

# JEFFERSON MATH PROJECT

## INTEGRATED ALGEBRA REGENTS QUESTIONS BY CONTENT STRAND PERFORMANCE INDICATORS

All 156 Integrated Algebra NY Regents Exam Questions  
Sorted by Content Strand Performance Indicators

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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.

CONTENT STRAND	BAND		PERFORMANCE INDICATORS	# of ?s
Number Sense and Operation  6-10%	Number Theory	Students will understand numbers, multiple ways of representing numbers, relationships among numbers, and number systems.	A.N.1	2
	Operations	Students will understand meanings of operations and procedures, and how they relate to one another.	A.N.2-A.N.8	11
Algebra  50-55%	Variables and Expressions	Students will represent and analyze algebraically a wide variety of problem solving situations.	A.A.1-A.A.2	3
	Equations and Inequalities		A.A.3-A.A.11	22
	Variables and Expressions	Students will perform algebraic procedures accurately.	A.A.12-A.A.20	21
	Equations and Inequalities		A.A.21-A.A.28	12
	Patterns, Relations and Functions	Students will recognize, use, and represent algebraically patterns, relations, and functions.	A.A.29-A.A.31	6
	Coordinate Geometry		A.A.32-A.A.41	11
	Trigonometric Functions		A.A.42-A.A.45	9
Geometry  14-19%	Shapes	Students will use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes.	A.G.1-A.G.2	8
	Coordinate Geometry	Students will apply coordinate geometry to analyze problem solving situations.	A.G.3-A.G.10	17
Measurement  3-8%	Units of Measurement	Students will determine what can be measured and how, using appropriate methods and formulas.	A.M.1-A.M.2	5
	Error and Magnitude	Students will understand that all measurement contains error and be able to determine its significance.	A.M.3	4
Statistics and Probability  14-19%	Organization and Display of Data	Students will collect, organize, display, and analyze data.	A.S.1-A.S.8	14
	Analysis of Data		A.S.9-A.S.14	3
	Predictions from Data	Students will make predictions that are based upon data analysis.	A.S.15-A.S.17	0
	Probability	Students will understand and apply concepts of probability.	A.S.18-A.S.23	8
			Total	156

A.N.1: Identify and apply the properties of real numbers.

1. 080802ia, P.I. A.N.1  
The statement  $2 + 0 = 2$  is an example of the use of which property of real numbers?  
[A] associative [B] distributive  
[C] additive inverse [D] additive identity

2. fall0705ia, P.I. A.N.1  
Which property is illustrated by the equation  $ax + ay = a(x + y)$ ?  
[A] identity [B] commutative  
[C] distributive [D] associative

A.N.2: Simplify radical terms (no variable in the radicand).

3. 010920ia, P.I. A.N.2  
What is  $\sqrt{72}$  expressed in simplest radical form?  
[A]  $8\sqrt{3}$  [B]  $6\sqrt{2}$   
[C]  $3\sqrt{8}$  [D]  $2\sqrt{18}$

4. fall0731ia, P.I. A.N.2  
Express  $5\sqrt{72}$  in simplest radical form.

5. 060828ia, P.I. A.N.2  
What is  $\frac{\sqrt{32}}{4}$  expressed in simplest radical form?  
[A]  $\sqrt{8}$  [B]  $\frac{\sqrt{8}}{2}$  [C]  $\sqrt{2}$  [D]  $4\sqrt{2}$

A.N.3: Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form.

6. 080834ia, P.I. A.N.3  
Express the product of  $3\sqrt{20}(2\sqrt{5} - 7)$  in simplest radical form.

A.N.4: Understand and use scientific notation to compute products and quotients of numbers.

7. 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]  $2.0 \times 10^5$  [B]  $35.28 \times 10^{11}$   
[C]  $12.6 \times 10^{11}$  [D]  $3.528 \times 10^{12}$
8. fall0725ia, P.I. A.N.4  
What is the quotient of  $8.05 \times 10^6$  and  $3.5 \times 10^2$ ?  
[A]  $2.3 \times 10^{12}$  [B]  $2.3 \times 10^8$   
[C]  $2.3 \times 10^3$  [D]  $2.3 \times 10^4$

A.N.5: Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount), and proportionality/direct variation.

9. 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] 160 [B] 90 [C] 7,200 [D] 5,400

10. 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.

11. 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?

A.N.6: Evaluate expressions involving factorial(s), absolute value(s), and exponential expressions.

A.N.7: Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting.

A.N.8: Determine the number of possible arrangements (permutations) of a list of items.

12. 060808a, 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]  ${}_3P_{10}$  [B]  ${}_{10}P_7$  [C]  ${}_{10}P_3$  [D]  ${}_7P_3$

13. 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] 4 [B] 24 [C] 10 [D] 16

A.A.1: Translate a quantitative verbal phrase into an algebraic expression.

1. 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]  $25x - 3$                       [B]  $22x$   
[C]  $25 - 3x$                       [D]  $25x - 75$

2. 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]  $3w^2 - 7w$                       [B]  $3w^2 - 4w$   
[C]  $3w - 4$                           [D]  $3w - 7$

A.A.2: Write a verbal expression that matches a given mathematical expression.

3. fall0729ia, P.I. A.A.2  
Which verbal expression represents  $2(n - 6)$ ?

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

A.A.3: Distinguish the difference between an algebraic expression and an algebraic equation.

A.A.4: Translate verbal sentences into mathematical equations or inequalities.

4. 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]  $8 - 3x < 15$   
[C]  $3x - 8 < 15$                       [D]  $3x - 8 > 15$

A.A.5: Write algebraic equations or inequalities that represent a situation.

5. 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]  $0.15(x + 6) = 1.35$   
[B]  $0.05(x + 6) + 0.10x = 1.35$   
[C]  $0.05 + 0.10(6x) = 1.35$   
[D]  $0.05x + 0.10(x + 6) = 1.35$

6. 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]  $w^2 + 5w - 36 = 0$

7. 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]  $h \geq 155$  or  $h \leq 190$   
[B]  $h > 155$  or  $h < 190$   
[C]  $155 < h < 190$                       [D]  $155 \leq h \leq 190$

8. 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]  $75d + 30c > 255$     [B]  $75d + 30c \geq 255$   
[C]  $75d + 30c < 255$     [D]  $75d + 30c \leq 255$

A.A.6: Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable.

9. 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] 692    [B] 421    [C] 271    [D] 150
10. 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?
11. 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.

A.A.7: Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables.

12. 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] \$10    [B] \$20    [C] \$4    [D] \$8
13. 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] \$1.50    [B] \$3.50  
[C] \$2.00    [D] \$3.00
14. 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] 29    [B] 33    [C] 13    [D] 15
15. 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] 84    [B] 42    [C] 21    [D] 63
16. 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.

A.A.8: Analyze and solve verbal problems that involve quadratic equations.

17. 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] 6      [B] 8      [C] 3      [D] 19

18. 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.

A.A.9: Analyze and solve verbal problems that involve exponential growth and decay.

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

20. 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]  $v = 21,000(1.14)^3$   
[C]  $v = 21,000(0.86)(3)$   
[D]  $v = 21,000(0.86)^3$

21. 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] \$28,507.72      [B] \$30,008.13  
[C] \$33,250.00      [D] \$27,082.33

A.A.10: Solve systems of two linear equations in two variables algebraically.

22. 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.]

A.A.11: Solve a system of one linear and one quadratic equation in two variables, where only factoring is required. Note: The quadratic equation should represent a parabola and the solution(s) should be integers.

23. 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] (0, 0)      [B] (-1, 1)  
[C] (2, 2)      [D] (-2, -2)

24. 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, 2)      [B] (-5, 6)  
[C] (5, -4)      [D] (-5, -1)

25. 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] (-1, -18)                      [B] (5, -1)  
[C] (0, 5)                            [D] (-5, -30)

A.A.12: Multiply and divide monomial expressions with a common base, using the properties of exponents. Note: Use integral exponents only.

26. 080827ia, P.I. A.A.12  
Which expression is equivalent to  $(3x^2)^3$ ?
- [A]  $27x^5$     [B]  $9x^5$     [C]  $27x^6$     [D]  $9x^6$
27. 060813ia, P.I. A.A.12  
What is half of  $2^6$ ?
- [A]  $1^6$     [B]  $2^5$     [C]  $2^3$     [D]  $1^3$

28. fall0703ia, P.I. A.A.12  
Which expression represents  $\frac{(2x^3)(8x^5)}{4x^6}$  in simplest form?
- [A]  $x^2$     [B]  $x^9$     [C]  $4x^9$     [D]  $4x^2$

29. 010932ia, P.I. A.A.12  
Simplify:  $\frac{27k^5m^8}{(4k^3)(9m^2)}$

A.A.13: Add, subtract, and multiply monomials and polynomials.

30. 080819a, P.I. A.A.13  
When  $3g^2 - 4g + 2$  is subtracted from  $7g^2 + 5g - 1$ , the difference is
- [A]  $4g^2 + g + 1$                       [B]  $4g^2 + 9g - 3$   
[C]  $-4g^2 - 9g + 3$                     [D]  $10g^2 + g + 1$

31. 060807ia, P.I. A.A.13  
What is the product of  $-3x^2y$  and  $(5xy^2 + xy)$ ?
- [A]  $-15x^3y^3 - 3x^3y^2$     [B]  $-15x^3y^3 - 3x^3y$   
[C]  $-15x^2y^2 - 3x^2y$     [D]  $-15x^3y^3 + xy$

A.A.14: Divide a polynomial by a monomial or binomial, where the quotient has no remainder.

32. 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]  $9x^3(1 - x)$                       [D]  $3x(1 - 9x^5)$

A.A.15: Find values of a variable for which an algebraic fraction is undefined.

33. 060817ia, P.I. A.A.15  
Which value of  $x$  makes the expression  $\frac{x+4}{x-3}$  undefined?
- [A] -4    [B] -3    [C] 0    [D] 3

34. 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, only  
[C] 3 or -3                                      [D] 0 or 3

35. fall0728ia, P.I. A.A.15  
For which value of  $x$  is  $\frac{x-3}{x^2-4}$  undefined?
- [A] 4    [B] -2    [C] 0    [D] 3



A.A.16: Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms.

36. 060824ia, P.I. A.A.16

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

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

37. 080821ia, P.I. A.A.16

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

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

A.A.17: Add or subtract fractional expressions with monomial or like binomial denominators.

38. fall0727ia, P.I. A.A.17

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

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

39. 010921ia, P.I. A.A.17

What is  $\frac{6}{5x} - \frac{2}{3x}$  in simplest form?

- [A]  $\frac{8}{15x^2}$  [B]  $\frac{4}{15x}$  [C]  $\frac{4}{2x}$  [D]  $\frac{8}{15x}$

A.A.18: Multiply and divide algebraic fractions and express the product or quotient in simplest form.

40. 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]  $\frac{4(x + 1)}{3}$

- [C]  $\frac{4x}{3}$  [D]  $\frac{4x^2}{3}$

41. 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]  $x + 3$  [B]  $\frac{x + 3}{3}$  [C]  $\frac{x}{3}$  [D]  $x$

42. 010935ia, P.I. A.A.18

Perform the indicated operation and simplify:

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

A.A.19: Identify and factor the difference of two perfect squares.

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

44. 060804ia, P.I. A.A.19

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

- [A]  $(8x - 5y)(8x - 5y)$

- [B]  $(8x - 5y)(8x + 5y)$

- [C]  $(4x - 5y)(4x + 5y)$

- [D]  $(4x - 5y)(4x - 5y)$

45. 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]  $(3x - 100)(3x - 1)$  [D]  $(9x - 10)(x + 10)$

A.A.20: Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF).

46. 080806ia, P.I. A.A.20

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

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

A.A.21: Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable.

47. fall0724ia, P.I. A.A.21

Which value of  $x$  is in the solution set of the inequality  $-2x + 5 > 17$ ?

- [A] -4 [B] 12 [C] -6 [D] -8

48. 080805ia, P.I. A.A.21

Which value of  $x$  is in the solution set of the inequality  $-4x + 2 > 10$ ?

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

A.A.22: Solve all types of linear equations in one variable.

49. 080801ia, P.I. A.A.22

Which value of  $p$  is the solution of  $5p - 1 = 2p + 20$ ?

- [A]  $\frac{19}{3}$  [B] 3 [C] 7 [D]  $\frac{19}{7}$

50. fall0732ia, P.I. A.A.22

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

A.A.23: Solve literal equations for a given variable.

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

52. 080808ia, P.I. A.A.23

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

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

A.A.24: Solve linear inequalities in one variable.

A.A.25: Solve equations involving fractional expressions. Note: Expressions which result in linear equations in one variable.

53. 080820ia, P.I. A.A.25

Which value of  $x$  is the solution of

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

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

A.A.26: Solve algebraic proportions in one variable which result in linear or quadratic equations.

54. 010906ia, P.I. A.A.26

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

- [A] 6 [B] 1 [C] 14 [D] 5

55. 010918ia, P.I. A.A.26  
What is the value of  $x$  in the equation

$$\frac{2}{x} - 3 = \frac{26}{x}?$$

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

56. 060826ia, P.I. A.A.26

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

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

57. fall0739ia, P.I. A.A.26

Solve for  $x$ :  $\frac{x+1}{x} = \frac{-7}{x-12}$

A.A.27: Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots.

58. 010914ia, P.I. A.A.27

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

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

A.A.28: Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression.

A.A.29: Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form.

59. 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)

60. 010917ia, P.I. A.A.29

The set  $\{1,2,3,4\}$  is equivalent to

- [A]  $\{x|0 < x \leq 4, \text{ where } x \text{ is a whole number}\}$   
[B]  $\{x|1 < x < 4, \text{ where } x \text{ is a whole number}\}$   
[C]  $\{x|1 < x \leq 4, \text{ where } x \text{ is a whole number}\}$   
[D]  $\{x|0 < x < 4, \text{ where } x \text{ is a whole number}\}$

A.A.30: Find the complement of a subset of a given set, within a given universe.

61. 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]  $\{-2, -1, 0, 2, 3, 4, 6\}$   
[C]  $\{-1, 0, 2, 3, 4\}$  [D]  $\{0, 2, 3, 4\}$

62. 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.

A.A.31: Find the intersection of sets (no more than three sets) and/or union of sets, within a given universe.

63. fall0710ia, P.I. A.A.31

Given:

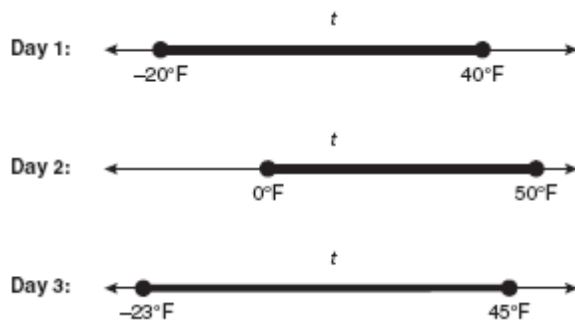
$$\text{Set } A = \{(-2,-1), (-1,0), (1,8)\}$$

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

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]  $\{(-2,-1)\}$

64. 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,  $t$ .

A.A.32: Explain slope as a rate of change between dependent and independent variables.

65. 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] negative                      [B] zero  
[C] undefined                    [D] positive

A.A.33: Determine the slope of a line, given the coordinates of two points on the line.

66. fall0716ia, P.I. A.A.33  
What is the slope of the line containing the points (3,4) and (-6,10)?
- [A]  $-\frac{2}{3}$     [B] 2    [C]  $-\frac{3}{2}$     [D]  $\frac{1}{2}$
67. 010913ia, P.I. A.A.33  
What is the slope of the line that passes through the points (2,5) and (7,3)?
- [A]  $\frac{8}{9}$     [B]  $\frac{9}{8}$     [C]  $-\frac{2}{5}$     [D]  $-\frac{5}{2}$

68. 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

A.A.34: Write the equation of a line, given its slope and the coordinates of a point on the line.

A.A.35: Write the equation of a line, given the coordinates of two points on the line.

69. 010910ia, P.I. A.A.35  
What is an equation of the line that passes through the points  $(3,-3)$  and  $(-3,-3)$ ?
- [A]  $y = 3$                       [B]  $x = -3$   
[C]  $x = y$                       [D]  $y = -3$

70. 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]  $y = -\frac{2}{3}x - 2$

71. 080836ia, P.I. A.A.35  
Write an equation that represents the line that passes through the points (5,4) and (-5,0).

A.A.36: Write the equation of a line parallel to the x- or y-axis.

72. 080810ia, P.I. A.A.36  
Which equation represents a line parallel to the x-axis?
- [A]  $y = 5x + 17$                       [B]  $x = 5$   
[C]  $x = \frac{1}{3}y$                       [D]  $y = 10$

A.A.37: Determine the slope of a line, given its equation in any form.

A.A.38: Determine if two lines are parallel, given their equations in any form.

73. 060814ia, P.I. A.A.38

Which equation represents a line parallel to the line  $y = -4x + 5$ ?

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

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

74. 010926ia, P.I. A.A.38

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

[A]  $y = 4x - 2$       [B]  $y = 3 - 4x$

[C]  $4x + 2y = 5$       [D]  $2x + 4y = 1$

A.A.39: Determine whether a given point is on a line, given the equation of the line.

A.A.40: Determine whether a given point is in the solution set of a system of linear inequalities.

75. 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] (3, -5)      [B] (4, 0)

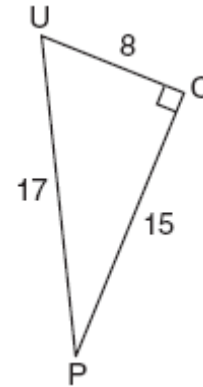
[C] (-5, 3)      [D] (0, 4)

A.A.41: Determine the vertex and axis of symmetry of a parabola, given its equation.

A.A.42: Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides.

76. 010919ia, P.I. A.A.42

The diagram below shows right triangle  $UPC$ .



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

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

77. 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.

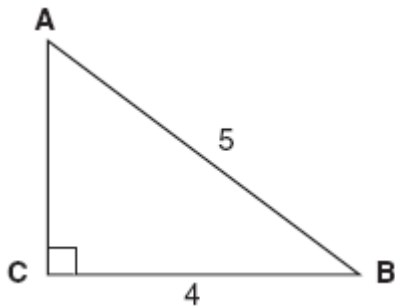
Which ratio represents the sine of  $\angle C$ ?

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

A.A.43: Determine the measure of an angle of a right triangle, given an acute angle and the length of another side.

78. 080824ia, P.I. A.A.43

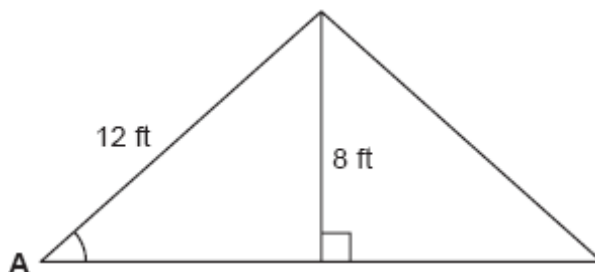
Which equation could be used to find the measure of one acute angle in the right triangle shown below?



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

79. 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.

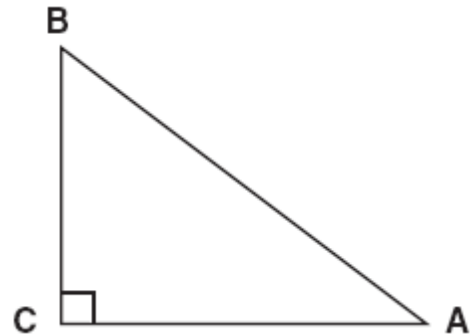


If a right angle is formed where the center pole meets the ground, what is the measure of angle A to the nearest degree?

- [A] 42      [B] 48      [C] 56      [D] 34

80. 080829ia, P.I. A.A.43

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



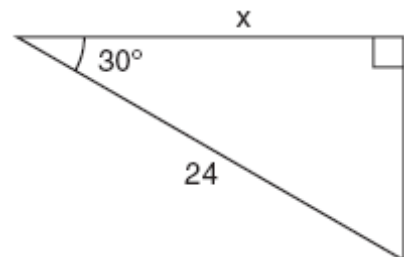
To the nearest tenth of a degree, what is the measure of the largest acute angle in the triangle?

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

A.A.44: Find the measure of a side of a right triangle, given an acute angle and the length of another side.

81. 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?

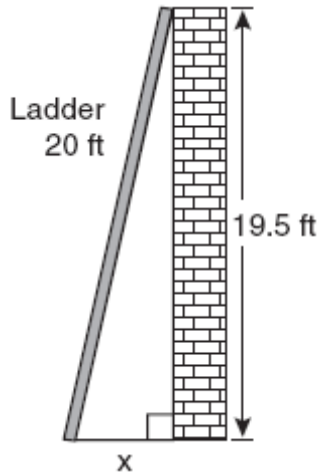


- [A] 21      [B] 28      [C] 12      [D] 14

A.A.45: Determine the measure of a third side of a right triangle using the Pythagorean theorem, given the lengths of any two sides.

82. 060825ia, P.I. A.A.45

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

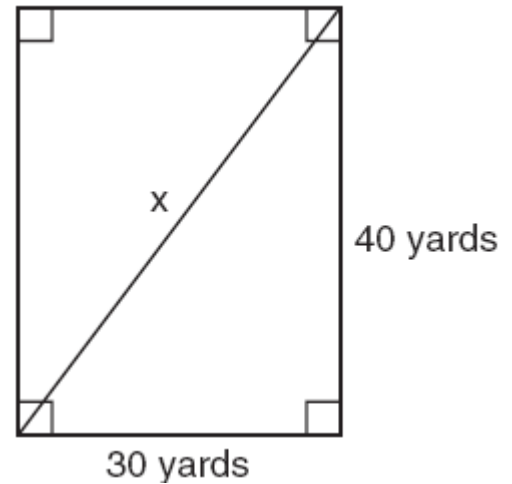


Which equation could be used to find the distance,  $x$ , from the foot of the ladder to the base of the house?

- [A]  $x = \sqrt{20^2 - 19.5^2}$     [B]  $x = 20^2 - 19.5^2$   
[C]  $x = \sqrt{20^2 + 19.5^2}$     [D]  $x = 20 - 19.5$

83. 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] 70    [B] 60    [C] 80    [D] 50

84. 080809ia, P.I. A.A.45

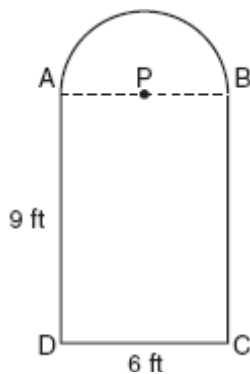
The length of the hypotenuse of a right triangle is 34 inches and the length of one of its legs is 16 inches. What is the length, in inches, of the other leg of this right triangle?

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

A.G.1: Find the area and/or perimeter of figures composed of polygons and circles or sectors of a circle. Note: Figures may include triangles, rectangles, squares, parallelograms, rhombuses, trapezoids, circles, semi-circles, and regular polygons (perimeter only).

1. fall0733ia, P.I. A.G.1

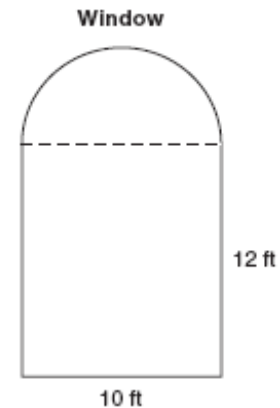
Serena's garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment  $AB$  is the diameter of semicircle  $P$ . Serena wants to put a fence around her garden.



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

2. 010931ia, P.I. A.G.1

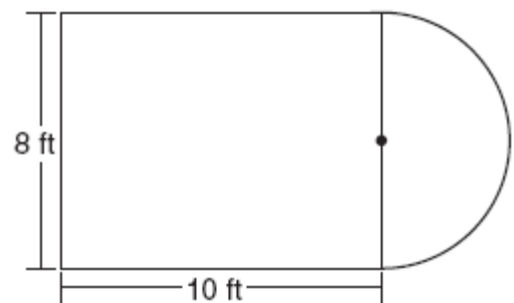
A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.



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

3. 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.



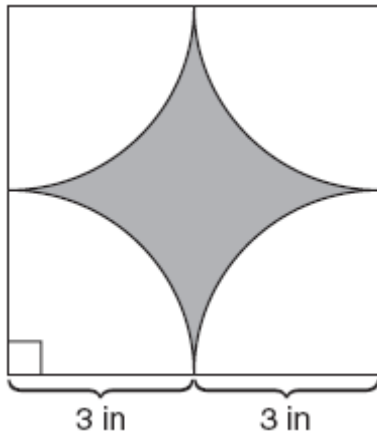
Which expression represents the area of this basketball court, in square feet?

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



4. 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.

A.G.2: Use formulas to calculate volume and surface area of rectangular solids and cylinders.

5. 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] 3.375    [B] 9.0    [C] 13.5    [D] 2.25

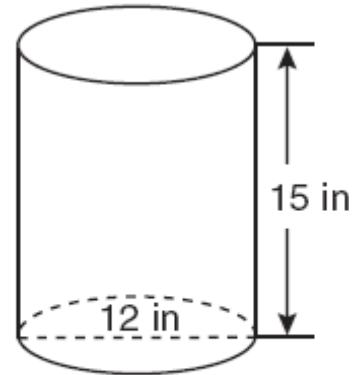
6. 060827ia, P.I. A.G.2

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]  $22.5 \text{ ft}^2$                       [B]  $27.0 \text{ ft}^2$   
[C]  $13.5 \text{ ft}^2$                       [D]  $9.0 \text{ ft}^2$

7. 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] 4,241.2                      [B] 2,160.0  
[C] 6,785.8                      [D] 1,696.5

8. 010936ia, P.I. A.G.2

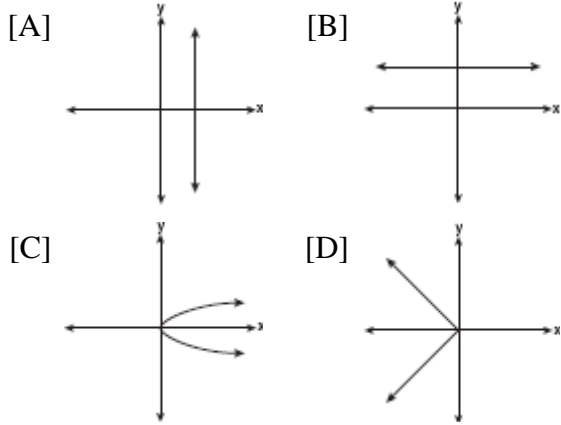
A soup can is in the shape of a cylinder. The can has a volume of  $342 \text{ cm}^3$  and a diameter of 6 cm. Express the height of the can in terms of  $\pi$ . Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly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

A.G.3: Determine whether a relation is a function, by examining ordered pairs and inspecting graphs of relations.

A.G.4: Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions.

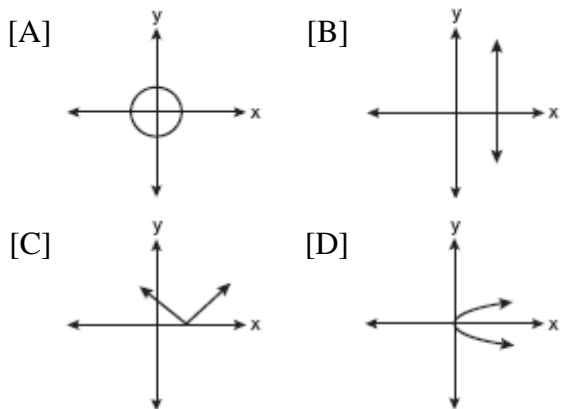
9. fall0730ia, P.I. A.G.3

Which graph represents a function?



10. 010930ia, P.I. A.G.3

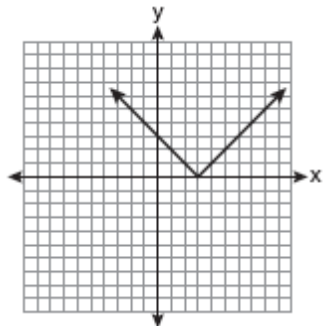
Which graph represents a function?



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

The diagram below shows the graph of

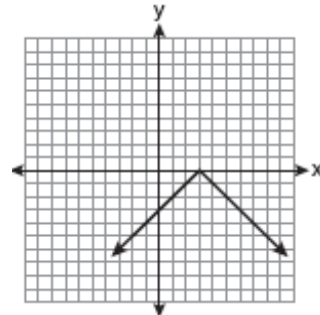
$$y = |x - 3|.$$



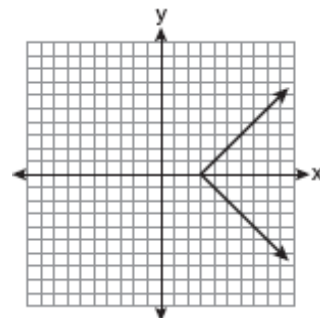
Which diagram shows the graph of

$$y = -|x - 3|?$$

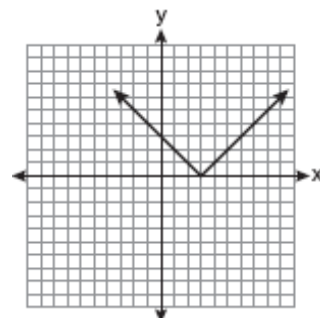
[A]



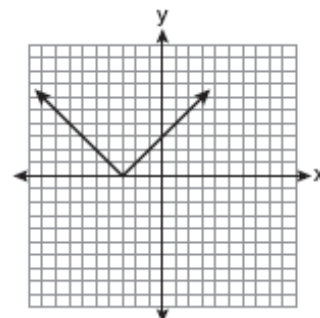
[B]



[C]

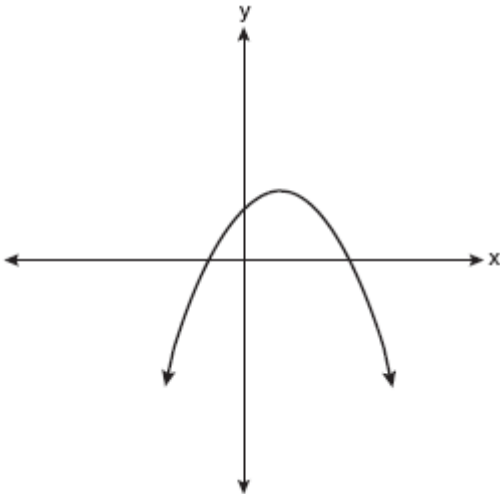


[D]



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

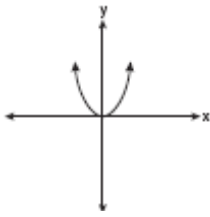
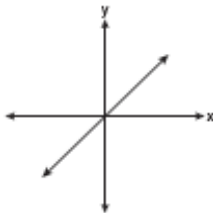
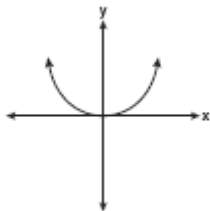
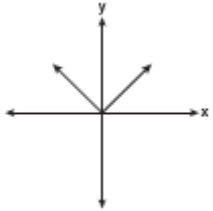
Which type of graph is shown in the diagram below?



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

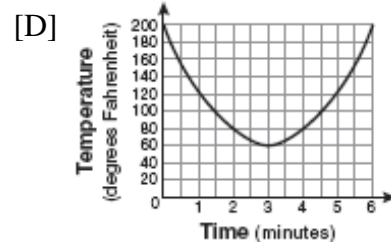
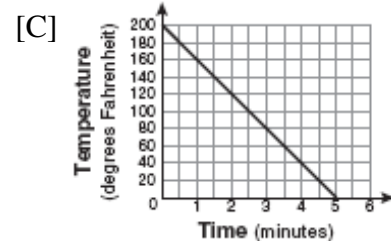
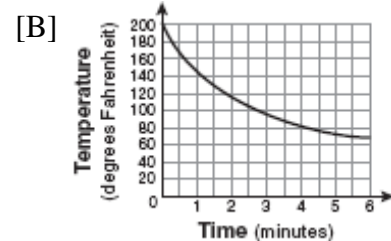
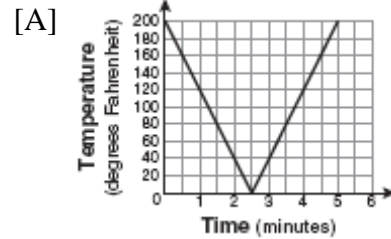
13. 060801ia, P.I. A.G.4

Which graph represents a linear function?

- [A]  [B] 
- [C]  [D] 

14. 010905ia, P.I. A.G.4

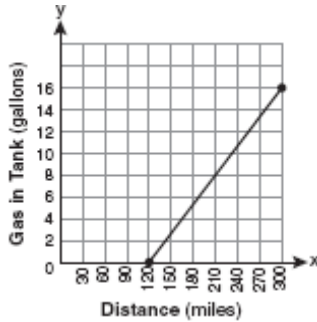
Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?



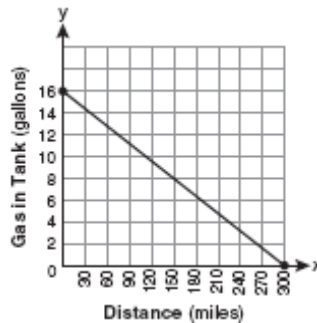
15. 080807ia, P.I. A.G.4

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?

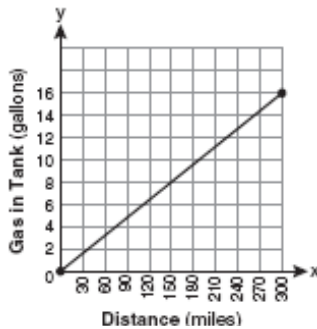
[A]



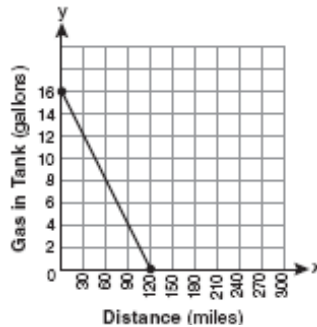
[B]



[C]

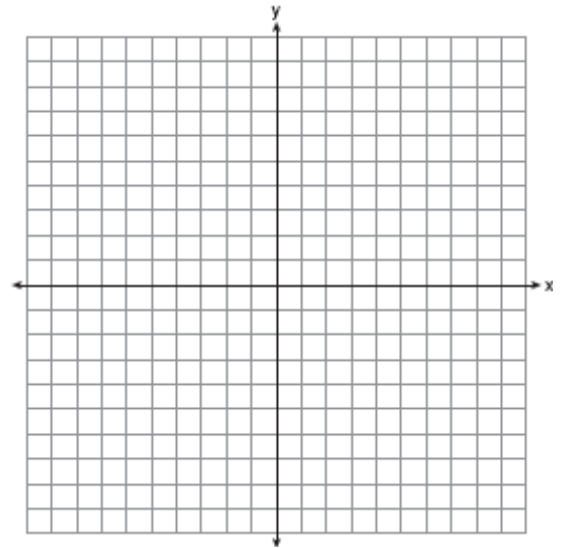


[D]



16. 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.



A.G.5: Investigate and generalize how changing the coefficients of a function affect its graph.

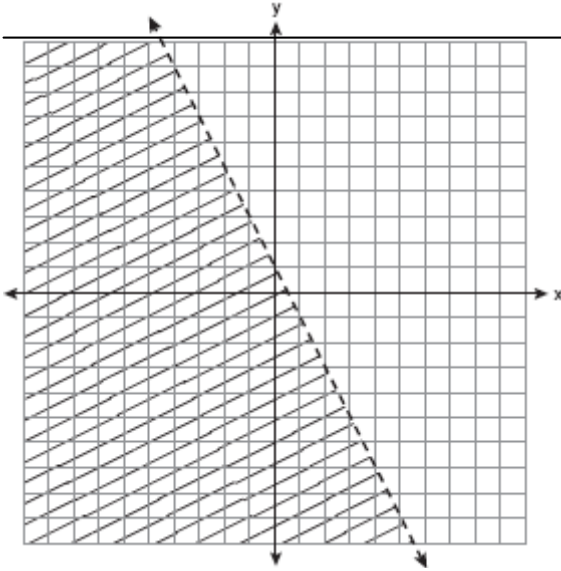
17. 060829ia, P.I. A.G.5

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

A.G.6: Graph linear inequalities.

18. fall0720ia, P.I. A.G.6  
Which inequality is represented by the graph below?

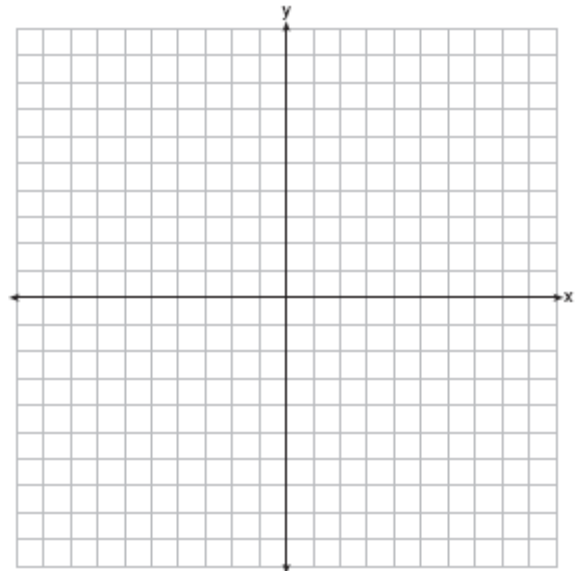


- [A]  $y < \frac{1}{2}x + 1$       [B]  $y < -\frac{1}{2}x + 1$   
[C]  $y < 2x + 1$       [D]  $y < -2x + 1$

A.G.7: Graph and solve systems of linear equations and inequalities with rational coefficients in two variables.

19. 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.

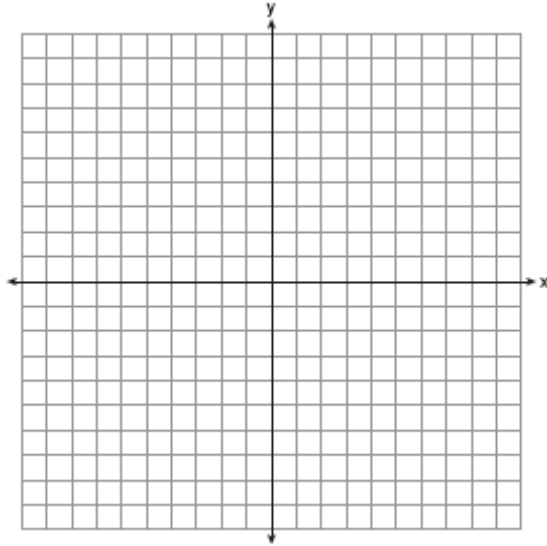
$$2x - y \geq 6$$
$$x > 2$$



A.G.8: Find the roots of a parabolic function graphically. Note: Only quadratic equations with integral solutions.

20. 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  $x^2 - 2x - 3 = 0$ .

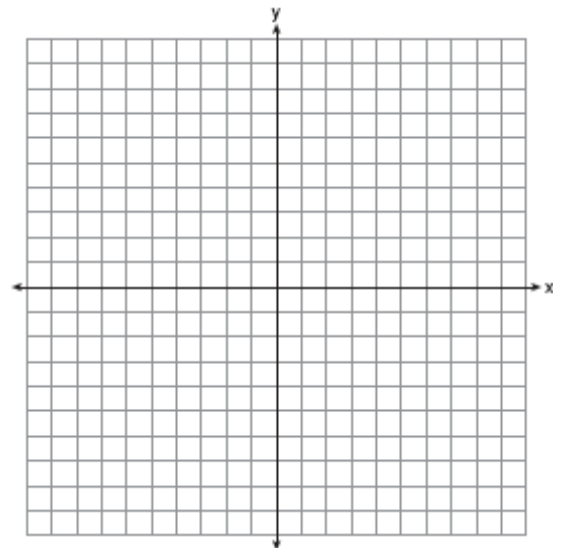


A.G.9: Solve systems of linear and quadratic equations graphically. Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.

21. 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.

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

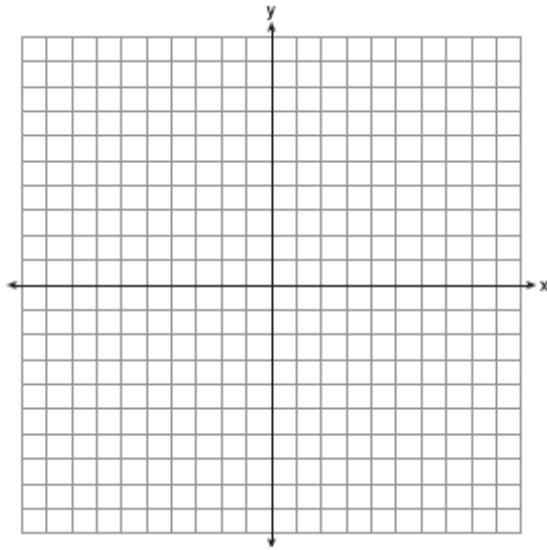


22. 080839ia, P.I. A.G.9

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

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

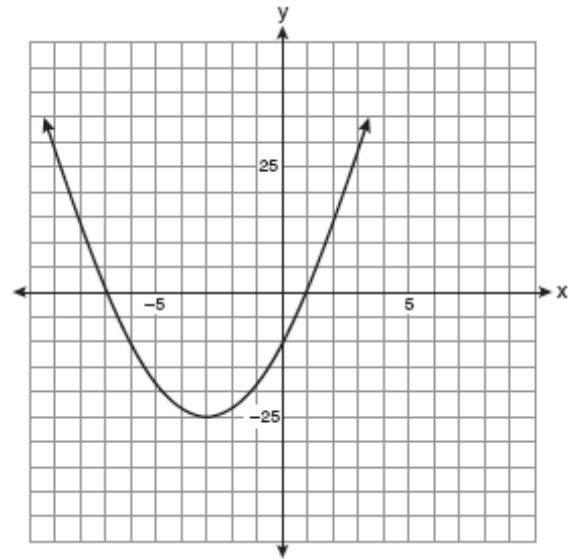
$$y = x - 1$$



A.G.10: Determine the vertex and axis of symmetry of a parabola, given its graph (See A.A.41). Note: The vertex will have an ordered pair of integers and the axis of symmetry will have an integral value.

23. 010916ia, P.I. A.G.10

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



[A]  $y = -3$

[B]  $x = -25$

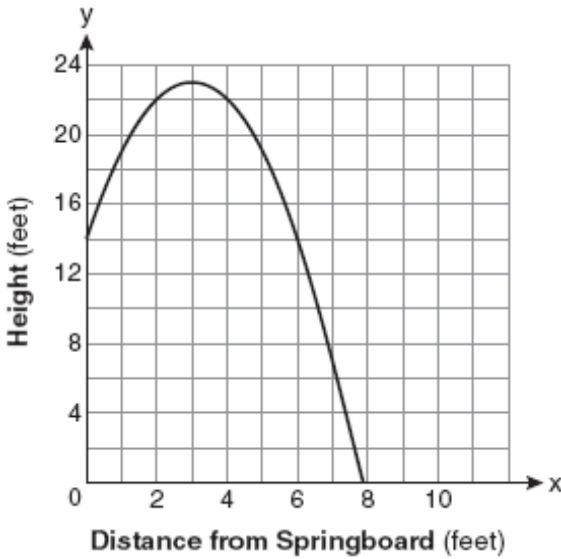
[C]  $x = -3$

[D]  $y = -25$



24. 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.

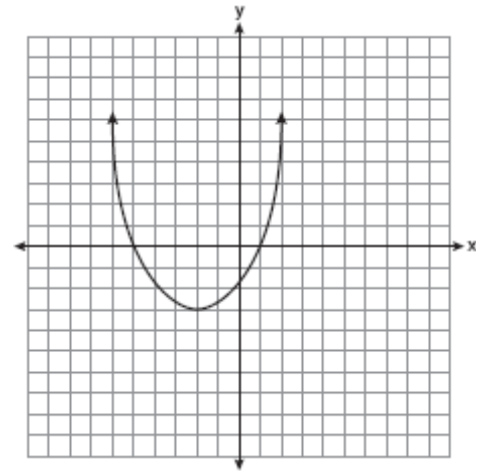


Which equation represents the axis of symmetry?

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

25. 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  $(-3, -2)$ , and the axis of symmetry is  $x = -2$ .  
[B] The vertex is  $(-3, -2)$ , and the axis of symmetry is  $y = -2$ .  
[C] The vertex is  $(-2, -3)$ , and the axis of symmetry is  $y = -2$ .  
[D] The vertex is  $(-2, -3)$ , and the axis of symmetry is  $x = -2$ .

A.M.1: Calculate rates using appropriate units (e.g., rate of a space ship versus the rate of a snail).

1. 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] 30 [B] 4 [C] 144 [D] 18

2. 080831a, 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.

3. 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.

4. 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?

A.M.2: Solve problems involving conversions within measurement systems, given the relationship between the units.

5. 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] 35 [B] 59 [C] -9 [D] 85

A.M.3: Calculate the relative error in measuring square and cubic units, when there is an error in the linear measure.

6. 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]  $\frac{(130)(60) - (120)(54)}{(120)(54)}$

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

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

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

7. 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] 0.025                      [B] 0.096

[C] 0.024                      [D] 1.025

8. 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*.

9. 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.

A.S.1: Categorize data as qualitative or quantitative.

1. 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 elevations of the five highest mountains in the world
- [C] the opinions of students regarding school lunches
- [D] the ages of presidents at the time of their inauguration

A.S.2: Determine whether the data to be analyzed is univariate or bivariate.

2. 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. DeStefan records his customers' best video game scores during the summer.
- [C] Mr. Chan keeps track of his daughter's algebra grades for the quarter.
- [D] Mr. Benjamin tries to see if his students' shoe sizes are directly related to their heights.

A.S.3: Determine when collected data or display of data may be biased.

3. 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 of the varsity football team
- [B] every student having a second-period French class
- [C] every third student entering the building
- [D] every member in Ms. Zimmer's drama classes
4. 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] surveying 10 people who work in a sporting goods store
- [C] randomly surveying 50 people during the day in a mall
- [D] surveying the first 25 people who enter a grocery store

A.S.4: Compare and contrast the appropriateness of different measures of central tendency for a given data set.

5. 080804ia, P.I. A.S.4  
Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?
- [A] mean = mode      [B] mean > mode
- [C] mean = median    [D] mean < median

6. 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] median < mode < mean  
[B] mean < median < mode  
[C] mode < median < mean  
[D] mean < mode < median

7. 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.

8. fall0737ia, P.I. A.S.4  
The values of 11 houses on Washington St. are shown in the table below.

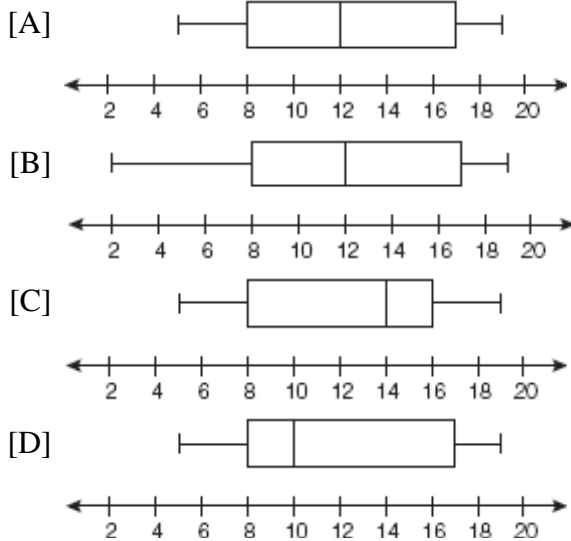
Value per House	Number of Houses
\$100,000	1
\$175,000	5
\$200,000	4
\$700,000	1

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.

A.S.5: Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data.

9. 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?



10. 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}

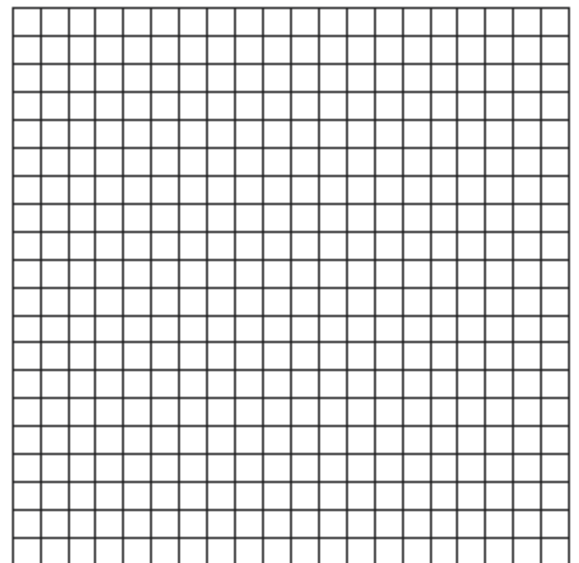
Complete the frequency table and cumulative frequency table below for these data. Create a cumulative frequency histogram based upon the table you made.

Number of Days Outside

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

Number of Days Outside

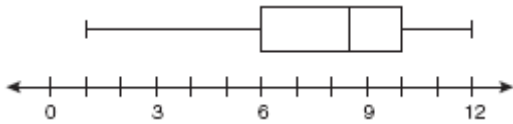
Interval	Cumulative Frequency
0-1	
0-3	
0-5	
0-7	



A.S.6: Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-and-whisker plot.

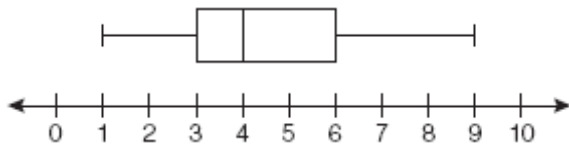
A.S.7: Create a scatter plot of bivariate data.

11. 080818ia, P.I. A.S.6  
What is the value of the third quartile shown on the box-and-whisker plot below?



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

12. 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?

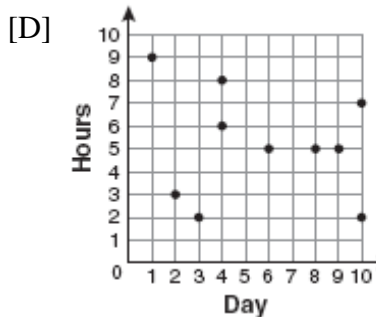
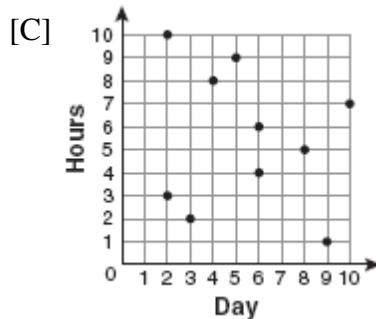
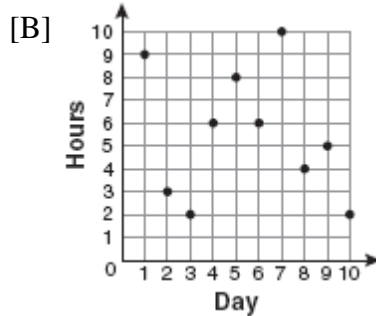
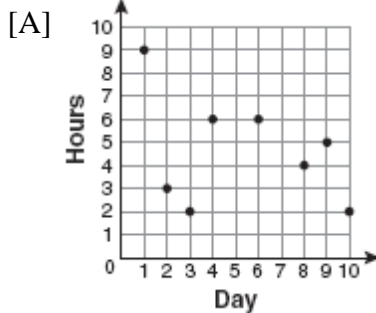
- [A] The range of the attendance is 300 to 600.  
[B] The mean of the attendance is 400.  
[C] The second quartile is 600.  
[D] Twenty-five percent of the attendance is between 300 and 400.

13. 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

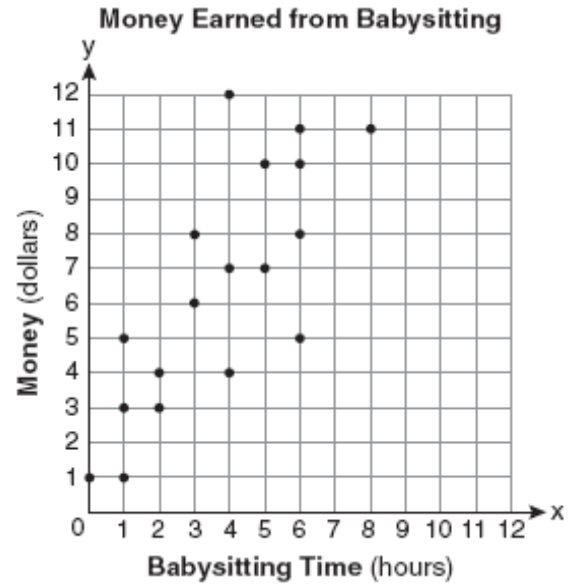
Which scatter plot shows Romero's data graphically?



A.S.8: Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line.

14. 080822ia, P.I. A.S.8

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



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

[C]  $y = \frac{3}{2}x + 4$       [D]  $y = \frac{2}{3}x + 1$



A.S.9: Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot.

15. 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?

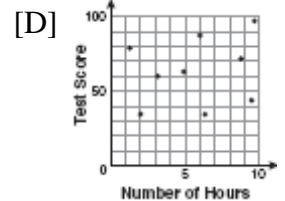
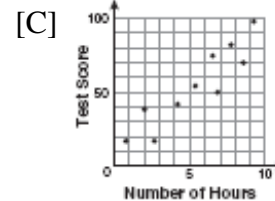
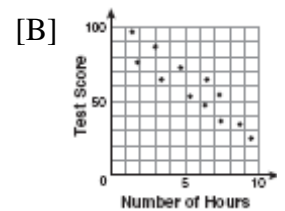
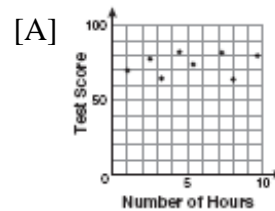
- [A] 7      [B] 6      [C] 10      [D] 25

A.S.10: Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions.

A.S.11: Find the percentile rank of an item in a data set and identify the point values for first, second, and third quartiles.

A.S.12: Identify the relationship between the independent and dependent variables from a scatter plot (positive, negative, or none).

16. 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?



A.S.13: Understand the difference between correlation and causation.

A.S.14: Identify variables that might have a correlation but not a causal relationship.

17. 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.

A.S.15: Identify and describe sources of bias and its effect, drawing conclusions from data.

A.S.16: Recognize how linear transformations of one-variable data affect the data's mean, median, mode, and range.

A.S.17: Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation.

A.S.18: Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.

A.S.19: Determine the number of elements in a sample space and the number of favorable events.

18. 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.

19. 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.

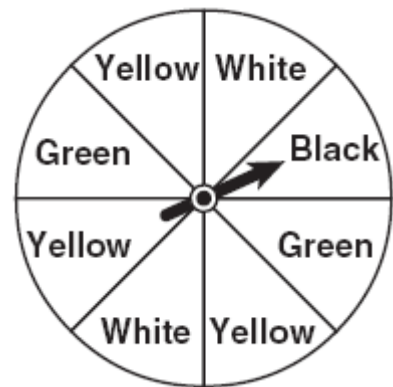
A.S.20: Calculate the probability of an event and its complement.

A.S.21: Determine empirical probabilities based on specific sample data.

A.S.22: Determine, based on calculated probability of a set of events, if some or all are equally likely to occur, one is more likely to occur than another and whether or not an event is certain to happen or not to happen.

20. 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.

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

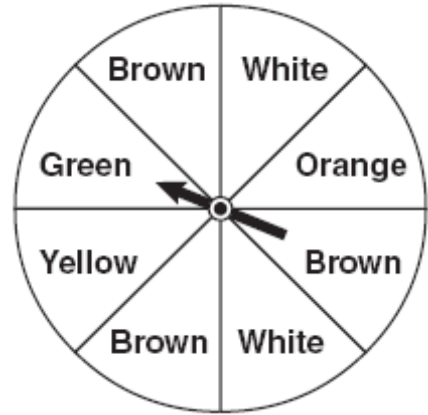
A.S.23: Calculate the probability of a series of independent events, a series of dependent events, two mutually exclusive events, two events that are not mutually exclusive.

22. 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*.

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

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

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