

JEFFERSON MATH PROJECT

REGENTS BY INTEGRATED ALGEBRA CONTENT STRAND PERFORMANCE INDICATORS

636 NY Math Regents Exam Questions Sorted by
Integrated Algebra Content Strand Performance
Indicators

www.jmap.org

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	Number Theory	Students will understand numbers, multiple ways of representing numbers, relationships among numbers, and number systems.	A.N.1	32
	Operations	Students will understand meanings of operations and procedures, and how they relate to one another.	A.N.2-A.N.8	97
Algebra	Variables and Expressions	Students will represent and analyze algebraically a wide variety of problem solving situations.	A.A.1-A.A.2	16
	Equations and Inequalities		A.A.3-A.A.11	101
	Variables and Expressions	Students will perform algebraic procedures accurately.	A.A.12-A.A.20	81
	Equations and Inequalities		8.A.13-8.A.14 A.A.21-A.A.28	75
	Patterns, Relations and Functions	Students will recognize, use, and represent algebraically patterns, relations, and functions.	8.A.17-8.A.19 A.A.29-A.A.31	6
	Coordinate Geometry		A.A.32-A.A.41	32
	Trigonometric Functions		A.A.42-A.A.45	34
Geometry	Shapes	Students will use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes.	A.G.1-A.G.2	51
	Coordinate Geometry	Students will apply coordinate geometry to analyze problem solving situations.	8.G.13-8.G.21 A.G.3-A.G.10	38
Measurement	Units of Measurement	Students will determine what can be measured and how, using appropriate methods and formulas.	A.M.1-A.M.2	25
	Error and Magnitude	Students will understand that all measurement contains error and be able to determine its significance.	A.M.3	1
Statistics and Probability	Organization and Display of Data	Students will collect, organize, display, and analyze data.	A.S.1-A.S.8	17
	Analysis of Data		A.S.9-A.S.14	5
	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	25
			Total	636

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

1. fall0705ia, P.I. A.N.1

Which property is illustrated by the equation $ax + ay = a(x + y)$?

- [A] commutative [B] identity
[C] associative [D] distributive

2. 010821a, P.I. A.N.1

The additive inverse of $\frac{1}{a}$ is

- [A] 0 [B] a [C] $-a$ [D] $-\frac{1}{a}$

3. 010812a, P.I. A.N.1

Which property is represented by the statement $\frac{1}{2}(6a + 4b) = 3a + 2b$?

- [A] identity [B] commutative
[C] distributive [D] associative

4. 080725a, P.I. A.N.1

Which equation illustrates the associative property?

- [A] $a + b = b + a$
[B] $(a + b) + c = a + (b + c)$
[C] $a(b + c) = (ab) + (ac)$ [D] $a(1) = a$

5. 060714a, P.I. A.N.1

Which property is illustrated by the equation $\frac{3}{2}x + 0 = \frac{3}{2}x$?

- [A] commutative property of addition
[B] additive identity property
[C] additive inverse property
[D] distributive property

6. 010730a, P.I. A.N.1

The multiplicative inverse of $-\frac{1}{3}$ is

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

7. 010720a, P.I. A.N.1

If M and A represent integers, $M + A = A + M$ is an example of which property?

- [A] commutative [B] closure
[C] associative [D] distributive

8. 080601a, P.I. A.N.1

While solving the equation $4(x + 2) = 28$, Becca wrote $4x + 8 = 28$. Which property did she use?

- [A] associative [B] commutative
[C] distributive [D] identity

9. 060624a, P.I. A.N.1

Which statement best illustrates the additive identity property?

- [A] $6 + 2 = 2 + 6$ [B] $6(2) = 2(6)$
[C] $6 + 0 = 6$ [D] $6 + (-6) = 0$

10. 010630a, P.I. A.N.1

Which equation illustrates the multiplicative inverse property?

- [A] $x \cdot \frac{1}{x} = 1$ [B] $1 \cdot 0 = 0$
[C] $-1 \cdot x = -x$ [D] $1 \cdot x = x$

11. 080514a, P.I. A.N.1

What is the identity element for \clubsuit in the accompanying table?

\clubsuit	r	s	t	u
r	t	r	u	s
s	r	s	t	u
t	u	t	s	r
u	s	u	r	t

- [A] s [B] r [C] t [D] u

12. 080504a, P.I. A.N.1

The equation $*(\Delta + \diamond) = * \Delta + * \diamond$ is an example of the

- [A] commutative law [B] distributive law
[C] associative law [D] transitive law

13. 060503a, P.I. A.N.1

Which equation illustrates the distributive property?

- [A] $a + 0 = a$ [B] $a + b = b + a$
[C] $a + (b + c) = (a + b) + c$
[D] $5(a + b) = 5a + 5b$

14. 010516a, P.I. A.N.1

What is the multiplicative inverse of $\frac{3}{4}$?

- [A] $-\frac{4}{3}$ [B] $-\frac{3}{4}$ [C] -1 [D] $\frac{4}{3}$

15. 080413a, P.I. A.N.1

Which equation illustrates the distributive property of multiplication over addition?

- [A] $6(3a + 4b) = 6(4b + 3a)$
[B] $6(3a + 4b) = 18a + 4b$
[C] $6(3a + 4b) = 18a + 24b$
[D] $6(3a + 4b) = (3a + 4b)6$

16. 060424a, P.I. A.N.1

Which expression is an example of the associative property?

- [A] $x \cdot 1 = x$ [B] $x(y + z) = xy + xz$
[C] $x + y + z = z + y + x$
[D] $(x + y) + z = x + (y + z)$

17. 060413a, P.I. A.N.1

Which property of real numbers is illustrated by the equation $-\sqrt{3} + \sqrt{3} = 0$

- [A] associative property of addition
[B] additive identity
[C] commutative property of addition
[D] additive inverse

18. 010428a, P.I. A.N.1

Which equation illustrates the associative property of addition?

- [A] $3 + x = 0$ [B] $x + y = y + x$
[C] $(3 + x) + y = 3 + (x + y)$
[D] $3(x + 2) = 3x + 6$

19. 060315a, P.I. A.N.1

What is the additive inverse of $\frac{2}{3}$?

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

20. 060306a, P.I. A.N.1

Tori computes the value of 8×95 in her head by thinking $8(100 - 5) = 8 \times 100 - 8 \times 5$.

Which number property is she using?

- [A] commutative [B] closure
[C] associative [D] distributive

21. 010314a, P.I. A.N.1
Which equation illustrates the multiplicative identity element?

[A] $x \cdot \frac{1}{x} = 1$ [B] $x \cdot 1 = x$
[C] $x - x = 0$ [D] $x + 0 = x$

22. 080222a, P.I. A.N.1
In the addition table for a subset of real numbers shown below, which number is the inverse of 3? Explain your answer.

\oplus	1	2	3	4
1	2	3	4	1
2	3	4	1	2
3	4	1	2	3
4	1	2	3	4

23. 060224a, P.I. A.N.1
An addition table for a subset of real numbers is shown below. Which number is the identity element? Explain your answer.

+	0	1	2	3
0	0	1	2	3
1	1	2	3	4
2	2	3	4	0
3	3	4	0	1

24. 010217a, P.I. A.N.1
Which set is closed under division?
[A] {1} [B] whole numbers
[C] counting numbers [D] integers
25. 010207a, P.I. A.N.1
Which expression must be added to $3x - 7$ to equal 0?
[A] $3x + 7$ [B] $-3x + 7$
[C] $-3x - 7$ [D] 0

26. 080129a, P.I. A.N.1
Ramón said that the set of integers is *not* closed for one of the basic operations (addition, subtraction, multiplication, or division). You want to show Ramón that his statement is correct. For the operation for which the set of integers is *not* closed, write an example using:
o a positive even integer and a zero
o a positive and a negative even integer
o two negative even integers
Be sure to explain why *each* of your examples illustrates that the set of integers is *not* closed for that operation.

27. 080112a, P.I. A.N.1
The operation element @ is determined by the following table:

@	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

What is the identity element of this operation?

- [A] b , only [B] a , only
[C] c [D] a and b
28. 060108a, P.I. A.N.1
Which equation illustrates the distributive property for real numbers?
[A] $-3(5 + 7) = (-3)(5) + (-3)(7)$
[B] $(1.3 \times 0.07) \times 0.63 = 1.3 \times (0.07 \times 0.63)$
[C] $\sqrt{3} + 0 = \sqrt{3}$ [D] $\frac{1}{3} + \frac{1}{2} = \frac{1}{2} + \frac{1}{3}$
29. 010107a, P.I. A.N.1
If a and b are integers, which equation is always true?
[A] $a + b = b + a$ [B] $a + 2b = b + 2a$
[C] $a - b = b - a$ [D] $\frac{a}{b} = \frac{b}{a}$

30. 080010a, P.I. A.N.1
The operation $*$ for the set $\{p, r, s, v\}$ is defined in the accompanying table. What is the inverse element of r under the operation $*$?

$*$	p	r	s	v
p	s	v	p	r
r	v	p	r	s
s	p	r	s	v
v	r	s	v	p

- [A] v [B] p [C] s [D] r

31. 060011a, P.I. A.N.1
If $a \neq 0$ and the sum of x and $\frac{1}{a}$ is 0, then
- [A] $x = -a$ [B] $x = a$
[C] $x = 1 - a$ [D] $x = -\frac{1}{a}$

32. 089907a, P.I. A.N.1
Which equation is an illustration of the additive identity property?
- [A] $x - x = 0$ [B] $x \cdot \frac{1}{x} = 1$
[C] $x + 0 = x$ [D] $x \cdot 1 = x$

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

33. fall0731ia, P.I. A.N.2
Express $5\sqrt{72}$ in simplest radical form.
34. 010530a, P.I. A.N.2
When $\sqrt{72}$ is expressed in simplest $a\sqrt{b}$ form, what is the value of a ?
- [A] 2 [B] 6 [C] 8 [D] 3

35. 089902a, P.I. A.N.2
The expression $\sqrt{50}$ can be simplified to
- [A] $5\sqrt{10}$ [B] $5\sqrt{2}$
[C] $2\sqrt{25}$ [D] $25\sqrt{2}$

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

36. 010826a, P.I. A.N.3
The expression $\sqrt{28} - \sqrt{7}$ is equivalent to
- [A] 4 [B] $3\sqrt{7}$ [C] 2 [D] $\sqrt{7}$
37. 080724b, P.I. A.N.3
Classical mathematics uses the term "Golden Ratio" for the ratio $(1 + \sqrt{5}):2$. The Golden Ratio was used by many famous artists to determine the dimensions of their paintings. If the ratio of the length to the width of a painting is $(1 + \sqrt{5}):2$, find the length, in feet, of a painting that has a width of 14 feet. Express your answer in simplest radical form.
38. 080712a, P.I. A.N.3
What is the sum of $\sqrt{50}$ and $\sqrt{8}$?
- [A] $7\sqrt{2}$ [B] $29\sqrt{2}$
[C] $\sqrt{58}$ [D] $9\sqrt{2}$
39. 060724a, P.I. A.N.3
The expression $\sqrt{28} + \sqrt{63}$ is equivalent to
- [A] $\sqrt{91}$ [B] $5\sqrt{7}$
[C] $13\sqrt{7}$ [D] $6\sqrt{7}$
40. 080614a, P.I. A.N.3
What is the sum of $\sqrt{50}$ and $\sqrt{32}$?
- [A] $\sqrt{2}$ [B] $9\sqrt{2}$
[C] $20\sqrt{20}$ [D] $\sqrt{82}$

41. 060627a, P.I. A.N.3
Expressed in simplest radical form, the product of $\sqrt{6} \cdot \sqrt{15}$ is

[A] $3\sqrt{15}$ [B] $9\sqrt{10}$
[C] $3\sqrt{10}$ [D] $\sqrt{90}$

42. 010622a, P.I. A.N.3
The expression $\frac{6\sqrt{20}}{3\sqrt{5}}$ is equivalent to

[A] 8 [B] $3\sqrt{15}$ [C] 4 [D] $2\sqrt{15}$

43. 080524a, P.I. A.N.3
What is the sum of $5\sqrt{7}$ and $3\sqrt{28}$?

[A] $11\sqrt{7}$ [B] $8\sqrt{35}$
[C] $9\sqrt{7}$ [D] $60\sqrt{7}$

44. 060512a, P.I. A.N.3
The expression $\sqrt{50} + \sqrt{32}$ is equivalent to

[A] 18 [B] $9\sqrt{2}$ [C] $\sqrt{82}$ [D] 6

45. 060316a, P.I. A.N.3
The sum of $\sqrt{18}$ and $\sqrt{72}$ is

[A] $9\sqrt{2}$ [B] $\sqrt{90}$
[C] $6\sqrt{3}$ [D] $3\sqrt{10}$

46. 010311a, P.I. A.N.3
The sum of $\sqrt{75}$ and $\sqrt{3}$ is

[A] $6\sqrt{3}$ [B] $\sqrt{78}$ [C] 18 [D] 15

47. 060218a, P.I. A.N.3
The expression $\sqrt{90} \cdot \sqrt{40} - \sqrt{8} \cdot \sqrt{18}$ simplifies to

[A] 3,456 [B] 864 [C] 48 [D] 22.9

48. 080016a, P.I. A.N.3
The expression $2\sqrt{50} - \sqrt{2}$ is equivalent to

[A] $49\sqrt{2}$ [B] 10
[C] $2\sqrt{48}$ [D] $9\sqrt{2}$

49. 069920a, P.I. A.N.3
The expression $\sqrt{27} + \sqrt{12}$ is equivalent to

[A] $\sqrt{39}$ [B] $5\sqrt{6}$
[C] $13\sqrt{3}$ [D] $5\sqrt{3}$

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

50. fall0725ia, P.I. A.N.4
What is the quotient of 8.05×10^6 and 3.5×10^2 ?

[A] 2.3×10^8 [B] 2.3×10^3
[C] 2.3×10^{12} [D] 2.3×10^4

51. 060429a, P.I. A.N.4
If the mass of a proton is 1.67×10^{-24} gram, what is the mass of 1,000 protons?

[A] 1.67×10^{-23} [B] 1.67×10^{-27}
[C] 1.67×10^{-21} [D] 1.67×10^{-22}

52. 060308b, P.I. A.N.4
Two objects are 2.4×10^{20} centimeters apart. A message from one object travels to the other at a rate of 1.2×10^5 centimeters per second. How many seconds does it take the message to travel from one object to the other?

[A] 1.2×10^{15} [B] 2.0×10^4
[C] 2.0×10^{15} [D] 2.88×10^{25}

53. 010319a, P.I. A.N.4

What is the value of $\frac{6.3 \times 10^8}{3 \times 10^4}$ in scientific notation?

[A] 2.1×10^2 [B] 2.1×10^{-2}

[C] 2.1×10^4 [D] 2.1×10^{-4}

54. 060207a, P.I. A.N.4

If 3.85×10^6 is divided by 385×10^4 , the result is

[A] 0.01 [B] 3.85×10^4

[C] 3.85×10^{10} [D] 1

55. 060029a, P.I. A.N.4

The distance from Earth to the imaginary planet Med is 1.7×10^7 miles. If a spaceship is capable of traveling 1,420 miles per hour, how many days will it take the spaceship to reach the planet Med? Round your answer to the *nearest day*.

56. 010018a, P.I. A.N.4

If the number of molecules in 1 mole of a substance is 6.02×10^{23} , then the number of molecules in 100 moles is

[A] 6.02×10^{21} [B] 6.02×10^{22}

[C] 6.02×10^{25} [D] 6.02×10^{24}

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

57. 010806a, P.I. A.N.5

If x varies directly as y , and $x = 8$ when $y = 24$, what is the value of x when $y = 6$?

[A] 3 [B] 2 [C] 4 [D] 1

58. 010732a, P.I. A.N.5

A 14-gram serving of mayonnaise contains 11 grams of fat. What percent of the mayonnaise, to the *nearest tenth of a percent*, is fat?

59. 010708a, P.I. A.N.5

Which equation represents the direct variation relationship of the equation $\frac{x}{y} = \frac{1}{2}$?

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

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

60. 080635a, P.I. A.N.5

A recent survey shows that the average man will spend 141,288 hours sleeping, 85,725 hours working, 81,681 hours watching television, 9,945 hours commuting, 1,662 hours kissing, and 363,447 hours on other tasks during his lifetime. What percent of his life, to the *nearest tenth of a percent*, does he spend sleeping?

61. 080603a, P.I. A.N.5

Jordan and Missy are standing together in the schoolyard. Jordan, who is 6 feet tall, casts a shadow that is 54 inches long. At the same time, Missy casts a shadow that is 45 inches long. How tall is Missy?

[A] 86.4 in [B] 5 ft 6 in

[C] 5 ft [D] 38 in

62. 010626a, P.I. A.N.5

The Edison Lightbulb Company tests 5% of their daily production of lightbulbs. If 500 bulbs were tested on Tuesday, what was the total number of bulbs produced that day?

[A] 1,000 [B] 10,000

[C] 100,000 [D] 25

63. 060505a, P.I. A.N.5
A cake recipe calls for 1.5 cups of milk and 3 cups of flour. Seth made a mistake and used 5 cups of flour. How many cups of milk should he use to keep the proportions correct?
[A] 2 [B] 2.25 [C] 1.75 [D] 2.5
64. 080436a, P.I. A.N.5
Walter is a waiter at the Towne Diner. He earns a daily wage of \$50, plus tips that are equal to 15% of the total cost of the dinners he serves. What was the total cost of the dinners he served if he earned \$170 on Tuesday?
65. 060420a, P.I. A.N.5
Rashawn bought a CD that cost \$18.99 and paid \$20.51, including sales tax. What was the rate of the sales tax?
[A] 2% [B] 3% [C] 5% [D] 8%
66. 010431a, P.I. A.N.5
Julio's wages vary directly as the number of hours that he works. If his wages for 5 hours are \$29.75, how much will he earn for 30 hours?
67. 060328a, P.I. A.N.5
In a town election, candidates *A* and *B* were running for mayor. There were 30,500 people eligible to vote, and $\frac{3}{4}$ of them actually voted. Candidate *B* received $\frac{1}{3}$ of the votes cast. How many people voted for candidate *B*? What percent of the votes cast, to the nearest tenth of a percent, did candidate *A* receive?
68. 010331a, P.I. A.N.5
At the Phoenix Surfboard Company, \$306,000 in profits was made last year. This profit was shared by the four partners in the ratio 3:3:5:7. How much *more* money did the partner with the largest share make than one of the partners with the smallest share?
69. 010322a, P.I. A.N.5
The world population was 4.2 billion people in 1982. The population in 1999 reached 6 billion. Find the percent of change from 1982 to 1999.
70. 080228a, P.I. A.N.5
There are 28 students in a mathematics class. If $\frac{1}{4}$ of the students are called to the guidance office, $\frac{1}{3}$ of the remaining students are called to the nurse, and, finally, $\frac{1}{2}$ of those left go to the library, how many students remain in the classroom?
71. 080225a, P.I. A.N.5
In bowling leagues, some players are awarded extra points called their "handicap." The "handicap" in Anthony's league is 80% of the difference between 200 and the bowler's average. Anthony's average is 145. What is Anthony's "handicap"?
72. 080223a, P.I. A.N.5
An image of a building in a photograph is 6 centimeters wide and 11 centimeters tall. If the image is similar to the actual building and the actual building is 174 meters wide, how tall is the actual building, in meters?

73. 060233a, P.I. A.N.5
Mr. Perez owns a sneaker store. He bought 350 pairs of basketball sneakers and 150 pairs of soccer sneakers from the manufacturers for \$62,500. He sold all the sneakers and made a 25% profit. If he sold the soccer sneakers for \$130 per pair, how much did he charge for one pair of basketball sneakers?
74. 060222a, P.I. A.N.5
Ninety percent of the ninth grade students at Richbartville High School take algebra. If 180 ninth grade students take algebra, how many ninth grade students do *not* take algebra?
75. 010222a, P.I. A.N.5
A 12-foot tree casts a 16-foot shadow. How many feet tall is a nearby tree that casts a 20-foot shadow at the same time?
76. 010210a, P.I. A.N.5
There are 357 seniors in Harris High School. The ratio of boys to girls is 7:10. How many boys are in the senior class?
[A] 107 [B] 210 [C] 117 [D] 147
77. 080114a, P.I. A.N.5
In his will, a man leaves one-half of his money to his wife, one-half of what is then left to his older child, and one-half of what is then left to his younger child. His two cousins divide the remainder equally, each receiving \$2,000. What was the total amount of money in the man's will?
[A] \$32,000 [B] \$16,000
[C] \$40,000 [D] \$24,000
78. 060127a, P.I. A.N.5
A factory packs CD cases into cartons for a music company. Each carton is designed to hold 1,152 CD cases. The Quality Control Unit in the factory expects an error of less than 5% over or under the desired packing number. What is the *least* number and the *most* number of CD cases that could be packed in a carton and still be acceptable to the Quality Control Unit?
79. 060124a, P.I. A.N.5
If a girl 1.2 meters tall casts a shadow 2 meters long, how many meters tall is a tree that casts a shadow 75 meters long at the same time?
80. 060116a, P.I. A.N.5
A boy got 50% of the questions on a test correct. If he had 10 questions correct out of the first 12, and $\frac{1}{4}$ of the remaining questions correct, how many questions were on the test?
[A] 24 [B] 16 [C] 26 [D] 28
81. 010122a, P.I. A.N.5
Sue bought a picnic table on sale for 50% off the original price. The store charged her 10% tax and her final cost was \$22.00. What was the original price of the picnic table?
82. 080029a, P.I. A.N.5
After an ice storm, the following headlines were reported in the *Glacier County Times*:
Monday: Ice Storm Devastates County - 8 out of every 10 homes lose electrical power
Tuesday: Restoration Begins - Power restored to $\frac{1}{2}$ of affected homes
Wednesday: More Freezing Rain - Power lost by 20% of homes that had power on Tuesday
Based on these headlines, what fractional portion of homes in Glacier County had electrical power on Wednesday?

83. 080005a, A.N.5
Which table does *not* show an example of direct variation?

[A]

x	y
2	24
4	12
6	8
8	6

[B]

x	y
1	4
2	8
3	12
4	16

[C]

x	y
-4	-20
-3	-15
-2	-10
-1	-5

[D]

x	y
1	$\frac{1}{2}$
2	1
3	$\frac{3}{2}$
4	2

84. 010014a, P.I. A.N.5
Sterling silver is made of an alloy of silver and copper in the ratio of 37:3. If the mass of a sterling silver ingot is 600 grams, how much silver does it contain?

- [A] 200 g [B] 450 g
[C] 555 g [D] 48.65 g

85. 010009a, P.I. A.N.5
Twenty-five percent of 88 is the same as what percent of 22?

- [A] $12\frac{1}{2}\%$ [B] 100%
[C] 40% [D] 50%

86. 089931a, P.I. A.N.5
The profits in a business are to be shared by the three partners in the ratio of 3 to 2 to 5. The profit for the year was \$176,500. Determine the number of dollars each partner is to receive.

87. 089930a, P.I. A.N.5
A painting that regularly sells for a price of \$55 is on sale for 20% off. The sales tax on the painting is 7%. Will the final total cost of the painting differ depending on whether the salesperson deducts the discount before adding the sales tax or takes the discount after computing the sum of the original price and the sales tax on \$55?

88. 069915a, P.I. A.N.5
During a recent winter, the ratio of deer to foxes was 7 to 3 in one county of New York State. If there were 210 foxes in the county, what was the number of deer in the county?

- [A] 147 [B] 90 [C] 280 [D] 490

89. 069913a, P.I. A.N.5
A total of \$450 is divided into equal shares. If Kate receives four shares, Kevin receives three shares, and Anna receives the remaining two shares, how much money did Kevin receive?

- [A] \$250 [B] \$100
[C] \$200 [D] \$150

90. 069910a, P.I. A.N.5
Linda paid \$48 for a jacket that was on sale for 25% of the original price. What was the original price of the jacket?

- [A] \$192 [B] \$72 [C] \$96 [D] \$60

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

91. 060726a, P.I. A.N.6
If $a = 3$ and $b = -1$, what is the value of $ab - b^2$?

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

92. 080617a, P.I. A.N.6
If $x = 4$ and $y = -2$, the value of $\frac{1}{2}xy^2$ is

- [A] -8 [B] 32 [C] -4 [D] 8

93. 060605a, P.I. A.N.6
What is the value of $\frac{8!}{4!}$?
[A] 4! [B] 2 [C] 1,680 [D] 2!
94. 080503a, P.I. A.N.6
The value of $\frac{7!}{3!}$ is
[A] 24 [B] 4 [C] 7 [D] 840
95. 060522a, P.I. A.N.6
If $r = 2$ and $s = -7$, what is the value of $|r| - |s|$?
[A] -9 [B] 5 [C] -5 [D] 9
96. 010518a, P.I. A.N.6
The expression $-|-7|$ is equivalent to
[A] 0 [B] -7 [C] 7 [D] 1
97. 080408a, P.I. A.N.6
If $x = -4$ and $y = 3$, what is the value of $x - 3y^2$?
[A] -85 [B] -23 [C] -31 [D] -13
98. 060432a, P.I. A.N.6
Brett was given the problem: "Evaluate $2x^2 + 5$ when $x = 3$." Brett wrote that the answer was 41. Was Brett correct? Explain your answer.
99. 010406a, P.I. A.N.6
What is the value of $\frac{x^2 - 4y}{2}$, if $x = 4$ and $y = -3$?
[A] -2 [B] 2 [C] 10 [D] 14
100. 080107a, P.I. A.N.6
The value of $5!$ is
[A] $\frac{1}{5}$ [B] 20 [C] 5 [D] 120
101. 010015a, P.I. A.N.6
If $t = -3$, then $3t^2 + 5t + 6$ equals
[A] 6 [B] -36 [C] 18 [D] -6
- A.N.7: Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting.*
102. 080704a, P.I. A.N.7
Jen and Barry's ice cream stand has three types of cones, six flavors of ice cream, and four kinds of sprinkles. If a serving consists of a cone, one flavor of ice cream, and one kind of sprinkles, how many different servings are possible?
[A] 72 [B] ${}_{13}P_3$ [C] ${}_{13}C_3$ [D] 90
103. 060728a, P.I. A.N.7
Max goes through the cafeteria line and counts seven different meals and three different desserts that he can choose. Which expression can be used to determine how many different ways Max can choose a meal and a dessert?
[A] ${}_7P_3$ [B] $7! \cdot 3!$
[C] ${}_7C_3$ [D] $7 \cdot 3$
104. 080636a, P.I. A.N.7
Debbie goes to a diner famous for its express lunch menu. The menu has five appetizers, three soups, seven entrees, six vegetables, and four desserts. How many different meals consisting of either an appetizer *or* a soup, one entree, one vegetable, and one dessert can Debbie order?

105. 060607a, P.I. A.N.7
Leo purchased five shirts, three pairs of pants, and four pairs of shoes. Which expression represents how many different outfits consisting of one shirt, one pair of pants, and one pair of shoes Leo can make?
[A] ${}_{12}C_3$ [B] $5 \cdot 3 \cdot 4$
[C] ${}_{12}P_3$ [D] $5 + 3 + 4$
106. 010612a, P.I. A.N.7
Robin has 8 blouses, 6 skirts, and 5 scarves. Which expression can be used to calculate the number of different outfits she can choose, if an outfit consists of a blouse, a skirt, and a scarf?
[A] $8 \cdot 6 \cdot 5$ [B] ${}_{19}C_3$
[C] $8 + 6 + 5$ [D] $8!6!5!$
107. 080502a, P.I. A.N.7
Cole's Ice Cream Stand serves sixteen different flavors of ice cream, three types of syrup, and seven types of sprinkles. If an ice cream sundae consists of one flavor of ice cream, one type of syrup, and one type of sprinkles, how many different ice cream sundaes can Cole serve?
[A] 336 [B] 10,836 [C] 26 [D] 3
108. 060501a, P.I. A.N.7
Jeremy's bedroom has two doors leading into the hallway. His house has four doors leading to the outside. Using the doorways, in how many different ways can Jeremy leave his room and go outside?
[A] 5 [B] 8 [C] 6 [D] 4
109. 010503a, P.I. A.N.7
A deli has five types of meat, two types of cheese, and three types of bread. How many different sandwiches, consisting of one type of meat, one type of cheese, and one type of bread, does the deli serve?
[A] 25 [B] 30 [C] 75 [D] 10
110. 080404a, P.I. A.N.7
The school cafeteria offers five sandwich choices, four desserts, and three beverages. How many different meals consisting of one sandwich, one dessert, and one beverage can be ordered?
[A] 1 [B] 12 [C] 60 [D] 3
111. 060403a, P.I. A.N.7
How many different outfits consisting of a hat, a pair of slacks, and a sweater can be made from two hats, three pairs of slacks, and four sweaters?
[A] 29 [B] 9 [C] 24 [D] 12
112. 010405a, P.I. A.N.7
In a school building, there are 10 doors that can be used to enter the building and 8 stairways to the second floor. How many different routes are there from outside the building to a class on the second floor?
[A] 80 [B] 1 [C] 18 [D] 10
113. 080204a, P.I. A.N.7
Juan has three blue shirts, two green shirts, seven red shirts, five pairs of denim pants, and two pairs of khaki pants. How many different outfits consisting of one shirt and one pair of pants are possible?
[A] 420 [B] 84 [C] 19 [D] 130
114. 080111a, P.I. A.N.7
A certain car comes in three body styles with a choice of two engines, a choice of two transmissions, and a choice of six colors. What is the minimum number of cars a dealer must stock to have one car of every possible combination?
[A] 13 [B] 42 [C] 36 [D] 72

115. 089923a, P.I. A.N.7
Paloma has 3 jackets, 6 scarves, and 4 hats. Determine the number of different outfits consisting of a jacket, a scarf, and a hat that Paloma can wear.

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

116. 010829a, P.I. A.N.8
What is the total number of different seven-letter arrangements that can be formed using the letters in the word "MILLION"?

[A] 1,260 [B] 210 [C] 2,520 [D] 30

117. 080727a, P.I. A.N.8
Which expression represents the number of different 8-letter arrangements that can be made from the letters of the word "SAVANNAH" if each letter is used only once?

[A] ${}_8P_5$ [B] $\frac{8!}{3!2!}$ [C] $\frac{8!}{5!}$ [D] 8!

118. 060723a, P.I. A.N.8
What is the total number of different four-letter arrangements that can be formed from the letters in the word "VERTICAL," if each letter is used only once in an arrangement?

[A] 1,680 [B] 40,320
[C] 8 [D] 6,720

119. 080616a, P.I. A.N.8
Julia has four different flags that she wants to hang on the wall of her room. How many different ways can the flags be arranged in a row?

[A] 10 [B] 1 [C] 24 [D] 16

120. 010435a, P.I. A.N.8
In Jackson County, Wyoming, license plates are made with two letters (A through Z) followed by three digits (0 through 9). The plates are made according to the following restrictions:

o the first letter must be J or W, and the second letter can be any of the 26 letters in the alphabet

o no digit can be repeated

How many different license plates can be made with these restrictions?

121. 060329a, P.I. A.N.8
A certain state is considering changing the arrangement of letters and numbers on its license plates. The two options the state is considering are:

Option 1: three letters followed by a four-digit number with repetition of both letters and digits allowed

Option 2: four letters followed by a three-digit number without repetition of either letters or digits

[Zero may be chosen as the first digit of the number in either option.]

Which option will enable the state to issue more license plates? How many *more* different license plates will that option yield?

122. 010323a, P.I. A.N.8
Six members of a school's varsity tennis team will march in a parade. How many different ways can the players be lined up if Angela, the team captain, is always at the front of the line?

123. 060125a, P.I. A.N.8
There were seven students running in a race. How many different arrangements of first, second, and third place are possible?

124. 010114a, P.I. A.N.8
A locker combination system uses three digits from 0 to 9. How many different three-digit combinations with no digit repeated are possible?
[A] 1,000 [B] 720 [C] 30 [D] 504
125. 080034a, P.I. A.N.8
The telephone company has run out of seven-digit telephone numbers for an area code. To fix this problem, the telephone company will introduce a new area code. Find the number of new seven-digit telephone numbers that will be generated for the new area code if both of the following conditions must be met:
o The first digit cannot be a zero or a one.
o The first three digits cannot be the emergency number (911) or the number used for information (411).
126. 060023a, P.I. A.N.8
All seven-digit telephone numbers in a town begin with 245. How many telephone numbers may be assigned in the town if the last four digits do *not* begin or end in a zero?
127. 060016a, P.I. A.N.8
How many different five-digit numbers can be formed from the digits 1, 2, 3, 4, and 5 if each digit is used only once?
[A] 60 [B] 24 [C] 20 [D] 120
128. 010013a, P.I. A.N.8
How many different 4-letter arrangements can be formed using the letters of the word "JUMP," if each letter is used only once?
[A] 24 [B] 16 [C] 4 [D] 12
129. 089917a, P.I. A.N.8
How many different 6-letter arrangements can be formed using the letters in the word "ABSENT," if each letter is used only once?
[A] 720 [B] 6 [C] 36 [D] 46,656

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

1. 010824a, P.I. A.A.1
The larger of two consecutive integers is represented by $x + 4$. Which expression represents the *smaller* integer?
[A] $x + 5$ [B] $x + 6$
[C] $x + 2$ [D] $x + 3$
2. 010820a, P.I. A.A.1
If x represents a given number, the expression "5 less than twice the given number" is written as
[A] $5 - 2x$ [B] $5 < 2x$
[C] $5 < 2 + x$ [D] $2x - 5$
3. 080716a, P.I. A.A.1
In the Ambrose family, the ages of the three children are three consecutive even integers. If the age of the youngest child is represented by $x + 3$, which expression represents the age of the oldest child?
[A] $x + 5$ [B] $x + 8$
[C] $x + 6$ [D] $x + 7$
4. 010712a, P.I. A.A.1
Which expression represents the product of two consecutive odd integers, where n is an odd integer?
[A] $2n + 1$ [B] $n(n + 1)$
[C] $n(n + 3)$ [D] $n(n + 2)$
5. 010604a, P.I. A.A.1
Which expression represents "5 less than the product of 7 and x "?
[A] $7x - 5$ [B] $5 - 7x$
[C] $7(x - 5)$ [D] $7 + x - 5$
6. 080509a, P.I. A.A.1
The sum of Scott's age and Greg's age is 33 years. If Greg's age is represented by g , Scott's age is represented by
[A] $33 - g$ [B] $g - 33$
[C] $33g$ [D] $g + 33$
7. 010506a, P.I. A.A.1
If $n + 4$ represents an odd integer, the next larger odd integer is represented by
[A] $n + 5$ [B] $n + 2$
[C] $n + 3$ [D] $n + 6$
8. 060408a, P.I. A.A.1
Tara buys two items that cost d dollars each. She gives the cashier \$20. Which expression represents the change she should receive?
[A] $20 - d$ [B] $20 - 2d$
[C] $20 + 2d$ [D] $2d - 20$
9. 010427a, P.I. A.A.1
Which expression represents the number of yards in x feet?
[A] $12x$ [B] $3x$ [C] $\frac{x}{12}$ [D] $\frac{x}{3}$
10. 010224a, P.I. A.A.1
Ashanti and Maria went to the store to buy snacks for their back-to-school party. They bought bags of chips, pretzels, and nachos. They bought three times as many bags of pretzels as bags of chips, and two fewer bags of nachos than bags of pretzels. If x represents the number of bags of chips they bought, express, in terms of x , how many bags of snacks they bought in all.

11. 060113b, P.I. A.A.1

A store advertises that during its Labor Day sale \$15 will be deducted from every purchase over \$100. In addition, after the deduction is taken, the store offers an early-bird discount of 20% to any person who makes a purchase before 10 a.m. If Hakeem makes a purchase of x dollars, $x > 100$, at 8 a.m., what, in terms of x , is the cost of Hakeem's purchase?

- [A] $0.20x - 15$ [B] $0.20x - 3$
[C] $0.85x - 20$ [D] $0.80x - 12$

12. 060101a, P.I. A.A.1

A car travels 110 miles in 2 hours. At the same rate of speed, how far will the car travel in h hours?

- [A] $\frac{h}{55}$ [B] $55h$ [C] $220h$ [D] $\frac{h}{220}$

13. 080002a, P.I. A.A.1

A hockey team played n games, losing four of them and winning the rest. The ratio of games won to games lost is

- [A] $\frac{4}{n}$ [B] $\frac{n}{4}$ [C] $\frac{n-4}{4}$ [D] $\frac{4}{n-4}$

14. 060014a, P.I. A.A.1

If rain is falling at the rate of 2 inches per hour, how many inches of rain will fall in x minutes?

- [A] $\frac{60}{x}$ [B] $2x$ [C] $\frac{x}{30}$ [D] $\frac{30}{x}$

15. 010006a, P.I. A.A.1

If the number represented by $n-3$ is an odd integer, which expression represents the next greater odd integer?

- [A] $n + 1$ [B] $n - 2$ [C] $n - 1$ [D] $n - 5$

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

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

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

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

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

17. fall0715ia, P.I. A.A.4

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] $75d + 30c > 255$
[C] $75d + 30c \geq 255$ [D] $75d + 30c \leq 255$

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

18. 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] $w^2 - 5w - 36 = 0$

19. 080627a, P.I. A.A.5
When Albert flips open his mathematics textbook, he notices that the product of the page numbers of the two facing pages that he sees is 156. Which equation could be used to find the page numbers that Albert is looking at?
- [A] $x(x+1) = 156$
[B] $(x+1)(x+3) = 156$
[C] $x+(x+1) = 156$
[D] $(x+1)+(x+2) = 156$
20. 060425a, P.I. A.A.5
A farmer has a rectangular field that measures 100 feet by 150 feet. He plans to increase the area of the field by 20%. He will do this by increasing the length and width by the same amount, x . Which equation represents the area of the new field?
- [A] $(100+x)(150+x) = 15,000$
[B] $(100+2x)(150+x) = 18,000$
[C] $2(100+x) + 2(150+x) = 15,000$
[D] $(100+x)(150+x) = 18,000$
- A.A.6: Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable.
21. 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?
22. 010801a, P.I. A.A.6
Robin spent \$17 at an amusement park for admission and rides. If she paid \$5 for admission, and rides cost \$3 each, what is the total number of rides that she went on?
- [A] 2 [B] 12 [C] 9 [D] 4
23. 080732a, P.I. A.A.6
Thelma and Laura start a lawn-mowing business and buy a lawnmower for \$225. They plan to charge \$15 to mow one lawn. What is the *minimum* number of lawns they need to mow if they wish to earn a profit of *at least* \$750?
24. 060738a, P.I. A.A.6
Angelo, Brandon, and Carl work in the same office. Angelo's age is 4 years more than twice Carl's age. Brandon is 5 years younger than Carl. The average of the three ages is 41. Find the age of *each* of the men.
25. 060703a, P.I. A.A.6
In his first three years coaching baseball at High Ridge High School, Coach Batty's team won 7 games the first year, 16 games the second year, and 4 games the third year. How many games does the team need to win in the fourth year so that the coach's average will be 10 wins per year?
- [A] 10 [B] 3 [C] 9 [D] 13
26. 010737a, P.I. A.A.6
The Eye Surgery Institute just purchased a new laser machine for \$500,000 to use during eye surgery. The Institute must pay the inventor \$550 each time the machine is used. If the Institute charges \$2,000 for each laser surgery, what is the *minimum* number of surgeries that must be performed in order for the Institute to make a profit?

27. 010733a, P.I. A.A.6
Every month, Omar buys pizzas to serve at a party for his friends. In May, he bought three more than twice the number of pizzas he bought in April. If Omar bought 15 pizzas in May, how many pizzas did he buy in April?
28. 010726a, P.I. A.A.6
Mario paid \$44.25 in taxi fare from the hotel to the airport. The cab charged \$2.25 for the first mile plus \$3.50 for each additional mile. How many miles was it from the hotel to the airport?
[A] 11 [B] 13 [C] 10 [D] 12
29. 010635a, P.I. A.A.6
A candy store sells 8-pound bags of mixed hazelnuts and cashews. If c pounds of cashews are in a bag, the price p of the bag can be found using the formula $p = 2.59c + 1.72(8 - c)$. If one bag is priced at \$18.11, how many pounds of cashews does it contain?
30. 060519a, P.I. A.A.6
If $-2x + 3 = 7$ and $3x + 1 = 5 + y$, the value of y is
[A] -10 [B] 10 [C] 1 [D] 0
31. 060438a, P.I. A.A.6
On the first six tests in her social studies course, Jerelyn's scores were 92, 78, 86, 92, 95, and 91. Determine the median and the mode of her scores. If Jerelyn took a seventh test and raised the mean of her scores exactly 1 point, what was her score on the seventh test?
32. 060409a, P.I. A.A.6
At the beginning of her mathematics class, Mrs. Reno gives a warm-up problem. She says, "I am thinking of a number such that 6 less than the product of 7 and this number is 85." Which number is she thinking of?
[A] $11\frac{2}{7}$ [B] 637 [C] 84 [D] 13
33. 060406a, P.I. A.A.6
Parking charges at Superior Parking Garage are \$5.00 for the first hour and \$1.50 for each additional 30 minutes. If Margo has \$12.50, what is the maximum amount of time she will be able to park her car at the garage?
[A] $2\frac{1}{2}$ hours [B] 6 hours
[C] $3\frac{1}{2}$ hours [D] $6\frac{1}{2}$ hours
34. 010432a, P.I. A.A.6
TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is \$360. If the weekly salaries of four of the employees are \$340, \$340, \$345, and \$425, what is the salary of the fifth employee?
35. 080332b, P.I. A.A.6
A company calculates its profit by finding the difference between revenue and cost. The cost function of producing x hammers is $C(x) = 4x + 170$. If each hammer is sold for \$10, the revenue function for selling x hammers is $R(x) = 10x$. How many hammers must be sold to make a profit? How many hammers must be sold to make a profit of \$100?

36. 080227a, P.I. A.A.6
Tamika could not remember her scores from five mathematics tests. She did remember that the mean (average) was exactly 80, the median was 81, and the mode was 88. If all her scores were integers with 100 the highest score possible and 0 the lowest score possible, what was the *lowest* score she could have received on any one test?
37. 080224a, P.I. A.A.6
A doughnut shop charges \$0.70 for each doughnut and \$0.30 for a carryout box. Shirley has \$5.00 to spend. At most, how many doughnuts can she buy if she also wants them in one carryout box?
38. 080219a, P.I. A.A.6
If $2x + 5 = -25$ and $-3m - 6 = 48$, what is the product of x and m ?
[A] -33 [B] 270 [C] 3 [D] -270
39. 060204a, P.I. A.A.6
During each marking period, there are five tests. If Vanita needs a 65 average to pass this marking period and her first four grades are 60, 72, 55, and 80, what is the *lowest* score she can earn on the last test to have a passing average?
[A] 100 [B] 80 [C] 65 [D] 58
40. 010230a, P.I. A.A.6
The students in Woodland High School's meteorology class measured the noon temperature every schoolday for a week. Their readings for the first 4 days were Monday, 56° ; Tuesday, 72° ; Wednesday, 67° ; and Thursday, 61° . If the mean (average) temperature for the 5 days was exactly 63° , what was the temperature on Friday?
41. 010220b, P.I. A.A.6
The revenue, $R(x)$, from selling x units of a product is represented by the equation $R(x) = 35x$, while the total cost, $C(x)$, of making x units of the product is represented by the equation $C(x) = 20x + 500$. The total profit, $P(x)$, is represented by the equation $P(x) = R(x) - C(x)$. For the values of $R(x)$ and $C(x)$ given above, what is $P(x)$?
[A] $15x$ [B] $15x - 500$
[C] $15x + 500$ [D] $10x + 100$
42. 080110a, P.I. A.A.6
The exact average of a set of six test scores is 92. Five of these scores are 90, 98, 96, 94, and 85. What is the other test score?
[A] 86 [B] 92 [C] 91 [D] 89
43. 010101a, P.I. A.A.6
There are 461 students and 20 teachers taking buses on a trip to a museum. Each bus can seat a maximum of 52. What is the *least* number of buses needed for the trip?
[A] 11 [B] 9 [C] 10 [D] 8
44. 080024a, P.I. A.A.6
The sum of the ages of the three Romano brothers is 63. If their ages can be represented as consecutive integers, what is the age of the middle brother?
45. 060017a, P.I. A.A.6
For five algebra examinations, Maria has an average of 88. What must she score on the sixth test to bring her average up to exactly 90?
[A] 94 [B] 98 [C] 100 [D] 92

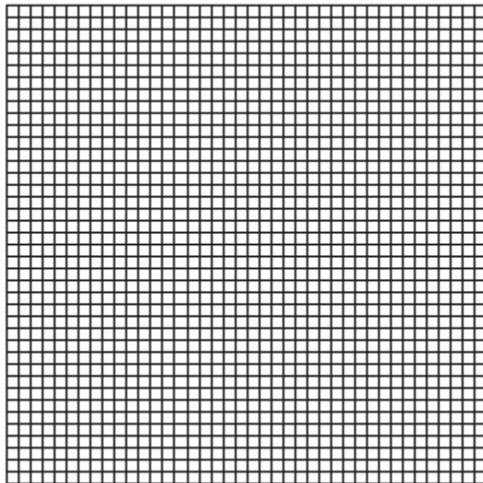
46. 010026a, P.I. A.A.6
Judy needs a mean (average) score of 86 on four tests to earn a midterm grade of B. If the mean of her scores for the first three tests was 83, what is the *lowest* score on a 100-point scale that she can receive on the fourth test to have a midterm grade of B?
47. 089914a, P.I. A.A.6
In a hockey league, 87 players play on seven different teams. Each team has at least 12 players. What is the largest possible number of players on any one team?
[A] 21 [B] 13 [C] 15 [D] 14
48. 089913a, P.I. A.A.6
If 6 and x have the same mean (average) as 2, 4, and 24, what is the value of x ?
[A] 5 [B] 36 [C] 10 [D] 14
49. 069929a, P.I. A.A.6
The mean (average) weight of three dogs is 38 pounds. One of the dogs, Sparky, weighs 46 pounds. The other two dogs, Eddie and Sandy, have the same weight. Find Eddie's weight.
50. 069928a, P.I. A.A.6
A swimmer plans to swim at least 100 laps during a 6-day period. During this period, the swimmer will increase the number of laps completed each day by one lap. What is the *least* number of laps the swimmer must complete on the first day?
51. 069925a, P.I. A.A.6
Sara's telephone service costs \$21 per month plus \$0.25 for each local call, and long-distance calls are extra. Last month, Sara's bill was \$36.64, and it included \$6.14 in long-distance charges. How many local calls did she make?

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

52. 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] \$8 [B] \$20 [C] \$4 [D] \$10
53. 080606a, P.I. A.A.7
Sal keeps quarters, nickels, and dimes in his change jar. He has a total of 52 coins. He has three more quarters than dimes and five fewer nickels than dimes. How many dimes does Sal have?
[A] 21 [B] 13 [C] 20 [D] 18
54. 060638a, P.I. A.A.7
Sharu has \$2.35 in nickels and dimes. If he has a total of thirty-two coins, how many of *each* coin does he have?
55. 060531a, P.I. A.A.7
A ribbon 56 centimeters long is cut into two pieces. One of the pieces is three times longer than the other. Find the lengths, in centimeters, of both pieces of ribbon.
56. 010539a, P.I. A.A.7
The tickets for a dance recital cost \$5.00 for adults and \$2.00 for children. If the total number of tickets sold was 295 and the total amount collected was \$1,220, how many adult tickets were sold? [Only an algebraic solution can receive full credit.]
57. 080412a, P.I. A.A.7
The ratio of Tariq's telephone bill to Pria's telephone bill was 7:5. Tariq's bill was \$14 more than Pria's bill. What was Tariq's bill?
[A] \$49 [B] \$35 [C] \$28 [D] \$21

58. 010436a, P.I. A.A.7
Using only 32-cent and 20-cent stamps, Charlie put \$3.36 postage on a package he sent to his sister. He used twice as many 32-cent stamps as 20-cent stamps. Determine how many of *each* type of stamp he used.

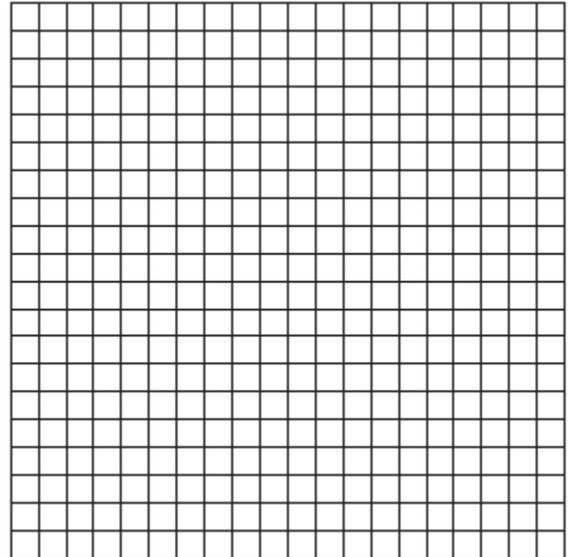
59. 060335a, P.I. A.A.7
The senior class is sponsoring a dance. The cost of a student disk jockey is \$40, and tickets sell for \$2 each. Write a linear equation and, on the accompanying grid, graph the equation to represent the relationship between the number of tickets sold and the profit from the dance. Then find how many tickets must be sold to break even.



60. 060326a, P.I. A.A.7
Seth has one less than twice the number of compact discs (CDs) that Jason has. Raoul has 53 more CDs than Jason has. If Seth gives Jason 25 CDs, Seth and Jason will have the same number of CDs. How many CDs did *each* of the three boys have to begin with?

61. 010332a, P.I. A.A.7
Alexandra purchases two doughnuts and three cookies at a doughnut shop and is charged \$3.30. Briana purchases five doughnuts and two cookies at the same shop for \$4.95. All the doughnuts have the same price and all the cookies have the same price. Find the cost of one doughnut and find the cost of one cookie.

62. 010329a, P.I. A.A.7
Currently, Tyrone has \$60 and his sister has \$135. Both get an allowance of \$5 each week. Tyrone decides to save his entire allowance, but his sister spends all of hers each week plus an additional \$10 each week. After how many weeks will they each have the same amount of money? [The use of the grid is optional.]



63. 010327a, P.I. A.A.7
Arielle has a collection of grasshoppers and crickets. She has 561 insects in all. The number of grasshoppers is twice the number of crickets. Find the number of *each* type of insect that she has.

64. 080233a, P.I. A.A.7
Tanisha and Rachel had lunch at the mall. Tanisha ordered three slices of pizza and two colas. Rachel ordered two slices of pizza and three colas. Tanisha's bill was \$6.00, and Rachel's bill was \$5.25. What was the price of one slice of pizza? What was the price of one cola?

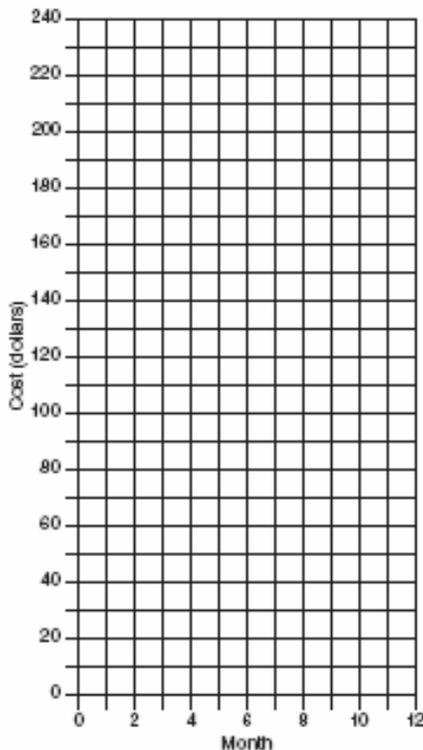
65. 060232a, P.I. A.A.7

At Ron's Rental, a person can rent a big-screen television for \$10 a month plus a one-time "wear-and-tear" fee of \$100. At Josie's Rental, the charge is \$20 a month and an additional charge of \$20 for delivery with no "wear-and-tear" fee.

a If c equals the cost, write one equation representing the cost of the rental for m months at Ron's Rental and one equation representing the cost of the rental for m months at Josie's Rental.

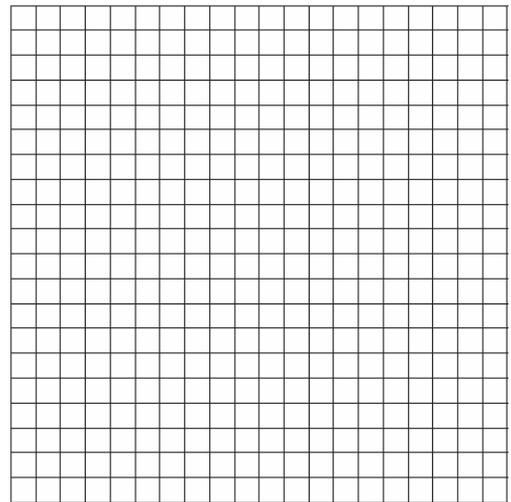
b On the accompanying grid, graph and label each equation.

c From your graph, determine in which month Josie's cost will equal Ron's cost.



66. 060226b, P.I. A.A.7

Island Rent-a-Car charges a car rental fee of \$40 plus \$5 per hour or fraction of an hour. Wayne's Wheels charges a car rental fee of \$25 plus \$7.50 per hour or fraction of an hour. Under what conditions does it cost *less* to rent from Island Rent-a-Car? [The use of the accompanying grid is optional.]



67. 060201a, P.I. A.A.7

Jamie is 5 years older than her sister Amy. If the sum of their ages is 19, how old is Jamie?

- [A] 14 [B] 5 [C] 7 [D] 12

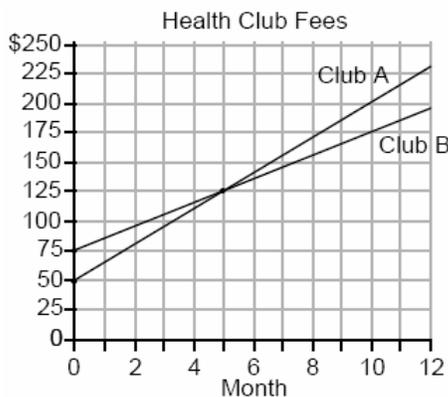
68. 010232a, P.I. A.A.7

When Tony received his weekly allowance, he decided to purchase candy bars for all his friends. Tony bought three Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$4.25 without tax. Then he realized this candy would not be enough for all his friends, so he returned to the store and bought an additional six Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$6.50 without tax. How much did *each* type of candy bar cost?

69. 010228b, P.I. A.A.7
At the local video rental store, José rents two movies and three games for a total of \$15.50. At the same time, Meg rents three movies and one game for a total of \$12.05. How much money is needed to rent a combination of one game and one movie?
70. 010228a, P.I. A.A.7
A total of 600 tickets were sold for a concert. Twice as many tickets were sold in advance than were sold at the door. If the tickets sold in advance cost \$25 each and the tickets sold at the door cost \$32 each, how much money was collected for the concert?
71. 080132a, P.I. A.A.7
The ninth graders at a high school are raising money by selling T-shirts and baseball caps. The number of T-shirts sold was three times the number of caps. The profit they received for each T-shirt sold was \$5.00, and the profit on each cap was \$2.50. If the students made a total profit of \$210, how many T-shirts *and* how many caps were sold?
72. 080114b, P.I. A.A.7
A cellular telephone company has two plans. Plan *A* charges \$11 a month and \$0.21 per minute. Plan *B* charges \$20 a month and \$0.10 per minute. After how much time, to the *nearest minute*, will the cost of plan *A* be equal to the cost of plan *B*?
- [A] 81 hr 8 min [B] 81 hr 48 min
[C] 1 hr 22 m [D] 1 hr 36 min
73. 060123b, P.I. A.A.7
The cost of a long-distance telephone call is determined by a flat fee for the first 5 minutes and a fixed amount for each additional minute. If a 15-minute telephone call costs \$3.25 and a 23-minute call costs \$5.17, find the cost of a 30-minute call.
74. 060133a, P.I. A.A.7
Ramón rented a sprayer and a generator. On his first job, he used each piece of equipment for 6 hours at a total cost of \$90. On his second job, he used the sprayer for 4 hours and the generator for 8 hours at a total cost of \$100. What was the hourly cost of *each* piece of equipment?
75. 060123a, P.I. A.A.7
Ben had twice as many nickels as dimes. Altogether, Ben had \$4.20. How many nickels *and* how many dimes did Ben have?
76. 060117a, P.I. A.A.7
A hotel charges \$20 for the use of its dining room and \$2.50 a plate for each dinner. An association gives a dinner and charges \$3 a plate but invites four nonpaying guests. If each person has one plate, how many paying persons must attend for the association to collect the exact amount needed to pay the hotel?
- [A] 40 [B] 60 [C] 20 [D] 44
77. 010134a, P.I. A.A.7
There were 100 more balcony tickets than main-floor tickets sold for a concert. The balcony tickets sold for \$4 and the main-floor tickets sold for \$12. The total amount of sales for both types of tickets was \$3,056.
- a* Write an equation or a system of equations that describes the given situation. Define the variables.
b Find the number of balcony tickets that were sold.
78. 010130a, P.I. A.A.7
Juan has a cellular phone that costs \$12.95 per month plus 25¢ per minute for each call. Tiffany has a cellular phone that costs \$14.95 per month plus 15¢ per minute for each call. For what number of minutes do the two plans cost the same?

79. 010104a, P.I. A.A.7
Three times as many robins as cardinals visited a bird feeder. If a total of 20 robins and cardinals visited the feeder, how many were robins?
[A] 15 [B] 20 [C] 5 [D] 10
80. 060031a, P.I. A.A.7
The owner of a movie theater was counting the money from 1 day's ticket sales. He knew that a total of 150 tickets were sold. Adult tickets cost \$7.50 each and children's tickets cost \$4.75 each. If the total receipts for the day were \$891.25, how many of *each* kind of ticket were sold?
81. 060004a, P.I. A.A.7
Two numbers are in the ratio 2:5. If 6 is subtracted from their sum, the result is 50. What is the larger number?
[A] 35 [B] 45 [C] 55 [D] 40
82. 010035a, P.I. A.A.7
The Excel Cable Company has a monthly fee of \$32.00 and an additional charge of \$8.00 for each premium channel. The Best Cable Company has a monthly fee of \$26.00 and additional charge of \$10.00 for each premium channel. The Horton family is deciding which of these two cable companies to subscribe to.
a For what number of premium channels will the total monthly subscription fee for the Excel and Best Cable companies be the same?
b The Horton family decides to subscribe to 2 premium channels for a period of one year.
(1) Which cable company should they subscribe to in order to spend less money?
(2) How much money will the Hortons save in one year by using the less expensive company?
83. 010033a, P.I. A.A.7
A group of 148 people is spending five days at a summer camp. The cook ordered 12 pounds of food for each adult and 9 pounds of food for each child. A total of 1,410 pounds of food was ordered.
a Write an equation or a system of equations that describes the above situation and define your variables.
b Using your work from part *a*, find:
(1) the total number of adults in the group
(2) the total number of children in the group
84. 010022a, P.I. A.A.7
Mary and Amy had a total of 20 yards of material from which to make costumes. Mary used three times more material to make her costume than Amy used, and 2 yards of material was not used. How many yards of materials did Amy use for her costume?

85. 089935a, P.I. A.A.7
Two health clubs offer different membership plans. The graph below represents the total cost of belonging to Club A and Club B for one year.



- a If the yearly cost includes a membership fee plus a monthly charge, what is the membership fee for Club A?
b (1) What is the number of the month when the total cost is the same for both clubs?
(2) What is the total cost for Club A when both plans are the same?
c What is the monthly charge for Club B?

86. 089916a, P.I. A.A.7
At a concert, \$720 was collected for hot dogs, hamburgers, and soft drinks. All three items sold for \$1.00 each. Twice as many hot dogs were sold as hamburgers. Three times as many soft drinks were sold as hamburgers. The number of soft drinks sold was
[A] 120 [B] 240 [C] 480 [D] 360

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

87. 060636a, P.I. A.A.8
Tamara has two sisters. One of the sisters is 7 years older than Tamara. The other sister is 3 years younger than Tamara. The product of Tamara's sisters' ages is 24. How old is Tamara?

88. 060606b, P.I. A.A.8
If the equation $x^2 - kx - 36 = 0$ has $x = 12$ as one root, what is the value of k ?
[A] -3 [B] 9 [C] 3 [D] -9
89. 080508a, P.I. A.A.8
The height of a golf ball hit into the air is modeled by the equation $h = -16t^2 + 48t$, where h represents the height, in feet, and t represents the number of seconds that have passed since the ball was hit. What is the height of the ball after 2 seconds?
[A] 16 ft [B] 80 ft [C] 32 ft [D] 64 ft
90. 060536a, P.I. A.A.8
Mr. James wanted to plant a garden that would be in the shape of a rectangle. He was given 80 feet of fencing to enclose his garden. He wants the length to be 10 feet more than twice the width. What are the dimensions, in feet, for a rectangular garden that will use exactly 80 feet of fencing?
91. 080431b, P.I. A.A.8
A rectangular piece of cardboard is to be formed into an uncovered box. The piece of cardboard is 2 centimeters longer than it is wide. A square that measures 3 centimeters on a side is cut from each corner. When the sides are turned up to form the box, its volume is 765 cubic centimeters. Find the dimensions, in centimeters, of the original piece of cardboard.
92. 010326a, P.I. A.A.8
Three brothers have ages that are consecutive even integers. The product of the first and third boys' ages is 20 more than twice the second boy's age. Find the age of *each* of the three boys.

93. 010322b, P.I. A.A.8
The height of an object, $h(t)$, is determined by the formula $h(t) = -16t^2 + 256t$, where t is time, in seconds. Will the object reach a maximum or a minimum? Explain or show your reasoning.
94. 080232a, P.I. A.A.8
A rectangular park is three blocks longer than it is wide. The area of the park is 40 square blocks. If w represents the width, write an equation in terms of w for the area of the park. Find the length and the width of the park.
95. 010233a, P.I. A.A.8
Javon's homework is to determine the dimensions of his rectangular backyard. He knows that the length is 10 feet more than the width, and the total area is 144 square feet. Write an equation that Javon could use to solve this problem. Then find the dimensions, in feet, of his backyard.
96. 080112b, P.I. A.A.8
A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball t seconds after it is thrown is given by the formula $h(t) = 54t - 12t^2$. How many seconds after the ball is thrown will it return to the ground?
[A] 6 [B] 4 [C] 4.5 [D] 9.2
97. 060131a, P.I. A.A.8
Find three consecutive odd integers such that the product of the first and the second exceeds the third by 8.
98. 060101b, P.I. A.A.8
An archer shoots an arrow into the air such that its height at any time, t , is given by the function $h(t) = -16t^2 + kt + 3$. If the maximum height of the arrow occurs at time $t = 4$, what is the value of k ?
[A] 128 [B] 4 [C] 8 [D] 64
99. 080035a, P.I. A.A.8
Jack is building a rectangular dog pen that he wishes to enclose. The width of the pen is 2 yards less than the length. If the area of the dog pen is 15 square yards, how many yards of fencing would he need to completely enclose the pen?
100. 060035a, P.I. A.A.8
The area of the rectangular playground enclosure at South School is 500 square meters. The length of the playground is 5 meters longer than the width. Find the dimensions of the playground, in meters. [Only an algebraic solution will be accepted.]
- A.A.9: Analyze and solve verbal problems that involve exponential growth and decay.
101. 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] \$33,250.00 [B] \$28,507.72
[C] \$30,008.13 [D] \$27,082.33
102. 010813b, P.I. A.A.9
A radioactive substance has an initial mass of 100 grams and its mass halves every 4 years. Which expression shows the number of grams remaining after t years?
[A] $100\left(\frac{1}{2}\right)^{4t}$ [B] $100(4)^{\frac{t}{4}}$
[C] $100(4)^{-2t}$ [D] $100\left(\frac{1}{2}\right)^{\frac{t}{4}}$
103. 060721b, P.I. A.A.9
A population of wolves in a county is represented by the equation $P(t) = 80(0.98)^t$, where t is the number of years since 1998. Predict the number of wolves in the population in the year 2008.

104. 060607b, P.I. A.A.9
The height, $f(x)$, of a bouncing ball after x bounces is represented by $f(x) = 80(0.5)^x$. How many times higher is the first bounce than the fourth bounce?
[A] 16 [B] 4 [C] 2 [D] 8
105. 010525b, P.I. A.A.9
On January 1, 1999, the price of gasoline was \$1.39 per gallon. If the price of gasoline increased by 0.5% per month, what was the cost of one gallon of gasoline, to the *nearest cent*, on January 1 one year later?
106. 080224b, P.I. A.A.9
The Franklins inherited \$3,500, which they want to invest for their child's future college expenses. If they invest it at 8.25% with interest compounded monthly, determine the value of the account, in dollars, after 5 years.
Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where $A =$ value of the investment after t years, $P =$ principal invested, $r =$ annual interest rate, and $n =$ number of times compounded per year.
107. 080221b, P.I. A.A.9
A used car was purchased in July 1999 for \$11,900. If the car depreciates 13% of its value each year, what is the value of the car, to the *nearest hundred dollars*, in July 2002?
109. 060716a, P.I. A.A.10
Which ordered pair satisfies the system of equations below?
 $3x - y = 8$
 $x + y = 2$
[A] (5, -3) [B] (2.5, -0.5)
[C] (3, -1) [D] (2.5, 0.5)
110. 080429a, P.I. A.A.10
What point is the intersection of the graphs of the lines $2x - y = 3$ and $x + y = 3$?
[A] (3, 3) [B] (3, 0)
[C] (2, 1) [D] (1, 2)
111. 080013a, P.I. A.A.10
What is the value of y in the following system of equations?
 $2x + 3y = 6$
 $2x + y = -2$
[A] 4 [B] 2 [C] 1 [D] -3
112. 060007a, P.I. A.A.10
Which ordered pair is the solution of the following system of equations?
 $3x + 2y = 4$
 $-2x + 2y = 24$
[A] (2, -1) [B] (-4, -8)
[C] (2, -5) [D] (-4, 8)

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

108. 080706a, P.I. A.A.10
If $a + 3b = 13$ and $a + b = 5$, the value of b is
[A] 1 [B] 7 [C] 4 [D] 4.5

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.

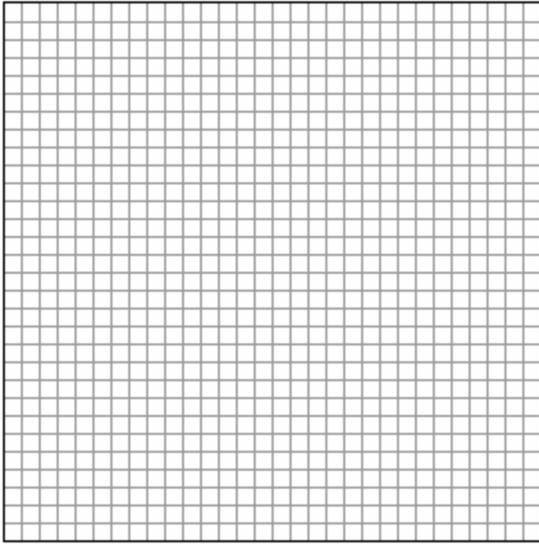
113. 080538a, P.I. A.A.11

Solve the following system of equations:

$$y = x^2 + 4x + 1$$

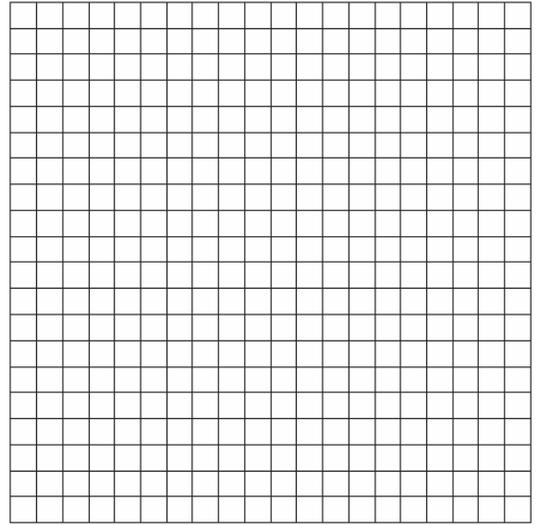
$$y = 5x + 3$$

[The use of the grid is optional.]



114. 060228b, P.I. A.A.11

A pelican flying in the air over water drops a crab from a height of 30 feet. The distance the crab is from the water as it falls can be represented by the function $h(t) = -16t^2 + 30$, where t is time, in seconds. To catch the crab as it falls, a gull flies along a path represented by the function $g(t) = -8t + 15$. Can the gull catch the crab before the crab hits the water? Justify your answer. [The use of the accompanying grid is optional.]



115. 080135a, P.I. A.A.11

Solve the following system of equations algebraically:

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

$$y = 2x + 1$$

116. 060018a, P.I. A.A.11

The graphs of the equations $y = x^2 + 4x - 1$ and $y + 3 = x$ are drawn on the same set of axes. At which point do the graphs intersect?

[A] (1, 4)

[B] (-2, -5)

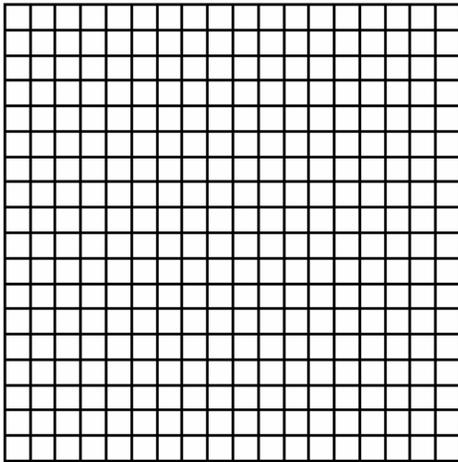
[C] (-2, 1)

[D] (1, -2)

117. 069935a, P.I. A.A.11
Solve the following system of equations algebraically or graphically for x and y :

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

$$y = 3x + 5$$



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

118. fall0703ia, P.I. A.A.12
Which expression represents $\frac{(2x^3)(8x^5)}{4x^6}$ in simplest form?

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

119. 010817a, P.I. A.A.12
The expression $\frac{4x^2y^3}{2xy^4}$ is equivalent to

[A] $2xy$ [B] $\frac{2y}{x}$ [C] $-2xy$ [D] $\frac{2x}{y}$

120. 060707a, P.I. A.A.12
The expression $\frac{-32x^8}{4x^2}$, $x \neq 0$, is equivalent to

[A] $8x^6$ [B] $-8x^4$
[C] $8x^4$ [D] $-8x^6$

121. 010728a, P.I. A.A.12
The expression $(6x^3y^6)^2$ is equivalent to
- [A] $6x^6y^{12}$ [B] $36x^6y^{12}$
[C] $36x^5y^8$ [D] $12x^6y^{12}$

122. 080605a, P.I. A.A.12
What is the product of $10x^4y^2$ and $3xy^3$?
- [A] $30x^5y^6$ [B] $30x^5y^5$
[C] $30x^4y^6$ [D] $30x^4y^5$

123. 060604a, P.I. A.A.12
What is the product of $\frac{1}{3}x^2y$ and $\frac{1}{6}xy^3$?
- [A] $\frac{1}{9}x^3y^4$ [B] $\frac{1}{18}x^2y^3$
[C] $\frac{1}{18}x^3y^4$ [D] $\frac{1}{2}x^2y^3$

124. 080526a, P.I. A.A.12
The expression $\frac{5x^6y^2}{x^8y}$ is equivalent to
- [A] $\frac{5y^3}{x^{14}}$ [B] $5x^2y$
[C] $5x^{14}y^3$ [D] $\frac{5y}{x^2}$

125. 060518a, P.I. A.A.12
If $x \neq 0$, then $\frac{(x^2)^3}{x^5} \cdot 1000$ is equivalent to
- [A] 1000 [B] 0
[C] $1000 + x$ [D] $1000x$

126. 010506a, P.I. A.A.12
The product of $(5ab)$ and $(-2a^2b)^3$ is
- [A] $-40a^7b^4$ [B] $-30a^6b^4$
[C] $-40a^6b^4$ [D] $-30a^7b^4$

127. 080415b, P.I. A.A.12

The expression $\frac{(b^{2n+1})^3}{b^n \cdot b^{4n+3}}$ is equivalent to

- [A] b^{-3n+1} [B] b^{-3n} [C] b^n [D] $\frac{b^n}{2}$

128. 080405a, P.I. A.A.12

When $-9x^5$ is divided by $-3x^3$, $x \neq 0$, the quotient is

- [A] $3x^2$ [B] $27x^8$
[C] $-27x^{15}$ [D] $-3x^2$

129. 010413a, P.I. A.A.12

The expression $8^{-4} \cdot 8^6$ is equivalent to

- [A] 8^{-2} [B] 8^{10} [C] 8^2 [D] 8^{-24}

130. 060312a, P.I. A.A.12

The expression $3^2 \cdot 3^3 \cdot 3^4$ is equivalent to

- [A] 3^{24} [B] 27^9 [C] 27^{24} [D] 3^9

131. 010306a, P.I. A.A.12

The product of $3x^5$ and $2x^4$ is

- [A] $5x^9$ [B] $6x^{20}$ [C] $5x^{20}$ [D] $6x^9$

132. 010205a, P.I. A.A.12

The product of $3x^2y$ and $-4xy^3$ is

- [A] $-12x^2y^3$ [B] $-12x^3y^4$
[C] $12x^2y^3$ [D] $12x^3y^4$

133. 080001a, P.I. A.A.12

The product of $2x^3$ and $6x^5$ is

- [A] $12x^8$ [B] $10x^{15}$
[C] $10x^8$ [D] $12x^{15}$

134. 060005a, P.I. A.A.12

The quotient of $-\frac{15x^8}{5x^2}$, $x \neq 0$, is

- [A] $-10x^6$ [B] $-3x^4$
[C] $-10x^4$ [D] $-3x^6$

135. 089906a, P.I. A.A.12

The product of $4x^2y$ and $2xy^3$ is

- [A] $8x^3y^3$ [B] $8x^2y^3$
[C] $8x^2y^4$ [D] $8x^3y^4$

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

136. 010819a, P.I. A.A.13

What is the product of $2r^2 - 5$ and $3r$?

- [A] $6r^2 - 15r$ [B] $6r^2 - 15$
[C] $6r^3 - 5$ [D] $6r^3 - 15r$

137. 080710a, P.I. A.A.13

The sum of $8x^2 - x + 4$ and $x - 5$ is

- [A] $8x^2 + 9$ [B] $8x^2 - 1$
[C] $8x^2 - 2x + 9$ [D] $8x^2 - 2x - 1$

138. 060708a, P.I. A.A.13

What is the product of $(c + 8)$ and $(c - 5)$?

- [A] $c^2 - 40$ [B] $c^2 + 13c - 40$
[C] $c^2 - 3c - 40$ [D] $c^2 + 3c - 40$

139. 010707a, P.I. A.A.13

The expression $(2x^2 + 6x + 5) - (6x^2 + 3x + 5)$ is equivalent to

- [A] $-4x^2 + 3x$ [B] $-4x^2 - 3x + 10$
[C] $4x^2 - 3x$ [D] $4x^2 + 3x - 10$

140. 080623a, P.I. A.A.13

The expression $2x^2 - x^2$ is equivalent to

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

141. 010619a, P.I. A.A.13
When $3a^2 - 7a + 6$ is subtracted from $4a^2 - 3a + 4$, the result is
[A] $7a^2 - 10a + 10$ [B] $a^2 - 10a - 2$
[C] $-a^2 - 4a + 2$ [D] $a^2 + 4a - 2$
142. 060511a, P.I. A.A.13
The expression $(x^2 - 5x - 2) - (-6x^2 - 7x - 3)$ is equivalent to
[A] $7x^2 + 2x - 5$ [B] $7x^2 - 2x + 1$
[C] $7x^2 - 12x - 5$ [D] $7x^2 + 2x + 1$
143. 010523a, P.I. A.A.13
When $3x^2 - 8x$ is subtracted from $2x^2 + 3x$, the difference is
[A] $-x^2 - 5x$ [B] $-x^2 - 11x$
[C] $x^2 - 5x$ [D] $-x^2 + 11x$
144. 080423a, P.I. A.A.13
The expression $(3x^2 + 2xy + 7) - (6x^2 - 4xy + 3)$ is equivalent to
[A] $3x^2 - 2xy + 4$ [B] $-3x^2 + 6xy + 4$
[C] $-3x^2 - 2xy + 4$ [D] $3x^2 - 6xy - 4$
145. 010430a, P.I. A.A.13
The expression $(a^2 + b^2)^2$ is equivalent to
[A] $a^4 + a^2b^2 + b^4$ [B] $a^4 + b^4$
[C] $a^4 + 4a^2b^2 + b^4$ [D] $a^4 + 2a^2b^2 + b^4$
146. 010429a, P.I. A.A.13
If $2x^2 - x + 6$ is subtracted from $x^2 + 3x - 2$, the result is
[A] $x^2 + 2x - 8$ [B] $-x^2 + 2x - 8$
[C] $x^2 - 4x + 8$ [D] $-x^2 + 4x - 8$
147. 080209a, P.I. A.A.13
When $-2x^2 + 4x + 2$ is subtracted from $x^2 + 6x - 4$, the result is
[A] $3x^2 + 2x - 6$ [B] $-3x^2 - 2x + 6$
[C] $2x^2 - 2x - 6$ [D] $-x^2 + 10x - 2$
148. 080123a, P.I. A.A.13
Subtract $5x^2 - 7x - 6$ from $9x^2 + 3x - 4$.
149. 010108a, P.I. A.A.13
The sum of $3x^2 + 4x - 2$ and $x^2 - 5x + 3$ is
[A] $4x^2 + x - 1$ [B] $4x^2 - x + 1$
[C] $4x^2 - x - 1$ [D] $4x^2 + x + 1$
150. 080020a, P.I. A.A.13
When $3x^2 - 2x + 1$ is subtracted from $2x^2 + 7x + 5$, the result will be
[A] $-x^2 + 5x + 6$ [B] $-x^2 + 9x + 4$
[C] $x^2 - 9x - 4$ [D] $x^2 + 5x + 6$
151. 060019a, P.I. A.A.13
If $2x^2 - 4x + 6$ is subtracted from $5x^2 + 8x - 2$, the difference is
[A] $3x^2 + 12x - 8$ [B] $3x^2 + 4x + 4$
[C] $-3x^2 - 12x + 8$ [D] $-3x^2 + 4x + 4$
152. 060015a, P.I. A.A.13
The expression $(x - 6)^2$ is equivalent to
[A] $x^2 + 36$ [B] $x^2 - 36$
[C] $x^2 + 12x + 36$ [D] $x^2 - 12x + 36$
153. 010019a, P.I. A.A.13
When $3a^2 - 2a + 5$ is subtracted from $a^2 + a - 1$, the result is
[A] $2a^2 - 3a + 6$ [B] $2a^2 - 3a - 6$
[C] $-2a^2 + 3a - 6$ [D] $-2a^2 + 3a + 6$

154. 069904a, P.I. A.A.13
The sum of $3x^2 + x + 8$ and $x^2 - 9$ can be expressed as

[A] $4x^2 + x - 1$ [B] $4x^2 + x - 17$
[C] $4x^4 + x - 1$ [D] $3x^4 + x - 1$

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

155. fall0718ia, P.I. A.A.14
The expression $\frac{9x^4 - 27x^6}{3x^3}$ is equivalent to

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

156. 010724a, P.I. A.A.14
The expression $(50x^3 - 60x^2 + 10x) \div 10x$ is equivalent to

[A] $5x^2 - 60x^2 + 10x$ [B] $5x^3 - 6x^2 + x$
[C] $5x^2 - 6x$ [D] $5x^2 - 6x + 1$

157. 060506a, P.I. A.A.14
When $3x^2 - 6x$ is divided by $3x$, the result is

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

158. 060102a, P.I. A.A.14
Which polynomial is the quotient of $\frac{6x^3 + 9x^2 + 3x}{3x}$?

[A] $2x + 3$ [B] $2x^2 + 3x + 1$
[C] $2x^2 + 3x$ [D] $6x^2 + 9x$

159. 010109a, P.I. A.A.14
If $x \neq 0$, the expression $\frac{x^2 + 2x}{x}$ is equivalent to

[A] $3x$ [B] 2 [C] $x + 2$ [D] 4

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

160. fall0728ia, P.I. A.A.15
For which value of x is $\frac{x-3}{x^2-4}$ undefined?

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

161. 010822a, P.I. A.A.15
For which value of x is the expression $\frac{6-x}{x+2}$ undefined?

[A] 0 [B] 6 [C] 2 [D] -2

162. 010716a, P.I. A.A.15
Which expression is undefined when $w = 3$?

[A] $\frac{w^2 + 2w}{5w}$ [B] $\frac{w + 1}{w^2 - 3w}$
[C] $\frac{w - 3}{w + 1}$ [D] $\frac{3w}{3w^2}$

163. 080610a, P.I. A.A.15
For which value of x is the expression $\frac{3}{x-2}$ undefined?

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

164. 010607a, P.I. A.A.15
For which value of x will the fraction $\frac{3}{2x+4}$ be undefined?

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

165. 080422a, P.I. A.A.15
For which value of x is the expression $\frac{x-7}{x+2}$ undefined?

[A] -2 [B] 2 [C] 7 [D] 0

166. 060319a, P.I. A.A.15
For which value of x is the expression $\frac{3x-6}{x-4}$ undefined?
[A] 0 [B] 4 [C] -4 [D] 2

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

167. 060712b, P.I. A.A.16
Which expression is in simplest form?

[A] $\frac{x^2-4}{x+2}$ [B] $\frac{9}{x^2+9}$
[C] $\frac{x^2-6x+9}{x^2-x-6}$ [D] $\frac{x}{x^2}$

168. 080619b, P.I. A.A.16
The expression $\frac{3y^2-12y}{4y^2-y^3}$ is equivalent to
[A] $\frac{3}{y}$ [B] $-\frac{9}{4}$ [C] $\frac{3}{4}-\frac{12}{y^2}$ [D] $-\frac{3}{y}$

169. 010631a, P.I. A.A.16
Simplify: $\frac{x^2+6x+5}{x^2-25}$

170. 060504b, P.I. A.A.16
Written in simplest form, the expression $\frac{x^2-9x}{45x-5x^2}$ is equivalent to
[A] $-\frac{1}{5}$ [B] 5 [C] -5 [D] $\frac{1}{5}$

171. 080305b, P.I. A.A.16
Written in simplest form, the expression $\frac{x^2y^2-9}{3-xy}$ is equivalent to
[A] $-(3+xy)$ [B] $3+xy$

[C] -1 [D] $\frac{1}{3+xy}$

172. 060202b, P.I. A.A.16
For all values of x for which the expression is defined, $\frac{2x+x^2}{x^2+5x+6}$ is equivalent to

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

173. 069924a, P.I. A.A.16
Simplify: $\frac{9x^2-15xy}{9x^2-25y^2}$

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

174. 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] $\frac{7d}{6}$

175. 060727a, P.I. A.A.17
What is the sum of $\frac{3}{7n}$ and $\frac{7}{3n}$?

[A] $\frac{58}{21n}$ [B] $\frac{42}{21n}$ [C] $\frac{10}{21n}$ [D] $\frac{1}{n}$

176. 060625a, P.I. A.A.17

The expression $\frac{5x}{6} + \frac{x}{4}$ is equivalent to

- [A] $\frac{5x^2}{10}$ [B] $\frac{5x}{24}$ [C] $\frac{13x}{12}$ [D] $\frac{3x}{5}$

177. 010423a, P.I. A.A.17

What is the sum of $\frac{2}{x}$ and $\frac{x}{2}$?

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

178. 080207a, P.I. A.A.17

The sum of $\frac{3}{x} + \frac{2}{5}$, $x \neq 0$, is

- [A] $\frac{5}{x+5}$ [B] $\frac{1}{x}$
[C] $\frac{2x+15}{5x}$ [D] $\frac{2x+15}{x+5}$

179. 010016a, P.I. A.A.17

The expression $\frac{y}{x} - \frac{1}{2}$ is equivalent to

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

180. 089911a, P.I. A.A.17

Which expression is equivalent to $\frac{a}{x} + \frac{b}{2x}$?

- [A] $\frac{2a+b}{x}$ [B] $\frac{a+b}{3x}$
[C] $\frac{2a+b}{2x}$ [D] $\frac{a+b}{2x}$

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

181. 010733b, P.I. A.A.18

Perform the indicated operations and simplify completely:

$$\frac{x^2-9}{x^2-5x} \cdot \frac{5x-x^2}{x^2-x-12} \div \frac{x-4}{x^2-8x+16}$$

182. 010434b, P.I. A.A.18

Express in simplest form:

$$\frac{4x+8}{x+1} \cdot \frac{2-x}{3x-15} \div \frac{x^2-4}{2x^2-8x-10}$$

183. 080117b, P.I. A.A.18

If the length of a rectangular garden is

represented by $\frac{x^2+2x}{x^2+2x-15}$ and its width is

represented by $\frac{2x-6}{2x+4}$, which expression

represents the area of the garden?

- [A] x [B] $\frac{x}{x+5}$
[C] $x+5$ [D] $\frac{x^2+2x}{2(x+5)}$

184. 060124b, P.I. A.A.18

A rectangular prism has a length of

$\frac{2x^2+2x-24}{4x^2+x}$, a width of $\frac{x^2+x-6}{x+4}$, and a

height of $\frac{8x^2+2x}{x^2-9}$. For all values of x for

which it is defined, express, in terms of x , the volume of the prism in simplest form.

185. 080022a, P.I. A.A.18

Perform the indicated operation and express

the result in simplest terms: $\frac{x}{x+3} \div \frac{3x}{x^2-9}$

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

186. fall0706ia, P.I. A.A.19
The expression $x^2 - 16$ is equivalent to
[A] $(x + 2)(x - 8)$ [B] $(x + 4)(x - 4)$
[C] $(x + 8)(x - 8)$ [D] $(x - 2)(x + 8)$
187. 080711a, P.I. A.A.19
One factor of the expression $x^2y^2 - 16$ is
[A] $xy - 8$ [B] $x^2 + 8$
[C] $x^2 - 4$ [D] $xy - 4$
188. 010414a, P.I. A.A.19
What is a common factor of $x^2 - 9$ and $x^2 - 5x + 6$?
[A] $x - 3$ [B] $x - 2$
[C] $x + 3$ [D] x^2
189. 010201a, P.I. A.A.19
Expressed in factored form, the binomial $4a^2 - 9b^2$ is equivalent to
[A] $(4a - 3b)(a + 3b)$
[B] $(2a + 3b)(2a - 3b)$
[C] $(2a - 3b)(2a - 3b)$
[D] $(2a - 9b)(2a + b)$
190. 010105a, P.I. A.A.19
One of the factors of $4x^2 - 9$ is
[A] $(2x + 3)$ [B] $(4x - 3)$
[C] $(x - 3)$ [D] $(x + 3)$

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

191. 010814a, P.I. A.A.20
What are the factors of $x^2 - 5x + 6$?
[A] $(x - 2)$ and $(x - 3)$
[B] $(x + 6)$ and $(x - 1)$
[C] $(x - 6)$ and $(x + 1)$
[D] $(x + 2)$ and $(x + 3)$
192. 060623a, P.I. A.A.20
Factored completely, the expression $2y^2 + 12y - 54$ is equivalent to
[A] $2(y - 3)(y - 9)$ [B] $(2y + 6)(y - 9)$
[C] $(y + 6)(2y - 9)$ [D] $2(y + 9)(y - 3)$
193. 060535a, P.I. A.A.20
Factor completely: $3x^2 + 15x - 42$
194. 060421a, P.I. A.A.20
If $3x$ is one factor of $3x^2 - 9x$, what is the other factor?
[A] $x + 3$ [B] $x^2 - 6x$
[C] $3x$ [D] $x - 3$
195. 060318a, P.I. A.A.20
If one factor of $56x^4y^3 - 42x^2y^6$ is $14x^2y^3$, what is the other factor?
[A] $4x^2y - 3xy^3$ [B] $4x^2y - 3xy^2$
[C] $4x^2 - 3y^3$ [D] $4x^2 - 3y^2$
196. 010318a, P.I. A.A.20
What are the factors of $x^2 - 10x - 24$?
[A] $(x - 4)(x - 6)$ [B] $(x - 12)(x + 2)$
[C] $(x - 4)(x + 6)$ [D] $(x + 12)(x - 2)$

197. 060206a, P.I. A.A.20
Which expression is a factor of $n^2 + 3n - 54$?
[A] $n + 9$ [B] $n^2 + 9$
[C] $n + 6$ [D] $n - 9$

198. 010004a, P.I. A.A.20
Which expression is a factor of $x^2 + 2x - 15$
[A] $(x - 5)$ [B] $(x - 3)$
[C] $(x + 15)$ [D] $(x + 3)$

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.

199. fall0724ia, P.I. A.A.21
Which value of x is in the solution set of the inequality $-2x + 5 > 17$?
[A] -8 [B] -4 [C] -6 [D] 12
200. 080513a, P.I. A.A.21
Which ordered pair is not in the solution set of $y > 2x + 1$?
[A] (1,4) [B] (1,6) [C] (3,8) [D] (2,5)
201. 060311a, P.I. A.A.21
Which number is in the solution set of the inequality $5x + 3 > 38$?
[A] 6 [B] 8 [C] 5 [D] 7

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

202. fall0732ia, P.I. A.A.22
Solve for g : $3 + 2g = 5g - 9$
203. 010807a, P.I. A.A.22
What is the value of p in the equation $8p + 2 = 4p - 10$?
[A] 3 [B] -3 [C] 1 [D] -1
204. 080731a, P.I. A.A.22
Solve for x : $5(x - 2) = 2(10 + x)$

205. 060702a, P.I. A.A.22
What is the value of x in the equation $6(x - 2) = 36 - 10x$?
[A] -6 [B] 1.5 [C] 3 [D] 6

206. 010705a, P.I. A.A.22
What is the value of n in the equation $3n - 8 = 32 - n$?
[A] 6 [B] -6 [C] 10 [D] -10

207. 080602a, P.I. A.A.22
What is the value of p in the equation $2(3p - 4) = 10$?
[A] 3 [B] $2\frac{1}{3}$ [C] $\frac{1}{3}$ [D] 1

208. 060602a, P.I. A.A.22
What is the value of x in the equation $13x - 2(x + 4) = 8x + 1$?
[A] 1 [B] 2 [C] 3 [D] 4

209. 010601a, P.I. A.A.22
What is the value of x in the equation $5(2x - 7) = 15x - 10$?
[A] -5 [B] 1 [C] 0.6 [D] -9

210. 060513a, P.I. A.A.22
If $7x + 2a = 3x + 5a$, then x is equivalent to
[A] $\frac{3a}{4}$ [B] $\frac{7a}{10}$ [C] $\frac{3a}{10}$ [D] $\frac{7a}{4}$

211. 080406a, P.I. A.A.22
What is the value of n in the equation $0.6(n + 10) = 3.6$?
[A] 5 [B] -4 [C] 4 [D] -0.4

212. 060404a, P.I. A.A.22
If $3(x - 2) = 2x + 6$, the value of x is
[A] 5 [B] 20 [C] 0 [D] 12

213. 010401a, P.I. A.A.22
If $2(x + 3) = x + 10$, then x equals
[A] 5 [B] 7 [C] 14 [D] 4

214. 060323a, P.I. A.A.22
Solve for m : $0.6m + 3 = 2m + 0.2$

215. 060310a, P.I. A.A.22
If $x + y = 9x + y$, then x is equal to
[A] y [B] $\frac{1}{5}y$ [C] 0 [D] 8

216. 060214a, P.I. A.A.22
What is the solution of the equation
 $3y - 5y + 10 = 36$?
[A] 2 [B] 13 [C] -13 [D] 4.5

217. 080015a, P.I. A.A.22
Solve for x : $15x - 3(3x + 4) = 6$
[A] 1 [B] $-\frac{1}{2}$ [C] 3 [D] $\frac{1}{3}$

218. 010011a, P.I. A.A.22
If $9x + 2a = 3a - 4x$, then x equals
[A] a [B] $\frac{a}{13}$ [C] $-a$ [D] $\frac{5a}{12}$

219. 089921a, P.I. A.A.22
Solve for x : $2(x - 3) = 1.2 - x$

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

220. 080725b, P.I. A.A.23
The slant height, ℓ , of the conical water tank shown in the accompanying diagram is

$$\ell = \sqrt[3]{\frac{8v}{\pi}}$$

Solve for v , in terms of ℓ and π .



221. 080722a, P.I. A.A.23
Which equation is equivalent to
 $3x + 4y = 15$?

[A] $y = 15 - 3x$ [B] $y = \frac{3x - 15}{4}$

[C] $y = \frac{15 - 3x}{4}$ [D] $y = 3x - 15$

222. 060719a, P.I. A.A.23
If $c = 2m + d$, then m is equal to

[A] $c - \frac{d}{2}$ [B] $d - 2c$

[C] $\frac{c - d}{2}$ [D] $\frac{c}{2} - d$

223. 010703b, P.I. A.A.23
If $\sqrt{x - a} = b$, $x > a$, which expression is equivalent to x ?

[A] $b - a$ [B] $b^2 + a$

[C] $b + a$ [D] $b^2 - a$

224. 010710a, P.I. A.A.23
The formula for potential energy is $P = mgh$, where P is potential energy, m is mass, g is gravity, and h is height. Which expression can be used to represent g ?
- [A] $\frac{P}{mh}$ [B] $\frac{P}{m} - h$
[C] $P - m - h$ [D] $P - mh$
225. 080622b, P.I. A.A.23
The volume of any spherical balloon can be found by using the formula $V = \frac{4}{3}\pi r^3$. Write an equation for r in terms of V and π .
226. 060617a, P.I. A.A.23
The formula for the volume of a right circular cylinder is $V = \pi r^2 h$. The value of h can be expressed as
- [A] $V - \pi r^2$ [B] $\frac{V}{\pi r^2}$
[C] $\frac{\pi r^2}{V}$ [D] $\frac{V}{\pi} r^2$
227. 010620a, P.I. A.A.23
In the equation $A = p + prt$, t is equivalent to
- [A] $\frac{A - p}{pr}$ [B] $\frac{A}{p} - pr$
[C] $\frac{A - pr}{p}$ [D] $\frac{A}{pr} - p$
228. 080530a, P.I. A.A.23
If $\frac{x}{4} - \frac{a}{b} = 0$, $b \neq 0$, then x is equal to
- [A] $\frac{4a}{b}$ [B] $\frac{a}{4b}$ [C] $-\frac{4a}{b}$ [D] $-\frac{a}{4b}$
229. 010517a, P.I. A.A.23
Sean knows the length of the base, b , and the area, A , of a triangular window in his bedroom. Which formula could he use to find the height, h , of this window?
- [A] $h = (2A)(b)$ [B] $h = 2A - b$
[C] $h = \frac{2A}{b}$ [D] $h = \frac{A}{2b}$
230. 010421a, P.I. A.A.23
If $2ax - 5x = 2$, then x is equivalent to
- [A] $\frac{2}{2a - 5}$ [B] $\frac{2 + 5a}{2a}$
[C] $7 - 2a$ [D] $\frac{1}{a - 5}$
231. 010310a, P.I. A.A.23
The equation $P = 2L + 2W$ is equivalent to
- [A] $L = \frac{P - 2W}{2}$ [B] $L = \frac{P + 2W}{2}$
[C] $L = P - W$ [D] $2L = \frac{P}{2W}$
232. 080218a, P.I. A.A.23
If $2m + 2p = 16$, p equals
- [A] $9m$ [B] $8 - m$
[C] $16 + 2m$ [D] $16 - m$
233. 060219a, P.I. A.A.23
If $x = 2a - b^2$, then a equals
- [A] $x + b^2$ [B] $\frac{x + b^2}{2}$
[C] $\frac{x - b^2}{2}$ [D] $\frac{b^2 - x}{2}$

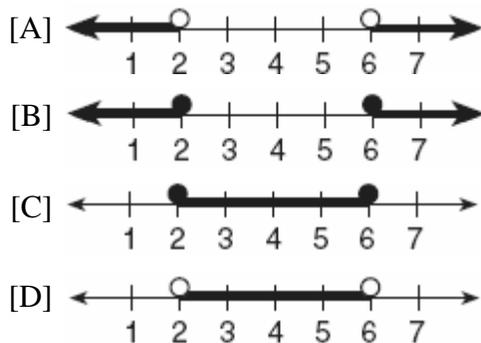
234. 010116a, P.I. A.A.23
If $bx - 2 = K$, then x equals

[A] $\frac{K+2}{b}$ [B] $\frac{2-K}{b}$
[C] $\frac{K-2}{b}$ [D] $\frac{K}{b} + 2$

235. 069922a, P.I. A.A.23
Shoe sizes and foot length are related by the formula $S = 3F - 24$, where S represents the shoe size and F represents the length of the foot, in inches.
a Solve the formula for F .
b To the nearest tenth of an inch, how long is the foot of a person who wears a size $10\frac{1}{2}$ shoe?

8.A.13: Solve multi-step inequalities and graph the solution set on a number line.

236. 010312a, P.I. 8.A.13
Which graph represents the solution set for $2x - 4 \leq 8$ and $x + 5 \geq 7$?



8.A.14: Solve linear inequalities by combining like terms, using the distributive property, or moving variables to one side of the inequality (including multiplication or division of inequalities by a negative number).

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

237. 010536a, P.I. A.A.24
Find all negative odd integers that satisfy the following inequality: $-3x + 1 \leq 17$

238. 010425a, P.I. A.A.24
The inequality $\frac{1}{2}x + 3 < 2x - 6$ is equivalent to
[A] $x > 6$ [B] $x < 6$
[C] $x > -\frac{5}{6}$ [D] $x < -\frac{5}{6}$

239. 060118a, P.I. A.A.24
In the set of positive integers, what is the solution set of the inequality $2x - 3 < 5$?
[A] {1, 2, 3, 4} [B] {0, 1, 2, 3, 4}
[C] {1, 2, 3} [D] {0, 1, 2, 3}

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

240. 080708a, P.I. A.A.25
In the equation $\frac{1}{4}n + 5 = 5\frac{1}{2}$, n is equal to
[A] $\frac{1}{8}$ [B] 8 [C] 2 [D] $\frac{1}{2}$

241. 060704a, P.I. A.A.25
What is the value of w in the equation $\frac{1}{2}w + 7 = 2w - 2$?
[A] 3.6 [B] 2 [C] 6 [D] $3\frac{1}{3}$

242. 010719a, P.I. A.A.25
What is the value of x in the equation $\frac{x}{2} + \frac{x}{6} = 2$?
[A] 3 [B] 12 [C] 8 [D] $\frac{1}{4}$

243. 080620a, P.I. A.A.25
What is the value of w in the equation
$$\frac{3}{4}w + 8 = \frac{1}{3}w - 7?$$

[A] -0.2 [B] 2.4 [C] -36 [D] -13.846

244. 060634a, P.I. A.A.25
Solve for x : $3.3 - x = 3(x - 1.7)$

245. 010636a, P.I. A.A.25
Solve for x : $\frac{1}{16}x + \frac{1}{4} = \frac{1}{2}$

246. 010507a, P.I. A.A.25
What is the solution set of the equation
$$\frac{x}{5} + \frac{x}{2} = 14?$$

[A] {20} [B] {4} [C] {49} [D] {10}

247. 060418a, P.I. A.A.25
The number of people on the school board is represented by x . Two subcommittees with an equal number of members are formed, one with $\frac{2}{3}x - 5$ members and the other with $\frac{x}{4}$ members. How many people are on the school board?
[A] 8 [B] 20 [C] 4 [D] 12

248. 010204a, P.I. A.A.25
What is the value of x in the equation
$$\frac{3}{4}x + 2 = \frac{5}{4}x - 6?$$

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

249. 060111a, P.I. A.A.25
If one-half of a number is 8 less than two-thirds of the number, what is the number?
[A] 24 [B] 54 [C] 48 [D] 32

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

250. fall0739ia, P.I. A.A.26
Solve for x : $\frac{x+1}{x} = \frac{-7}{x-12}$

251. 010825a, P.I. A.A.26
If $\frac{5}{n} - \frac{1}{2} = \frac{3}{6n}$, what is the value of n ?

- [A] 2 [B] $\frac{2}{7}$ [C] -2 [D] 9

252. 080722b, P.I. A.A.26
Solve for all values of x : $\frac{2}{x+1} = x$

253. 060612a, P.I. A.A.26
What is the value of x in the equation
$$\frac{x}{2x+1} = \frac{4}{3}?$$

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

254. 080439a, P.I. A.A.26
Solve for all values of x that satisfy the equation $\frac{x}{x+3} = \frac{5}{x+7}$.

255. 010131a, P.I. A.A.26
Solve algebraically for x : $\frac{1}{x} = \frac{x+1}{6}$

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

256. 010808a, P.I. A.A.27
A solution of the equation $\frac{x^2}{4} = 9$ is

- [A] 6 [B] $\frac{3}{2}$ [C] 3 [D] 12

257. 080733a, P.I. A.A.27
What is the positive solution of the equation
 $4x^2 - 36 = 0$?

258. 060725a, P.I. A.A.27
The solution set of the equation
 $x^2 - 4x - 12 = 0$ is

- [A] $\{-6, 2\}$ [B] $\{-4, 3\}$
[C] $\{-3, 4\}$ [D] $\{-2, 6\}$

259. 010727a, P.I. A.A.27
What is the solution set of the equation
 $x^2 - 5x = 0$?

- [A] $\{5\}$ [B] $\{0, 5\}$ [C] $\{0, -5\}$ [D] $\{0\}$

260. 080622a, P.I. A.A.27
One of the roots of the equation
 $x^2 + 3x - 18 = 0$ is 3. What is the other root?

- [A] -6 [B] -21 [C] 15 [D] 6

261. 010637a, P.I. A.A.27
Solve for x : $x^2 + 2x - 24 = 0$

262. 080525a, P.I. A.A.27
The solution set for the equation $x^2 - 5x = 6$
is

- [A] $\{-2, 3\}$ [B] $\{-1, 6\}$
[C] $\{1, -6\}$ [D] $\{2, -3\}$

263. 060514a, P.I. A.A.27
What is the solution set of the equation
 $x^2 + 11x + 28 = 0$?

- [A] $\{-3, -4\}$ [B] $\{3, 4\}$
[C] $\{-7, -4\}$ [D] $\{-7, 4\}$

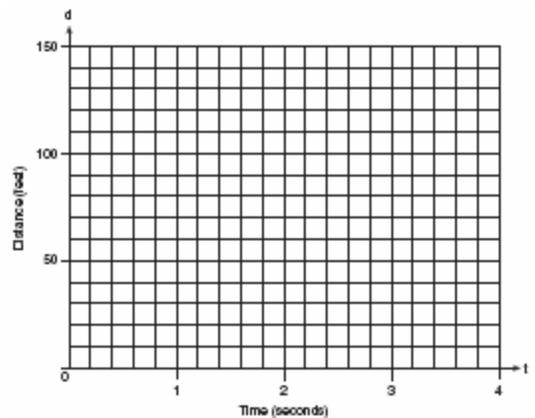
264. 010520a, P.I. A.A.27
What is the solution set for the equation
 $x^2 - 5x + 6 = 0$?

- [A] $\{2, 3\}$ [B] $\{-2, -3\}$
[C] $\{6, -1\}$ [D] $\{-6, 1\}$

265. 060313a, P.I. A.A.27
What is the solution set of the equation
 $x^2 - 5x - 24 = 0$?

- [A] $\{3, -8\}$ [B] $\{-3, 8\}$
[C] $\{3, 8\}$ [D] $\{-3, -8\}$

266. 080234a, P.I. A.A.27
Greg is in a car at the top of a roller-coaster ride. The distance, d , of the car from the ground as the car descends is determined by the equation $d = 144 - 16t^2$, where t is the number of seconds it takes the car to travel down to each point on the ride. How many seconds will it take Greg to reach the ground?



267. 060229a, P.I. A.A.27
Solve for x : $x^2 + 3x - 28 = 0$

268. 010215a, P.I. A.A.27
What is the solution set of the equation
 $3x^2 = 48$?

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

269. 080118a, P.I. A.A.27
What is the solution set of $m^2 - 3m - 10 = 0$?

- [A] $\{2, -5\}$ [B] $\{3, 10\}$
[C] $\{5, -2\}$ [D] $\{3, -10\}$

270. 080012a, P.I. A.A.27
The solution set for the equation $x^2 - 2x - 15 = 0$ is
- [A] {5,-3} [B] {-5,3}
[C] {5,3} [D] {-5,-3}

271. 089926a, P.I. A.A.27
Solve for x : $x^2 + 3x - 40 = 0$

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

272. 060430a, P.I. A.A.28
If $(x - 4)$ is a factor of $x^2 - x - w = 0$, then the value of w is
- [A] 12 [B] -3 [C] 3 [D] -12

273. 069909a, P.I. A.A.28
The larger root of the equation $(x + 4)(x - 3) = 0$ is
- [A] 4 [B] -3 [C] -4 [D] 3

8.A.19: Interpret multiple representations using equation, table of values and graph.

274. 010813a, P.I. 8.A.19
Which equation expresses the relationship between x and y , as shown in the accompanying table?

x	0	1	2	3	4
y	2	5	8	11	14

- [A] $y = x + 2$ [B] $y = 2x + 3$
[C] $y = 3x + 2$ [D] $y = x + 3$

275. 080420a, P.I. 8.A.19
Which linear equation represents the data in the accompanying table?

c	d
0	20.00
1	21.50
2	23.00
3	24.50

- [A] $d = 1.50c$ [B] $d = 21.50c$
[C] $d = 20.00c + 1.50$
[D] $d = 1.50c + 20.00$

276. 010211a, P.I. 8.A.19
If x and y are defined as indicated by the accompanying table, which equation correctly represents the relationship between x and y ?

x	y
2	1
3	3
5	7
7	11

- [A] $y = x + 2$ [B] $y = 2x - 3$
[C] $y = 2x + 3$ [D] $y = 2x + 2$

277. 010113a, P.I. 8.A.19
Which equation could represent the relationship between the x and y values shown in the accompanying table?

x	y
0	2
1	3
2	6
3	11
4	18

- [A] $y = 2^x$ [B] $y = x + 2$
[C] $y = x^2 + 2$ [D] $y = x^2$

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

278. 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] $(2,7]$

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

279. 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] $\{(-3,-4), (-2,-1), (-1,2), (-1,0), (1,8)\}$
[B] $\{(-2,-1)\}$ [C] $\{(-2,-1), (1,8)\}$
[D] $\{(1,8)\}$

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

280. 080417a, P.I. A.A.32
If the value of dependent variable y increases as the value of independent variable x increases, the graph of this relationship could be a
[A] vertical line [B] horizontal line
[C] line with a negative slope
[D] line with a positive slope

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

281. 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] $-\frac{3}{2}$

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

282. 060521a, P.I. A.A.34
If point $(-1,0)$ is on the line whose equation is $y = 2x + b$, what is the value of b ?
[A] 3 [B] 1 [C] 0 [D] 2

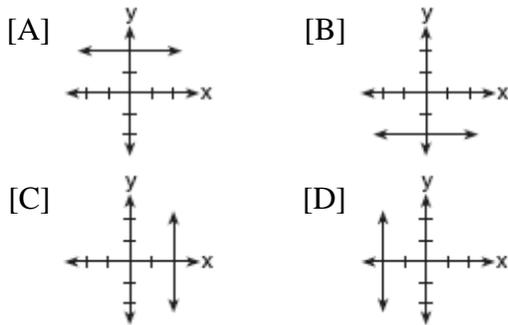
A.A.35: Write the equation of a line, given the coordinates of two points on the line.

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

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

284. 060613a, P.I. A.A.36
Which statement describes the graph of $x = 4$?
- [A] It passes through the point $(0, 4)$.
[B] It is parallel to the y -axis.
[C] It is parallel to the x -axis.
[D] It has a slope of 4.

285. 060523a, P.I. A.A.36
Which graph represents the equation $x = 2$?



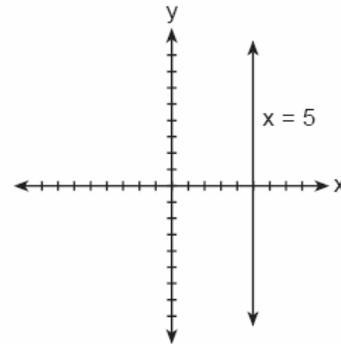
A.A.37: Determine the slope of a line, given its equation in any form.

286. 060428a, P.I. A.A.37
The line $3x - 2y = 12$ has
- [A] a slope of -3 and a y -intercept of -6
[B] a slope of 3 and a y -intercept of -2
[C] a slope of $\frac{3}{2}$ and a y -intercept of -6
[D] a slope of $-\frac{3}{2}$ and a y -intercept of 6
287. 060205a, P.I. A.A.37
What is the slope of the linear equation $5y - 10x = -15$?
- [A] -15 [B] -10 [C] 10 [D] 2

288. 010203a, P.I. A.A.37
What is the slope of the line whose equation is $2y = 5x + 4$?

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

289. 060012a, P.I. A.A.37
The accompanying figure shows the graph of the equation $x = 5$.



What is the slope of the line $x = 5$?

[A] undefined [B] 0 [C] -5 [D] 5

290. 089919a, P.I. A.A.37
What is the slope of the line whose equation is $3x - 4y - 16 = 0$?

[A] 3 [B] -4 [C] $\frac{4}{3}$ [D] $\frac{3}{4}$

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

291. 010522a, P.I. A.A.38
Which equation represents a line that is parallel to the line whose equation is $2x + 3y = 12$?

[A] $6y + 4x = 2$ [B] $6y - 4x = 2$
[C] $6x + 4y = -2$ [D] $4x - 6y = 2$

292. 08009a, P.I. A.A.38
Which equation represents a line parallel to the line $y = 2x - 5$?
- [A] $y = -2x - 5$ [B] $y = 2x + 5$
[C] $y = -\frac{1}{2}x - 5$ [D] $y = 5x - 2$

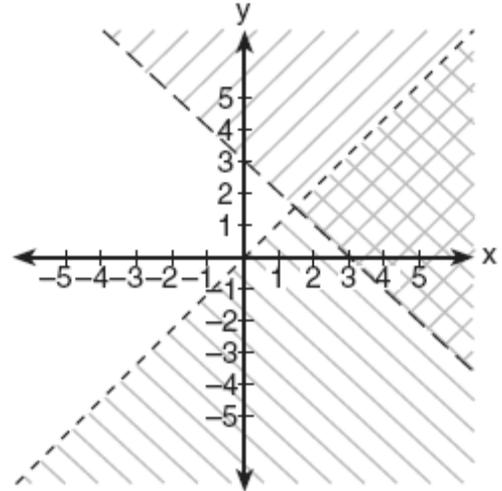
A.A.39: Determine whether a given point is on a line, given the equation of the line.

293. 060721a, P.I. A.A.39
The graph of the equation $2x + 6y = 4$ passes through point $(x, -2)$. What is the value of x ?
- [A] 4 [B] -4 [C] 16 [D] 8
294. 080628a, P.I. A.A.39
Point $(k, -3)$ lies on the line whose equation is $x - 2y = -2$. What is the value of k ?
- [A] 8 [B] 6 [C] -8 [D] -6

295. 080619a, P.I. A.A.39
The graph of the equation $x + 3y = 6$ intersects the y -axis at the point whose coordinates are
- [A] (0,2) [B] (6,0)
[C] (0,18) [D] (0,6)

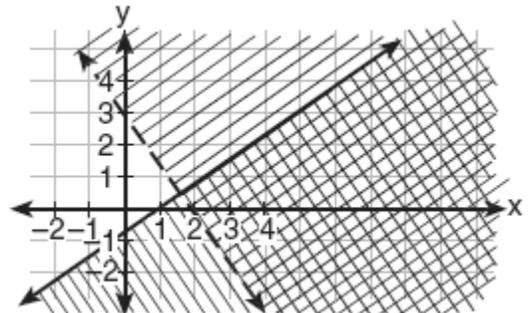
A.A.40: Determine whether a given point is in the solution set of a system of linear inequalities.

296. 080615a, P.I. A.A.40
Which ordered pair is in the solution set of the system of inequalities shown in the accompanying graph?



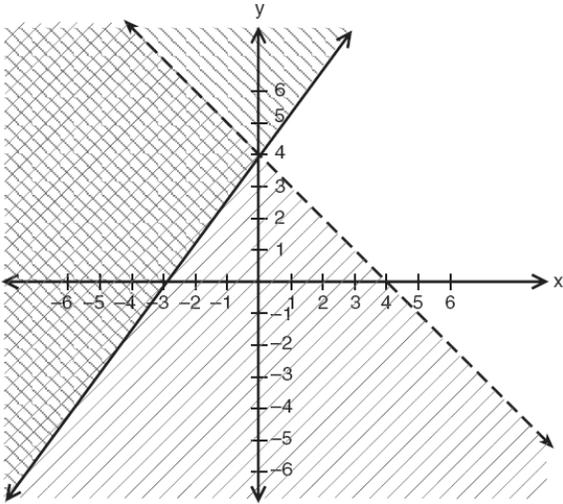
- [A] (0,1) [B] (3,2) [C] (0,0) [D] (1,5)

297. 060620a, P.I. A.A.40
Which coordinate point is in the solution set for the system of inequalities shown in the accompanying graph?



- [A] (0,1) [B] (2,2)
[C] (3,1) [D] (1,-1)

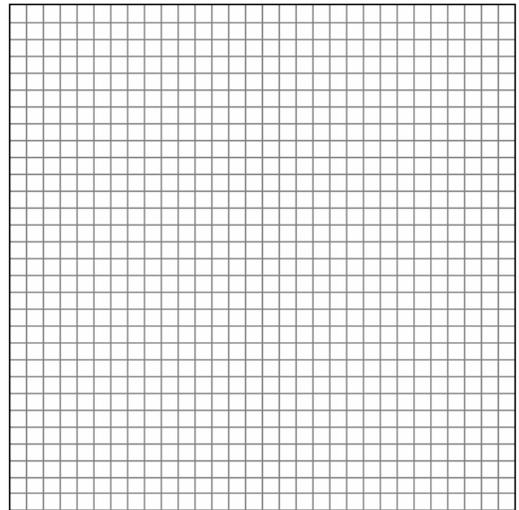
298. 010528a, P.I. A.A.40
 Which point is in the solution set of the system of inequalities shown in the accompanying graph?



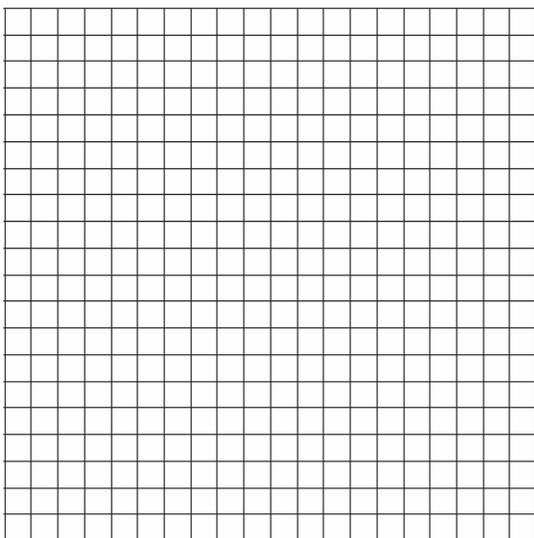
- [A] (0, 4) [B] (4, -1)
 [C] (2, 4) [D] (-4, 1)

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

299. 010834b, P.I. A.A.41
 The members of the Lincoln High School Prom Committee are trying to raise money for their senior prom. They plan to sell teddy bears. The senior advisor told them that the profit equation for their project is $y = -0.1x^2 + 9x - 50$, where x is the price at which the teddy bears will be sold and y is the profit, in dollars. On the grid below, graph this relationship so that $0 \leq x \leq 90$ and $-50 \leq y \leq 160$. How much profit can the committee expect to make if they sell the teddy bears for \$20 each? What price should they charge for the teddy bears to make the maximum profit possible?



300. 060732b, P.I. A.A.41
The path of a rocket fired during a fireworks display is given by the equation $s(t) = 64t - 16t^2$, where t is the time, in seconds, and s is the height, in feet. What is the maximum height, in feet, the rocket will reach? In how many seconds will the rocket hit the ground? [The grid is optional.]



301. 080603b, P.I. A.A.41
What is the minimum point of the graph of the equation $y = 2x^2 + 8x + 9$?
- [A] (2,33) [B] (2,17)
[C] (-2,1) [D] (-2,-15)

302. 060611b, P.I. A.A.41
The graph of $y = (x - 3)^2$ is shifted left 4 units and down 2 units. What is the axis of symmetry of the transformed graph?

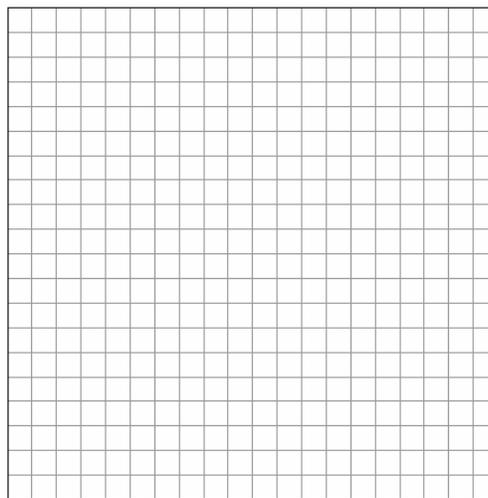
- [A] $x = 1$ [B] $x = 7$
[C] $x = -1$ [D] $x = -2$

303. 080501b, P.I. A.A.41
What is the turning point, or vertex, of the parabola whose equation is $y = 3x^2 + 6x - 1$?

- [A] (-3,8) [B] (1,8)
[C] (3,44) [D] (-1,-4)

304. 060514b, P.I. A.A.41
For which quadratic equation is the axis of symmetry $x = 3$?
- [A] $y = -x^2 + 3x + 5$ [B] $y = -x^2 + 6x + 2$
[C] $y = x^2 + x + 3$ [D] $y = x^2 + 6x + 3$

305. 060430b, P.I. A.A.41
A baseball player throws a ball from the outfield toward home plate. The ball's height above the ground is modeled by the equation $y = -16x^2 + 48x + 6$ where y represents height, in feet, and x represents time, in seconds. The ball is initially thrown from a height of 6 feet. How many seconds after the ball is thrown will it again be 6 feet above the ground? What is the maximum height, in feet, that the ball reaches? [The use of the accompanying grid is optional.]



306. 010424b, P.I. A.A.41
When a current, I , flows through a given electrical circuit, the power, W , of the circuit can be determined by the formula $W = 120I - 12I^2$. What amount of current, I , supplies the maximum power, W ?

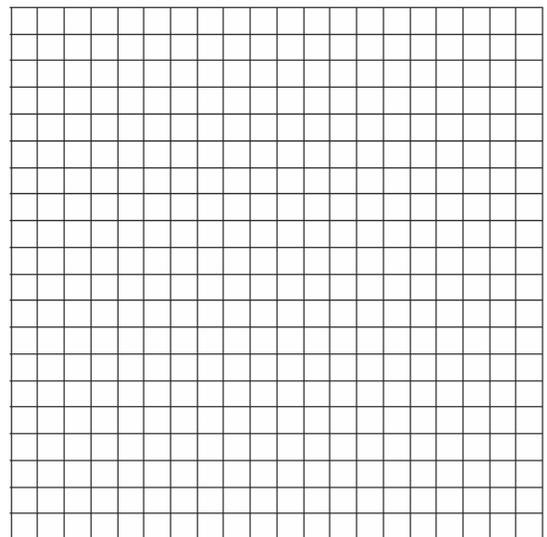
307. 010419b, P.I. A.A.41
 What is the axis of symmetry of the graph of the equation $x = y^2$?

- [A] x -axis [B] line $y = x$
 [C] line $y = -x$ [D] y -axis

308. 080321b, P.I. A.A.41
 The height, h , in feet, a ball will reach when thrown in the air is a function of time, t , in seconds, given by the equation $h(t) = -16t^2 + 30t + 6$. Find, to the *nearest tenth*, the maximum height, in feet, the ball will reach.

309. 060321b, P.I. A.A.41
 Vanessa throws a tennis ball in the air. The function $h(t) = -16t^2 + 45t + 7$ represents the distance, in feet, that the ball is from the ground at any time t . At what time, to the *nearest tenth of a second*, is the ball at its maximum height?

310. 080229b, P.I. A.A.41
 A rock is thrown vertically from the ground with a velocity of 24 meters per second, and it reaches a height of $2 + 24t - 4.9t^2$ after t seconds. How many seconds after the rock is thrown will it reach maximum height, and what is the maximum height the rock will reach, in meters? How many seconds after the rock is thrown will it hit the ground? Round your answers to the *nearest hundredth*. [Only an algebraic or graphic solution will be accepted.]



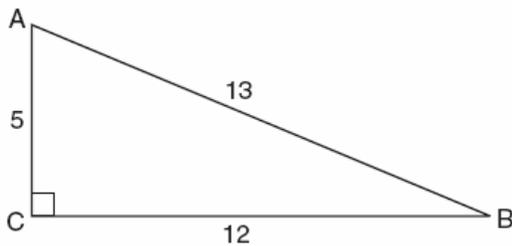
311. 060225b, P.I. A.A.41
 The equation $W = 120I - 12I^2$ represents the power (W), in watts, of a 120-volt circuit having a resistance of 12 ohms when a current (I) is flowing through the circuit. What is the maximum power, in watts, that can be delivered in this circuit?

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

312. 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 $\angle C$?

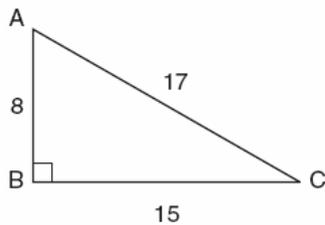
[A] $\frac{84}{85}$ [B] $\frac{84}{13}$ [C] $\frac{13}{85}$ [D] $\frac{13}{84}$

313. 080414a, P.I. A.A.42
Which ratio represents $\cos A$ in the accompanying diagram of $\triangle ABC$?



[A] $\frac{5}{13}$ [B] $\frac{12}{5}$ [C] $\frac{13}{5}$ [D] $\frac{12}{13}$

314. 010316a, P.I. A.A.42
In the accompanying diagram of right triangle ABC , $AB = 8$, $BC = 15$, $AC = 17$, and $m\angle ABC = 90$.

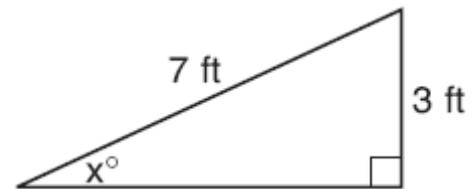


What is $\tan \angle C$?

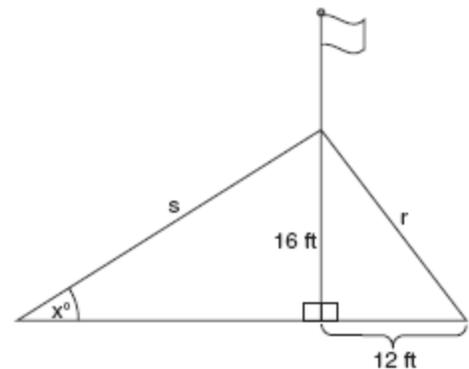
[A] $\frac{8}{17}$ [B] $\frac{17}{15}$ [C] $\frac{8}{15}$ [D] $\frac{15}{17}$

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

315. 060735a, P.I. A.A.43
Ron and Francine are building a ramp for performing skateboard stunts, as shown in the accompanying diagram. The ramp is 7 feet long and 3 feet high. What is the measure of the angle, x , that the ramp makes with the ground, to the nearest tenth of a degree?

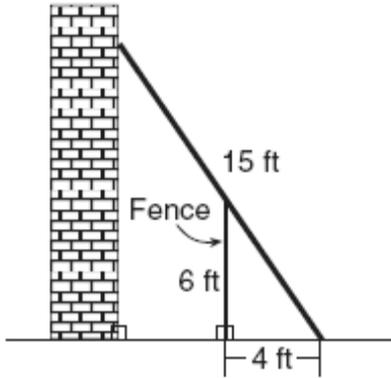


316. 060539a, P.I. A.A.43
The accompanying diagram shows a flagpole that stands on level ground. Two cables, r and s , are attached to the pole at a point 16 feet above the ground. The combined length of the two cables is 50 feet. If cable r is attached to the ground 12 feet from the base of the pole, what is the measure of the angle, x , to the nearest degree, that cable s makes with the ground?



317. 010438a, P.I. A.A.43

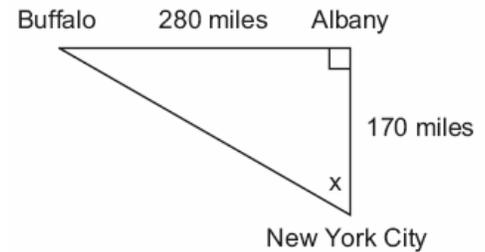
In the accompanying diagram, the base of a 15-foot ladder rests on the ground 4 feet from a 6-foot fence.



- a* If the ladder touches the top of the fence and the side of a building, what angle, to the nearest degree, does the ladder make with the ground?
- b* Using the angle found in part *a*, determine how far the top of the ladder reaches up the side of the building, to the nearest foot.

318. 060231a, P.I. A.A.43, G.G.48

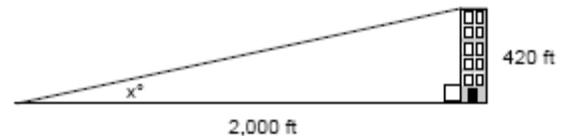
As seen in the accompanying diagram, a person can travel from New York City to Buffalo by going north 170 miles to Albany and then west 280 miles to Buffalo.



- a* If an engineer wants to design a highway to connect New York City directly to Buffalo, at what angle, x , would she need to build the highway? Find the angle to the nearest degree.
- b* To the nearest mile, how many miles would be saved by traveling directly from New York City to Buffalo rather than by traveling first to Albany and then to Buffalo?

319. 089927a, P.I. A.A.43

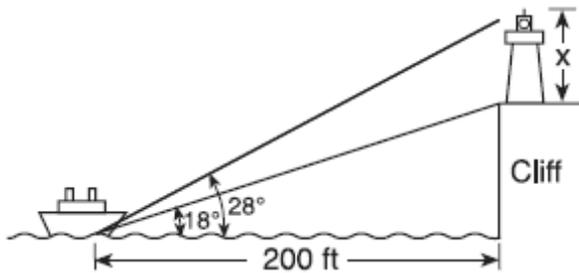
A person standing on level ground is 2,000 feet away from the foot of a 420-foot-tall building, as shown in the accompanying diagram. To the nearest degree, what is the value of x ?



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

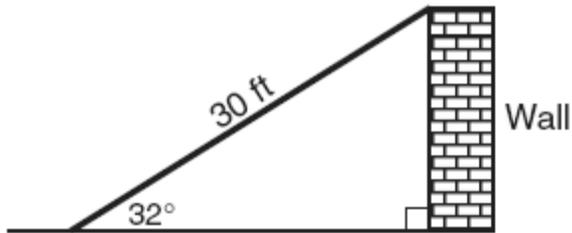
320. 010838a, P.I. A.A.44

A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28° . What is the height of the lighthouse, x , to the nearest tenth of a foot?



321. 080724a, P.I. A.A.44

The accompanying diagram shows a ramp 30 feet long leaning against a wall at a construction site.

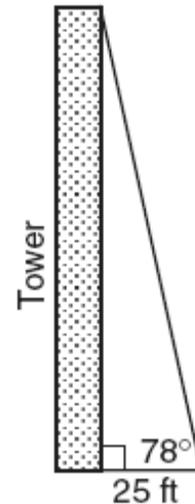


If the ramp forms an angle of 32° with the ground, how high above the ground, to the nearest tenth, is the top of the ramp?

- [A] 15.9 ft [B] 18.7 ft
[C] 25.4 ft [D] 56.6 ft

322. 010735a, P.I. A.A.44

From a point on level ground 25 feet from the base of a tower, the angle of elevation to the top of the tower is 78° , as shown in the accompanying diagram. Find the height of the tower, to the nearest tenth of a foot.

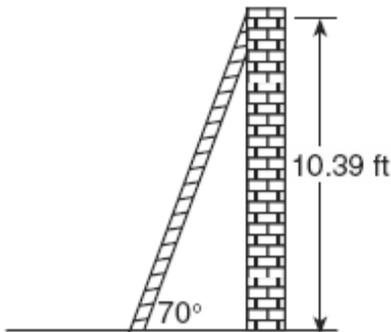


323. 060639a, P.I. A.A.44

A person measures the angle of depression from the top of a wall to a point on the ground. The point is located on level ground 62 feet from the base of the wall and the angle of depression is 52° . How high is the wall, to the nearest tenth of a foot?

324. 010638a, P.I. A.A.44

As shown in the accompanying diagram, a ladder is leaning against a vertical wall, making an angle of 70° with the ground and reaching a height of 10.39 feet on the wall. Find, to the *nearest foot*, the length of the ladder. Find, to the *nearest foot*, the distance from the base of the ladder to the wall.



325. 080536a, P.I. A.A.44

A tree casts a shadow that is 20 feet long. The angle of elevation from the end of the shadow to the top of the tree is 66° . Determine the height of the tree, to the *nearest foot*.

326. 010531a, P.I. A.A.44

In the accompanying diagram, a ladder leaning against a building makes an angle of 58° with level ground. If the distance from the foot of the ladder to the building is 6 feet, find, to the *nearest foot*, how far up the building the ladder will reach.



327. 060419a, P.I. A.A.44

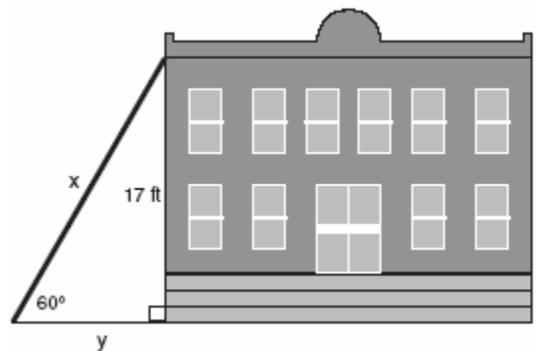
The angle of elevation from a point 25 feet from the base of a tree on level ground to the top of the tree is 30° . Which equation can be used to find the height of the tree?

[A] $\tan 30^\circ = \frac{x}{25}$ [B] $\sin 30^\circ = \frac{x}{25}$

[C] $30^2 + 25^2 = x^2$ [D] $\cos 30^\circ = \frac{x}{25}$

328. 080231a, P.I. A.A.44

In the accompanying diagram, x represents the length of a ladder that is leaning against a wall of a building, and y represents the distance from the foot of the ladder to the base of the wall. The ladder makes a 60° angle with the ground and reaches a point on the wall 17 feet above the ground. Find the number of feet in x and y .



329. 010235a, P.I. A.A.44

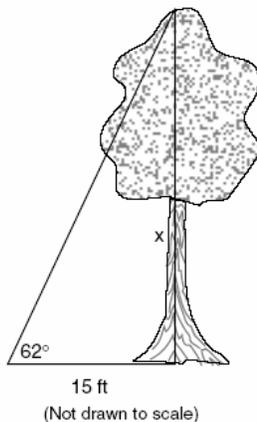
Draw and label a diagram of the path of an airplane climbing at an angle of 11° with the ground. Find, to the *nearest foot*, the ground distance the airplane has traveled when it has attained an altitude of 400 feet.

330. 080133a, P.I. A.A.44
A ship on the ocean surface detects a sunken ship on the ocean floor at an angle of depression of 50° . The distance between the ship on the surface and the sunken ship on the ocean floor is 200 meters. If the ocean floor is level in this area, how far above the ocean floor, to the *nearest meter*, is the ship on the surface?

331. 080108b, P.I. A.A.44
At Mogul's Ski Resort, the beginner's slope is inclined at an angle of 12.3° , while the advanced slope is inclined at an angle of 26.4° . If Rudy skis 1,000 meters down the advanced slope while Valerie skis the same distance on the beginner's slope, how much longer was the horizontal distance that Valerie covered?

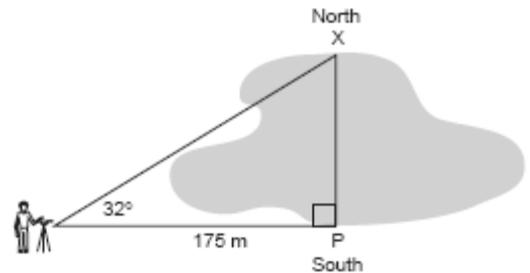
- [A] 977.0 m [B] 895.7 m
[C] 231.6 m [D] 81.3 m

332. 010135a, P.I. A.A.44
Find, to the *nearest tenth of a foot*, the height of the tree represented in the accompanying diagram.



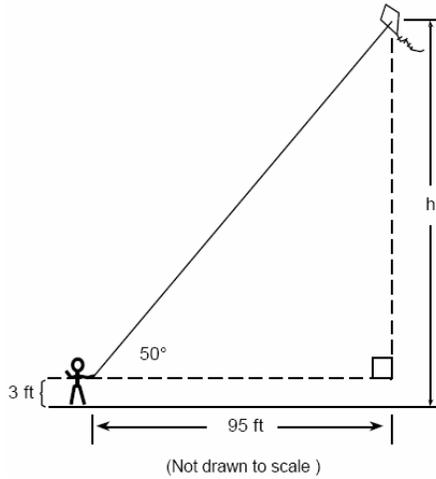
333. 080033a, P.I. A.A.44
A 10-foot ladder is to be placed against the side of a building. The base of the ladder must be placed at an angle of 72° with the level ground for a secure footing. Find, to the *nearest inch*, how far the base of the ladder should be from the side of the building and how far up the side of the building the ladder will reach.

334. 060030a, P.I. A.A.44
A surveyor needs to determine the distance across the pond shown in the accompanying diagram. She determines that the distance from her position to point P on the south shore of the pond is 175 meters and the angle from her position to point X on the north shore is 32° . Determine the distance, PX , across the pond, rounded to the *nearest meter*.



335. 069934a, P.I. A.A.44

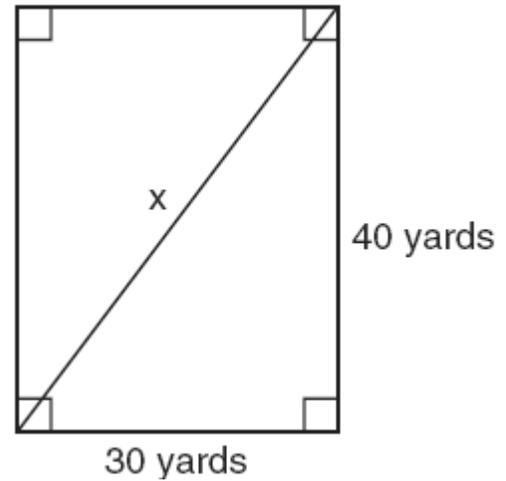
Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is 50° , find the height, h , of his kite, to the nearest foot.



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.

336. 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] 50 [C] 70 [D] 60

337. 080707a, P.I. A.A.45

A cable 20 feet long connects the top of a flagpole to a point on the ground that is 16 feet from the base of the pole. How tall is the flagpole?

- [A] 10 ft [B] 8 ft [C] 12 ft [D] 26 ft

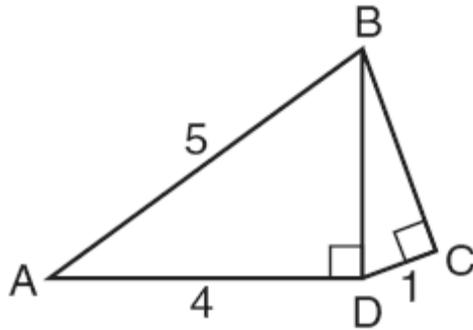
338. 060710a, P.I. A.A.45

If the length of a rectangular television screen is 20 inches and its height is 15 inches, what is the length of its diagonal, in inches?

- [A] 25 [B] 5 [C] 13.2 [D] 35

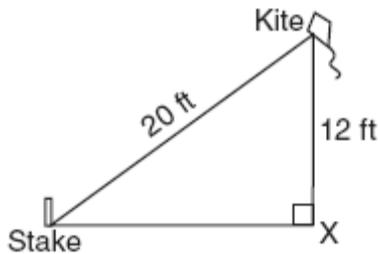
339. 080633a, P.I. A.A.45

In the accompanying diagram of right triangles ABD and DBC , $AB = 5$, $AD = 4$, and $CD = 1$. Find the length of \overline{BC} , to the nearest tenth.



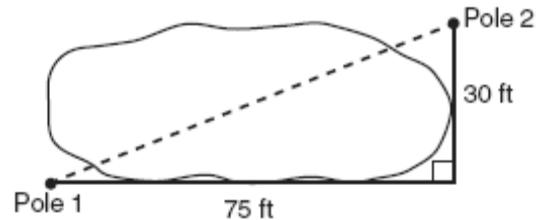
340. 080531a, P.I. A.A.45

The accompanying diagram shows a kite that has been secured to a stake in the ground with a 20-foot string. The kite is located 12 feet from the ground, directly over point X . What is the distance, in feet, between the stake and point X ?



341. 010508a, P.I. A.A.45

The NuFone Communications Company must run a telephone line between two poles at opposite ends of a lake, as shown in the accompanying diagram. The length and width of the lake are 75 feet and 30 feet, respectively.



What is the distance between the two poles, to the nearest foot?

- [A] 81 [B] 69 [C] 105 [D] 45

342. 010202a, P.I. A.A.45

If the length of the legs of a right triangle are 5 and 7, what is the length of the hypotenuse?

- [A] $\sqrt{2}$ [B] $\sqrt{74}$
 [C] $2\sqrt{3}$ [D] $2\sqrt{6}$

343. 080122a, P.I. A.A.45

How many feet from the base of a house must a 39-foot ladder be placed so that the top of the ladder will reach a point on the house 36 feet from the ground?

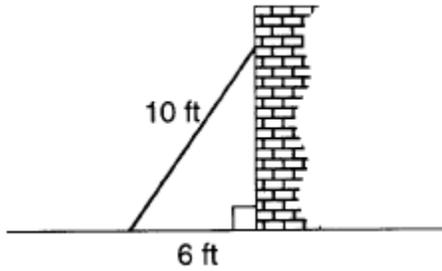
344. 060115a, P.I. A.A.45

A woman has a ladder that is 13 feet long. If she sets the base of the ladder on level ground 5 feet from the side of a house, how many feet above the ground will the top of the ladder be when it rests against the house?

- [A] 8 [B] 11 [C] 12 [D] 9

345. 010023a, P.I. A.A.45

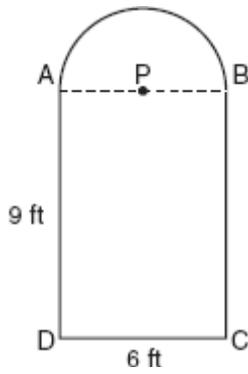
A wall is supported by a brace 10 feet long, as shown in the diagram below. If one end of the brace is placed 6 feet from the base of the wall, how many feet up the wall does the brace reach?



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 area).

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

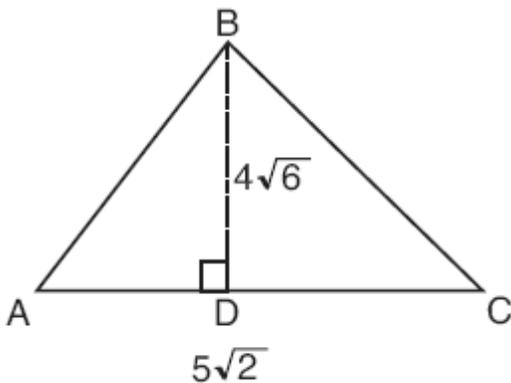
Serena's garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment AB is the diameter of semicircle P . Serena wants to put a fence around her garden.



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

2. 010833a, P.I. A.G.1

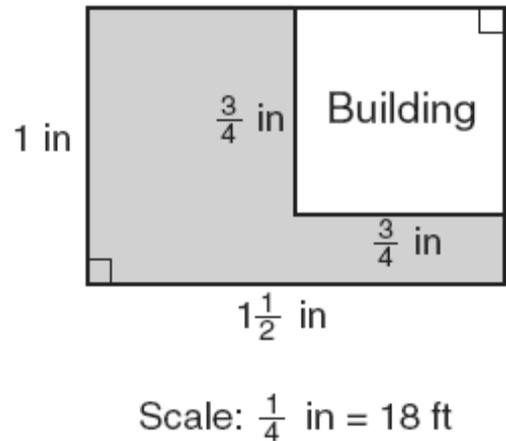
In the accompanying diagram of $\triangle ABC$, altitude $BD = 4\sqrt{6}$ and $AC = 5\sqrt{2}$. Find the area of the triangle to the nearest tenth of a square unit.



(Not drawn to scale)

3. 080738a, P.I. A.G.1

The accompanying diagram represents a scale drawing of the property where Brendan's business is located. He needs to purchase rock salt to melt the ice on the parking lot (shaded area) around his building. A bag of rock salt covers an area of 1,500 square feet. How many bags of rock salt does Brendan need to purchase to salt the entire parking lot?



4. 060713a, P.I. A.G.1

If the base of a triangle is represented by $x + 4$ and the height is represented by $2x$, which expression represents the area of the triangle?

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

5. 010717a, P.I. A.G.1

A circular garden has a diameter of 12 feet. How many bags of topsoil must Linda buy to cover the garden if one bag covers an area of 3 square feet?

- [A] 38 [B] 151 [C] 40 [D] 13

6. 060631a, P.I. A.G.1

Determine the area, in square feet, of the smallest square that can contain a circle with a radius of 8 feet.

7. 060611a, P.I. A.G.1
The second side of a triangle is two more than the first side, and the third side is three less than the first side. Which expression represents the perimeter of the triangle?

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

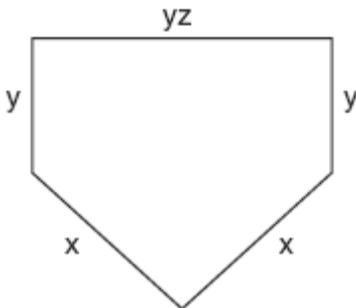
8. 010617a, P.I. A.G.1
A dog is tied with a rope to a stake in the ground. The length of the rope is 5 yards. What is the area, in square yards, in which the dog can roam?

[A] 25 [B] 25π [C] 20 [D] 10π

9. 010608a, P.I. A.G.1
The equation $A = \frac{1}{2}(12)(3 + 7)$ is used to find the area of a trapezoid. Which calculation would *not* result in the correct area?

[A] $\frac{12(3+7)}{2}$ [B] $\frac{12}{2} \times \frac{10}{2}$
[C] $6(3+7)$ [D] $0.5(12)(10)$

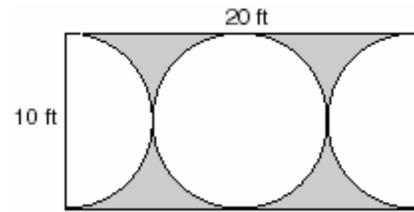
10. 010603a, P.I. A.G.1
The lengths of the sides of home plate in a baseball field are represented by the expressions in the accompanying figure.



Which expression represents the perimeter of the figure?

[A] $2x + 3yz$ [B] $5xyz$
[C] $x^2 + y^3z$ [D] $2x + 2y + yz$

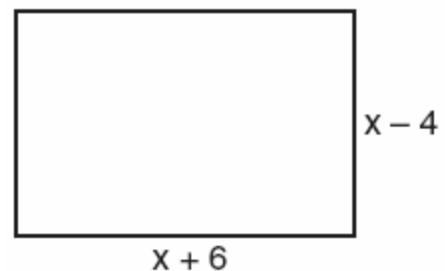
11. 080539a, P.I. A.G.1
Mr. Petri has a rectangular plot of land with length = 20 feet and width = 10 feet. He wants to design a flower garden in the shape of a circle with two semicircles at each end of the center circle, as shown in the accompanying diagram. He will fill in the shaded area with wood chips. If one bag of wood chips covers 5 square feet, how many bags must he buy?



12. 060527a, P.I. A.G.1
The length of a side of a square window in Jessica's bedroom is represented by $2x - 1$. Which expression represents the area of the window?

[A] $4x^2 + 4x - 1$ [B] $4x^2 - 4x + 1$
[C] $2x^2 + 1$ [D] $4x^2 + 1$

13. 060437a, P.I. A.G.1
Express both the perimeter and the area of the rectangle shown in the accompanying diagram as polynomials in simplest form.



14. 010437a, P.I. A.G.1
A wheel has a radius of 5 feet. What is the minimum number of *complete* revolutions that the wheel must make to roll at least 1,000 feet?

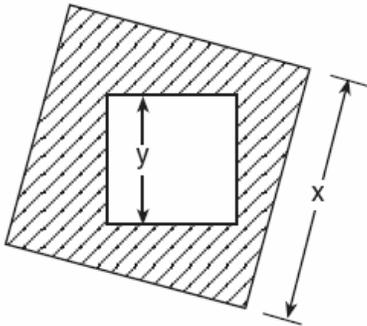
15. 010417b, P.I. A.G.1

A garden in the shape of an equilateral triangle has sides whose lengths are 10 meters. What is the area of the garden?

- [A] 50 m^2 [B] 25 m^2
[C] $25\sqrt{3} \text{ m}^2$ [D] $50\sqrt{3} \text{ m}^2$

16. 060302a, P.I. A.G.1

The accompanying diagram shows a square with side y inside a square with side x .



Which expression represents the area of the shaded region?

- [A] $x^2 - y^2$ [B] x^2
[C] y^2 [D] $y^2 - x^2$

17. 010335a, P.I. A.G.1

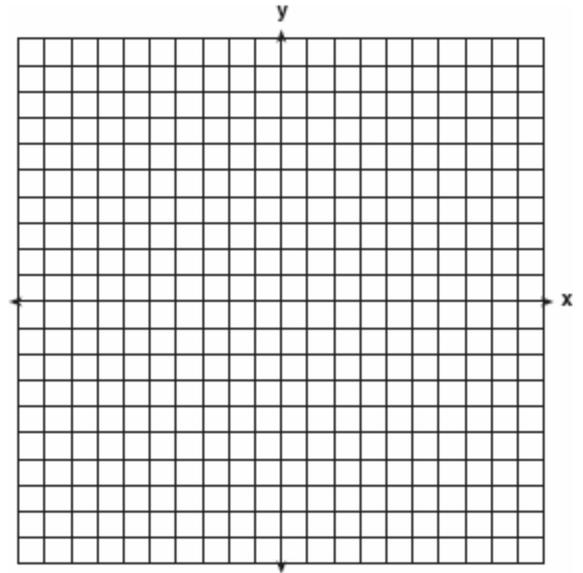
On the accompanying set of axes, graph and label the following lines:

$$y = 5$$

$$x = -4$$

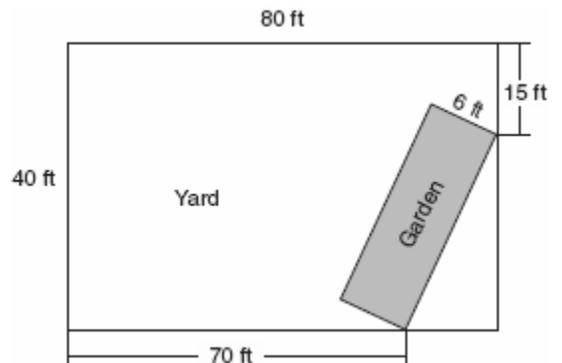
$$y = \frac{5}{4}x + 5$$

Calculate the area, in square units, of the triangle formed by the three points of intersection.



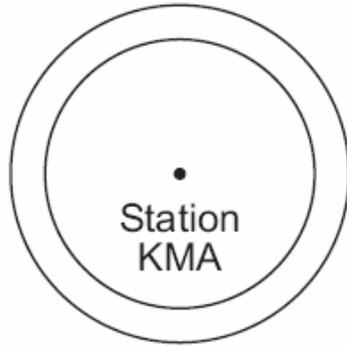
18. 010330a, P.I. A.G.1

A rectangular garden is going to be planted in a person's rectangular backyard, as shown in the accompanying diagram. Some dimensions of the backyard and the width of the garden are given. Find the area of the garden to the *nearest square foot*.



19. 060228a, P.I. A.G.1

As shown in the accompanying diagram, radio station KMA is increasing its radio listening radius from 40 miles to 50 miles. How many additional square miles of listening area, to the *nearest tenth*, will the radio station gain?



20. 010215b, P.I. A.G.1

Every time the pedals go through a 360° rotation on a certain bicycle, the tires rotate three times. If the tires are 24 inches in diameter, what is the minimum number of complete rotations of the pedals needed for the bicycle to travel at least 1 mile?

[A] 281 [B] 561 [C] 12 [D] 5,280

21. 010212a, P.I. A.G.1

What is the area of a square whose perimeter is represented by $12x$?

[A] $12x^2$ [B] $144x^2$
[C] $9x^2$ [D] $6x\sqrt{2}$

22. 010202b, P.I. A.G.1

Chad had a garden that was in the shape of a rectangle. Its length was twice its width. He decided to make a new garden that was 2 feet longer and 2 feet wider than his first garden. If x represents the original width of the garden, which expression represents the difference between the area of his new garden and the area of the original garden?

[A] $6x + 4$ [B] $x^2 + 3x + 2$
[C] 8 [D] $2x^2$

23. 080130b, P.I. A.G.1

A small, open-top packing box, similar to a shoebox without a lid, is three times as long as it is wide, and half as high as it is long. Each square inch of the bottom of the box costs \$0.008 to produce, while each square inch of any side costs \$0.003 to produce. Write a function for the cost of the box described above. Using this function, determine the dimensions of a box that would cost \$0.69 to produce.

24. 080124a, P.I. A.G.1

An engineer measured the dimensions for a rectangular site by using a wooden pole of unknown length x . The length of the rectangular site is 2 pole measures increased by 3 feet, while the width is 1 pole measure decreased by 4 feet. Write an algebraic representation, in terms of x , for the perimeter of the site.

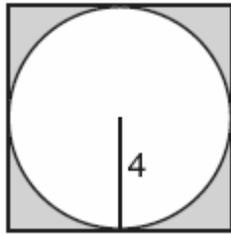
25. 080108a, P.I. A.G.1

What is the approximate circumference of a circle with radius 3?

[A] 18.85 [B] 7.07
[C] 28.27 [D] 9.42

26. 080105a, P.I. A.G.1

In the accompanying diagram, a circle with radius 4 is inscribed in a square.

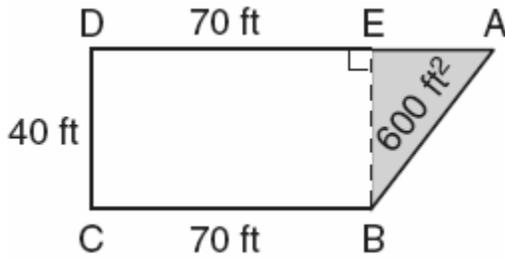


What is the area of the shaded region?

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

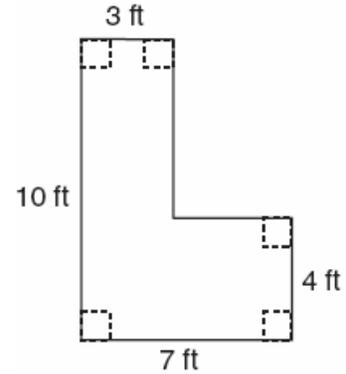
27. 060134a, P.I. A.G.1

The plan of a parcel of land is represented by trapezoid $ABCD$ in the accompanying diagram. If the area of $\triangle ABE$ is 600 square feet, find the minimum number of feet of fence needed to completely enclose the entire parcel of land, $ABCD$.



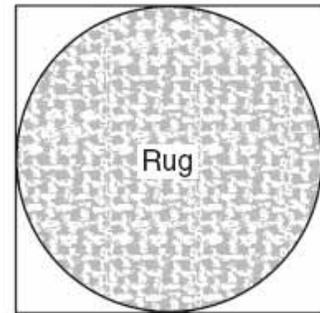
28. 060132a, P.I. A.G.1

Keesha wants to tile the floor shown in the accompanying diagram. If each tile measures 1 foot by 1 foot and costs \$2.99, what will be the total cost, including an 8% sales tax, for tiling the floor?



29. 060129a, P.I. A.G.1

Virginia has a circular rug on her square living room floor, as represented in the accompanying diagram. If her entire living room floor measures 100 square feet, what is the area of the part of the floor covered by the rug?



30. 080031a, P.I. A.G.1

Mr. Santana wants to carpet exactly half of his rectangular living room. He knows that the perimeter of the room is 96 feet and that the length of the room is 6 feet longer than the width. How many square feet of carpeting does Mr. Santana need?

31. 080027a, P.I. A.G.1

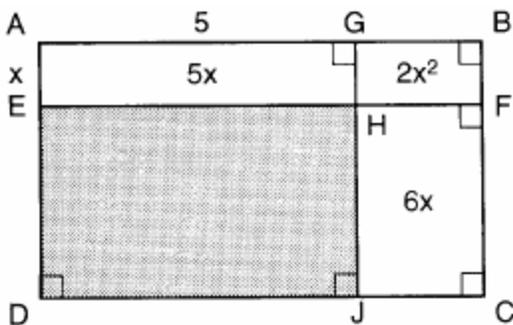
To measure the length of a hiking trail, a worker uses a device with a 2-foot-diameter wheel that counts the number of revolutions the wheel makes. If the device reads 1,100.5 revolutions at the end of the trail, how many miles long is the trail, to the *nearest tenth of a mile*?

32. 080023a, P.I. A.G.1

Kerry is planning a rectangular garden that has dimensions of 4 feet by 6 feet. Kerry wants one-half of the garden to have roses, and she says that the rose plot will have dimensions of 2 feet by 3 feet. Is she correct? Explain.

33. 010028a, P.I. A.G.1

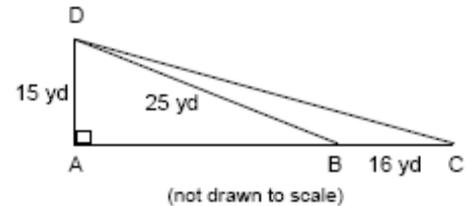
In the figure below, the large rectangle, $ABCD$, is divided into four smaller rectangles. The area of rectangle $AEHG = 5x$, the area of rectangle $GHFB = 2x^2$, the area of rectangle $HJCF = 6x$, segment $AG = 5$, and segment $AE = x$.



- a Find the area of the shaded region.
b Write an expression for the area of the rectangle $ABCD$ in terms of x .

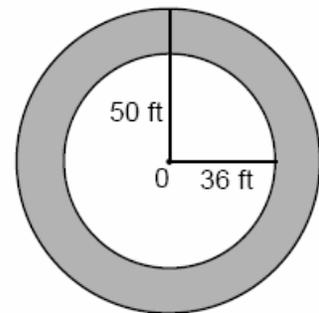
34. 089934a, P.I. A.G.1

Mr. Gonzalez owns a triangular plot of land BCD with $DB = 25$ yards and $BC = 16$ yards. He wishes to purchase the adjacent plot of land in the shape of right triangle ABD , as shown in the accompanying diagram, with $AD = 15$ yards. If the purchase is made, what will be the total number of square yards in the area of his plot of land, $\triangle ACD$?



35. 089932a, P.I. A.G.1

If asphalt pavement costs \$0.78 per square foot, determine, to the *nearest cent*, the cost of paving the shaded circular road with center O , an outside radius of 50 feet, and an inner radius of 36 feet, as shown in the accompanying diagram.



36. 089920a, P.I. A.G.1

What is the perimeter of an equilateral triangle whose height is $2\sqrt{3}$?

- [A] $12\sqrt{3}$ [B] 12 [C] 6 [D] $6\sqrt{3}$

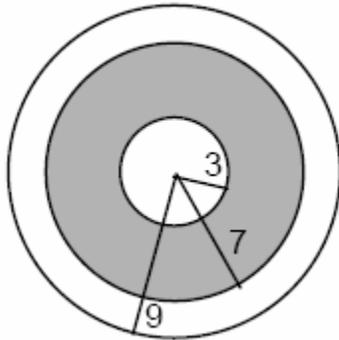
37. 089905a, P.I. A.G.1

The Pentagon building in Washington, D.C., is shaped like a regular pentagon. If the length of one side of the Pentagon is represented by $n + 2$, its perimeter would be represented by

- [A] $n + 10$ [B] $10n$
[C] $5n + 2$ [D] $5n + 10$

38. 069931a, P.I. A.G.1

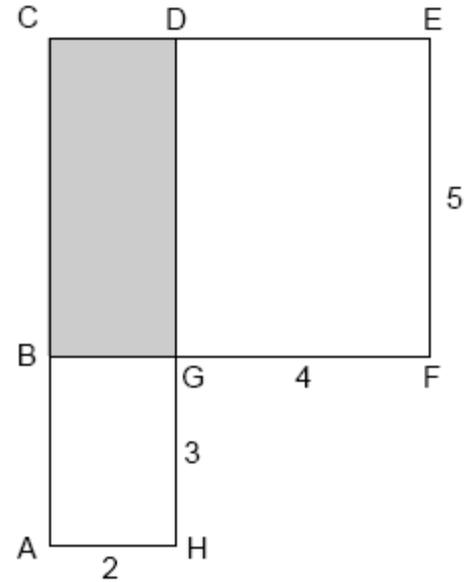
A target shown in the accompanying diagram consists of three circles with the same center. The radii of the circles have lengths of 3 inches, 7 inches, and 9 inches.



- a What is the area of the shaded region to the nearest tenth of a square inch?
b To the nearest percent, what percent of the target is shaded?

39. 069916a, P.I. A.G.1

In the accompanying figure, $ACDH$ and $BCEF$ are rectangles, $AH = 2$, $GH = 3$, $GF = 4$, and $FE = 5$.



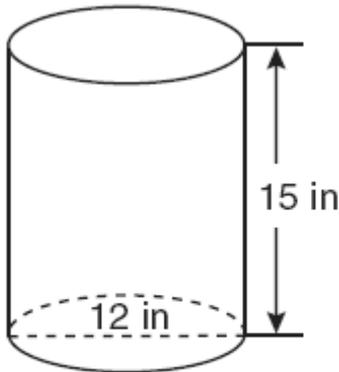
What is the area of $BCDG$?

- [A] 10 [B] 6 [C] 20 [D] 8

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

40. 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] 6,785.8 [B] 2,160.0
[C] 1,696.5 [D] 4,241.2

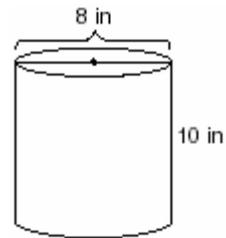
41. 010802a, P.I. A.G.2

A block of wood is 5 inches long, 2 inches wide, and 3 inches high. What is the volume of this block of wood?

- [A] 30 in^3 [B] 25 in^3
[C] 10 in^3 [D] 38 in^3

42. 060530a, P.I. A.G.2

A storage container in the shape of a right circular cylinder is shown in the accompanying diagram.

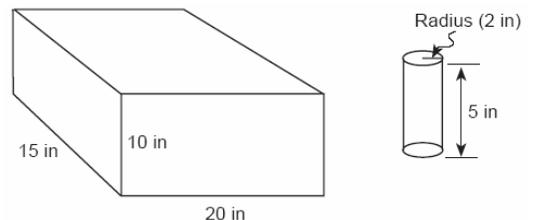


What is the volume of this container, to the nearest hundredth?

- [A] 125.66 in^3 [B] 502.65 in^3
[C] 251.33 in^3 [D] 56.55 in^3

43. 010227a, P.I. A.G.2

In the accompanying diagram, a rectangular container with the dimensions 10 inches by 15 inches by 20 inches is to be filled with water, using a cylindrical cup whose radius is 2 inches and whose height is 5 inches. What is the maximum number of full cups of water that can be placed into the container without the water overflowing the container?



44. 010123a, P.I. A.G.2

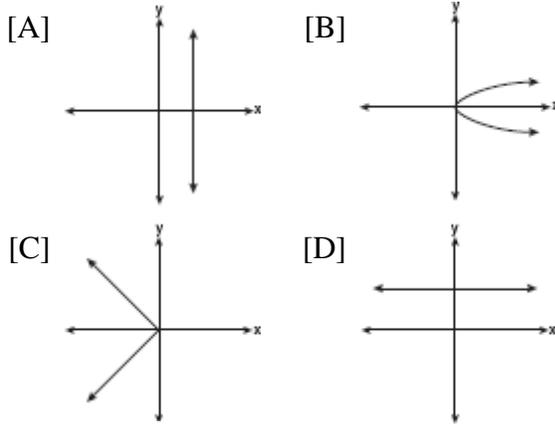
A cardboard box has length $x - 2$, width $x + 1$, and height $2x$.

- a Write an expression, in terms of x , to represent the volume of the box.
b If $x = 8$ centimeters, what is the number of cubic centimeters in the volume of the box?

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

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

Which graph represents a function?



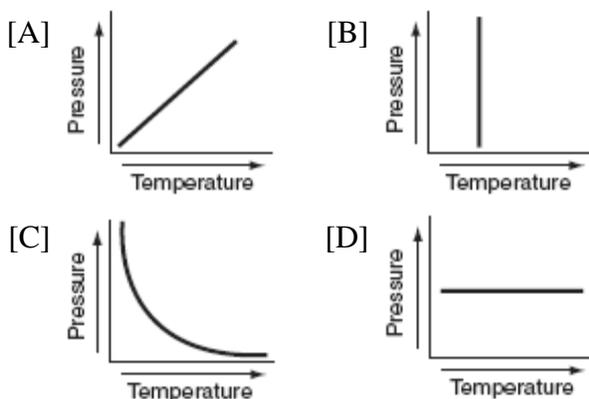
46. 060715b, P.I. A.G.3

Which set of ordered pairs does *not* represent a function?

- [A] $\{(3,-2), (5,-2), (4,-2), (-1,-2)\}$
- [B] $\{(3,-2), (-2,3), (4,-1), (-1,4)\}$
- [C] $\{(3,-2), (3,-4), (4,-1), (4,-3)\}$
- [D] $\{(3,-2), (4,-3), (5,-4), (6,-5)\}$

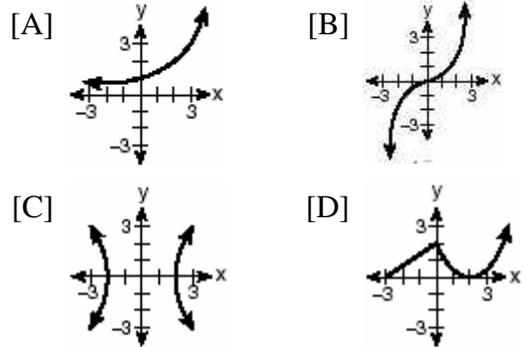
47. 060601b, P.I. A.G.3

Each graph below represents a possible relationship between temperature and pressure. Which graph does *not* represent a function?



48. 010511b, P.I. A.G.3

Which graph is *not* a function?



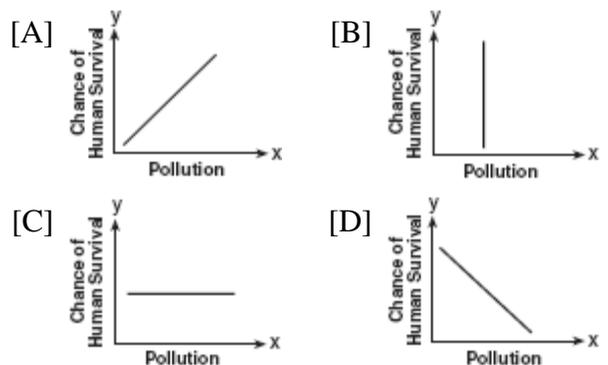
49. 080403b, P.I. A.G.3

Which set of ordered pairs is *not* a function?

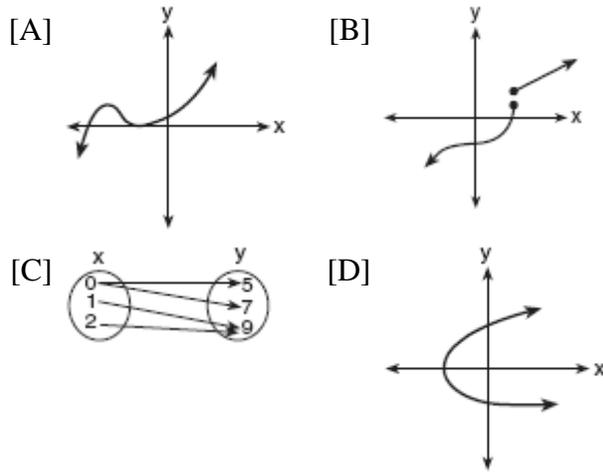
- [A] $\{(0,0), (1,1), (2,2), (3,3)\}$
- [B] $\{(1,2), (3,4), (4,5), (5,6)\}$
- [C] $\{(4,1), (5,1), (6,1), (7,1)\}$
- [D] $\{(3,1), (2,1), (1,2), (3,2)\}$

50. 080301b, P.I. A.G.3

Which graph does not represent a function of x ?

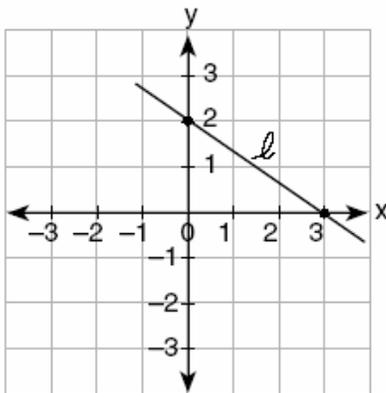


51. 060310b, P.I. A.G.3
Which diagram represents a relation in which each member of the domain corresponds to only one member of its range?



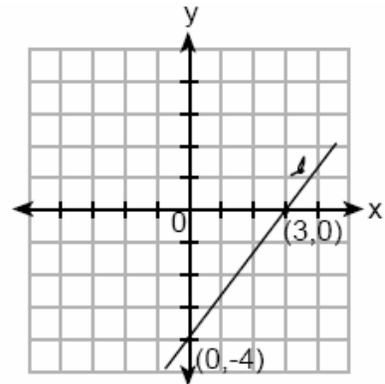
8.G.13: Determine the slope of a line from a graph and explain the meaning of slope as a constant rate of change.

52. 010115a, P.I. 8.G.13
What is the slope of line l in the accompanying diagram?



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

53. 069918a, P.I. 8.G.13
What is the slope of line l shown in the accompanying diagram?



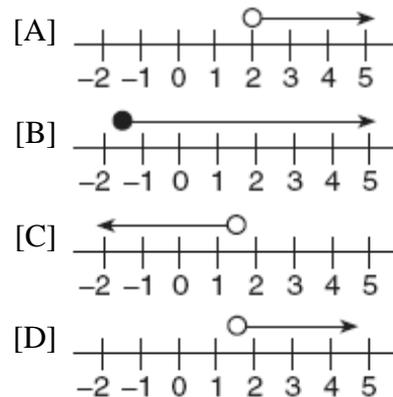
- [A] $-\frac{3}{4}$ [B] $\frac{3}{4}$ [C] $\frac{4}{3}$ [D] $-\frac{4}{3}$

8.G.16: Determine the equation of a line given the slope and the y-intercept.

54. 010408a, P.I. 8.G.16
An equation of the line that has a slope of 3 and a y-intercept of -2 is
- [A] $y = -x$ [B] $y = 3x - 2$
[C] $y = -2x + 3$ [D] $x = 3y - 2$

8.G.19: Graph the solution set of an inequality on a number line.

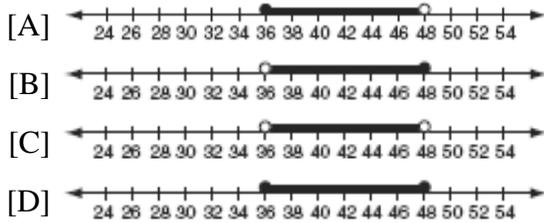
55. 060616a, P.I. 8.G.19
Which graph best represents the solution set for the inequality $x > \sqrt{2}$?



56. 010610a, P.I. 8.G.19

In order to be admitted for a certain ride at an amusement park, a child must be greater than or equal to 36 inches tall and less than 48 inches tall. Which graph represents these conditions?

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



57. 060532a, P.I. 8.G.19

The manufacturer of Ron's car recommends that the tire pressure be at least 26 pounds per square inch and less than 35 pounds per square inch. On the accompanying number line, graph the inequality that represents the recommended tire pressure.



58. 080411a, P.I. 8.G.19

Which inequality is represented in the accompanying graph?



- [A] $-3 \leq x \leq 4$ [B] $-3 < x \leq 4$
 [C] $-3 \leq x < 4$ [D] $-3 < x < 4$

59. 060001a, P.I. 8.G.19

Which inequality is represented in the graph below?

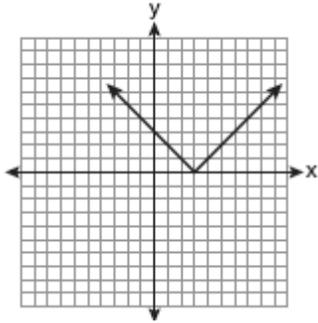


- [A] $-4 \leq x \leq 2$ [B] $-4 < x \leq 2$
 [C] $-4 \leq x < 2$ [D] $-4 < x < 2$

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

The diagram below shows the graph of

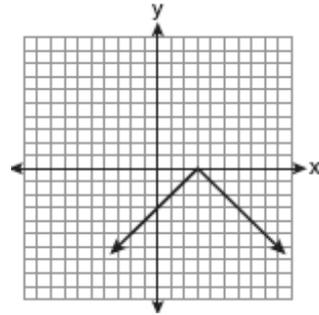
$$y = |x - 3|.$$



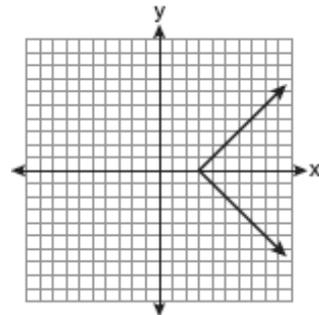
Which diagram shows the graph of

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

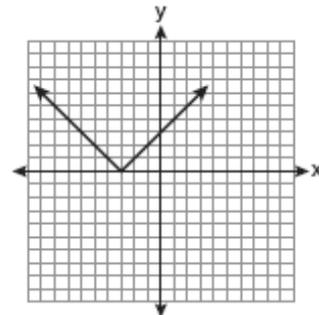
[A]



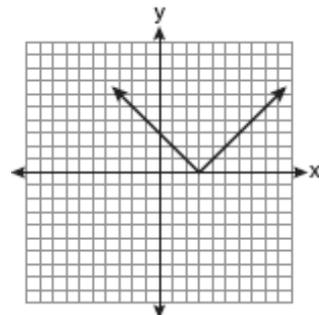
[B]



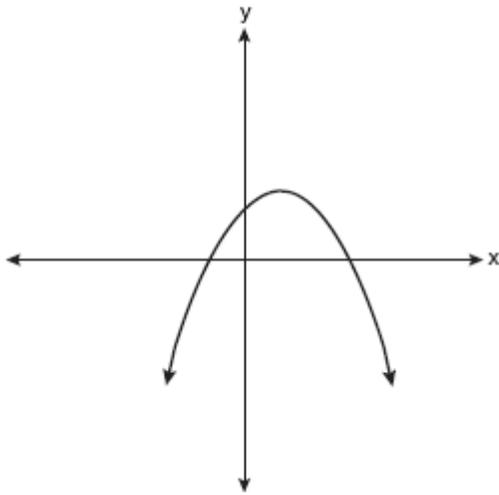
[C]



[D]

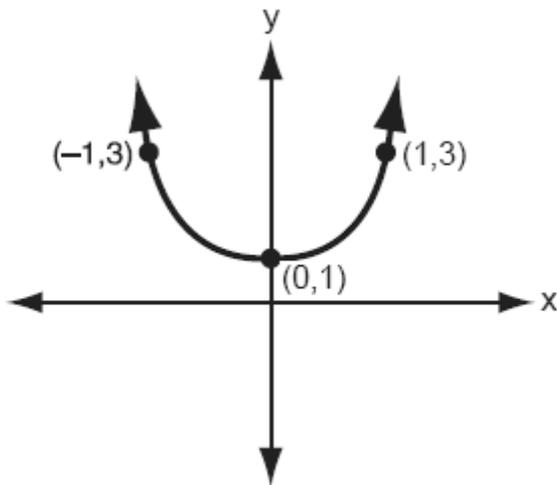


61. fall0717ia, P.I. A.G.4
Which type of graph is shown in the diagram below?



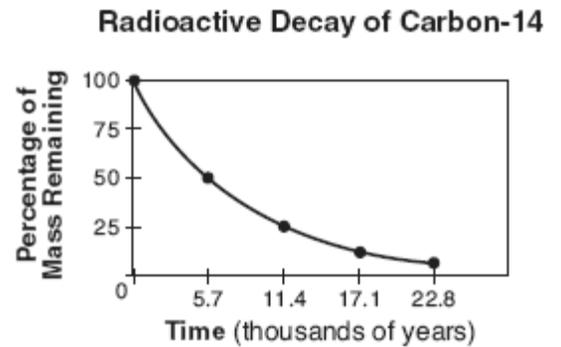
- [A] quadratic [B] linear
[C] exponential [D] absolute value

62. 010801b, P.I. A.G.4
Which equation is represented by the accompanying graph?



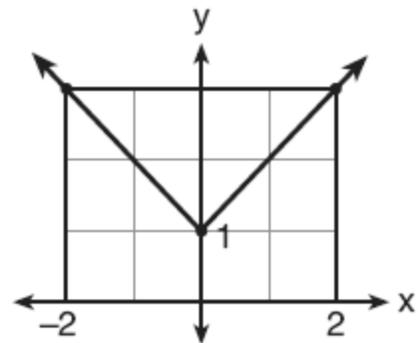
- [A] $y = 2(x^2 + 1)$ [B] $y = 2x^2 + 1$
[C] $y = x^2$ [D] $y = 2x^2$

63. 080710b, P.I. A.G.4
Which type of function could be used to model the data shown in the accompanying graph?



- [A] linear [B] trigonometric
[C] quadratic [D] exponential

64. 080707b, P.I. A.G.4
Which equation represents the function shown in the accompanying graph?

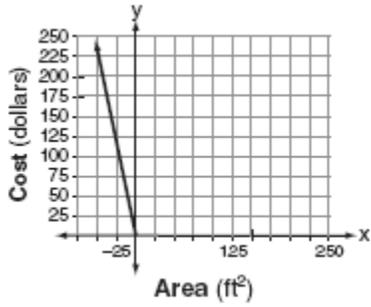


- [A] $f(x) = |x - 1|$ [B] $f(x) = |x + 1|$
[C] $f(x) = |x| + 1$ [D] $f(x) = |x| - 1$

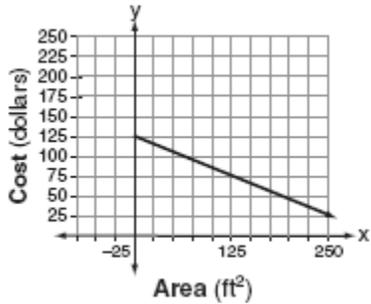
65. 080703a, P.I. A.G.4

Super Painters charges \$1.00 per square foot plus an additional fee of \$25.00 to paint a living room. If x represents the area of the walls of Francesca's living room, in square feet, and y represents the cost, in dollars, which graph best represents the cost of painting her living room?

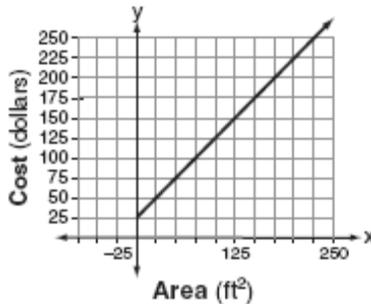
[A]



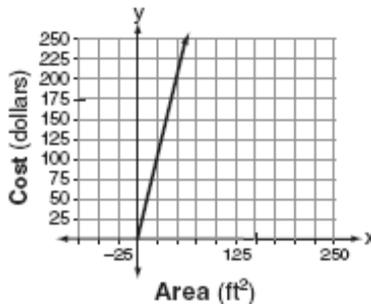
[B]



[C]

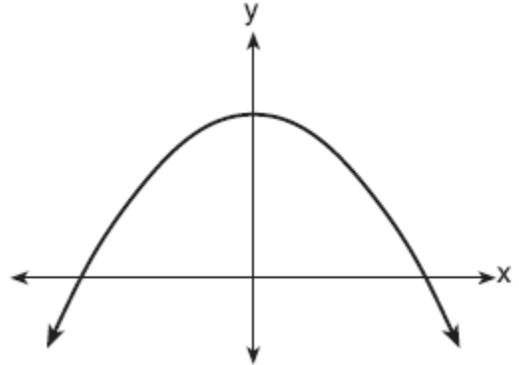


[D]



66. 060703b, P.I. A.G.4

Which equation is best represented by the accompanying graph?



[A] $y = -x^2 + 1$

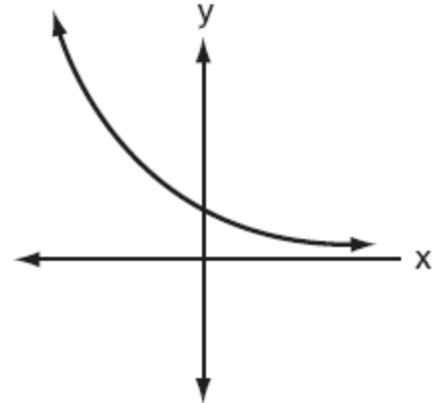
[B] $y = 6x^2$

[C] $y = 6^x$

[D] $y = 6x + 1$

67. 010701b, P.I. A.G.4

Which equation best represents the accompanying graph?



[A] $y = x^2 + 2$

[B] $y = 2^x$

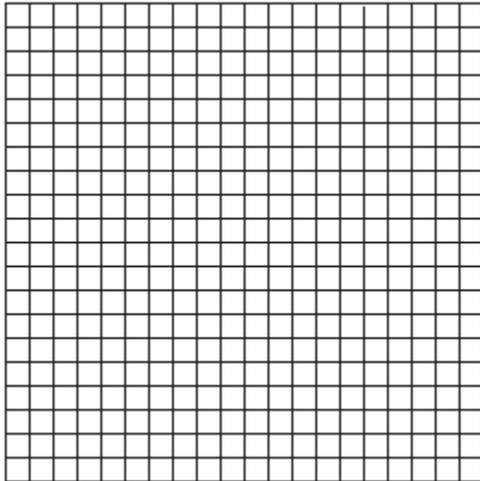
[C] $y = -2^x$

[D] $y = 2^{-x}$

68. 060632b, P.I. A.G.4

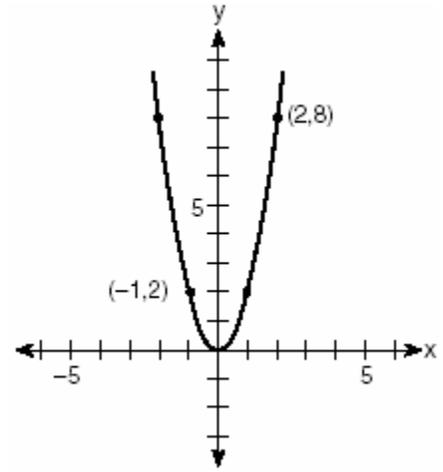
A small rocket is launched from a height of 72 feet. The height of the rocket in feet, h , is represented by the equation

$h(t) = -16t^2 + 64t + 72$, where $t =$ time, in seconds. Graph this equation on the accompanying grid. Use your graph to determine the number of seconds that the rocket will remain at or above 100 feet from the ground. [Only a graphic solution can receive full credit.]



69. 060404b, P.I. A.G.4

Which quadratic function is shown in the accompanying graph?



[A] $y = -\frac{1}{2}x^2$

[B] $y = 2x^2$

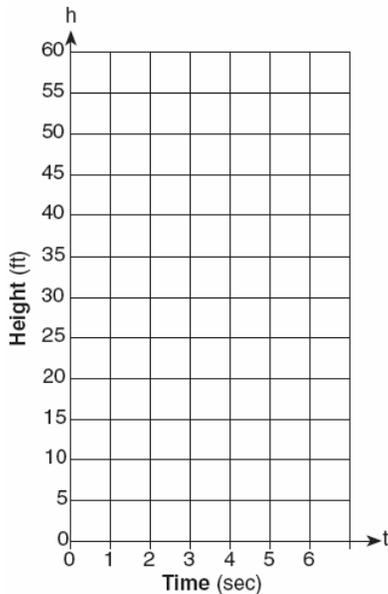
[C] $y = -2x^2$

[D] $y = \frac{1}{2}x^2$

70. 010439a, P.I. A.G.4

Tom throws a ball into the air. The ball travels on a parabolic path represented by the equation $h = -8t^2 + 40t$, where h is the height, in feet, and t is the time, in seconds.

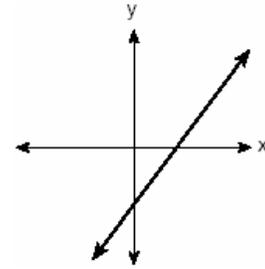
a On the accompanying set of axes, graph the equation from $t = 0$ to $t = 5$ seconds, including all integral values of t from 0 to 5.



b What is the value of t at which h has its greatest value?

71. 010414b, P.I. A.G.4

The graph below represents $f(x)$.



Which graph best represents $|f(x)|$?

- [A] (1)
- [B] (3)
- [C] (2)
- [D] (4)

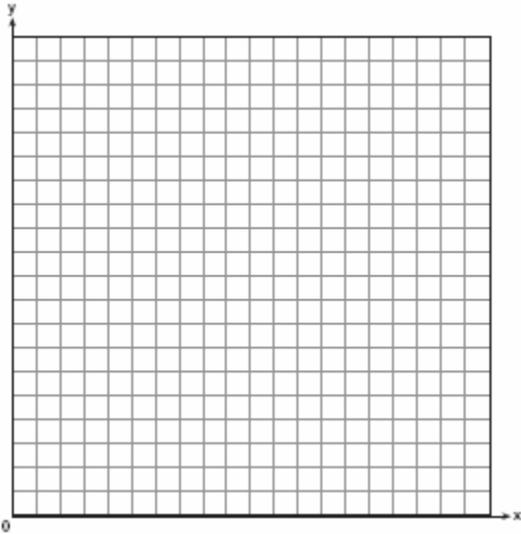
72. 080304b, P.I. A.G.4

The strength of a medication over time is represented by the equation $y = 200(1.5)^{-x}$, where x represents the number of hours since the medication was taken and y represents the number of micrograms per millimeter left in the blood. Which graph best represents this relationship?

- [A] (A)
- [B] (B)
- [C] (C)
- [D] (D)

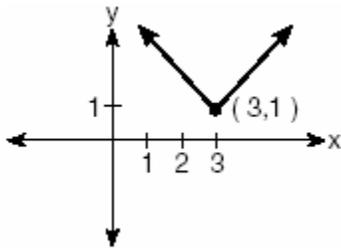
73. 060333a, P.I. A.G.4

An architect is designing a museum entranceway in the shape of a parabolic arch represented by the equation $y = -x^2 + 20x$, where $0 \leq x \leq 20$ and all dimensions are expressed in feet. On the accompanying set of axes, sketch a graph of the arch and determine its maximum height, in feet.



74. 060314b, P.I. A.G.4

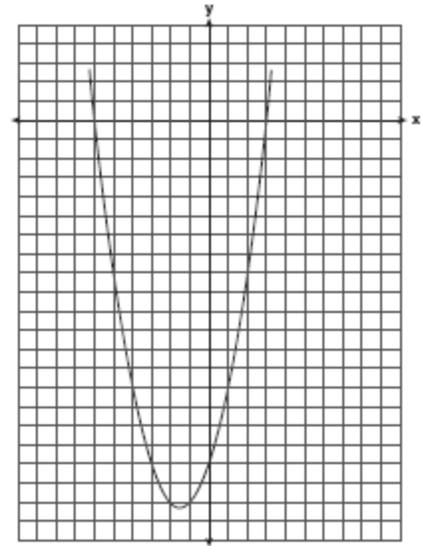
Which equation is represented by the accompanying graph?



- [A] $y = |x + 3| - 1$ [B] $y = (x - 3)^2 + 1$
 [C] $y = |x| - 3$ [D] $y = |x - 3| + 1$

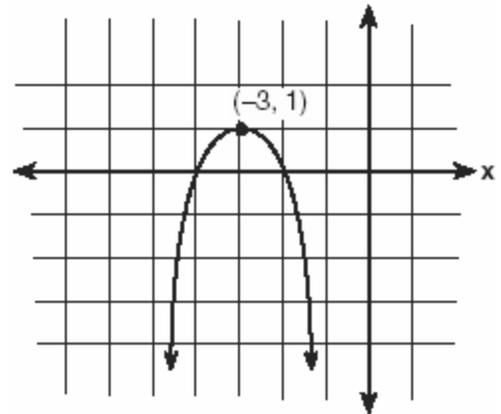
75. 010328a, P.I. A.G.4

The graph of a quadratic equation is shown in the accompanying diagram. The scale on the axes is a unit scale. Write an equation of this graph in standard form.



76. 010303b, P.I. A.G.4

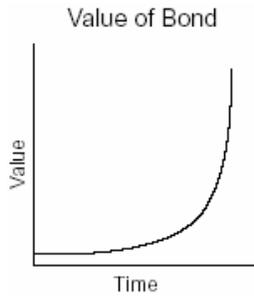
Which equation represents the parabola shown in the accompanying graph?



- [A] $f(x) = (x + 1)^2 - 3$
 [B] $f(x) = -(x - 3)^2 + 1$
 [C] $f(x) = -(x - 3)^2 - 3$
 [D] $f(x) = -(x + 3)^2 + 1$

77. 010203b, P.I. A.G.4

The accompanying graph represents the value of a bond over time.

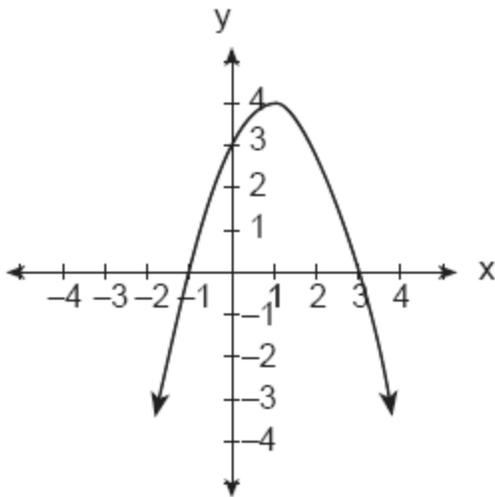


Which type of function does this graph best model?

- [A] trigonometric [B] quadratic
[C] logarithmic [D] exponential

78. 080017a, P.I. A.G.4

Which is an equation of the parabola shown in the accompanying diagram?

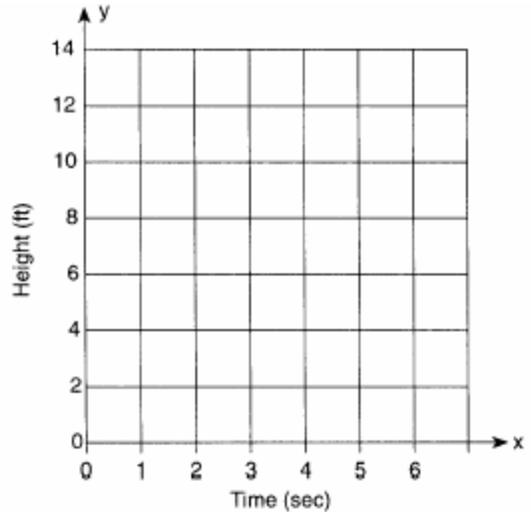


- [A] $y = -x^2 + 2x + 3$ [B] $y = x^2 - 2x + 3$
[C] $y = x^2 + 2x + 3$ [D] $y = -x^2 - 2x + 3$

79. 010031a, P.I. A.G.4

Amy tossed a ball in the air in such a way that the path of the ball was modeled by the equation $y = -x^2 + 6x$. In the equation, y represents the height of the ball in feet and x is the time in seconds.

a Graph $y = -x^2 + 6x$ for $0 \leq x \leq 6$ on the grid provided below.

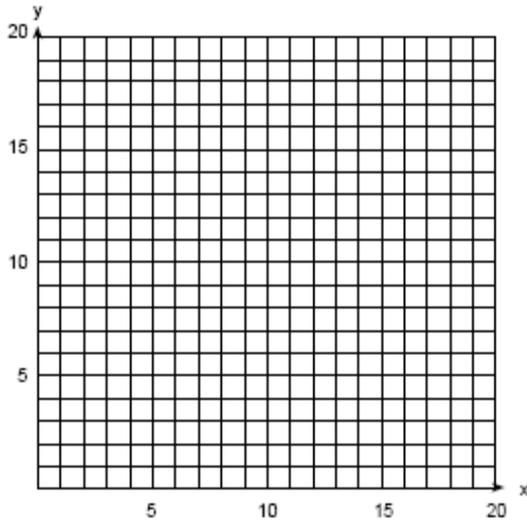


b At what time, x , is the ball at its highest point?

80. 089933a, P.I. A.G.4

An arch is built so that it is 6 feet wide at the base. Its shape can be represented by a parabola with the equation $y = -2x^2 + 12x$, where y is the height of the arch.

a Graph the parabola from $x = 0$ to $x = 6$ on the grid below.

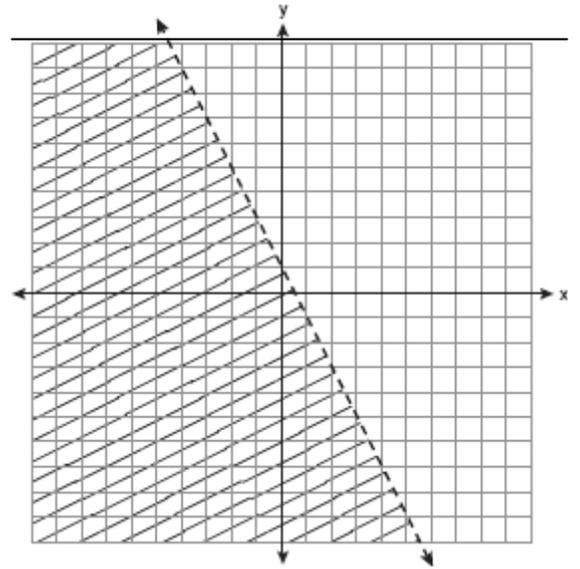


b Determine the maximum height, y , of the arch.

A.G.6: Graph linear inequalities.

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

Which inequality is represented by the graph below?

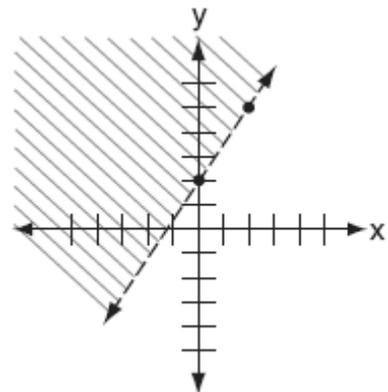


[A] $y < \frac{1}{2}x + 1$ [B] $y < 2x + 1$

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

82. 010828a, P.I. A.G.6

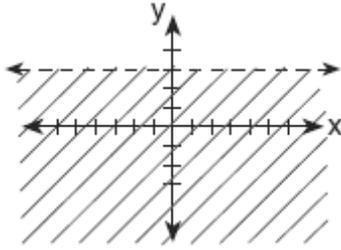
Which inequality is shown in the accompanying diagram?



[A] $y > \frac{3}{2}x + 2$ [B] $y \geq \frac{3}{2}x + 2$

[C] $y \leq \frac{3}{2}x + 2$ [D] $y < \frac{3}{2}x + 2$

83. 010629a, P.I. A.G.6
 Which inequality is represented by the accompanying graph?



- [A] $y \geq 3$ [B] $y < 3$
 [C] $y \leq 3$ [D] $y > 3$

84. 080220a, A.G.6
 In the graph of $y \leq -x$, which quadrant is completely shaded?
 [A] II [B] IV [C] III [D] I

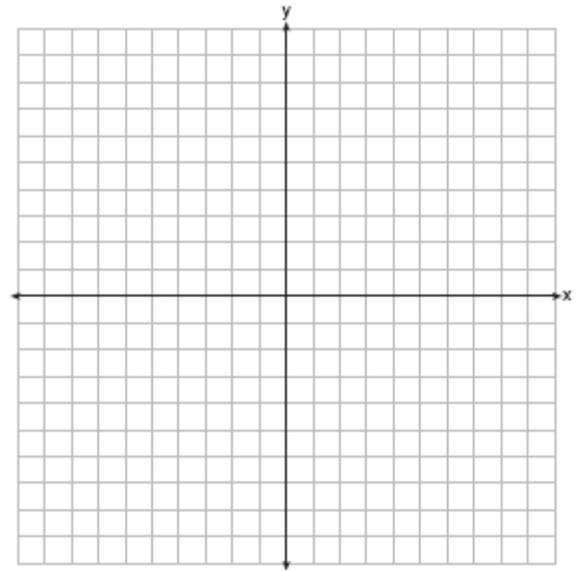
A.G.7: Graph and solve systems of linear equations and inequalities with rational coefficients in two variables.

85. 010738a, P.I. A.G.7
 Graph the following systems of inequalities on the accompanying set of axes and label the solution set S:

$$y > x - 4$$

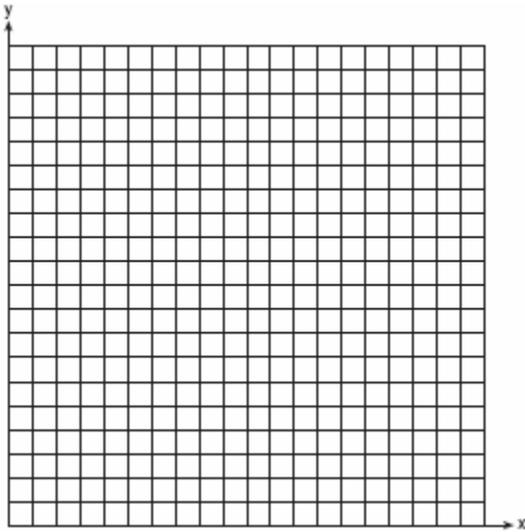
$$y + x \geq 2$$

[Only a graphic solution can receive full credit.]



86. 010234a, P.I. A.G.7

A company manufactures bicycles and skateboards. The company's daily production of bicycles cannot exceed 10, and its daily production of skateboards must be less than or equal to 12. The combined number of bicycles and skateboards cannot be more than 16. If x is the number of bicycles and y is the number of skateboards, graph on the accompanying set of axes the region that contains the number of bicycles and skateboards the company can manufacture daily.

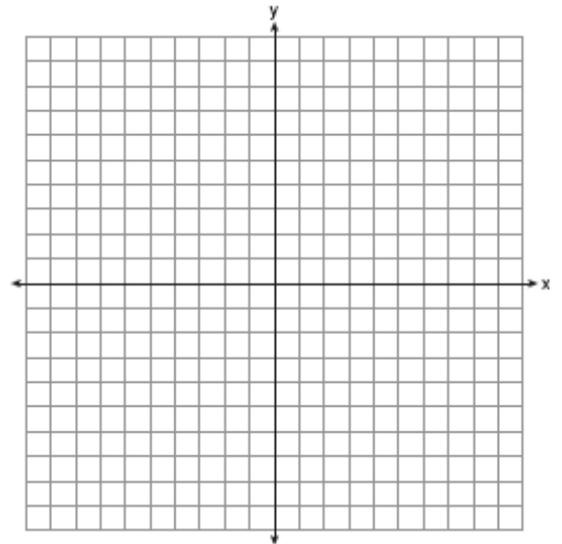


A.G.9: Solve systems of linear and quadratic equations graphically. Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.

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

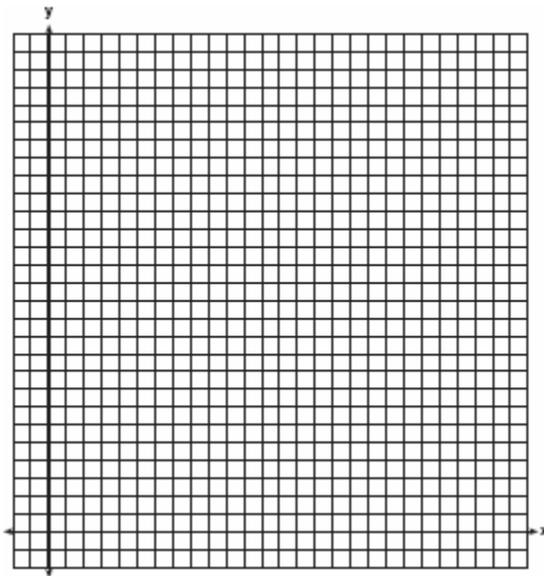
Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

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



88. 060235a, P.I. A.G.9

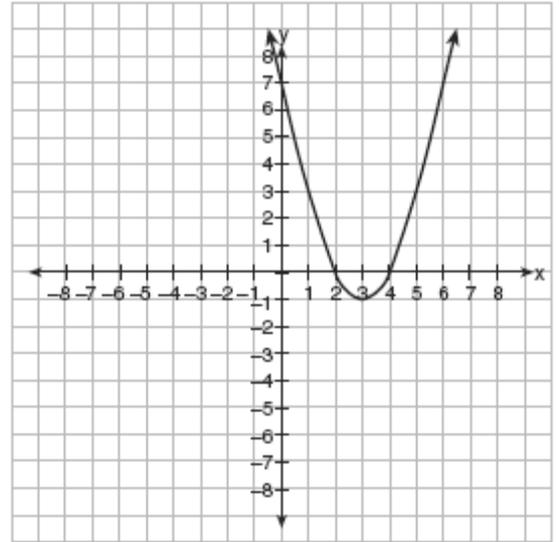
A rocket is launched from the ground and follows a parabolic path represented by the equation $y = -x^2 + 10x$. At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation $y = -x + 10$. Using the accompanying set of axes, graph the equations that represent the paths of the rocket and the flare, and find the coordinates of the point or points where the paths intersect.



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.

89. 010606b, P.I. A.G.10

Which is an equation of the line of symmetry for the parabola in the accompanying diagram?

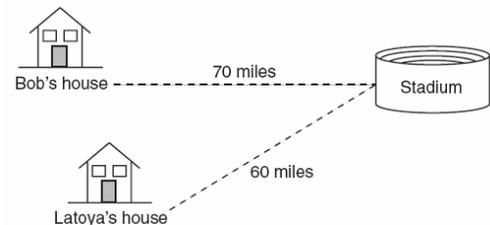


- [A] $x = 3$
- [B] $x = 2$
- [C] $x = 4$
- [D] $y = 3$

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

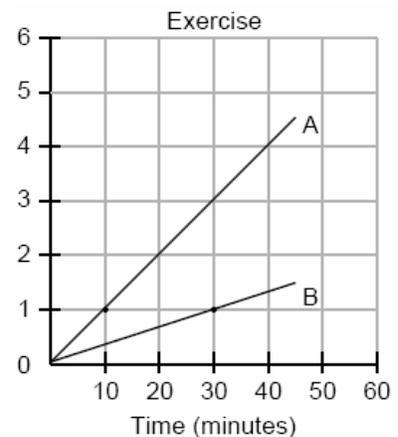
1. fall0734ia, P.I. A.M.1
Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin's house and the same distance back home. It took her 1.2 hours to get halfway to her cousin's house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip? Hannah's average 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?
2. 080736a, P.I. A.M.1
The trip from Manhattan to Montauk Point is 120 miles by train or by car. A train makes the trip in 2 hours, while a car makes the trip in $2\frac{1}{2}$ hours. How much faster, in miles per hour, is the average speed of the train than the average speed of the car?
3. 080632a, P.I. A.M.1
Running at a constant speed, Andrea covers 15 miles in $2\frac{1}{2}$ hours. At this speed, how many *minutes* will it take her to run 2 miles?
4. 080518a, P.I. A.M.1
A bicyclist leaves Bay Shore traveling at an average speed of 12 miles per hour. Three hours later, a car leaves Bay Shore, on the same route, traveling at an average speed of 30 miles per hour. How many hours after the car leaves Bay Shore will the car catch up to the cyclist?
[A] 4 [B] 5 [C] 8 [D] 2

5. 080415a, P.I. A.M.1
A rocket car on the Bonneville Salt Flats is traveling at a rate of 640 miles per hour. How much time would it take for the car to travel 384 miles at this rate?
[A] 245 minutes [B] 1.7 hours
[C] 256 minutes [D] 36 minutes
6. 010433a, P.I. A.M.1
Bob and Latoya both drove to a baseball game at a college stadium. Bob lives 70 miles from the stadium and Latoya lives 60 miles from it, as shown in the accompanying diagram. Bob drove at a rate of 50 miles per hour, and Latoya drove at a rate of 40 miles per hour. If they both left home at the same time, who got to the stadium first?



7. 060223a, P.I. A.M.1
If the instructions for cooking a turkey state "Roast turkey at 325° for 20 minutes per pound," how many hours will it take to roast a 20-pound turkey at 325° ?
8. 080119b, P.I. A.M.1
If Jamar can run $\frac{3}{5}$ of a mile in 2 minutes 30 seconds, what is his rate in miles per minute?
[A] $\frac{4}{5}$ [B] $3\frac{1}{10}$ [C] $4\frac{1}{6}$ [D] $\frac{6}{25}$

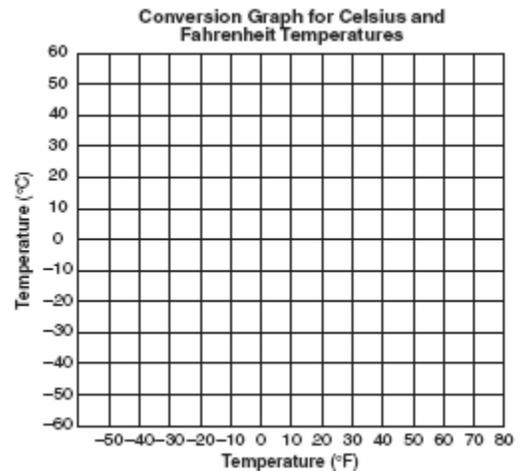
9. 080111b, P.I. A.M.1
On a trip, a student drove 40 miles per hour for 2 hours and then drove 30 miles per hour for 3 hours. What is the student's average rate of speed, in miles per hour, for the whole trip?
[A] 36 [B] 35 [C] 34 [D] 37
10. 060116b, P.I. A.M.1
On her first trip, Sari biked 24 miles in T hours. The following week Sari biked 32 miles in T hours. Determine the ratio of her average speed on her second trip to her average speed on her first trip.
[A] $\frac{2}{3}$ [B] $\frac{3}{4}$ [C] $\frac{4}{3}$ [D] $\frac{3}{2}$
11. 010125a, P.I. A.M.1
Two trains leave the same station at the same time and travel in opposite directions. One train travels at 80 kilometers per hour and the other at 100 kilometers per hour. In how many hours will they be 900 kilometers apart?
12. 010117a, P.I. A.M.1
In a molecule of water, there are two atoms of hydrogen and one atom of oxygen. How many atoms of hydrogen are in 28 molecules of water?
[A] 14 [B] 42 [C] 29 [D] 56
13. 080019a, P.I. A.M.1
A girl can ski down a hill five times as fast as she can climb up the same hill. If she can climb up the hill and ski down in a total of 9 minutes, how many minutes does it take her to climb up the hill?
[A] 7.2 [B] 1.8 [C] 4.5 [D] 7.5
14. 060010a, P.I. A.M.1
A truck travels 40 miles from point A to point B in exactly 1 hour. When the truck is halfway between point A and point B , a car starts from point A and travels at 50 miles per hour. How many miles has the car traveled when the truck reaches point B ?
[A] 50 [B] 40 [C] 60 [D] 25
15. 010027a, P.I. A.M.1
A truck traveling at a constant rate of 45 miles per hour leaves Albany. One hour later a car traveling at a constant rate of 60 miles per hour also leaves Albany traveling in the same direction on the same highway. How long will it take for the car to catch up to the truck, if both vehicles continue in the same direction on the highway?
16. 069926a, P.I. A.M.1
During a 45-minute lunch period, Albert (A) went running and Bill (B) walked for exercise. Their times and distances are shown in the accompanying graph. How much faster was Albert running than Bill was walking, in miles per hour?



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

17. 010818a, P.I. A.M.2
On a map, 1 inch represents 3 miles. How many miles long is a road that is $2\frac{1}{2}$ inches long on the map?
[A] $5\frac{1}{2}$ [B] $6\frac{1}{2}$ [C] $\frac{1}{2}$ [D] $7\frac{1}{2}$
18. 060731a, P.I. A.M.2
If a United States dollar is worth \$1.41 in Canadian money, how much is \$100 in Canadian money worth in United States money, to the *nearest cent*?
19. 060709a, P.I. A.M.2
Andy is 6 feet tall. If 1 inch equals 2.54 centimeters, how tall is Andy, to the *nearest centimeter*?
[A] 15 [B] 213 [C] 30 [D] 183
20. 010734a, P.I. A.M.2
The formula $C = \frac{5}{9}(F - 32)$ is used to convert Fahrenheit temperature, F , to Celsius temperature, C . What temperature, in degrees Fahrenheit, is equivalent to a temperature of 10° Celsius?
21. 060407a, P.I. A.M.2
If the temperature in Buffalo is 23° Fahrenheit, what is the temperature in degrees Celsius? [Use the formula $C = \frac{5}{9}(F - 32)$.]
[A] 5 [B] -45 [C] 45 [D] -5
22. 080201a, P.I. A.M.2
On a map, 1 centimeter represents 40 kilometers. How many kilometers are represented by 8 centimeters?
[A] 5 [B] 48 [C] 280 [D] 320

23. 060128a, P.I. A.M.2
Connor wants to compare Celsius and Fahrenheit temperatures by drawing a conversion graph. He knows that $-40^\circ C = -40^\circ F$ and that $20^\circ C = 68^\circ F$. On the accompanying grid, construct the conversion graph and, using the graph, determine the Celsius equivalent of $25^\circ F$.



24. 060021a, P.I. A.M.2
The formula for changing Celsius (C) temperature to Fahrenheit (F) temperature is $F = \frac{9}{5}C + 32$. Calculate, to the *nearest degree*, the Fahrenheit temperature when the Celsius temperature is -8 .
25. 089908a, P.I. A.M.2
The formula $C = \frac{5}{9}(F - 32)$ can be used to find the Celsius temperature (C) for a given Fahrenheit temperature (F). What Celsius temperature is equal to a Fahrenheit temperature of 77° ?
[A] 45° [B] 171° [C] 8° [D] 25°

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

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

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

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

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

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

1. fall0714ia, P.I. A.S.2
Which situation should be analyzed using bivariate data?
[A] Mr. DeStefan records his customers' best video game scores during the summer.
[B] Mr. Benjamin tries to see if his students' shoe sizes are directly related to their heights.
[C] Mr. Chan keeps track of his daughter's algebra grades for the quarter.
[D] Ms. Saleem keeps a list of the amount of time her daughter spends on her social studies homework.

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

2. 010815b, P.I. A.S.3
Which method of collecting data would most likely result in an unbiased random sample?
[A] selecting students by the last digit of their school ID number to participate in a survey about cafeteria food
[B] surveying honor students taking Mathematics B to determine the average amount of time students in a school spend doing homework each night
[C] selecting every third teenager leaving a movie theater to answer a survey about entertainment
[D] placing a survey in a local newspaper to determine how people voted in the 2004 presidential election

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

3. 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.

4. 010618a, P.I. A.S.4
Melissa's test scores are 75, 83, and 75. Which statement is true about this set of data?
[A] mode < median [B] mean < mode
[C] mode = median [D] mean = median
5. 080501a, P.I. A.S.4
The weights of all the students in grade 9 are arranged from least to greatest. Which statistical measure separates the top half of this set of data from the bottom half?
[A] mean [B] median
[C] average [D] mode

6. 010321b, P.I. A.S.4

Two social studies classes took the same current events examination that was scored on the basis of 100 points. Mr. Wong's class had a median score of 78 and a range of 4 points, while Ms. Rizzo's class had a median score of 78 and a range of 22 points. Explain how these classes could have the same median score while having very different ranges.

7. 010315a, P.I. A.S.4

The ages of five children in a family are 3, 3, 5, 8, and 18. Which statement is true for this group of data?

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

8. 010118a, P.I. A.S.4

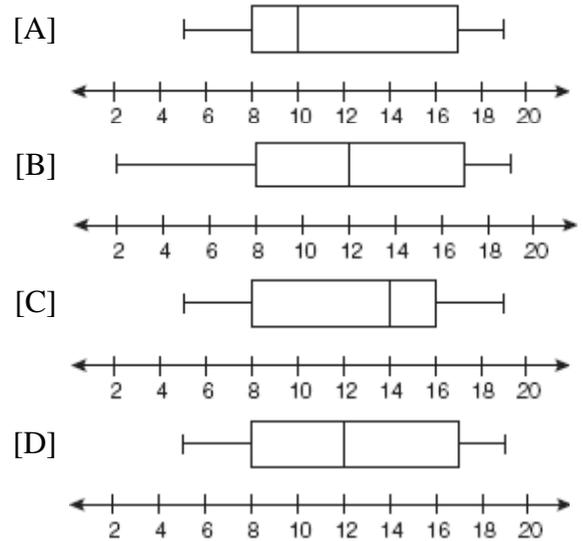
From January 3 to January 7, Buffalo recorded the following daily high temperatures: 5° , 7° , 6° , 5° , and 7° . Which statement about the temperatures is true?

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

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. 010739a, P.I. A.S.5

The accompanying table shows the weights, in pounds, for the students in an algebra class. Using the data, complete the cumulative frequency table and construct a cumulative frequency histogram on the grid below.

Interval	Frequency	Cumulative Frequency
91–100	6	
101–110	3	
111–120	0	
121–130	3	
131–140	0	
141–150	2	
151–160	2	

11. 080437a, P.I. A.S.5

The following set of data represents the scores on a mathematics quiz:

58, 79, 81, 99, 68, 92, 76, 84, 53, 57, 81, 91,
77, 50, 65, 57, 51, 72, 84, 89

Complete the frequency table below and, on the accompanying grid, draw and label a frequency histogram of these scores.

Mathematics Quiz Scores

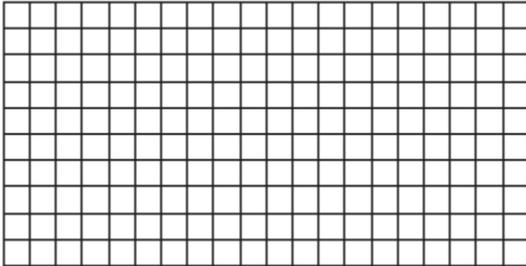
Interval	Tally	Frequency
50–59		
60–69		
70–79		
80–89		
90–99		

12. 010334a, P.I. A.S.5

Sarah's mathematics grades for one marking period were 85, 72, 97, 81, 77, 93, 100, 75, 86, 70, 96, and 80.

a Complete the tally sheet and frequency table below, and construct and label a frequency histogram for Sarah's grades using the accompanying grid.

Interval (grades)	Tally	Frequency
61–70		
71–80		
81–90		
91–100		



b Which interval contains the 75th percentile (upper quartile)?

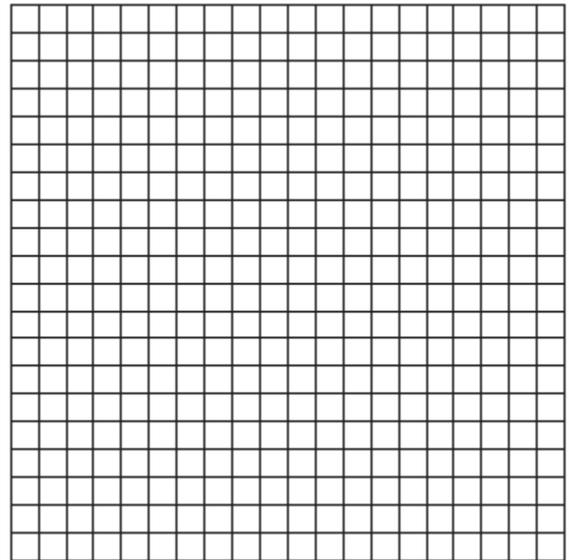
13. 080134a, P.I. A.S.5

The following data consists of the weights, in pounds, of 30 adults:

195, 206, 100, 98, 150, 210, 195, 106, 195, 168, 180, 212, 104, 195, 100, 216, 195, 209, 112, 99, 206, 116, 195, 100, 142, 100, 135, 98, 160, 155

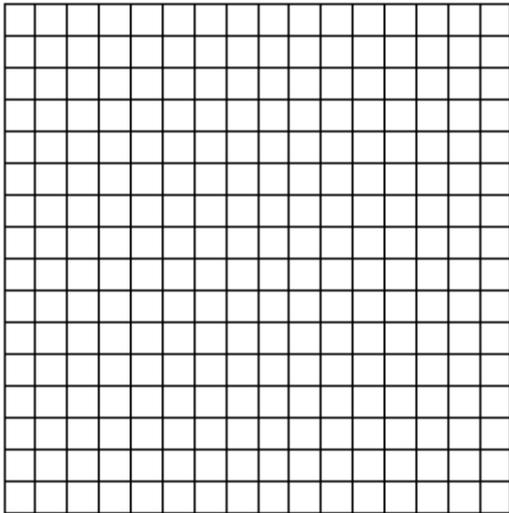
Using the data, complete the accompanying cumulative frequency table and construct a cumulative frequency histogram on the grid below.

Interval	Frequency	Cumulative Frequency
51–100		
101–150		
151–200		
201–250		



14. 010132a, P.I. A.S.5

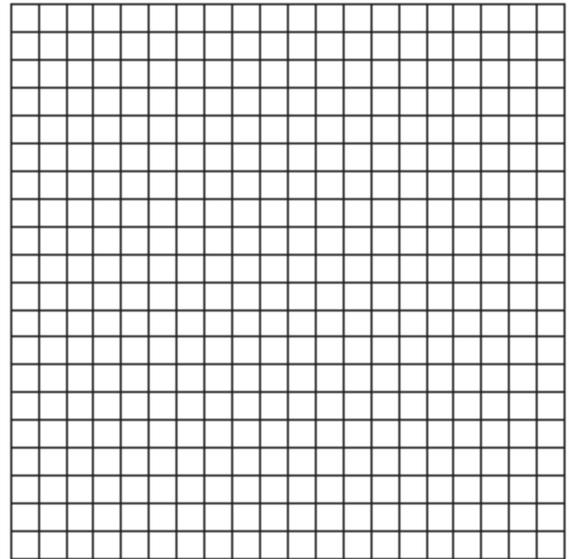
On a science quiz, 20 students received the following scores: 100, 95, 95, 90, 85, 85, 85, 80, 80, 80, 80, 75, 75, 75, 70, 70, 65, 65, 60, 55. Construct a statistical graph, such as a histogram or a stem-and-leaf plot, to display this data. *[Be sure to title the graph and label all axes or parts used.]*



15. 060033a, P.I. A.S.5

The scores on a mathematics test were 70, 55, 61, 80, 85, 72, 65, 40, 74, 68, and 84. Complete the accompanying table, and use the table to construct a frequency histogram for these scores.

Score	Tally	Frequency
40–49		
50–59		
60–69		
70–79		
80–89		



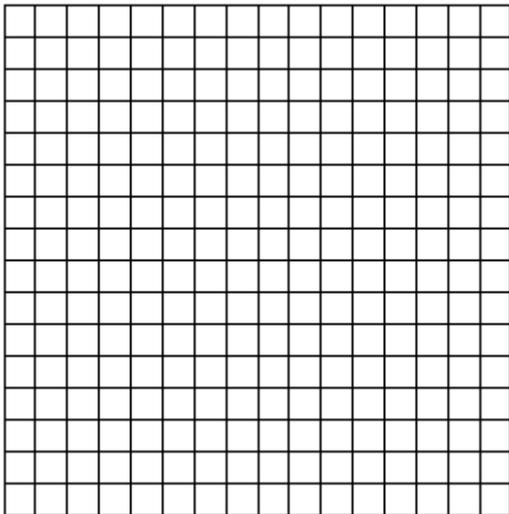
16. 010032a, P.I. A.S.5

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

In the time trials for the 400-meter run at the state sectionals, the 15 runners recorded the times shown in the table below.

400-Meter Run	
Time (sec)	Frequency
50.0–50.9	
51.0–51.9	
52.0–52.9	
53.0–53.9	
54.0–54.9	

a Using the data from the frequency column, draw a frequency histogram on the grid provided below.



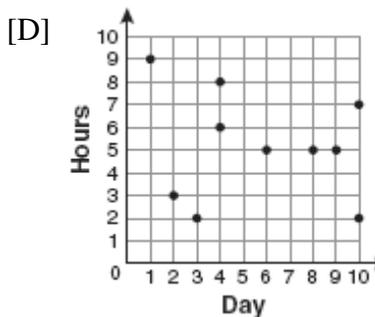
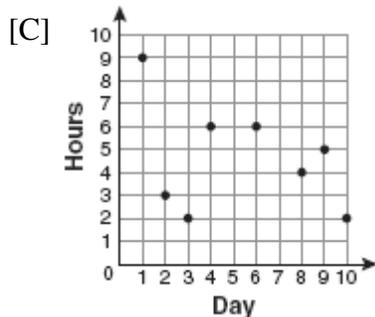
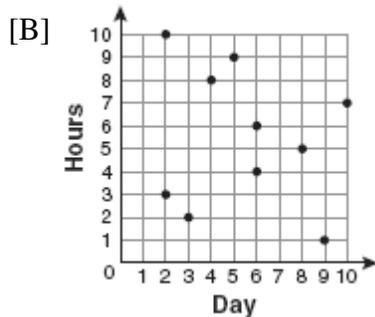
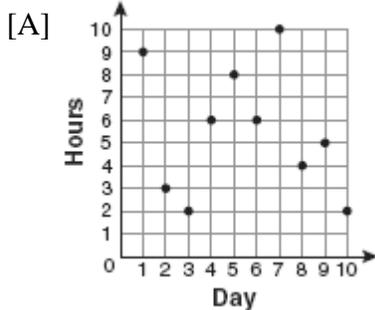
b What percent of the runners completed the time trial between 52.0 and 53.9 seconds?

17. 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

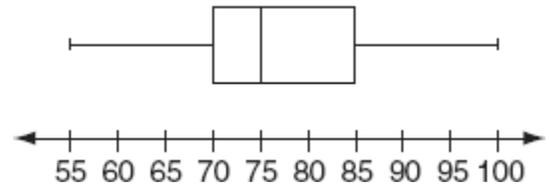
Which scatter plot shows Romero's data graphically?



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

18. 060610a, P.I. A.S.9

The accompanying box-and-whisker plot represents the scores earned on a science test.

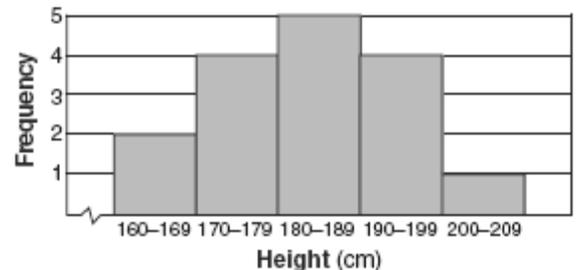


What is the median score?

- [A] 70 [B] 75 [C] 85 [D] 77

19. 010504a, P.I. A.S.9

The accompanying histogram shows the heights of the students in Kyra's health class.



What is the total number of students in the class?

- [A] 15 [B] 209 [C] 16 [D] 5

20. 060401a, P.I. A.S.9
The test scores for 10 students in Ms. Sampson's homeroom were 61, 67, 81, 83, 87, 88, 89, 90, 98, and 100. Which frequency table is accurate for this set of data?

[A]

Interval	Frequency
61–70	2
71–80	0
81–90	6
91–100	2

[B]

Interval	Frequency
61–70	2
71–80	2
81–90	8
91–100	10

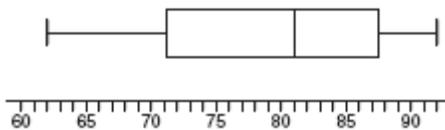
[C]

Interval	Frequency
61–70	2
71–80	0
81–90	8
91–100	10

[D]

Interval	Frequency
61–70	2
71–80	2
81–90	7
91–100	10

21. 010301a, P.I. A.S.9
The accompanying diagram shows a box-and-whisker plot of student test scores on last year's Mathematics A midterm examination.



What is the median score?

- [A] 92 [B] 81 [C] 62 [D] 71

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

22. fall0707ia, P.I. A.S.14
Which situation describes a correlation that is *not* a causal relationship?
- [A] The rooster crows, and the Sun rises.
[B] The more powerful the microwave, the faster the food cooks.
[C] The more miles driven, the more gasoline needed.
[D] The faster the pace of a runner, the quicker the runner finishes.

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

23. 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.

24. 010731a, P.I. A.S.19
Kimberly has three pair of pants: one black, one red, and one tan. She also has four shirts: one pink, one white, one yellow, and one green. Draw a tree diagram or list the sample space showing all possible outfits that she could wear, if an outfit consists of one pair of pants and one shirt. How many different outfits can Kimberly wear?

25. 010321a, P.I. A.S.19
If Laquisha can enter school by any one of three doors and the school has two staircases to the second floor, in how many different ways can Laquisha reach a room on the second floor? Justify your answer by drawing a tree diagram or listing a sample space.

26. 089922a, P.I. A.S.19
The Grimaldis have three children born in different years.
a Draw a tree diagram or list a sample space to show all the possible arrangements of boy and girl children in the Grimaldi family.
b Using your information from part *a*, what is the probability that the Grimaldis have three boys?

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

27. fall0702ia, P.I. A.S.20
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] $\frac{2}{8}$ [B] $\frac{3}{8}$ [C] $\frac{4}{8}$ [D] $\frac{6}{8}$

28. 010832a, P.I. A.S.20
As captain of his football team, Jamal gets to call heads or tails for the toss of a fair coin at the beginning of each game. At the last three games, the coin has landed with heads up. What is the probability that the coin will land with heads up at the next game? Explain your answer.

29. 010811a, P.I. A.S.20
Which event has a probability of zero?
[A] choosing a triangle that is both isosceles and right
[B] choosing a letter from the alphabet that has line symmetry
[C] choosing a number that is greater than 6 and is even
[D] choosing a pair of parallel lines that have unequal slopes

30. 010805a, P.I. A.S.20
A box contains 6 dimes, 8 nickels, 12 pennies, and 3 quarters. What is the probability that a coin drawn at random is *not* a dime?

[A] $\frac{12}{29}$ [B] $\frac{23}{29}$ [C] $\frac{6}{29}$ [D] $\frac{8}{29}$

31. 060712a, P.I. A.S.20
When a fair coin was tossed ten times, it landed heads up the first seven times. What is the probability that on the eighth toss the coin will land with tails up?

[A] $\frac{1}{2}$ [B] $\frac{3}{7}$ [C] $\frac{3}{10}$ [D] $\frac{7}{10}$

32. 060705a, P.I. A.S.20
A six-sided number cube has faces with the numbers 1 through 6 marked on it. What is the probability that a number less than 3 will occur on one toss of the number cube?

[A] $\frac{4}{6}$ [B] $\frac{1}{6}$ [C] $\frac{2}{6}$ [D] $\frac{3}{6}$

33. 010709a, P.I. A.S.20
Seth tossed a fair coin five times and got five heads. The probability that the next toss will be a tail is

[A] $\frac{5}{6}$ [B] $\frac{1}{2}$ [C] $\frac{1}{6}$ [D] 0

34. 080604a, P.I. A.S.20
The faces of a cube are numbered from 1 to 6. What is the probability of *not* rolling a 5 on a single toss of this cube?

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

35. 060630a, P.I. A.S.20
Which inequality represents the probability, x , of any event happening?

[A] $x < 1$ [B] $0 < x < 1$
[C] $x \geq 0$ [D] $0 \leq x \leq 1$

36. 060415a, P.I. A.S.20
Mary chooses an integer at random from 1 to 6. What is the probability that the integer she chooses is a prime number?

[A] $\frac{4}{6}$ [B] $\frac{2}{6}$ [C] $\frac{3}{6}$ [D] $\frac{5}{6}$

37. 060202a, P.I. A.S.20
If the probability that it will rain on Thursday is $\frac{5}{6}$, what is the probability that it will *not* rain on Thursday?

[A] $\frac{5}{6}$ [B] 0 [C] $\frac{1}{6}$ [D] 1

38. 010209a, P.I. A.S.20
A fair coin is tossed three times. What is the probability that the coin will land tails up on the second toss?

[A] $\frac{1}{3}$ [B] $\frac{1}{2}$ [C] $\frac{3}{4}$ [D] $\frac{2}{3}$

39. 080011a, P.I. A.S.20
A box contains six black balls and four white balls. What is the probability of selecting a black ball at random from the box?

[A] $\frac{1}{10}$ [B] $\frac{6}{4}$ [C] $\frac{4}{6}$ [D] $\frac{6}{10}$

40. 010017a, P.I. A.S.20
The party registration of the voters in Jonesville is shown in the table below.

Registered Voters in Jonesville	
Party Registration	Number of Voters Registered
Democrat	6,000
Republican	5,300
Independent	3,700

If one of the registered Jonesville voters is selected at random, what is the probability that the person selected is *not* a Democrat?

[A] 0.600 [B] 0.333
[C] 0.667 [D] 0.400

41. 069901a, P.I. A.S.20
A fair coin is thrown in the air four times. If the coin lands with the head up on the first three tosses, what is the probability that the coin will land with the head up on the fourth toss?

[A] 0 [B] $\frac{1}{16}$ [C] $\frac{1}{2}$ [D] $\frac{1}{8}$

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.

42. 060529a, P.I. A.S.23
The probability that the Cubs win their first game is $\frac{1}{3}$. The probability that the Cubs win their second game is $\frac{3}{7}$. What is the probability that the Cubs win both games?

[A] $\frac{16}{21}$ [B] $\frac{1}{7}$ [C] $\frac{6}{7}$ [D] $\frac{2}{5}$

43. 010525a, P.I. A.S.23
A student council has seven officers, of which five are girls and two are boys. If two officers are chosen at random to attend a meeting with the principal, what is the probability that the first officer chosen is a girl and the second is a boy?
- [A] $\frac{10}{42}$ [B] $\frac{2}{7}$ [C] $\frac{7}{14}$ [D] $\frac{7}{13}$
44. 080430a, P.I. A.S.23
Selena and Tracey play on a softball team. Selena has 8 hits out of 20 times at bat, and Tracey has 6 hits out of 16 times at bat. Based on their past performance, what is the probability that both girls will get a hit next time at bat?
- [A] 1 [B] $\frac{14}{36}$ [C] $\frac{48}{320}$ [D] $\frac{31}{40}$
45. 060305a, P.I. A.S.23
Bob and Laquisha have volunteered to serve on the Junior Prom Committee. The names of twenty volunteers, including Bob and Laquisha, are put into a bowl. If two names are randomly drawn from the bowl without replacement, what is the probability that Bob's name will be drawn first and Laquisha's name will be drawn second?
- [A] $\frac{2}{20}$ [B] $\frac{1}{20} \cdot \frac{1}{19}$
[C] $\frac{1}{20} \cdot \frac{1}{20}$ [D] $\frac{2}{20!}$
46. 080127a, P.I. A.S.23
There are four students, all of different heights, who are to be randomly arranged in a line. What is the probability that the tallest student will be first in line and the shortest student will be last in line?
47. 060130a, P.I. A.S.23
Mr. Yee has 10 boys and 15 girls in his mathematics class. If he chooses two students at random to work on the blackboard, what is the probability that both students chosen are girls?