tally	Frequency
0-1		
2-3		
4-5		
6-7		

**Number of Days Outside**

Interval	Cumulative Frequency
0-1	
0-3	
0-5	
0-7	

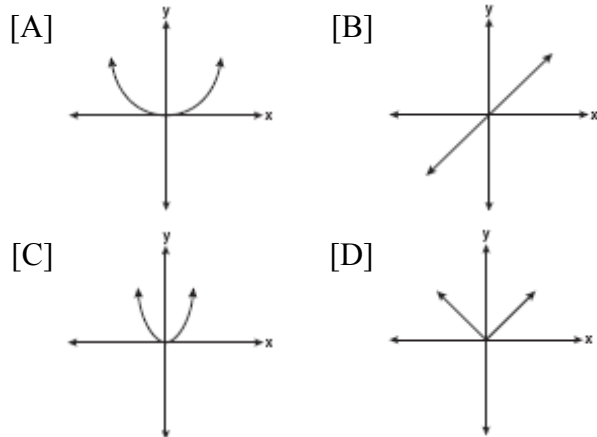




51. 060927ia, P.I. A.N.4  
What is the product of 12 and  $4.2 \times 10^6$  expressed in scientific notation?  
[A]  $50.4 \times 10^7$  [B]  $5.04 \times 10^6$   
[C]  $5.04 \times 10^7$  [D]  $50.4 \times 10^6$
52. 060901ia, P.I. A.M.1  
It takes Tammy 45 minutes to ride her bike 5 miles. At this rate, how long will it take her to ride 8 miles?  
[A] 0.89 hours [B] 1.125 hours  
[C] 48 minutes [D] 72 minutes
53. 060923ia, P.I. A.A.13  
When  $4x^2 + 7x - 5$  is subtracted from  $9x^2 - 2x + 3$ , the result is  
[A]  $-5x^2 + 5x - 2$  [B]  $-5x^2 + 9x - 8$   
[C]  $5x^2 - 9x + 8$  [D]  $5x^2 + 5x - 2$
54. 060808ia, P.I. A.N.8  
The bowling team at Lincoln High School must choose a president, vice president, and secretary. If the team has 10 members, which expression could be used to determine the number of ways the officers could be chosen?  
[A]  ${}_{10}P_7$  [B]  ${}_{10}P_3$  [C]  ${}_7P_3$  [D]  ${}_3P_{10}$
55. 080913ia, P.I. A.A.21  
Which value of  $x$  is in the solution set of the inequality  $-2(x - 5) < 4$   
[A] 5 [B] 3 [C] 2 [D] 0
56. fall0739ia, P.I. A.A.26  
Solve for  $x$ :  $\frac{x+1}{x} = \frac{-7}{x-12}$
57. 080827ia, P.I. A.A.12  
Which expression is equivalent to  $(3x^2)^3$ ?  
[A]  $9x^6$  [B]  $9x^5$  [C]  $27x^6$  [D]  $27x^5$
58. fall0719ia, P.I. A.A.9  
Daniel's Print Shop purchased a new printer for \$35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?  
[A] \$30,008.13 [B] \$33,250.00  
[C] \$28,507.72 [D] \$27,082.33
59. 060803ia, P.I. A.S.3  
A school wants to add a coed soccer program. To determine student interest in the program, a survey will be taken. In order to get an unbiased sample, which group should the school survey?  
[A] every member in Ms. Zimmer's drama classes  
[B] every third student entering the building  
[C] every student having a second-period French class  
[D] every member of the varsity football team
60. fall0715ia, P.I. A.A.5  
An electronics store sells DVD players and cordless telephones. The store makes a \$75 profit on the sale of each DVD player ( $d$ ) and a \$30 profit on the sale of each cordless telephone ( $c$ ). The store wants to make a profit of at least \$255.00 from its sales of DVD players and cordless phones. Which inequality describes this situation?  
[A]  $75d + 30c \geq 255$  [B]  $75d + 30c > 255$   
[C]  $75d + 30c < 255$  [D]  $75d + 30c \leq 255$

61. 060801ia, P.I. A.G.4

Which graph represents a linear function?



62. 010934ia, P.I. A.M.3

Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches and 42.5 inches. Using the measurements that Sarah took, determine the number of square inches in the area of the window. Determine the number of square inches in the actual area of the window. Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*.

63. 080911ia, P.I. A.A.36

Which equation represents a line parallel to the  $x$ -axis?

- [A]  $x = 3$                       [B]  $x = 3y$   
[C]  $y = -5$                       [D]  $y = -5x$

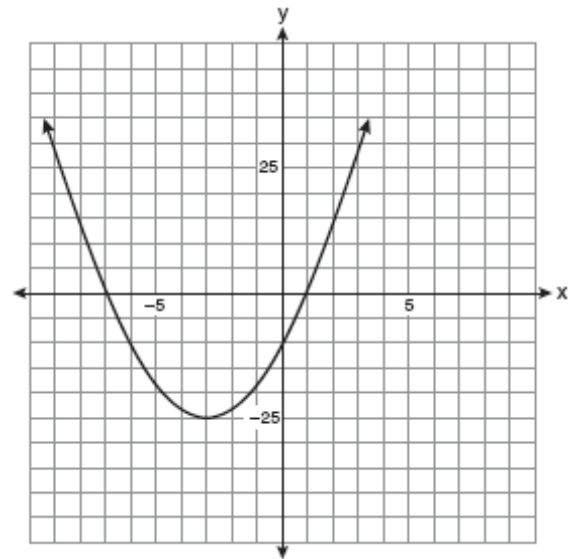
64. 060809ia, P.I. A.G.2

Lenny made a cube in technology class. Each edge measured 1.5 cm. What is the volume of the cube in cubic centimeters?

- [A] 2.25    [B] 13.5    [C] 9.0    [D] 3.375

65. 010916ia, P.I. A.G.10

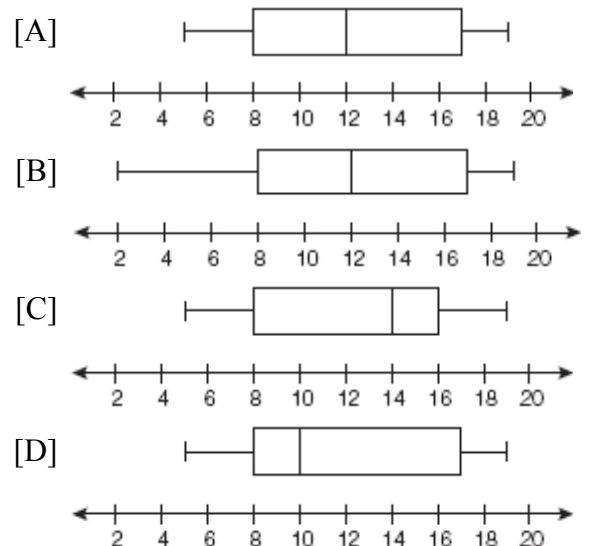
Which equation represents the axis of symmetry of the graph of the parabola below?



- [A]  $x = -3$                       [B]  $x = -25$   
[C]  $y = -25$                       [D]  $y = -3$

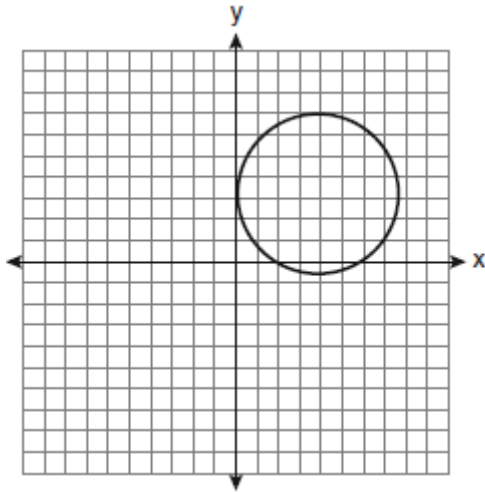
66. fall0709ia, P.I. A.S.5

The data set 5, 6, 7, 8, 9, 9, 9, 10, 12, 14, 17, 17, 18, 19, 19 represents the number of hours spent on the Internet in a week by students in a mathematics class. Which box-and-whisker plot represents the data?



67. 060919ia, P.I. A.G.3

Which statement is true about the relation shown on the graph below?



- [A] It is a function because there exists one  $y$ -coordinate for each  $x$ -coordinate.
- [B] It is a function because there exists one  $x$ -coordinate for each  $y$ -coordinate.
- [C] It is *not* a function because there are multiple  $x$ -values for a given  $y$ -value.
- [D] It is *not* a function because there are multiple  $y$ -values for a given  $x$ -value.

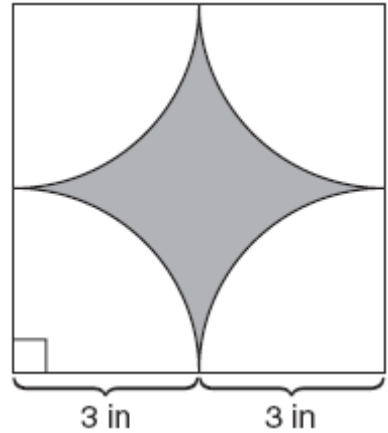
68. 060829ia, P.I. A.G.5

Consider the graph of the equation  $y = ax^2 + bx + c$ , when  $a \neq 0$ . If  $a$  is multiplied by 3, what is true of the graph of the resulting parabola?

- [A] The new parabola is wider than the original parabola.
- [B] The vertex is 3 units above the vertex of the original parabola.
- [C] The new parabola is 3 units to the right of the original parabola.
- [D] The new parabola is narrower than the original parabola.

69. 060832ia, P.I. A.G.1

A designer created the logo shown below. The logo consists of a square and four quarter-circles of equal size.



Express, in terms of  $\pi$ , the exact area, in square inches, of the shaded region.

70. 010936ia, P.I. A.G.2

A soup can is in the shape of a cylinder. The can has a volume of  $342 \text{ cm}^3$  and a diameter of 6 cm. Express the height of the can in terms of  $\pi$ . Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

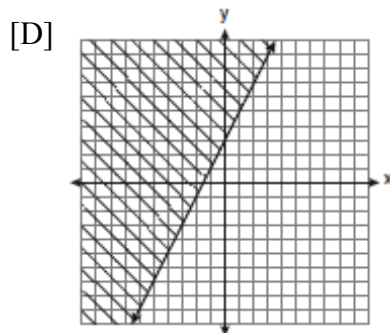
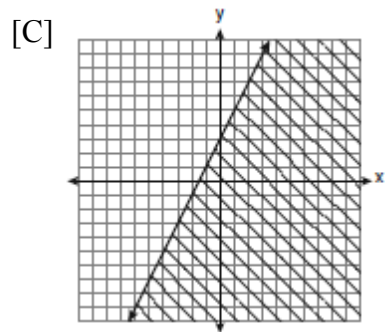
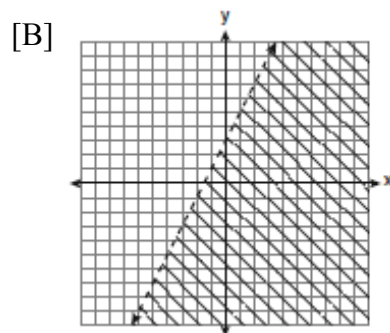
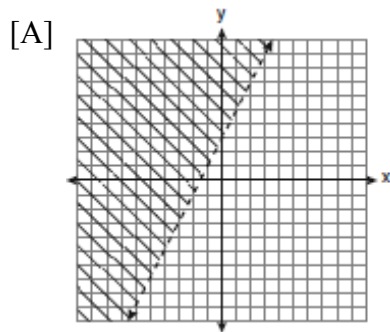
71. 010911ia, P.I. A.A.23

If the formula for the perimeter of a rectangle is  $P = 2l + 2w$ , then  $w$  can be expressed as

- [A]  $w = \frac{P - 2l}{2l}$
- [B]  $w = \frac{2l - P}{2}$
- [C]  $w = \frac{P - l}{2}$
- [D]  $w = \frac{P - 2l}{2}$

72. 060920ia, P.I. A.G.6

Which graph represents the solution of  $3y - 9 \leq 6x$ ?



73. 010906ia, P.I. A.A.26

What is the solution of  $\frac{k+4}{2} = \frac{k+9}{3}$ ?

- [A] 14    [B] 6    [C] 5    [D] 1

74. 060821a, P.I. A.A.5

Students in a ninth grade class measured their heights,  $h$ , in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?

- [A]  $155 \leq h \leq 190$   
 [B]  $h > 155$  or  $h < 190$   
 [C]  $h \geq 155$  or  $h \leq 190$   
 [D]  $155 < h < 190$

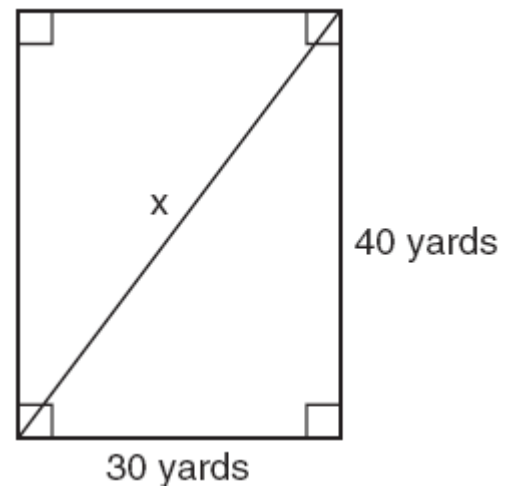
75. 010935ia, P.I. A.A.18

Perform the indicated operation and simplify:

$$\frac{3x+6}{4x+12} \div \frac{x^2-4}{x+3}$$

76. fall0711ia, P.I. A.A.45

Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.



What is the length of the diagonal, in yards, that Tanya runs?

- [A] 80    [B] 60    [C] 70    [D] 50

77. 080923ia, P.I. A.N.6

What is the value of the expression  $|-5x+12|$  when  $x = 5$ ?

- [A] 13    [B] -13    [C] -37    [D] 37

78. 060815ia, P.I. A.A.18

What is the product of  $\frac{x^2 - 1}{x + 1}$  and  $\frac{x + 3}{3x - 3}$  expressed in simplest form?

- [A]  $x$    [B]  $x + 3$    [C]  $\frac{x + 3}{3}$    [D]  $\frac{x}{3}$

79. 060804ia, P.I. A.A.19

Factored, the expression  $16x^2 - 25y^2$  is equivalent to

- [A]  $(8x - 5y)(8x - 5y)$   
[B]  $(4x - 5y)(4x + 5y)$   
[C]  $(4x - 5y)(4x - 5y)$   
[D]  $(8x - 5y)(8x + 5y)$

80. 080831ia, P.I. A.M.1

In a game of ice hockey, the hockey puck took 0.8 second to travel 89 feet to the goal line. Determine the average speed of the puck in feet per second.

81. 080832ia, P.I. A.S.23

Brianna is using the two spinners shown below to play her new board game. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She uses the second spinner to determine whether her move from the first spinner will be forward or backward.



Find the probability that Brianna will move *fewer than* four spaces and *backward*.

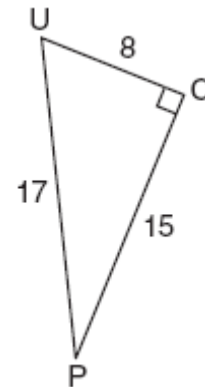
82. 080823a, P.I. A.A.32

In a linear equation, the independent variable increases at a constant rate while the dependent variable decreases at a constant rate. The slope of this line is

- [A] positive                      [B] zero  
[C] negative                      [D] undefined

83. 010919ia, P.I. A.A.42

The diagram below shows right triangle  $UPC$ .



Which ratio represents the sine of  $\angle U$ ?

- [A]  $\frac{15}{8}$    [B]  $\frac{8}{15}$    [C]  $\frac{8}{17}$    [D]  $\frac{15}{17}$

84. 060834ia, P.I. A.A.6

Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day. Write an inequality that can be used to determine how many days,  $d$ , it takes Peter to be able to spell *at least* 75 words. Use this inequality to determine the minimum number of whole days it will take for him to be able to spell *at least* 75 words.

85. fall0718ia, P.I. A.A.14

The expression  $\frac{9x^4 - 27x^6}{3x^3}$  is equivalent to

- [A]  $3x(1 - 3x^2)$                       [B]  $3x(1 - 3x)$   
[C]  $3x(1 - 9x^5)$                       [D]  $9x^3(1 - x)$

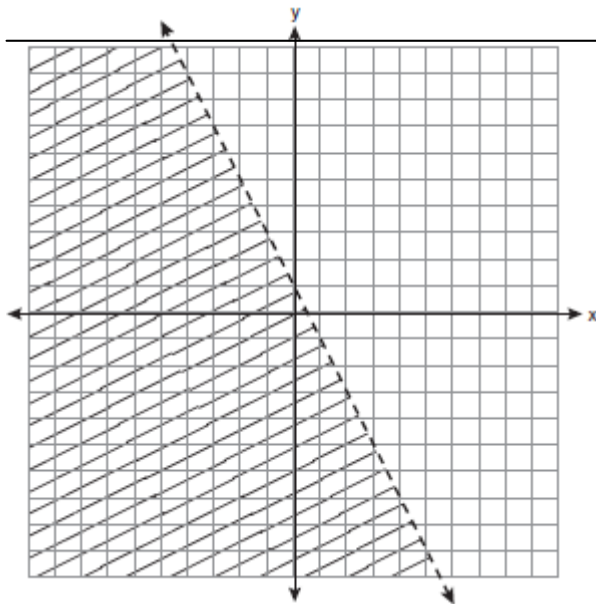
86. 060824ia, P.I. A.A.14

Which expression represents  $\frac{2x^2 - 12x}{x - 6}$  in simplest form?

- [A]  $2x$     [B]  $0$     [C]  $4x$     [D]  $2x + 2$

87. fall0720ia, P.I. A.G.6

Which inequality is represented by the graph below?



- [A]  $y < -\frac{1}{2}x + 1$     [B]  $y < 2x + 1$   
 [C]  $y < -2x + 1$     [D]  $y < \frac{1}{2}x + 1$

88. 080922ia, P.I. A.N.2

When  $5\sqrt{20}$  is written in simplest radical form, the result is  $k\sqrt{5}$ . What is the value of  $k$ ?

- [A]  $20$     [B]  $7$     [C]  $10$     [D]  $4$

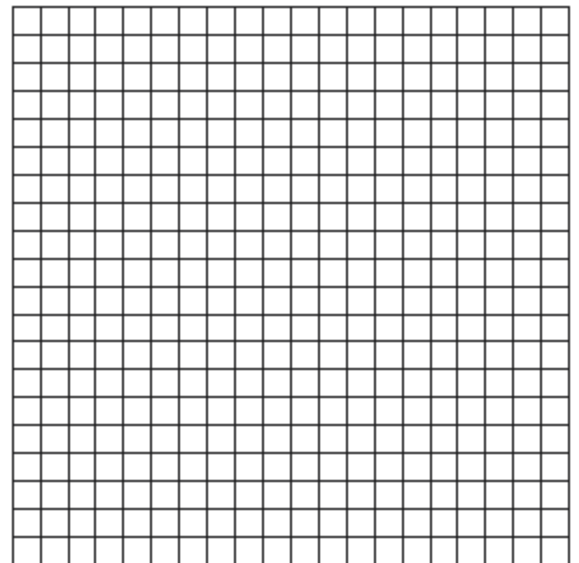
89. 060938ia, P.I. A.S.8

The Fahrenheit temperature readings on 30 April mornings in Stormville, New York, are shown below.

$41^\circ, 58^\circ, 61^\circ, 54^\circ, 49^\circ, 46^\circ, 52^\circ, 58^\circ, 67^\circ, 43^\circ, 47^\circ, 60^\circ, 52^\circ, 58^\circ, 48^\circ, 44^\circ, 59^\circ, 66^\circ, 62^\circ, 55^\circ, 44^\circ, 49^\circ, 62^\circ, 61^\circ, 59^\circ, 54^\circ, 57^\circ, 58^\circ, 63^\circ, 60^\circ$   
 Using the data, complete the frequency table below.

Interval	Tally	Frequency
40–44		
45–49		
50–54		
55–59		
60–64		
65–69		

On the grid below, construct and label a frequency histogram based on the table.



90. 080802ia, P.I. A.N.1

The statement  $2 + 0 = 2$  is an example of the use of which property of real numbers?

- [A] additive identity    [B] distributive  
 [C] associative    [D] additive inverse

91. 060823ia, P.I. A.A.1

Mr. Turner bought  $x$  boxes of pencils. Each box holds 25 pencils. He left 3 boxes of pencils at home and took the rest to school. Which expression represents the total number of pencils he took to school?

- [A]  $25 - 3x$                       [B]  $25x - 75$   
[C]  $22x$                               [D]  $25x - 3$

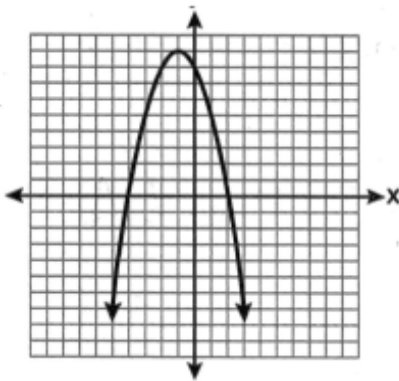
92. fall0726ia, P.I. A.A.5

The length of a rectangular window is 5 feet more than its width,  $w$ . The area of the window is 36 square feet. Which equation could be used to find the dimensions of the window?

- [A]  $w^2 + 5w + 36 = 0$       [B]  $w^2 - 5w - 36 = 0$   
[C]  $w^2 + 5w - 36 = 0$       [D]  $w^2 - 5w + 36 = 0$

93. 080916ia, P.I. A.G.8

The equation  $y = -x^2 - 2x + 8$  is graphed on the set of axes below.



Based on this graph, what are the roots of the equation  $-x^2 - 2x + 8 = 0$ ?

- [A] 8 and 0                          [B] 9 and -1  
[C] 2 and -4                        [D] 4 and -2

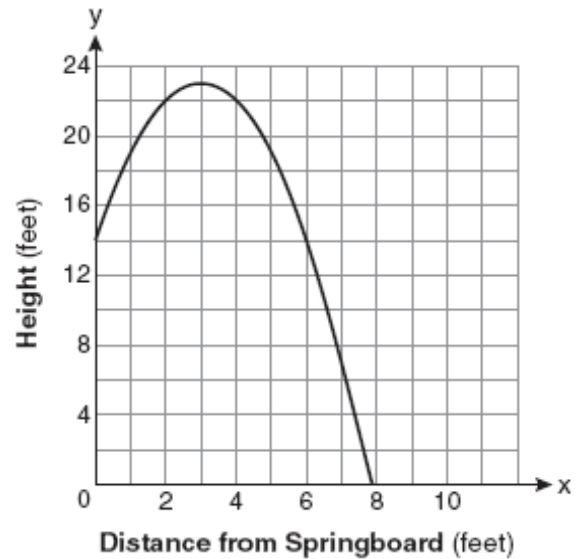
94. 080915ia, P.I. A.A.33

What is the slope of the line that passes through the points  $(-5, 4)$  and  $(15, -4)$ ?

- [A] 0                                      [B]  $-\frac{2}{5}$   
[C] undefined                        [D]  $-\frac{5}{2}$

95. 080813ia, P.I. A.G.10

A swim team member performs a dive from a 14-foot-high springboard. The parabola below shows the path of her dive.



Which equation represents the axis of symmetry?

- [A]  $y = 3$                               [B]  $y = 23$   
[C]  $x = 23$                             [D]  $x = 3$

96. 080809ia, P.I. A.A.45

The length of the hypotenuse of a right triangle is 34 inches and the length of one of its legs is 16 inches. What is the length, in inches, of the other leg of this right triangle?

- [A] 25      [B] 18      [C] 16      [D] 30

97. 060837ia, P.I. A.A.8

A contractor needs 54 square feet of brick to construct a rectangular walkway. The length of the walkway is 15 feet more than the width. Write an equation that could be used to determine the dimensions of the walkway. Solve this equation to find the length and width, in feet, of the walkway.

98. 080808ia, P.I. A.A.23

If  $3ax + b = c$ , then  $x$  equals

- [A]  $c + b - 3a$       [B]  $\frac{c - b}{3a}$   
 [C]  $\frac{b - c}{3a}$       [D]  $c - b + 3a$

99. 060912ia, P.I. A.A.7

The sum of two numbers is 47, and their difference is 15. What is the larger number?

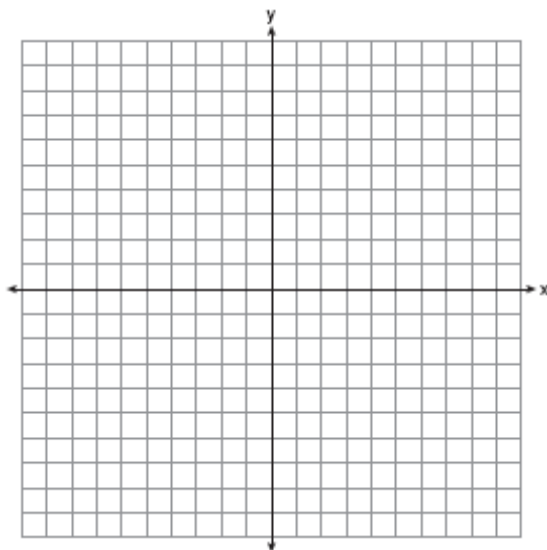
- [A] 31    [B] 32    [C] 16    [D] 36

100. 080839ia, P.I. A.G.9

On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

$$y = x^2 + 4x - 5$$

$$y = x - 1$$

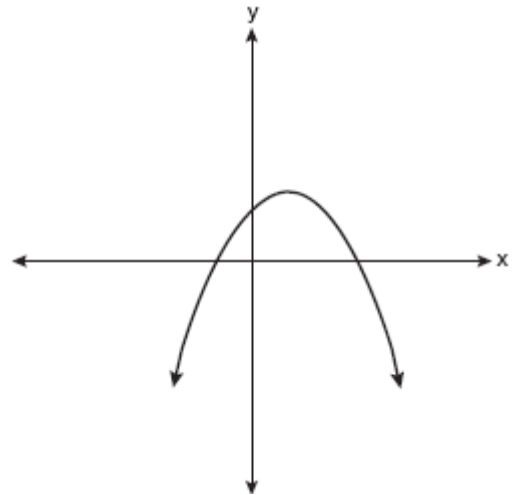


101. 080834ia, P.I. A.N.3

Express the product of  $3\sqrt{20}(2\sqrt{5} - 7)$  in simplest radical form.

102. fall0717ia, P.I. A.G.4

Which type of graph is shown in the diagram below?



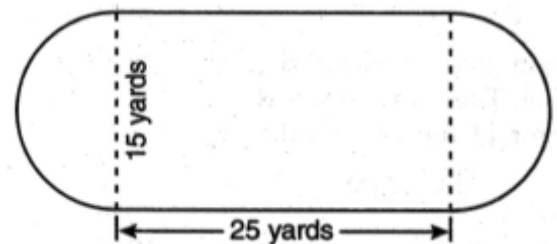
- [A] exponential      [B] linear  
 [C] absolute value    [D] quadratic

103. fall0732ia, P.I. A.A.22

Solve for  $g$ :  $3 + 2g = 5g - 9$

104. 080924ia, P.I. A.G.1

A playground in a local community consists of a rectangle and two semicircles, as shown in the diagram below.



Which expression represents the amount of fencing, in yards, that would be needed to completely enclose the playground?

- [A]  $15\pi + 80$       [B]  $15\pi + 50$   
 [C]  $30\pi + 50$       [D]  $30\pi + 80$



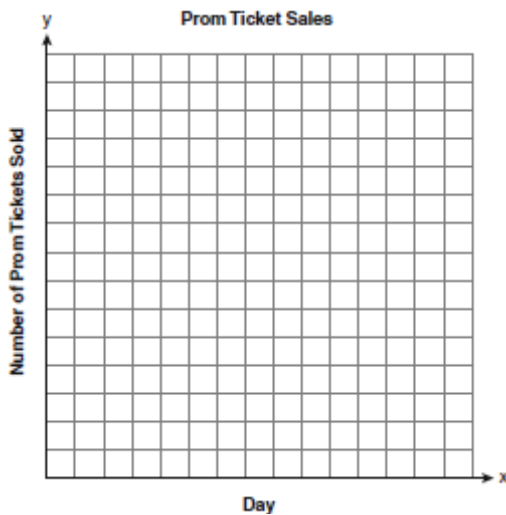
105. 060936ia, P.I. A.S.8

The table below shows the number of prom tickets sold over a ten-day period.

Prom Ticket Sales

Day ( $x$ )	1	2	5	7	10
Number of Prom Tickets Sold ( $y$ )	30	35	55	60	70

Plot these data points on the coordinate grid below. Use a consistent and appropriate scale. Draw a reasonable line of best fit and write its equation.



106. 080927ia, P.I. A.A.34

What is an equation of the line that passes through the point  $(3, -1)$  and has a slope of 2?

- [A]  $y = 2x - 4$       [B]  $y = 2x - 1$   
 [C]  $y = 2x + 5$       [D]  $y = 2x - 7$

107. fall0710ia, P.I. A.A.31

Given:

Set  $A = \{(-2, -1), (-1, 0), (1, 8)\}$

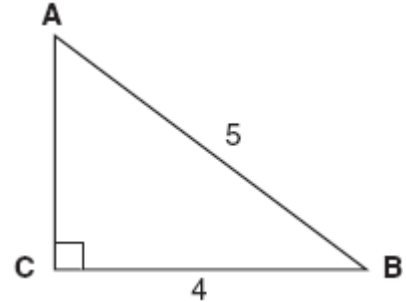
Set  $B = \{(-3, -4), (-2, -1), (-1, 2), (1, 8)\}$ .

What is the intersection of sets  $A$  and  $B$ ?

- [A]  $\{(1, 8)\}$   
 [B]  $\{(-3, -4), (-2, -1), (-1, 2), (-1, 0), (1, 8)\}$   
 [C]  $\{(-2, -1), (1, 8)\}$       [D]  $\{(-2, -1)\}$

108. 080824ia, P.I. A.A.43

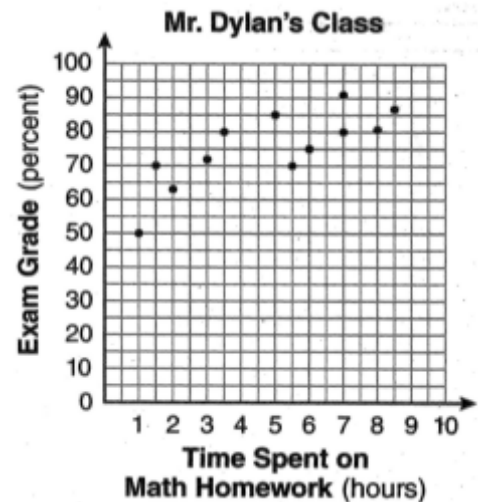
Which equation could be used to find the measure of one acute angle in the right triangle shown below?



- [A]  $\cos B = \frac{5}{4}$       [B]  $\sin A = \frac{4}{5}$   
 [C]  $\tan A = \frac{5}{4}$       [D]  $\tan B = \frac{4}{5}$

109. 080930ia, P.I. A.S.17

The number of hours spent on math homework each week and the final exam grades for twelve students in Mr. Dylan's algebra class are plotted below.



Based on a line of best fit, which exam grade is the best prediction for a student who spends about 4 hours on math homework each week?

- [A] 92      [B] 82      [C] 62      [D] 72

110. 080837ia, P.I. A.A.7  
The cost of 3 markers and 2 pencils is \$1.80.  
The cost of 4 markers and 6 pencils is \$2.90.  
What is the cost of *each* item? Include appropriate units in your answer.
111. 080812ia, P.I. A.A.11  
Which ordered pair is in the solution set of the system of equations  $y = -x + 1$  and  $y = x^2 + 5x + 6$ ?
- [A] (5, -4)                      [B] (5, 2)  
[C] (-5, 6)                      [D] (-5, -1)
112. 080905ia, P.I. A.N.7  
The local ice cream stand offers three flavors of soft-serve ice cream: vanilla, chocolate, and strawberry; two types of cone: sugar and wafer; and three toppings: sprinkles, nuts, and cookie crumbs. If Dawn does not order vanilla ice cream, how many different choices can she make that have one flavor of ice cream, one type of cone, and one topping?
- [A] 18      [B] 7      [C] 8      [D] 12
113. 060908ia, P.I. A.S.21  
Students in Ms. Nazzeer's mathematics class tossed a six-sided number cube whose faces are numbered 1 to 6. The results are recorded in the table below.

Result	Frequency
1	3
2	6
3	4
4	6
5	4
6	7

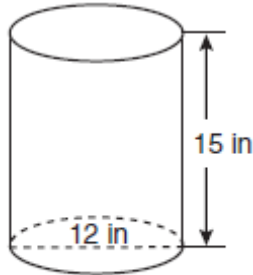
Based on these data, what is the empirical probability of tossing a 4?

- [A]  $\frac{8}{30}$     [B]  $\frac{1}{30}$     [C]  $\frac{5}{30}$     [D]  $\frac{6}{30}$

114. 010923ia, P.I. A.S.3  
A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?
- [A] randomly surveying 75 people during the day in a clothing store  
[B] randomly surveying 50 people during the day in a mall  
[C] surveying the first 25 people who enter a grocery store  
[D] surveying 10 people who work in a sporting goods store
115. fall0707ia, P.I. A.S.14  
Which situation describes a correlation that is *not* a causal relationship?
- [A] The more powerful the microwave, the faster the food cooks.  
[B] The faster the pace of a runner, the quicker the runner finishes.  
[C] The more miles driven, the more gasoline needed.  
[D] The rooster crows, and the Sun rises.
116. 060819ia, P.I. A.S.1  
Which data set describes a situation that could be classified as qualitative?
- [A] the shoe sizes of players on the basketball team  
[B] the ages of presidents at the time of their inauguration  
[C] the opinions of students regarding school lunches  
[D] the elevations of the five highest mountains in the world

117. fall0712ia, P.I. A.G.2

A cylindrical container has a diameter of 12 inches and a height of 15 inches, as illustrated in the diagram below.



(Not drawn to scale)

What is the volume of this container to the nearest tenth of a cubic inch?

- [A] 2,160.0                      [B] 1,696.5  
[C] 6,785.8                      [D] 4,241.2

118. 060905ia, P.I. A.S.1

Which data set describes a situation that could be classified as qualitative?

- [A] the favorite ice cream flavor of each of Mr. Hayden's students  
[B] the ages of the students in Ms. Marshall's Spanish class  
[C] the test scores of the students in Ms. Fitzgerald's class  
[D] the heights of the players on the East High School basketball team

119. 060810ia, P.I. A.A.11

Which ordered pair is a solution to the system of equations  $y = x$  and  $y = x^2 - 2$ ?

- [A] (2, 2)                      [B] (-1, 1)  
[C] (0, 0)                      [D] (-2, -2)

120. 010925ia, P.I. A.A.15

The function  $y = \frac{x}{x^2 - 9}$  is undefined when the value of  $x$  is

- [A] 3, only                      [B] 3 or -3  
[C] 0 or 3                      [D] -3, only

121. fall0737ia, P.I. A.S.4

The values of 11 houses on Washington St. are shown in the table below.

Value per House	Number of Houses
\$100,000	1
\$175,000	5
\$200,000	4
\$700,000	1

Find the mean value of these houses in dollars. Find the median value of these houses in dollars. State which measure of central tendency, the mean or the median, *best* represents the values of these 11 houses. Justify your answer.

122. 080908ia, P.I. A.S.13

Which relationship can best be described as causal?

- [A] height and intelligence  
[B] shoe size and running speed  
[C] number of correct answers on a test and test score  
[D] number of students in a class and number of students with brown hair

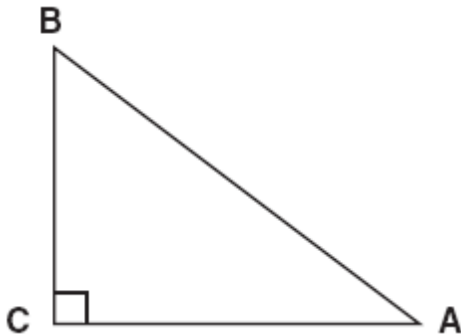
123. fall0716ia, P.I. A.A.33

What is the slope of the line containing the points (3,4) and (-6,10)?

- [A] 2    [B]  $\frac{1}{2}$     [C]  $-\frac{2}{3}$     [D]  $-\frac{3}{2}$

124. 080829ia, P.I. A.A.43

In the diagram of  $\triangle ABC$  shown below,  
 $BC = 10$  and  $AB = 16$ .



To the *nearest tenth of a degree*, what is the measure of the largest acute angle in the triangle?

- [A] 51.3 [B] 38.7 [C] 90.0 [D] 32.0

125. 080931ia, P.I. A.A.3

Chad complained to his friend that he had five equations to solve for homework. Are all of the homework problems equations? Justify your answer.

**Math Homework**

1.  $3x^2 \cdot 2x^4$
2.  $5 - 2x = 3x$
3.  $3(2x + 7)$
4.  $7x^2 + 2x - 3x^2 - 9$
5.  $\frac{2}{3} = \frac{x+2}{6}$

Name Chad

126. 060838ia, P.I. A.M.3

Sophie measured a piece of paper to be 21.7 cm by 28.5 cm. The piece of paper is actually 21.6 cm by 28.4 cm. Determine the number of square centimeters in the area of the piece of paper using Sophie's measurements. Determine the number of square centimeters in the actual area of the piece of paper. Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*. Sophie does not think there is a significant amount of error. Do you agree or disagree? Justify your answer.

127. fall0736ia, P.I. A.S.19

Mr. Laub has three children: two girls (Sue and Karen) and one boy (David). After each meal, one child is chosen at random to wash dishes. If the same child can be chosen for both lunch and dinner, construct a tree diagram or list a sample space of all the possible outcomes of who will wash dishes after lunch and dinner on Saturday. Determine the probability that one boy and one girl will wash dishes after lunch and dinner on Saturday.

128. 010937ia, P.I. A.A.10

Solve the following system of equations algebraically:

$$3x + 2y = 4$$

$$4x + 3y = 7$$

[Only an algebraic solution can receive full credit.]

129. 080901ia, P.I. A.A.4

If  $h$  represents a number, which equation is a correct translation of "Sixty more than 9 times a number is 375"?

[A]  $60h + 9 = 375$  [B]  $9h = 375$

[C]  $9h + 60 = 375$  [D]  $9h - 60 = 375$

130. 060812ia, P.I. A.A.7  
Pam is playing with red and black marbles. The number of red marbles she has is three more than twice the number of black marbles she has. She has 42 marbles in all. How many red marbles does Pam have?  
[A] 13 [B] 29 [C] 33 [D] 15

131. 060932ia, P.I. A.A.19  
Factor completely:  $4x^3 - 36x$

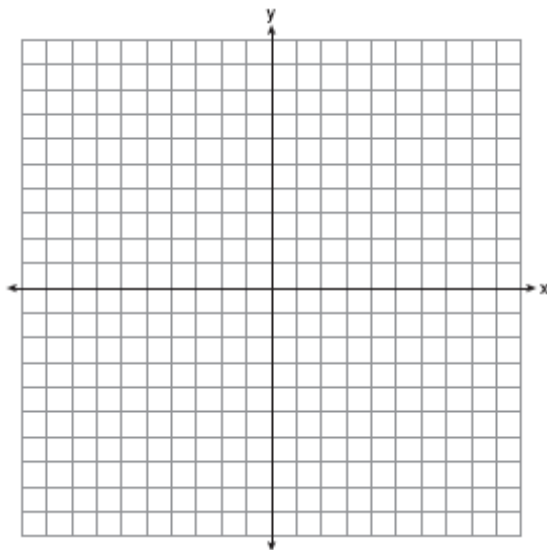
132. 080825ia, P.I. A.A.40  
Which ordered pair is in the solution set of the following system of inequalities?

$$y < \frac{1}{2}x + 4$$

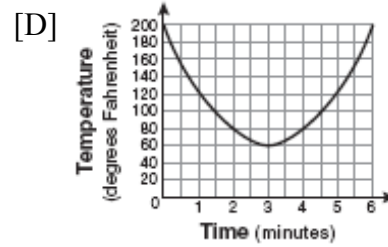
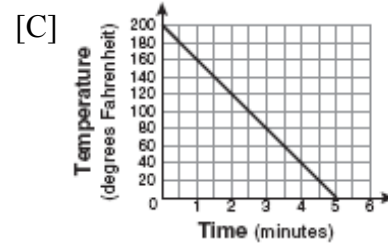
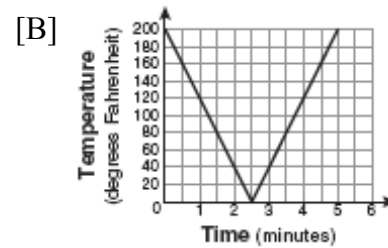
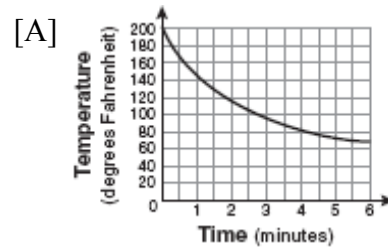
$$y \geq -x + 1$$

- [A] (0, 4) [B] (4, 0)  
[C] (-5, 3) [D] (3, -5)

133. 080835ia, P.I. A.G.4  
On the set of axes below, draw the graph of  $y = 2^x$  over the interval  $-1 \leq x \leq 3$ . Will this graph ever intersect the  $x$ -axis? Justify your answer.



134. 010905ia, P.I. A.G.4  
Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?



135. 060902ia, P.I. A.A.28  
What are the roots of the equation  $x^2 - 7x + 6 = 0$ ?  
[A] -1 and 7 [B] 1 and 6  
[C] 1 and 7 [D] -1 and -6

136. 060913ia, P.I. A.A.23

If  $a + ar = b + r$ , the value of  $a$  in terms of  $b$  and  $r$  can be expressed as

- [A]  $\frac{b+r}{1+r}$       [B]  $\frac{b}{r} + 1$   
 [C]  $\frac{1+b}{r+b}$       [D]  $\frac{1+b}{r}$

137. 060835ia, P.I. A.N.5

The Hudson Record Store is having a going-out-of-business sale. CDs normally sell for \$18.00. During the first week of the sale, all CDs will sell for \$15.00. Written as a fraction, what is the rate of discount? What is this rate expressed as a percent? Round your answer to the *nearest hundredth of a percent*. During the second week of the sale, the same CDs will be on sale for 25% off the *original* price. What is the price of a CD during the second week of the sale?

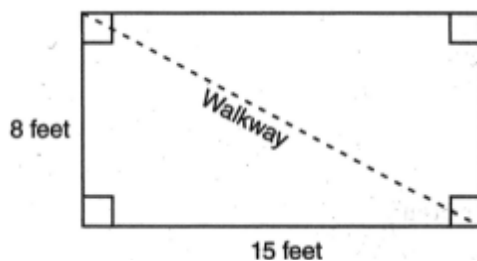
138. 080821ia, P.I. A.A.16

Which expression represents  $\frac{25x - 125}{x^2 - 25}$  in simplest form?

- [A]  $\frac{25}{x-5}$     [B]  $\frac{-5}{x}$     [C]  $\frac{5}{x}$     [D]  $\frac{25}{x+5}$

139. 080906ia, P.I. A.A.45

Nancy's rectangular garden is represented in the diagram below.



If a diagonal walkway crosses her garden, what is its length, in feet?

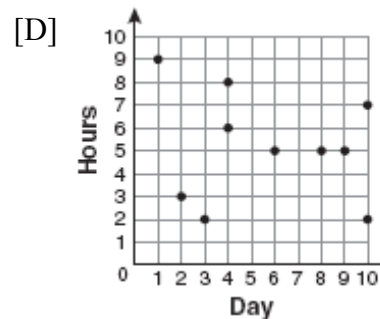
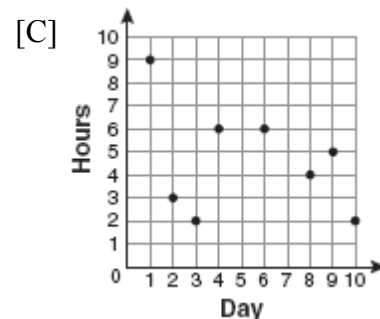
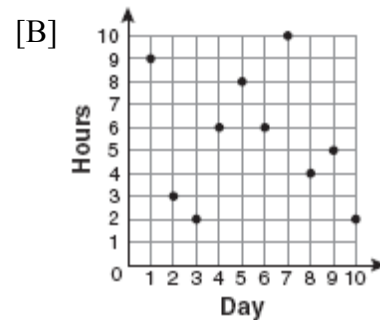
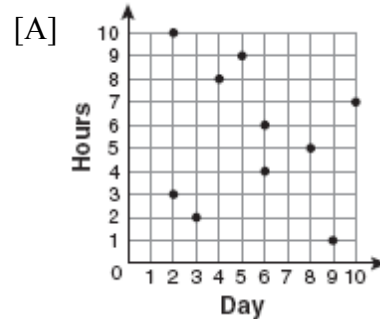
- [A]  $\sqrt{161}$     [B] 22    [C]  $\sqrt{529}$     [D] 17

140. fall0701ia, P.I. A.S.7

For 10 days, Romero kept a record of the number of hours he spent listening to music. The information is shown in the table below.

Day	1	2	3	4	5	6	7	8	9	10
Hours	9	3	2	6	8	6	10	4	5	2

Which scatter plot shows Romero's data graphically?



141. 060922ia, P.I. A.A.34

What is an equation of the line that passes through the point  $(4, -6)$  and has a slope of  $-3$ ?

- [A]  $y = -3x + 10$       [B]  $y = -3x + 14$   
[C]  $y = -3x - 6$       [D]  $y = -3x + 6$

142. 010907ia, P.I. A.S.4

Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

- [A] mean  $<$  median  $<$  mode  
[B] mean  $<$  mode  $<$  median  
[C] median  $<$  mode  $<$  mean  
[D] mode  $<$  median  $<$  mean

143. 010933ia, P.I. A.N.5

The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours ( $h$ )	Dollars Earned ( $d$ )
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars,  $d$ , earned in terms of the number of hours,  $h$ , worked. Using this equation, determine the number of dollars the student would earn for working 40 hours.

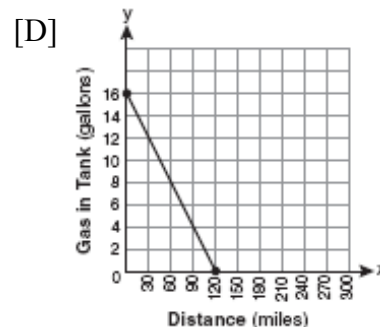
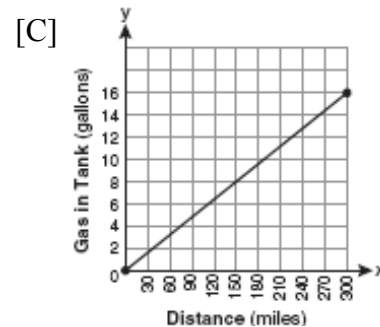
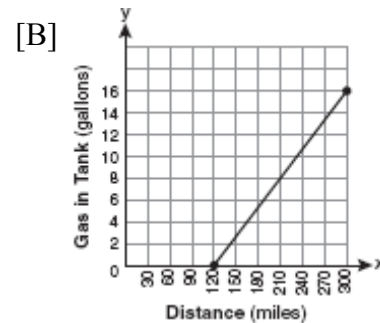
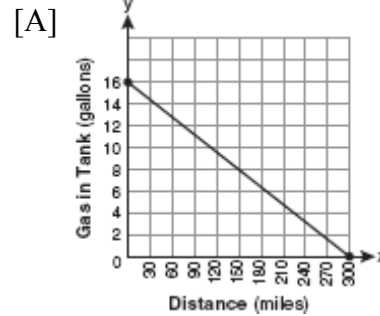
144. 060813ia, P.I. A.A.12

What is half of  $2^6$ ?

- [A]  $2^5$       [B]  $1^6$       [C]  $2^3$       [D]  $1^3$

145. 080807ia, P.I. A.G.4

The gas tank in a car holds a total of 16 gallons of gas. The car travels 75 miles on 4 gallons of gas. If the gas tank is full at the beginning of a trip, which graph represents the rate of change in the amount of gas in the tank?



146. fall0721ia, P.I. A.A.42

In triangle  $MCT$ , the measure of  $\angle T = 90^\circ$ ,  $MC = 85$  cm,  $CT = 84$  cm, and  $TM = 13$  cm.

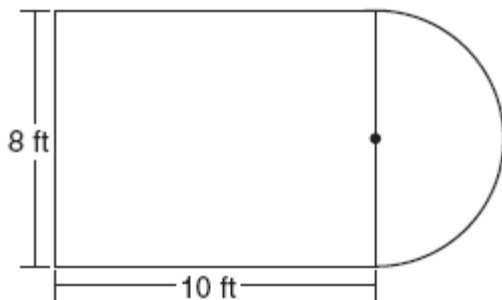
Which ratio represents the sine of  $\angle C$ ?

- [A]  $\frac{84}{85}$     [B]  $\frac{84}{13}$     [C]  $\frac{13}{84}$     [D]  $\frac{13}{85}$

147. 080815ia, P.I. A.G.1

Luis is going to paint a basketball court on his driveway, as shown in the diagram below.

This basketball court consists of a rectangle and a semicircle.



Which expression represents the area of this basketball court, in square feet?

- [A]  $80 + 64\pi$     [B]  $80 + 16\pi$   
[C] 80    [D]  $80 + 8\pi$

148. 080806ia, P.I. A.A.20

Factored completely, the expression  $2x^2 + 10x - 12$  is equivalent to

- [A]  $2(x - 2)(x - 3)$     [B]  $2(x + 2)(x + 3)$   
[C]  $2(x - 6)(x + 1)$     [D]  $2(x + 6)(x - 1)$

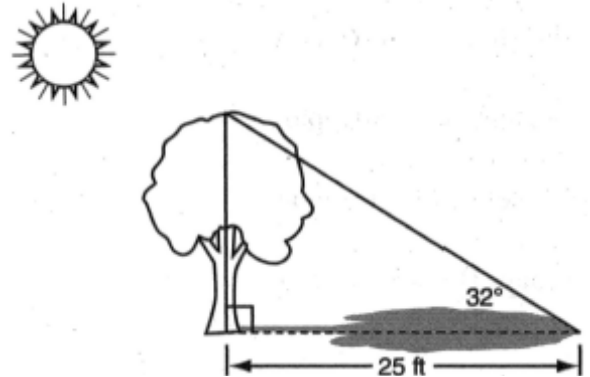
149. 080903ia, P.I. A.A.12

Which expression represents  $(3x^2y^4)(4xy^2)$  in equivalent form?

- [A]  $12x^2y^6$     [B]  $12x^2y^8$   
[C]  $12x^3y^6$     [D]  $12x^3y^8$

150. 080914ia, P.I. A.A.44

A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.



If the angle of elevation from the tip of the shadow to the top of the tree is  $32^\circ$ , what is the height of the tree to the *nearest tenth of a foot*?

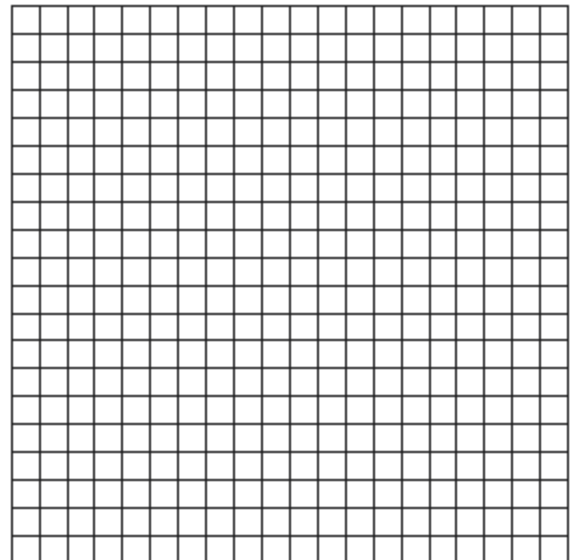
- [A] 40.0    [B] 21.2    [C] 15.6    [D] 13.2

151. 080938ia, P.I. A.G.7

On the grid below, solve the system of equations graphically for  $x$  and  $y$ .

$$4x - 2y = 10$$

$$y = -2x - 1$$



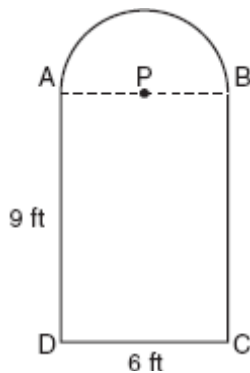


152. 010918ia, P.I. A.A.26  
What is the value of  $x$  in the equation  $\frac{2}{x} - 3 = \frac{26}{x}$ ?
- [A]  $-\frac{1}{8}$     [B] 8    [C]  $\frac{1}{8}$     [D]  $-8$

153. 060911ia, P.I. A.M.2  
If the speed of sound is 344 meters per second, what is the approximate speed of sound, in meters per hour?

60 seconds = 1 minute  
60 minutes = 1 hour

- [A] 123,840                      [B] 41,280  
[C] 1,238,400                  [D] 20,640
154. 080836ia, P.I. A.A.35  
Write an equation that represents the line that passes through the points  $(5,4)$  and  $(-5,0)$ .
155. fall0733ia, P.I. A.G.1  
Serena's garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment  $AB$  is the diameter of semicircle  $P$ . Serena wants to put a fence around her garden.



Calculate the length of fence Serena needs to the *nearest tenth of a foot*.

156. fall0724ia, P.I. A.A.21  
Which value of  $x$  is in the solution set of the inequality  $-2x + 5 > 17$ ?
- [A]  $-8$     [B]  $-6$     [C] 12    [D]  $-4$
157. 080936ia, P.I. A.M.1  
The chart below compares two runners.

Runner	Distance, in miles	Time, in hours
Greg	11	2
Dave	16	3

Based on the information in this chart, state which runner has the faster rate. Justify your answer.

158. 060828ia, P.I. A.N.2  
What is  $\frac{\sqrt{32}}{4}$  expressed in simplest radical form?
- [A]  $\frac{\sqrt{8}}{2}$     [B]  $\sqrt{2}$     [C]  $\sqrt{8}$     [D]  $4\sqrt{2}$
159. 060916ia, P.I. A.A.15  
Which value of  $n$  makes the expression  $\frac{5n}{2n-1}$  undefined?
- [A] 1    [B]  $-\frac{1}{2}$     [C] 0    [D]  $\frac{1}{2}$
160. fall0731ia, P.I. A.N.2  
Express  $5\sqrt{72}$  in simplest radical form.
161. 080801ia, P.I. A.A.22  
Which value of  $p$  is the solution of  $5p - 1 = 2p + 20$ ?
- [A] 3    [B]  $\frac{19}{3}$     [C] 7    [D]  $\frac{19}{7}$

162. 060817ia, P.I. A.A.15

Which value of  $x$  makes the expression  $\frac{x+4}{x-3}$  undefined?

- [A] 0      [B] 3      [C] -4      [D] -3

163. fall0734ia, P.I. A.M.1

Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin's house and the same distance back home. It took her 1.2 hours to get halfway to her cousin's house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip? Hannah's average speed for the remainder of the trip to her cousin's house was 40 miles per hour. How long, in hours, did it take her to drive the remaining distance? Traveling home along the same route, Hannah drove at an average rate of 55 miles per hour. After 2 hours her car broke down. How many miles was she from home?

164. 080902ia, P.I. A.A.19

Which expression is equivalent to  $9x^2 - 16$ ?

- [A]  $(3x+4)(3x-4)$       [B]  $(3x-8)(3x-8)$   
[C]  $(3x+8)(3x-8)$       [D]  $(3x-4)(3x-4)$

165. 060931ia, P.I. A.N.8

Determine how many three-letter arrangements are possible with the letters  $A$ ,  $N$ ,  $G$ ,  $L$ , and  $E$  if no letter may be repeated.

166. 060903ia, P.I. A.A.12

Which equation represents  $\frac{27x^{18}y^5}{9x^6y}$  in simplest form?

- [A]  $18x^3y^5$       [B]  $3x^3y^5$   
[C]  $3x^{12}y^4$       [D]  $18x^{12}y^4$

167. 080826ia, P.I. A.A.18

What is the product of  $\frac{4x}{x-1}$  and  $\frac{x^2-1}{3x+3}$  expressed in simplest form?

- [A]  $\frac{4x^2}{3(x+1)}$       [B]  $\frac{4x}{3}$   
[C]  $\frac{4x^2}{3}$       [D]  $\frac{4(x+1)}{3}$

168. 080817ia, P.I. A.A.8

A rectangle has an area of 24 square units. The width is 5 units less than the length. What is the length, in units, of the rectangle?

- [A] 8      [B] 6      [C] 3      [D] 19

169. 010915ia, P.I. A.A.5

Rhonda has \$1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine  $x$ , the number of nickels she has?

- [A]  $0.05x + 0.10(x+6) = 1.35$   
[B]  $0.05(x+6) + 0.10x = 1.35$   
[C]  $0.05 + 0.10(6x) = 1.35$   
[D]  $0.15(x+6) = 1.35$

170. 010920ia, P.I. A.N.2

What is  $\sqrt{72}$  expressed in simplest radical form?

- [A]  $6\sqrt{2}$       [B]  $3\sqrt{8}$   
[C]  $8\sqrt{3}$       [D]  $2\sqrt{18}$

171. 080814ia, P.I. A.N.5

Nicole's aerobics class exercises to fast-paced music. If the rate of the music is 120 beats per minute, how many beats would there be in a class that is 0.75 hour long?

- [A] 90      [B] 7,200      [C] 160      [D] 5,400

172. 080830ia, P.I. A.S.23  
The faces of a cube are numbered from 1 to 6. If the cube is tossed once, what is the probability that a prime number or a number divisible by 2 is obtained?

[A]  $\frac{1}{6}$     [B]  $\frac{4}{6}$     [C]  $\frac{5}{6}$     [D]  $\frac{6}{6}$

173. 060839ia, P.I. A.S.4  
The prices of seven race cars sold last week are listed in the table below.

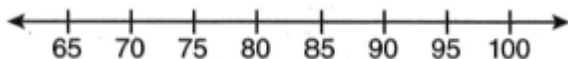
Price per Race Car	Number of Race Cars
\$126,000	1
\$140,000	2
\$180,000	1
\$400,000	2
\$819,000	1

What is the mean value of these race cars, in dollars? What is the median value of these race cars, in dollars? State which of these measures of central tendency best represents the value of the seven race cars. Justify your answer.

174. 080939ia, P.I. A.S.5  
The test scores from Mrs. Gray's math class are shown below.

72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92

Construct a box-and-whisker plot to display these data.



175. 080819a, P.I. A.A.13  
When  $3g^2 - 4g + 2$  is subtracted from  $7g^2 + 5g - 1$ , the difference is
- [A]  $-4g^2 - 9g + 3$     [B]  $4g^2 + 9g - 3$   
[C]  $4g^2 + g + 1$     [D]  $10g^2 + g + 1$

176. 080926ia, P.I. A.M.3  
Carrie bought new carpet for her living room. She calculated the area of the living room to be 174.2 square feet. The actual area was 149.6 square feet. What is the relative error of the area to the nearest ten-thousandth?
- [A] 0.1644    [B] 0.1412  
[C] 2.1644    [D] 1.8588

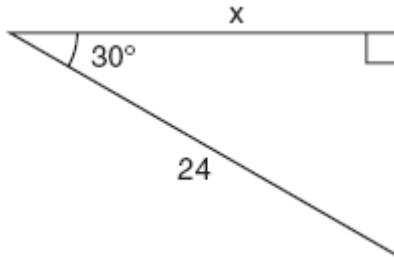
177. 080833ia, P.I. A.A.30  
Twelve players make up a high school basketball team. The team jerseys are numbered 1 through 12. The players wearing the jerseys numbered 3, 6, 7, 8, and 11 are the only players who start a game. Using set notation, list the complement of this subset.

178. fall0702ia, P.I. A.S.23  
Throughout history, many people have contributed to the development of mathematics. These mathematicians include Pythagoras, Euclid, Hypatia, Euler, Einstein, Agnesi, Fibonacci, and Pascal. What is the probability that a mathematician's name selected at random from those listed will start with either the letter E or the letter A?

[A]  $\frac{6}{8}$     [B]  $\frac{3}{8}$     [C]  $\frac{4}{8}$     [D]  $\frac{2}{8}$

179. 010912ia, P.I. A.A.44

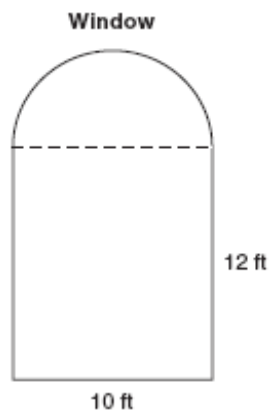
In the right triangle shown in the diagram below, what is the value of  $x$  to the *nearest whole number*?



- [A] 14    [B] 21    [C] 28    [D] 12

180. 010931ia, P.I. A.G.1

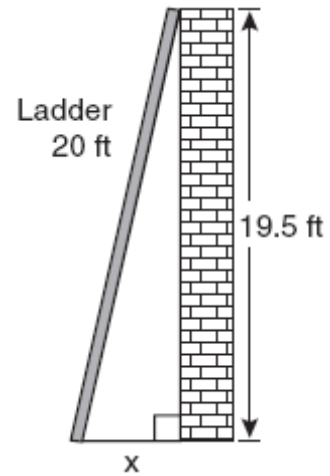
A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.



To the *nearest foot*, what is the length of the string of lights that Tess will need to decorate the window?

181. 060825ia, P.I. A.A.45

Don placed a ladder against the side of his house as shown in the diagram below.



Which equation could be used to find the distance,  $x$ , from the foot of the ladder to the base of the house?

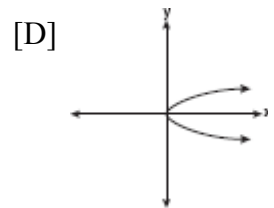
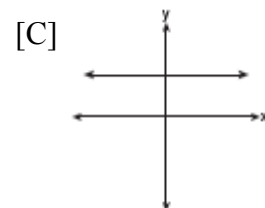
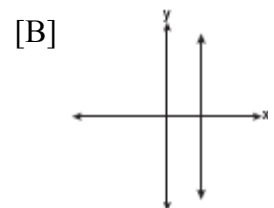
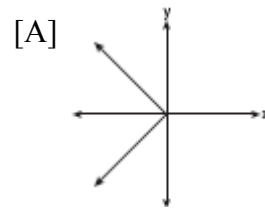
[A]  $x = \sqrt{20^2 - 19.5^2}$

[B]  $x = \sqrt{20^2 + 19.5^2}$

[C]  $x = 20^2 - 19.5^2$     [D]  $x = 20 - 19.5$

182. fall0730ia, P.I. A.G.3

Which graph represents a function?



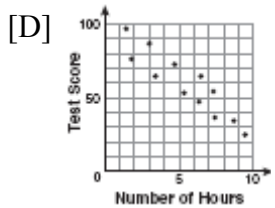
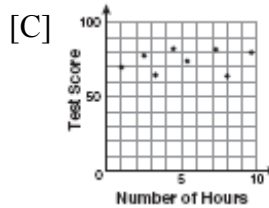
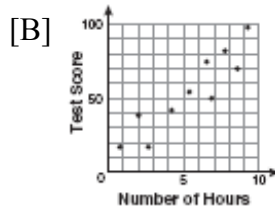
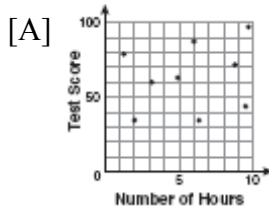
183. 080919ia, P.I. A.G.3  
Which relation is *not* a function?  
[A]  $\{(-1,2), (0,5), (5,0), (2,-1)\}$   
[B]  $\{(-1,6), (1,3), (2,5), (1,7)\}$   
[C]  $\{(1,5), (2,6), (3,6), (4,7)\}$   
[D]  $\{(4,7), (2,1), (-3,6), (3,4)\}$
184. fall0735ia, P.I. A.A.6  
A prom ticket at Smith High School is \$120. Tom is going to save money for the ticket by walking his neighbor's dog for \$15 per week. If Tom already has saved \$22, what is the minimum number of weeks Tom must walk the dog to earn enough to pay for the prom ticket?
185. 080810ia, P.I. A.A.36  
Which equation represents a line parallel to the  $x$ -axis?  
[A]  $x = 5$                       [B]  $x = \frac{1}{3}y$   
[C]  $y = 5x + 17$                 [D]  $y = 10$
186. 060830ia, P.I. A.A.9  
Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is \$21,000. Which equation represents the value,  $v$ , of the car after 3 years?  
[A]  $v = 21,000(0.14)^3$   
[B]  $v = 21,000(0.86)(3)$   
[C]  $v = 21,000(0.86)^3$   
[D]  $v = 21,000(1.14)^3$
187. 080828ia, P.I. A.M.3  
Ryan estimates the measurement of the volume of a popcorn container to be 282 cubic inches. The actual volume of the popcorn container is 289 cubic inches. What is the relative error of Ryan's measurement to the *nearest thousandth*?  
[A] 0.096                          [B] 0.025  
[C] 1.025                          [D] 0.024
188. fall0708ia, P.I. A.A.7  
The equations  $5x + 2y = 48$  and  $3x + 2y = 32$  represent the money collected from school concert ticket sales during two class periods. If  $x$  represents the cost for each adult ticket and  $y$  represents the cost for each student ticket, what is the cost for each adult ticket?  
[A] \$20    [B] \$4    [C] \$8    [D] \$10
189. 010924ia, P.I. A.A.1  
The length of a rectangular room is 7 less than three times the width,  $w$ , of the room. Which expression represents the area of the room?  
[A]  $3w^2 - 4w$                       [B]  $3w - 4$   
[C]  $3w^2 - 7w$                       [D]  $3w - 7$
190. 080921ia, P.I. A.A.27  
The solution to the equation  $x^2 - 6x = 0$  is  
[A] 0, only                          [B] 0 and 6  
[C] 6, only                          [D]  $\pm\sqrt{6}$
191. 060820ia, P.I. A.A.33  
What is the slope of the line that passes through the points  $(-6,1)$  and  $(4,-4)$ ?  
[A]  $-\frac{1}{2}$                       [B] -2    [C]  $\frac{1}{2}$                       [D] 2

192. 060933ia, P.I. A.S.18

Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

193. 060805ia, P.I. A.S.12

There is a negative correlation between the number of hours a student watches television and his or her social studies test score. Which scatter plot below displays this correlation?



194. 080920ia, P.I. A.A.10

What is the value of the  $y$ -coordinate of the solution to the system of equations  $x - 2y = 1$  and  $x + 4y = 7$ ?

- [A] 4      [B] 3      [C] 1      [D] -1

195. 060826ia, P.I. A.A.26

Which value of  $x$  is a solution of  $\frac{5}{x} = \frac{x+13}{6}$ ?

- [A] -10      [B] -15      [C] -2      [D] -3

196. 060904ia, P.I. A.A.1

Marie currently has a collection of 58 stamps. If she buys  $s$  stamps each week for  $w$  weeks, which expression represents the total number of stamps she will have?

- [A]  $58 + sw$       [B]  $58sw$   
[C]  $58 + s + w$       [D]  $58s + w$

197. 010908ia, P.I. A.A.9

The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams,  $t$ , that remained in the tournament after  $r$  rounds?

- [A]  $t = 64(0.5)^r$       [B]  $t = 64(1.5)^r$   
[C]  $t = 64(-0.5)^r$       [D]  $t = 64(r)^{0.5}$

198. fall0723ia, P.I. A.M.3

The groundskeeper is replacing the turf on a football field. His measurements of the field are 130 yards by 60 yards. The actual measurements are 120 yards by 54 yards. Which expression represents the relative error in the measurement?

- [A]  $\frac{(130)(60)}{(130)(60) - (120)(54)}$   
[B]  $\frac{(130)(60) - (120)(54)}{(130)(60)}$   
[C]  $\frac{(120)(54)}{(130)(60) - (120)(54)}$   
[D]  $\frac{(130)(60) - (120)(54)}{(120)(54)}$

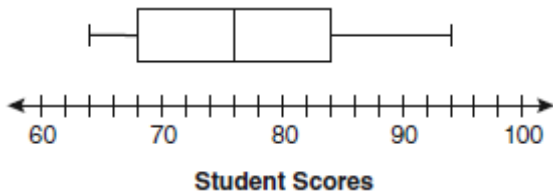
199. 060914ia, P.I. A.A.21

Which value of  $x$  is in the solution set of  $\frac{4}{3}x + 5 < 17$ ?

- [A] 8      [B] 9      [C] 16      [D] 12

200. 060915ia, P.I. A.S.6

The box-and-whisker plot below represents students' scores on a recent English test.

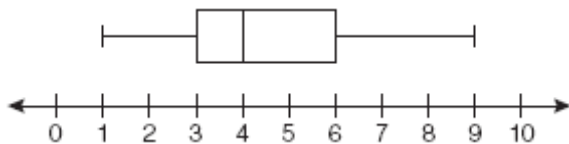


What is the value of the upper quartile?

- [A] 76    [B] 94    [C] 84    [D] 68

201. 010929ia, P.I. A.S.6

A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.



Which conclusion can be made using this plot?

- [A] The range of the attendance is 300 to 600.  
[B] The second quartile is 600.  
[C] The mean of the attendance is 400.  
[D] Twenty-five percent of the attendance is between 300 and 400.

202. 010903ia, P.I. A.S.22

The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is *least* likely to occur?

- [A] rolling an odd number  
[B] rolling a number less than 6  
[C] rolling a number greater than 4  
[D] rolling an even number

203. 060918ia, P.I. A.A.41

What are the vertex and axis of symmetry of the parabola  $y = x^2 - 16x + 63$ ?

- [A] vertex: (-8,1); axis of symmetry:  $x = -8$   
[B] vertex: (8,-1); axis of symmetry:  $x = 8$   
[C] vertex: (-8,-1); axis of symmetry:  $x = -8$   
[D] vertex: (8,1); axis of symmetry:  $x = 8$

204. 080909ia, P.I. A.A.25

Solve for  $x$ :  $\frac{3}{5}(x+2) = x-4$

- [A] 13    [B] 23    [C] 8    [D] 15

205. 010902ia, P.I. A.M.1

What is the speed, in meters per second, of a paper airplane that flies 24 meters in 6 seconds?

- [A] 18    [B] 144    [C] 4    [D] 30

206. fall0714ia, P.I. A.S.2

Which situation should be analyzed using bivariate data?

- [A] Ms. Saleem keeps a list of the amount of time her daughter spends on her social studies homework.  
[B] Mr. Benjamin tries to see if his students' shoe sizes are directly related to their heights.  
[C] Mr. DeStefan records his customers' best video game scores during the summer.  
[D] Mr. Chan keeps track of his daughter's algebra grades for the quarter.

207. 010914ia, P.I. A.A.28

What are the roots of the equation  $x^2 - 10x + 21 = 0$ ?

- [A] 3 and 7    [B] 1 and 21  
[C] -5 and -5    [D] -3 and -7

208. 060822ia, P.I. A.S.9

The table below shows a cumulative frequency distribution of runners' ages.

**Cumulative Frequency Distribution of Runners' Ages**

Age Group	Total
20–29	8
20–39	18
20–49	25
20–59	31
20–69	35

According to the table, how many runners are in their forties?

- [A] 7      [B] 25      [C] 10      [D] 6

209. 080929ia, P.I. A.A.9

Cassandra bought an antique dresser for \$500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the *nearest dollar*?

- [A] \$415                      [B] \$596  
[C] \$770                      [D] \$590

210. 010904ia, P.I. A.A.6

Tamara has a cell phone plan that charges \$0.07 per minute plus a monthly fee of \$19.00. She budgets \$29.50 per month for total cell phone expenses without taxes. What is the maximum number of minutes Tamara could use her phone each month in order to stay within her budget?

- [A] 150      [B] 692      [C] 271      [D] 421

211. 010932ia, P.I. A.A.12

Simplify:  $\frac{27k^5m^8}{(4k^3)(9m^2)}$

212. 060935ia, P.I. A.A.9

A bank is advertising that new customers can open a savings account with a  $3\frac{3}{4}\%$  interest rate compounded annually. Robert invests \$5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the *nearest cent*, after three years.

213. fall0728ia, P.I. A.A.15

For which value of  $x$  is  $\frac{x-3}{x^2-4}$  undefined?

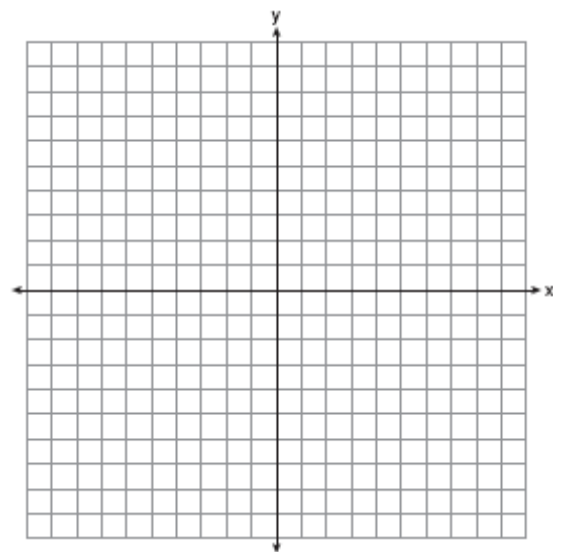
- [A] -2      [B] 0      [C] 3      [D] 4

214. fall0738ia, P.I. A.G.9

Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

$$y = x^2 - 6x + 5$$

$$2x + y = 5$$



215. fall0727ia, P.I. A.A.17

What is the sum of  $\frac{d}{2}$  and  $\frac{2d}{3}$  expressed in simplest form?

- [A]  $\frac{3d}{5}$       [B]  $\frac{3d}{6}$       [C]  $\frac{7d}{6}$       [D]  $\frac{7d}{5}$



216. fall0713ia, P.I. A.A.35  
What is an equation for the line that passes through the coordinates (2,0) and (0,3)?

[A]  $y = -\frac{3}{2}x - 3$       [B]  $y = -\frac{2}{3}x + 2$

[C]  $y = -\frac{3}{2}x + 3$       [D]  $y = -\frac{2}{3}x - 2$

217. fall0704ia, P.I. A.A.29  
Which interval notation represents the set of all numbers from 2 through 7, inclusive?

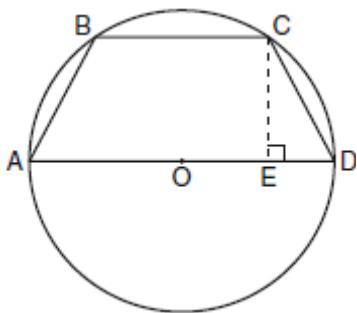
[A] (2,7]    [B] [2,7]    [C] (2,7)    [D] [2,7)

218. fall0725ia, P.I. A.N.4  
What is the quotient of  $8.05 \times 10^6$  and  $3.5 \times 10^2$ ?

[A]  $2.3 \times 10^4$       [B]  $2.3 \times 10^8$

[C]  $2.3 \times 10^{12}$       [D]  $2.3 \times 10^3$

219. 060934ia, P.I. A.G.1  
In the diagram below, the circumference of circle  $O$  is  $16\pi$  inches. The length of  $\overline{BC}$  is three-quarters of the length of diameter  $\overline{AD}$  and  $CE = 4$  inches. Calculate the area, in square inches, of trapezoid  $ABCD$ .



220. fall0706ia, P.I. A.A.19  
The expression  $x^2 - 16$  is equivalent to

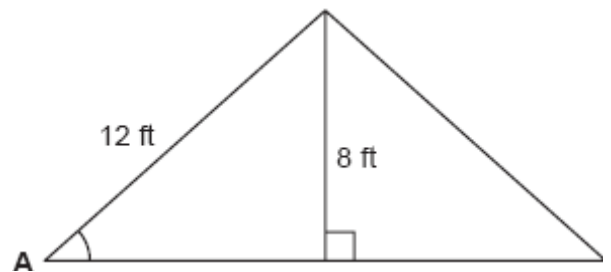
[A]  $(x - 2)(x + 8)$       [B]  $(x + 8)(x - 8)$

[C]  $(x + 4)(x - 4)$       [D]  $(x + 2)(x - 8)$

221. 080917ia, P.I. A.A.17  
What is the sum of  $\frac{3}{2x}$  and  $\frac{4}{3x}$  expressed in simplest form?

[A]  $\frac{17}{12x}$     [B]  $\frac{17}{6x}$     [C]  $\frac{7}{5x}$     [D]  $\frac{12}{6x^2}$

222. 060816ia, P.I. A.A.43  
The center pole of a tent is 8 feet long, and a side of the tent is 12 feet long as shown in the diagram below.



If a right angle is formed where the center pole meets the ground, what is the measure of angle  $A$  to the nearest degree?

[A] 56    [B] 48    [C] 34    [D] 42

223. 060928ia, P.I. A.M.3  
To calculate the volume of a small wooden cube, Ezra measured an edge of the cube as 2 cm. The actual length of the edge of Ezra's cube is 2.1 cm. What is the relative error in his volume calculation to the nearest hundredth?

[A] 0.16    [B] 0.15    [C] 0.14    [D] 0.13

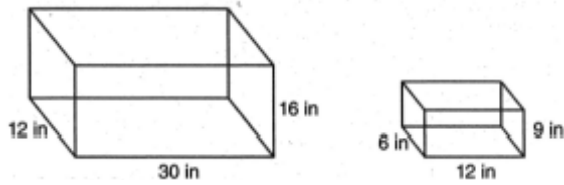
224. 060814ia, P.I. A.A.38  
Which equation represents a line parallel to the line  $y = -4x + 5$ ?

[A]  $y = 4x + 5$       [B]  $y = \frac{1}{4}x + 3$

[C]  $y = -\frac{1}{4}x + 5$       [D]  $y = -4x + 3$

225. 080932ia, P.I. A.G.2

The diagram below represents Joe's two fish tanks.



Joe's larger tank is completely filled with water. He takes water from it to completely fill the small tank. Determine how many cubic inches of water will remain in the larger tank.

226. 080912ia, P.I. A.A.30

Given:

$A = \{\text{All even integers from 2 to 20, inclusive}\}$

$B = \{10, 12, 14, 16, 18\}$

What is the complement of set  $B$  within the universe of set  $A$ ?

[A]  $\{2, 4, 6, 8\}$

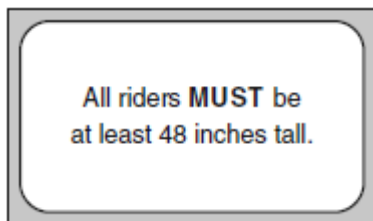
[B]  $\{4, 6, 8\}$

[C]  $\{2, 4, 6, 8, 20\}$

[D]  $\{4, 6, 8, 20\}$

227. 060906ia, P.I. A.A.4

The sign shown below is posted in front of a roller coaster ride at the Wadsworth County Fairgrounds.



If  $h$  represents the height of a rider in inches, what is a correct translation of the statement on this sign?

[A]  $h > 48$

[B]  $h \geq 48$

[C]  $h < 48$

[D]  $h \leq 48$

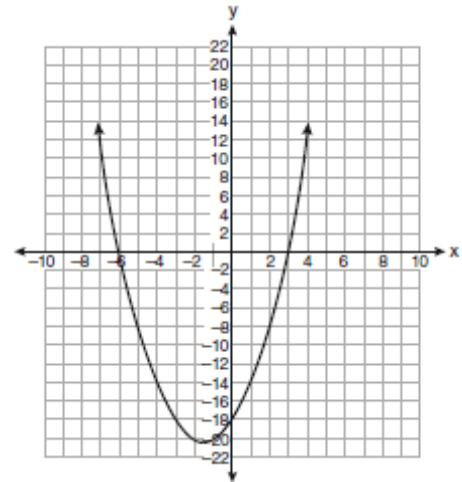
228. 080937ia, P.I. A.A.18

Express in simplest form:

$$\frac{2x^2 - 8x - 42}{6x^2} \div \frac{x^2 - 9}{x^2 - 3x}$$

229. 060924ia, P.I. A.G.8

The equation  $y = x^2 + 3x - 18$  is graphed on the set of axes below.



Based on this graph, what are the roots of the equation  $x^2 + 3x - 18 = 0$ ?

[A] 3 and -6

[B] 0 and -18

[C] -3 and 6

[D] 3 and -18

230. 080934ia, P.I. A.A.41

Find algebraically the equation of the axis of symmetry and the coordinates of the vertex of the parabola whose equation is

$$y = -2x^2 - 8x + 3.$$

231. 010926ia, P.I. A.A.38

Which equation represents a line that is parallel to the line  $y = 3 - 2x$ ?

[A]  $2x + 4y = 1$

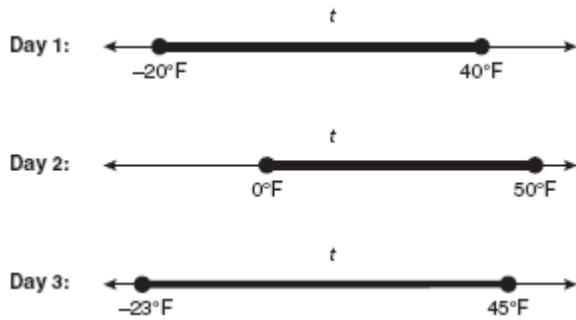
[B]  $4x + 2y = 5$

[C]  $y = 3 - 4x$

[D]  $y = 4x - 2$

232. 060833ia, P.I. A.A.31

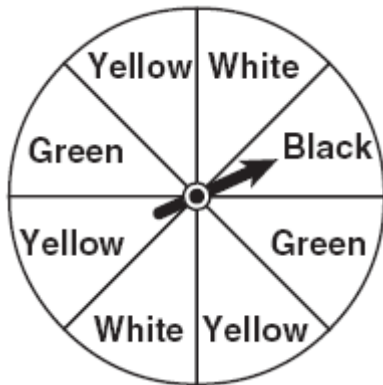
Maureen tracks the range of outdoor temperatures over three days. She records the following information.



Express the intersection of the three sets as an inequality in terms of temperature,  $t$ .

233. 060802ia, P.I. A.S.22

A spinner is divided into eight equal regions as shown in the diagram below.

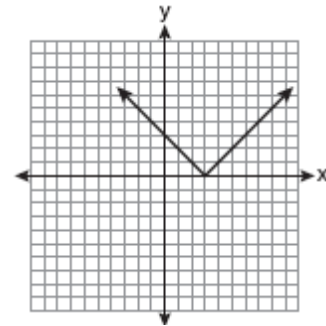


Which event is most likely to occur in one spin?

- [A] The arrow will land in a yellow or green area.
- [B] The arrow will land in a yellow or black area.
- [C] The arrow will land in a green or black area.
- [D] The arrow will land in a green or white area.

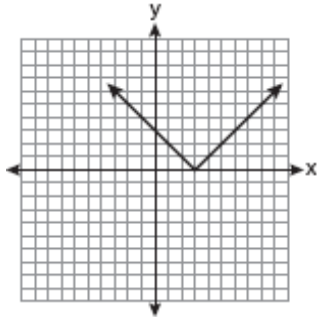
234. fall0722ia, P.I. A.G.4

The diagram below shows the graph of  $y = |x - 3|$ .

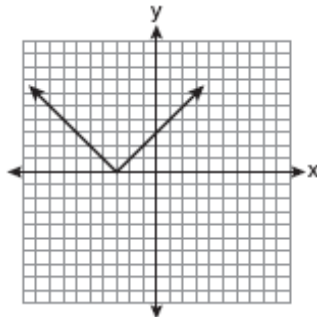


Which diagram shows the graph of  $y = -|x - 3|$ ?

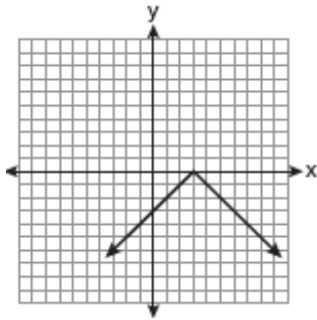
[A]



[B]



[C]



[D]

