

JMAP REGENTS BY STATE STANDARD: TOPIC

NY Algebra I Regents Exam Questions from Fall 2023 to
January 2026 Sorted by State Standard: Topic

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Algebra I Regents Exam Questions by State Standard: Topic

EXPRESSIONS AND EQUATIONS

A.REI.A.1: IDENTIFYING PROPERTIES

- 1 When solving the equation $4x^2 - 16 = 0$, Laura wrote $4x^2 = 16$ as her first step. Which property justifies Laura's first step?
 - 1) distributive property of multiplication over addition
 - 2) multiplication property of equality
 - 3) commutative property of addition
 - 4) addition property of equality
- 2 Stephanie is solving the equation $x^2 - 12 = 7x - 8$. Her first step is shown below.

Given: $x^2 - 12 = 7x - 8$

Step 1: $x^2 - 4 = 7x$

Which property justifies her first step?

 - 1) associative property
 - 2) commutative property
 - 3) distributive property
 - 4) addition property of equality
- 3 Chloe is solving the equation $x^2 + 5x = 3x + 3$. Her first step is shown below.

Given: $x^2 + 5x = 3x + 3$

Step 1: $x^2 + 2x - 3 = 0$

Which property justifies this step?

 - 1) the zero product property
 - 2) the commutative property
 - 3) the distributive property
 - 4) the subtraction property of equality

- 4 When solving $x^2 + 6x = -8$ for x , a student wrote $x^2 + 6x + 8 = 0$ as their first step. Which property justifies this step?
 - 1) associative property
 - 2) commutative property
 - 3) zero property of addition
 - 4) addition property of equality
- 5 When solving the equation $3(2x + 5) - 8 = 7x + 10$, the first step could be $3(2x + 5) = 7x + 18$. Which property justifies this step?
 - 1) addition property of equality
 - 2) commutative property of addition
 - 3) multiplication property of equality
 - 4) distributive property of multiplication over addition

A.REI.B.3: SOLVING LINEAR EQUATIONS

- 6 The solution to $\frac{4(x-5)}{3} + 2 = 14$ is
 - 1) 15
 - 2) 14
 - 3) 6
 - 4) 4
- 7 When solving $-2(3x - 5) = \frac{9}{2}x - 2$ for x , the solution is
 - 1) $\frac{8}{7}$
 - 2) $\frac{10}{11}$
 - 3) $-\frac{16}{21}$
 - 4) $-\frac{16}{3}$

8 The solution to the equation $\frac{2(3x-1)}{3} = x + 2$ is

- 1) $\frac{1}{3}$
- 2) $\frac{2}{3}$
- 3) $\frac{4}{3}$
- 4) $\frac{8}{3}$

9 When solved for x in terms of a , the solution to the equation $3x - 7 = ax + 5$ is

- 1) $\frac{12}{3a}$
- 2) $\frac{12}{3-a}$
- 3) $\frac{3a}{12}$
- 4) $\frac{3-a}{12}$

10 When the equation $6 - ax = ax - 2$ is solved for x in terms of a , and $a \neq 0$, the result is

- 1) $4a$
- 2) $\frac{4}{a}$
- 3) $2a$
- 4) $\frac{2}{a}$

11 Solve the equation for x : $14x = 3(1 + 2x) - 4x$

12 Solve algebraically for x : $0.05(x - 3) = 0.35x - 7.5$

13 Solve the equation $\frac{1}{6}(4x + 2) = 9$ algebraically.

A.CED.A.1: MODELING LINEAR EQUATIONS

14 The sum of Tim's age and Jack's age is 44. Tim's age is 4 less than 7 times Jack's age, x . An equation that could be used to model this scenario is

- 1) $(7x - 4) + x = 44$
- 2) $(4 - 7x) + x = 44$
- 3) $7x - 4 = 44$
- 4) $4 - 7x = 44$

15 Josie has \$2.30 in dimes and quarters. She has two more dimes than quarters. Which equation below can be used to determine x , the number of quarters she has?

- 1) $0.35(2x + 2) = 2.30$
- 2) $0.25(x + 2) + 0.10x = 2.30$
- 3) $0.25x + 0.10(x + 2) = 2.30$
- 4) $0.25x + 0.10(x - 2) = 2.30$

16 At Adelynn's first birthday party, each guest brought \$1 in coins for her piggy bank. Guests brought nickels, dimes, and quarters for a total of \$28. There were twice as many dimes as nickels and 12 more quarters than nickels. Which equation could be used to determine the number of nickels, x , that her guests brought to her party?

- 1) $.05x + .10x + .25x = 28$
- 2) $.05x + .10(2x) + .25(x + 12) = 28$
- 3) $.05(2x) + .10x + .25(x + 12) = 28$
- 4) $.05(x + 12) + .10(2x) + .25x = 28$

A.CED.A.4: TRANSFORMING FORMULAS

17 When the formula $p = 2l + 2w$ is solved for w , the result is

- 1) $w = \frac{2l+p}{2}$
- 2) $w = \frac{p-2l}{2}$
- 3) $w = \frac{p}{2} + l$
- 4) $w = l - \frac{p}{2}$

- 18 The formula to calculate kinetic energy is

$$K = \frac{1}{2}mv^2, \text{ where } K \text{ is kinetic energy, } m \text{ is mass,}$$

and v is velocity. When m is written in terms of K and v , the equation is

1) $m = \frac{2K}{v^2}$

2) $m = 2Kv^2$

3) $m = \sqrt{2Kv^2}$

4) $m = \frac{K}{2v^2}$

- 19 The formula for the area of a trapezoid is

$$A = \frac{1}{2}h(b_1 + b_2). \text{ The height, } h, \text{ of the trapezoid}$$

may be expressed as

1) $\frac{2A}{b_1 + b_2}$

2) $\frac{1}{2}A(b_1 + b_2)$

3) $\frac{b_1 + b_2}{2A}$

4) $\frac{1}{2}A - (b_1 + b_2)$

- 20 The formula for the surface area of a cylinder can be expressed as $S = 2\pi r^2 + 2\pi rh$, where r is the radius and h is the height of the cylinder. What is the height, h , expressed in terms of S , π , and r ?

1) $h = \frac{S - 2\pi r^2}{2\pi r}$

2) $h = S - r$

3) $h = \frac{2\pi r^2 - S}{2\pi r}$

4) $h = r - S$

RATE

N.Q.A.1: CONVERSIONS

- 21 Wayne van Niekerk, a runner from South Africa, ran 400 meters in 43.03 seconds to set a world record. Which calculation would determine his average speed, in miles per hour?

1) $\frac{400 \text{ m}}{43.03 \text{ sec}} \cdot \frac{1000 \text{ m}}{0.62 \text{ mi}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}}$

2) $\frac{400 \text{ m}}{43.03 \text{ sec}} \cdot \frac{0.62 \text{ mi}}{1000 \text{ m}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}}$

3) $\frac{400 \text{ m}}{43.03 \text{ sec}} \cdot \frac{0.62 \text{ mi}}{1000 \text{ m}} \cdot \frac{3600 \text{ sec}}{1 \text{ hr}}$

4) $\frac{400 \text{ m}}{43.03 \text{ sec}} \cdot \frac{1000 \text{ m}}{0.62 \text{ mi}} \cdot \frac{3600 \text{ sec}}{1 \text{ hr}}$

- 22 Joe is ordering water for his swimming pool. He determines the volume of his pool to be about 3240 cubic feet. There are approximately 7.5 gallons of water in 1 cubic foot. A truck load holds 6000 gallons of water. Which expression would allow Joe to correctly calculate the number of truck loads of water he needs to fill his pool?

1) $\frac{3240 \text{ ft}^3}{1 \text{ pool}} \cdot \frac{1 \text{ ft}^3}{7.5 \text{ gal}} \cdot \frac{6000 \text{ gal}}{1 \text{ truck load}}$

2) $\frac{3240 \text{ ft}^3}{1 \text{ pool}} \cdot \frac{1 \text{ ft}^3}{7.5 \text{ gal}} \cdot \frac{1 \text{ truck load}}{6000 \text{ gal}}$

3) $\frac{3240 \text{ ft}^3}{1 \text{ pool}} \cdot \frac{7.5 \text{ gal}}{1 \text{ ft}^3} \cdot \frac{6000 \text{ gal}}{1 \text{ truck load}}$

4) $\frac{3240 \text{ ft}^3}{1 \text{ pool}} \cdot \frac{7.5 \text{ gal}}{1 \text{ ft}^3} \cdot \frac{1 \text{ truck load}}{6000 \text{ gal}}$

- 23 Elena's fastest time for the 50-meter dash is 7 seconds. She wants to know how fast this is in inches per minute. Which expression can Elena use for a correct conversion?

- 1) $\frac{7 \text{ sec}}{50 \text{ meters}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ meter}}{39.37 \text{ in}}$
- 2) $\frac{7 \text{ sec}}{50 \text{ meters}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{39.37 \text{ in}}{1 \text{ meter}}$
- 3) $\frac{50 \text{ meters}}{7 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ meter}}{39.37 \text{ in}}$
- 4) $\frac{50 \text{ meters}}{7 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{39.37 \text{ in}}{1 \text{ meter}}$

- 24 Each day, a freight train passes by Anna's house. This freight train travels at 49 miles per hour. Each railroad car is 56 feet long. Which expression represents the number of railroad cars that pass by Anna's house per minute?

- 1) $\frac{49 \text{ mi}}{1 \text{ hr}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ car}}{56 \text{ ft}}$
- 2) $\frac{49 \text{ mi}}{1 \text{ hr}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ car}}{56 \text{ ft}}$
- 3) $\frac{49 \text{ mi}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ car}}{56 \text{ ft}}$
- 4) $\frac{49 \text{ mi}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ car}}{56 \text{ ft}}$

- 25 In 2009, Usain Bolt, a sprinter from Jamaica, set the world record in the 100-meter dash with a time of 9.58 seconds. His approximate speed, in kilometers per hour, can be found using which conversion?

- 1) $\frac{9.58 \text{ sec}}{100 \text{ m}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$
- 2) $\frac{100 \text{ m}}{9.58 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$
- 3) $\frac{100 \text{ m}}{9.58 \text{ sec}} \cdot \frac{1 \text{ km}}{1000 \text{ m}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$
- 4) $\frac{100 \text{ m}}{9.58 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ km}}{1000 \text{ m}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$

- 26 When Theodore was driving in Canada, his speed was 104 kilometers per hour. Theodore was asked to convert his metric speed to a different rate, using the following conversion:

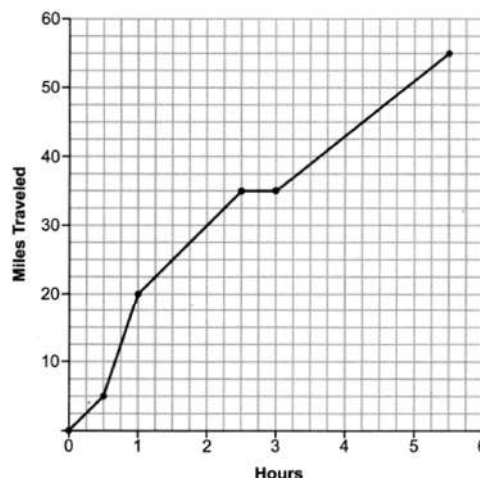
$$\frac{104 \text{ km}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{0.6214 \text{ mi}}{1 \text{ km}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}}$$

Assuming he did all the work correctly, what would the units be for Theodore's rate?

- 1) feet per second
- 2) feet per minute
- 3) seconds per foot
- 4) minutes per foot

F.IF.B.6: RATE OF CHANGE

- 27 One Saturday, Dave took a long bike ride. The graph below models his trip.



What was Dave's average rate of change, in miles per hour, on this trip?

- 1) 10
- 2) 11
- 3) 11.6
- 4) 14.5

28 A bookstore owner recorded the number of books sold and the profit made selling the books.

Books Sold	Profit
100	\$50.00
250	\$275.00
300	\$350.00
350	\$425.00

What is the average rate of change, in dollars per book, between 100 and 350 books sold?

- | | |
|---------|---------|
| 1) 0.50 | 3) 1.50 |
| 2) 0.67 | 4) 2.00 |

- 29 The function $h(x)$ is used to calculate the average height, in inches, of a tomato plant x weeks after it is transplanted. These data are represented in the table below.

x	h(x)
2	6
4	12
6	24
9	51
12	60
16	64

Between weeks 4 and 12, the average rate of change, in inches per week, is

- | | |
|------|-------|
| 1) 6 | 3) 48 |
| 2) 8 | 4) 58 |

- 30 The table below shows the radioactivity level of a substance after the given time, t , in seconds.

Time (seconds)	Radioactivity Level
0	20
1	10
2	5
3	2.5
4	1.25

What is the average rate of change in radioactivity level over the interval $1 \leq t \leq 3$?

- 1) 3.75 3) 4.6875
2) -3.75 4) -4.6875

- | Year | 2000 | 2001 | 2005 | 2010 | 2014 | 2017 | 2019 |
|--------------------------|------|------|------|------|------|------|------|
| Amount Remaining (grams) | 750 | 450 | 219 | 85 | 25 | 12 | 8 |

1) 39.1	3) -39.1
2) 51.8	4) -51.8

36 What is an equation of the line that passes through $(3, 7)$ and has a slope of 2?

- 1) $y - 7 = 2(x - 3)$
- 2) $y - 3 = 2(x - 7)$
- 3) $y + 7 = 2(x + 3)$
- 4) $y + 3 = 2(x + 7)$

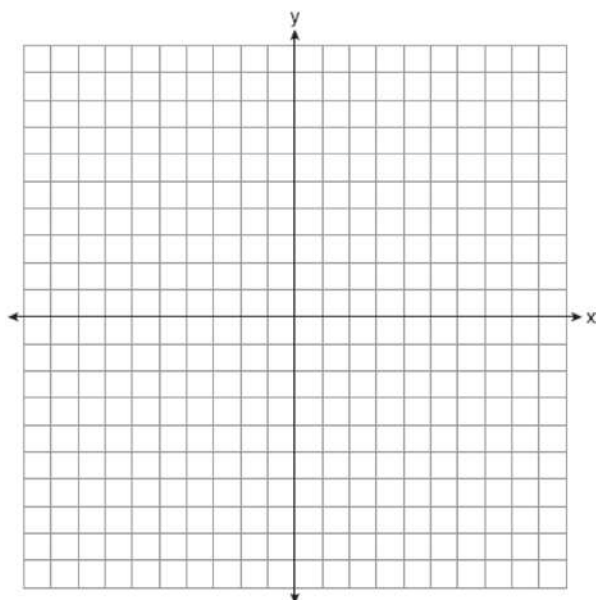
37 What is an equation of the line that passes through the points $(2, 7)$ and $(-1, 3)$?

- 1) $y - 2 = \frac{3}{4}(x - 7)$
- 2) $y - 2 = \frac{4}{3}(x - 7)$
- 3) $y - 7 = \frac{3}{4}(x - 2)$
- 4) $y - 7 = \frac{4}{3}(x - 2)$

- 38 Which equation represents the line that passes through the points $(-1, 8)$ and $(4, -2)$?

1) $y = -2x + 6$
 2) $y = -2x + 10$
 3) $y = -0.5x + 7.5$
 4) $y = -0.5x + 8.5$

- 39 Write an equation in slope-intercept form for the line that passes through $(-2, 5)$ and has a slope of -3 . [Use of the set of axes below is optional.]



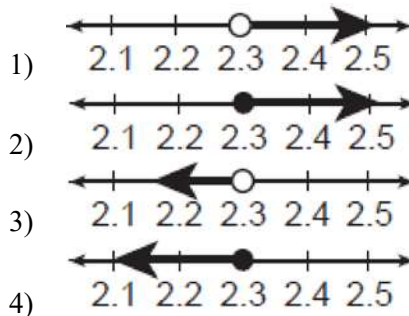
- 40 Write an equation, in slope-intercept form, of a line that passes through the point $(6, 3)$ and has a slope of $\frac{2}{3}$.

INEQUALITIES

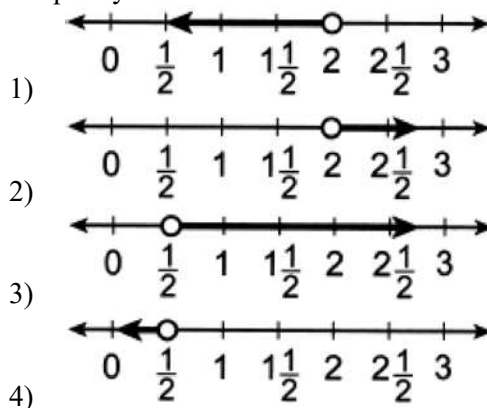
A.REI.B.3: SOLVING LINEAR INEQUALITIES

- 41 What is the solution to the inequality $2m - 4 \leq 3(2m + 4)$?
- 1) $m \leq -2$
 2) $m \geq -2$
 3) $m \leq -4$
 4) $m \geq -4$

- 42 Which graph is the solution to the inequality $6.4 - 4x \geq -2.8$?



- 43 Which graph represents the solution to the inequality $4 + 3x > 9 - 7x$?



- 44 Solve $5(x - 2) \leq 3x + 20$ algebraically.

- 45 Solve the inequality for y : $5(2 - y) > -11y - 8$

A.CED.A.1: MODELING LINEAR INEQUALITIES

- 46 The number of fish in a pond is eight more than the number of frogs. The total number of fish and frogs in the pond is at least 20. If x represents the number of frogs, which inequality can be used to represent this situation?
- 1) $x + 8x \geq 20$
 2) $2x + 8 \geq 20$
 3) $x + 8x \leq 20$
 4) $2x + 8 \leq 20$

- 47 Abby has \$20 to spend at a community festival. She uses \$8.50 to purchase food coupons for popcorn, a hot dog, and a soda. She can buy individual ride tickets for \$2.25 each. Determine algebraically the maximum number of ride tickets Abby can buy.
- 48 Vince wants to rent a canoe while he is on vacation. The canoe rental company charges \$18 for the first hour and \$7.50 for each additional hour, x . If Vince has \$78 to spend on renting a canoe, write an inequality in terms of x that models this situation. Algebraically determine the maximum number of hours that Vince could rent a canoe.
- 52 Which equation has the same solutions as $x^2 + 6x - 18 = 0$?
- 1) $(x + 3)^2 = 24$
 - 2) $(x + 3)^2 = 27$
 - 3) $(x + 6)^2 = 24$
 - 4) $(x + 6)^2 = 27$
- 53 Using the method of completing the square, express $x^2 + 14x - 28 = 0$ in the form $(x - p)^2 = q$.
- 54 Solve $x^2 + 8x = 33$ for x by completing the square.
- 55 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 6x - 41 = 0$. Express your answer in simplest radical form.

QUADRATICS

A.REI.B.4: SOLVING QUADRATICS

- 49 What is the solution set to the equation $3x^2 = 24x$?
- 1) $\{8\}$
 - 2) $\{0, 8\}$
 - 3) $\{0, -8\}$
 - 4) $\{0, 8, -8\}$
- 50 Which equation is equivalent to $x^2 - 6x = 27$?
- 1) $(x - 3)^2 = 27 - 9$
 - 2) $(x - 3)^2 = 27 + 9$
 - 3) $(x - 3)^2 = 27 + 36$
 - 4) $(x - 3)^2 = 27 - 36$
- 51 Which equation has the same solution as $x^2 - 6x = 24$?
- 1) $(x - 3)^2 = 24$
 - 2) $(x - 6)^2 = 24$
 - 3) $(x - 3)^2 = 33$
 - 4) $(x - 6)^2 = 60$
- 56 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.
- 57 Use the quadratic formula to determine the exact roots of the equation $x^2 + 3x - 6 = 0$.
- 58 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$. Express your solution in simplest radical form.
- 59 Using the quadratic formula, solve $6x^2 + 2x - 1 = 0$. Express the answer in simplest radical form.
- 60 Using the quadratic formula, solve $x^2 - 6x + 3 = 0$. Express the answer in simplest radical form.

- 61 Use the quadratic formula to solve $2x^2 - 4x - 3 = 0$, and express the answer in simplest radical form.

- 62 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

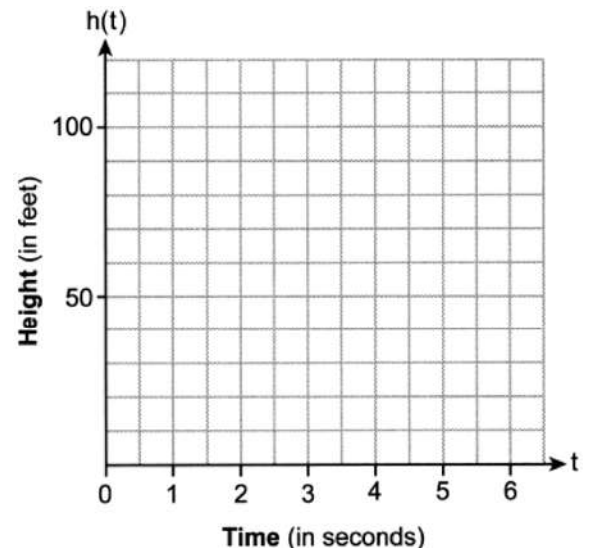
F.IF.B.4: GRAPHING QUADRATIC FUNCTIONS

- 63 A ball was launched into the air, and its height above the ground was recorded each second, as shown in the table below.

Time (sec)	0	1	2	3	4
Height (ft)	11	59	75	59	11

Based on these data, which statement is a valid conclusion?

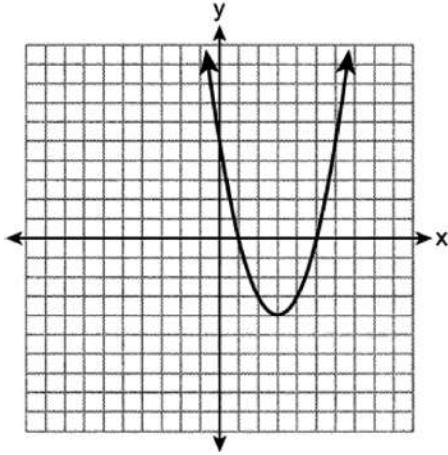
- 1) The ball lands on the ground at 4 seconds.
 - 2) The ball reaches a maximum height of 11 feet.
 - 3) The ball was launched from a height of 0 feet.
 - 4) The ball reaches its maximum height at 2 seconds.
- 64 An object is launched upward at 64 feet per second from a platform 80 feet above the ground. The function $s(t)$ models the height of the object t seconds after launch. If $s(t) = -16t^2 + 64t + 80$, state the vertex of $s(t)$, and explain in detail what each coordinate means in the context of the problem. After the object is launched, how many seconds does it take for the object to hit the ground? Justify your answer.
- 65 A rocket was launched from the ground into the air at an initial velocity of 80 feet per second. The path of the rocket can be modeled by $h(t) = -16t^2 + 80t$, where t represents the time after the rocket has been launched, and $h(t)$ represents the height of the rocket. Sketch the function on the set of axes below.



State how many seconds it will take for the rocket to reach its maximum height. State the maximum height, in feet, of the rocket.

F.IF.C.7: GRAPHING QUADRATIC
 FUNCTIONS

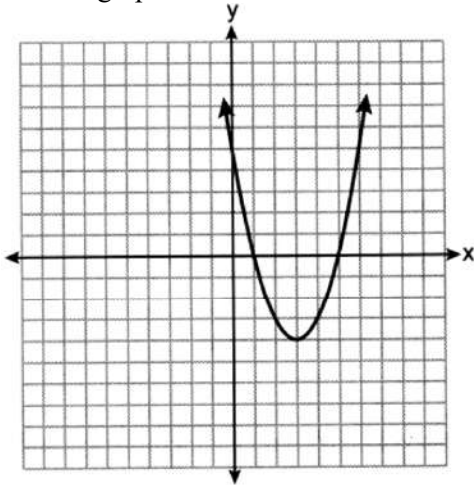
- 66 A parabola is graphed on the set of axes below.



Over which interval is the parabola only increasing?

- 1) $[1, 4]$
- 2) $[3, \infty)$
- 3) $(-\infty, 3]$
- 4) $[-1, 1]$

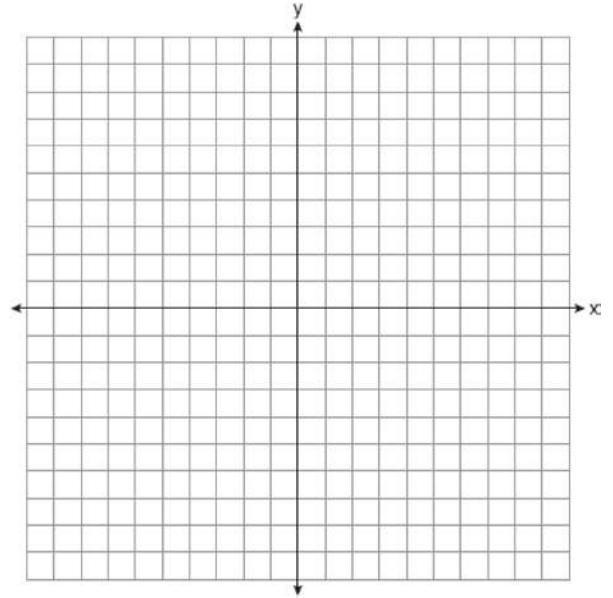
- 67 A parabola is graphed on the set of axes below.



What are the equation of the axis of symmetry and the coordinates of the vertex of this parabola?

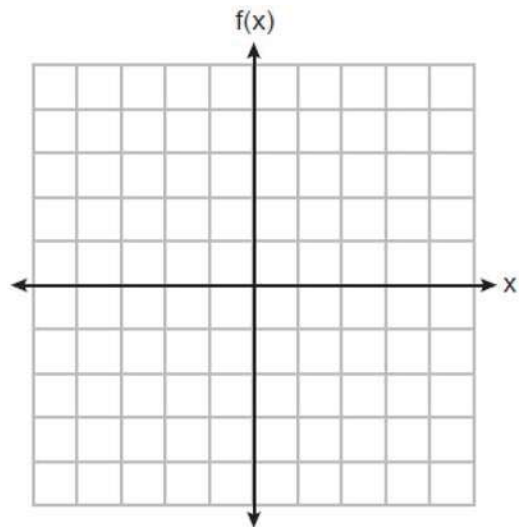
- 1) $x = 3$ and $(3, -4)$
- 2) $y = 3$ and $(3, -4)$
- 3) $x = -4$ and $(-4, 3)$
- 4) $y = -4$ and $(-4, 3)$

- 68 On the set of axes below, graph $f(x) = x^2 + 4x + 1$.



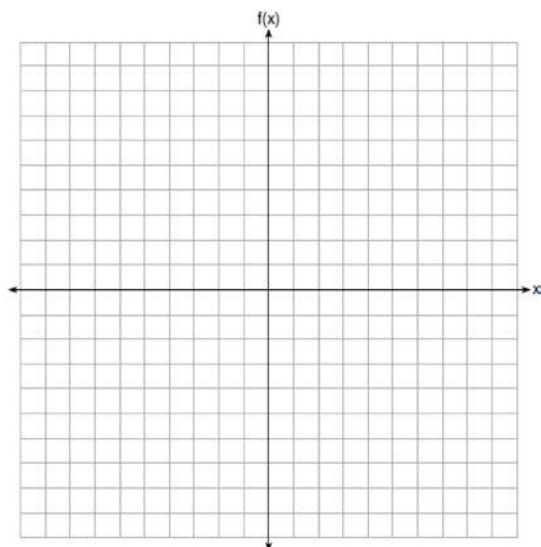
State the coordinates of the minimum.

- 69 Graph the function $f(x) = x^2 + 4x + 3$.



State the equation of the axis of symmetry of $f(x)$.

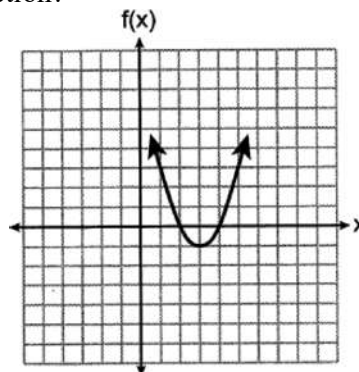
- 70 Graph $f(x) = -\frac{1}{3}x^2 + 4$ on the set of axes below.



State the vertex of this function. State the equation of the axis of symmetry of this function.

F.IF.C.9: COMPARING QUADRATIC FUNCTIONS

- 71 The axis of symmetry is $x = 2$ for which quadratic function?



- 1)
 2) $j(x) = 2x^2 + 8x$

x	g(x)
-2	6
-1	3
0	2
1	3
2	6

- 3)
 4) $h(x) = x^2 - 4x - 5$

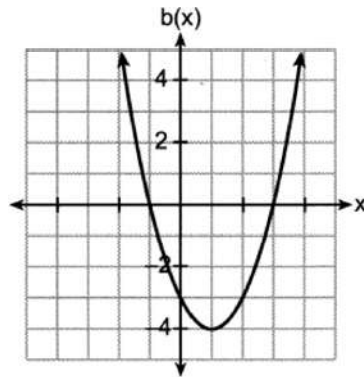
72 Four quadratic functions are represented below.

$$a(x) = (x - 3)^2 - 7$$

I

$$c(x) = x^2 + 6x + 3$$

III



II

x	d(x)
-4	-1
-3	-4
-2	-5
-1	-4
0	-1

IV

Which function has the *smallest* minimum value?

- | | |
|-------|--------|
| 1) I | 3) III |
| 2) II | 4) IV |

POWERS

A.APR.A.1: MULTIPLICATION OF POWERS

73 The expression 5^{a+2b} is equivalent to

- 1) $5^a \bullet 5^2 \bullet 5^b$
- 2) $5^a \bullet 25^b$
- 3) 25^{2ab}
- 4) 25^{a+2b}

74 The expression x^{2a+b} is equivalent to

- 1) $x^{2a} + x^b$
- 2) $x^a + x^{a+b}$
- 3) $x^a \bullet x^{a+b}$
- 4) $x^{a+b} \bullet x^{a+b}$

75 Which equation is always true?

- 1) $x^2 \bullet x^3 = x^5$
- 2) $3^x \bullet 3^2 = 9^{2x}$
- 3) $-z^2 = z^2$
- 4) $7^a \bullet 7^b = 7^{ab}$

A.APR.1: POWERS OF POWERS

76 Which expression is equivalent to $(-2x^2)^3$?

- 1) $-2x^5$
- 2) $-2x^6$
- 3) $-8x^5$
- 4) $-8x^6$

77 Which equation is always correct?

- 1) $a^3 \bullet a^x = a^{3x}$
- 2) $(a^4)^x = a^{4+x}$
- 3) $(ab)^x = a^x b^x$
- 4) $a^x \bullet b^y = ab^{x+y}$

F.LE.5: MODELING EXPONENTIAL
EQUATIONS

- 78 The following function models the value of a diamond ring, in dollars, t years after it is purchased:

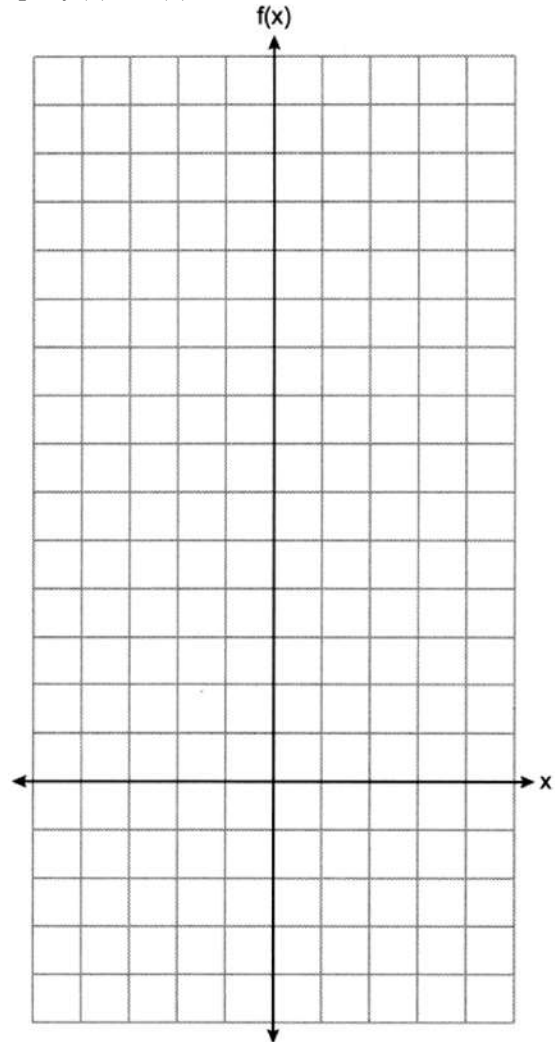
$$v(t) = 500(1.08)^t$$

What was the original price of the ring, in dollars?

- 1) \$108
- 2) \$460
- 3) \$500
- 4) \$540

F.IF.C.7: GRAPHING EXPONENTIAL
FUNCTIONS

- 79 Graph $f(x) = 3(2)^x$ over the interval $-1 \leq x \leq 2$.



POLYNOMIALS

A.SSE.A.1: MODELING POLYNOMIALS

- 80 What is the degree of the polynomial $2x - x^2 + 4x^3$?
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 4

81 What is the constant term of the polynomial

$$2x^3 - x + 5 + 4x^2?$$

- 1) 5
- 2) 2
- 3) 3
- 4) 4

82 A student creates a fourth-degree trinomial with a leading coefficient of 2 and a constant value of 5. The trinomial could be

- 1) $2x^4 + 3x^2 + 5$
- 2) $2x^4 + 5x + 3$
- 3) $4x^2 - 3x + 5$
- 4) $4x^3 - 5x^2 + 3$

83 Which expression has a degree of 3 and a leading coefficient of 2?

- 1) $2x^2 + 3x + 1$
- 2) $6x^3 + 3x^2 - 2x$
- 3) $3x^2 + 2x + 2$
- 4) $2x^3 + x^2 + 4x$

84 Which trinomial is written in standard form and has a constant term of five?

- 1) $x^5 - 4x^2 + 10$
- 2) $2x^2 + 6x^4 + 5$
- 3) $5x^4 - 3x^2 + 1$
- 4) $4x^5 - 8x^2 + 5$

85 Students were asked to write a polynomial given the following conditions:

- the degree of the expression is 3
- the leading coefficient is 2
- the constant term is -6

Which expression satisfies all three conditions?

- 1) $4x - 6 + 3x^2$
- 2) $3x^2 - 6x + 4$
- 3) $4 - 6x + 2x^3$
- 4) $4x^2 + 2x^3 - 6$

A.REI.D.10: IDENTIFYING SOLUTIONS

86 Which ordered pair is a solution to the equation

$$y - 1 = 2\left(x + \frac{1}{4}\right)?$$

- 1) (0.75, 0)
- 2) (1.25, 4)
- 3) (2.5, -6.5)
- 4) (4, -9.5)

87 The point $(x, -6)$ lies on the graph of a parabola whose equation is $y = -x^2 - x + 6$. The value of x can be

- 1) -3 or 2
- 2) -4 or 3
- 3) 3, only
- 4) -4, only

88 Which point lies on the graph of $y = 3x^2 - \frac{1}{4}x + 3$?

- 1) (-2, 15.5)
- 2) (-1, 5.75)
- 3) (1, 6.25)
- 4) (2, 15.5)

A.APR.1: OPERATIONS WITH POLYNOMIALS

89 The expression $-2(x^2 - 2x + 1) + (3x^2 + 3x - 5)$ is equivalent to

- 1) $x^2 + x - 4$
- 2) $x^2 - x - 7$
- 3) $x^2 + 7x - 4$
- 4) $x^2 + 7x - 7$

90 Which expression is equivalent to

$$3(x^2 - 2x + 3) - (4x^2 + 3x - 1)?$$

- 1) $-x^2 + x + 2$
- 2) $-x^2 - 8x + 7$
- 3) $-x^2 - 3x + 8$
- 4) $-x^2 - 9x + 10$

- 91 Which expression is equivalent to $(5x^2 - 2x + 4) - (3x^2 + 3x - 1)$?
- $2x^2 + x + 3$
 - $2x^2 - 5x + 5$
 - $2x^4 + x^2 + 3$
 - $2x^4 - 5x^2 + 5$
- 92 The expression $(-3x^2 + 9) - (7x^2 - 5x + 4)$ is equivalent to
- $-10x^2 + 5x + 5$
 - $-10x^2 + 5x + 13$
 - $-10x^2 - 5x + 5$
 - $-10x^2 - 5x + 13$
- 93 When $6x^3 - 2x + 8$ is subtracted from $5x^3 + 3x - 4$, the result is
- $x^3 - 5x + 12$
 - $x^3 + x + 4$
 - $-x^3 + 5x - 12$
 - $-x^3 + x + 4$
- 94 When $2x^2 - 3x + 4$ is subtracted from $x^2 + 2x - 5$, the result is
- $x^2 - 5x + 9$
 - $x^2 - x + 1$
 - $-x^2 + 5x - 9$
 - $-x^2 - x - 1$
- 95 If $x = 4a^2 - a + 3$ and $y = a - 5$, then which polynomial is equivalent to the product of x and y ?
- $-17a^2 - 2a - 15$
 - $-17a^2 + 8a - 15$
 - $4a^3 - 21a^2 - 2a - 15$
 - $4a^3 - 21a^2 + 8a - 15$
- 96 The sum of $(x + 7)^2$ and $(x - 3)^2$ is
- $2x^2 + 58$
 - $2x^4 + 58$
 - $2x^2 + 8x + 58$
 - $2x^4 + 8x^2 + 58$
- 97 Which expression is equivalent to $(x - 5)(2x + 7) - (x + 5)$?
- $2x^2 - 2x - 30$
 - $2x^2 - 2x - 40$
 - $2x^2 - 4x - 30$
 - $2x^2 - 4x - 40$
- 98 Express $(5x - 3)(-2x + 7)$ as a trinomial in standard form.
- 99 Determine the product of $(2x + 3)$ and $(-6x^2 + 5x - 1)$. Express the product in standard form.
- A.SSE.A.2: FACTORING POLYNOMIALS**
- 100 What is the correct factorization of $x^2 + 4x - 12$?
- $(x + 3)(x - 4)$
 - $(x - 3)(x + 4)$
 - $(x + 2)(x - 6)$
 - $(x - 2)(x + 6)$
- 101 The expression $x^2 - 26x - 120$ is equivalent to
- $(x + 4)(x - 30)$
 - $(x - 4)(x + 30)$
 - $(x - 20)(x + 6)$
 - $(x + 20)(x - 6)$

A.SSE.A.2: FACTORING THE DIFFERENCE OF
PERFECT SQUARES

- 102 Which expression is equivalent to $100x^2 - 16$?
- 1) $(50x - 8)(50x + 8)$
 - 2) $(50x - 8)(50x - 8)$
 - 3) $(10x - 4)(10x + 4)$
 - 4) $(10x - 4)(10x - 4)$

- 103 When factored, the expression $x^3 - 36x$ is equivalent to
- 1) $(x + 6)(x - 6)$
 - 2) $(x + 18)(x - 18)$
 - 3) $x(x + 6)(x - 6)$
 - 4) $x(x + 18)(x - 18)$

- 104 Which expression is equivalent to $a^8 - b^6$?
- 1) $(a^4 - b^3)^2$
 - 2) $(a^6 - b^4)^2$
 - 3) $(a^4)^2 - (b^3)^2$
 - 4) $(a^6)^2 - (b^4)^2$

- 105 Factor the expression $x^3 - 36x$ completely.

- 106 Factor $5x^3 - 80x$ completely.

- 107 Factor $20x^3 - 45x$ completely.

A.APR.B.3: ZEROS OF POLYNOMIALS

- 108 The zeros of the function $f(x) = x(x - 5)(3x + 6)$ are
- 1) 0, -5, and 2
 - 2) 0, 5, and -2
 - 3) -5 and 2, only
 - 4) 5 and -2, only

- 109 What are the zeros of $f(x) = x(x^2 - 36)$?

- 1) 0, only
- 2) 6, only
- 3) 6 and -6 only
- 4) 0, 6, and -6

- 110 What are the zeros of $f(x) = x^2 - 8x - 20$?

- 1) 10 and 2
- 2) 10 and -2
- 3) -10 and 2
- 4) -10 and -2

- 111 Which function has the zeros -1, 3, and -4?

- 1) $f(x) = (x + 1)(x - 3)(x - 4)$
- 2) $g(x) = (x - 1)(x + 3)(x - 4)$
- 3) $h(x) = (x + 1)(x - 3)(x + 4)$
- 4) $k(x) = (x - 1)(x + 3)(x + 4)$

RADICALS

N.RN.B.3: OPERATIONS WITH RADICALS

- 112 The product of $\sqrt{25}$ and $\sqrt{2}$ will result in

- 1) an irrational number
- 2) a rational number
- 3) a natural number
- 4) an integer

- 113 Which sum is irrational?

- 1) $-2\sqrt{12} + \sqrt{100}$
- 2) $-\sqrt{4} + \frac{1}{3}\sqrt{900}$
- 3) $\frac{1}{2}\sqrt{25} + \sqrt{64}$
- 4) $\sqrt{49} + 3\sqrt{121}$

114 Which expression results in an irrational number?

- 1) $\sqrt{3} \cdot \sqrt{3}$
- 2) $-\frac{2}{3} + \frac{1}{4}$
- 3) $5 \cdot \sqrt{81}$
- 4) $\frac{1}{3} + \sqrt{3}$

115 The sum of 3 and $\sqrt{5}$ is

- 1) rational, since the sum can be expressed as an integer
- 2) rational, since the sum can be expressed as a nonterminating decimal
- 3) irrational, since the sum can be expressed as a terminating decimal
- 4) irrational, since the sum cannot be expressed as a terminating or repeating decimal

116 Is the sum of $3\sqrt{2}$ and 5 rational or irrational?
Explain your answer.

117 The product of $2\sqrt{10}$ and $3\sqrt{2}$ is

- 1) $12\sqrt{5}$
- 2) $5\sqrt{20}$
- 3) $24\sqrt{5}$
- 4) $5\sqrt{12}$

118 The expression $\frac{10}{\sqrt{2}}$ is equivalent to

- 1) 5
- 2) 20
- 3) $5\sqrt{2}$
- 4) $10\sqrt{2}$

119 Rationalize: $\frac{3}{2\sqrt{6}}$

120 Rationalize the denominator of the fraction below.
Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$

121 What is the sum of $3x\sqrt{7}$ and $2x\sqrt{7}$?

- 1) $5x\sqrt{7}$
- 2) $5x^2\sqrt{7}$
- 3) $5x\sqrt{14}$
- 4) $5x^2\sqrt{14}$

122 The sum of $2\sqrt{54}$ and $2\sqrt{6}$ is

- 1) $4\sqrt{60}$
- 2) $8\sqrt{15}$
- 3) $7\sqrt{6}$
- 4) $8\sqrt{6}$

123 What is the sum of $8\sqrt{3}$ and $\sqrt{3}$?

- 1) $8\sqrt{6}$
- 2) $9\sqrt{6}$
- 3) $7\sqrt{3}$
- 4) $9\sqrt{3}$

124 The sum of $2\sqrt{27}$ and $4\sqrt{12}$ is

- 1) $14\sqrt{3}$
- 2) $34\sqrt{3}$
- 3) $6\sqrt{39}$
- 4) $8\sqrt{39}$

125 The expression $3 - 2\sqrt{5} + 6\sqrt{5}$ is equivalent to

- 1) $7\sqrt{5}$
- 2) $7\sqrt{10}$
- 3) $3 + 4\sqrt{5}$
- 4) $3 + 4\sqrt{10}$

SYSTEMS

A.CED.A.3: MODELING LINEAR SYSTEMS

- 126 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all. Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had. Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.
- 127 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax. If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation. Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25. Is Courtney correct? Justify your answer. Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.
- 128 Jen joined the Fan Favorite Movie Club at the local movie theater. At this theater, the cost of admission in May and June remains the same. In May, she saw 2 matinees and 3 regular-priced shows and spent \$38.50. In June, she went to 6 matinees and one regular-priced show and spent \$47.50. Write a system of equations to represent the cost, m , of a matinee ticket and the cost, r , of a regular-priced ticket. Jen said she spent \$5.75 on each matinee and \$9 on each regular show. Is Jen correct? Justify your answer. Use your system of equations to algebraically determine both the actual cost of each matinee ticket and the actual cost of each regular ticket.
- 129 Cameron sold hot dogs and sodas at a concession stand. He sold a total of 25 items for \$45.00. A hot dog sold for \$2.25 and a soda sold for \$1.50. All prices include tax. If x represents the number of hot dogs sold and y represents the number of sodas sold, write a system of equations that models this situation. Determine algebraically the number of hot dogs Cameron sold and the number of sodas he sold. A customer has \$20 to spend at the concession stand. Determine and state the maximum number of hot dogs he can purchase if he buys four sodas.
- 130 Acme Athletics purchases shoes from a supply company. In January the store bought 30 pairs of running shoes and 10 pairs of basketball shoes for \$3700. In March they bought 15 pairs of running shoes and 20 pairs of basketball shoes for \$3575. The supply company kept their prices constant. If x represents the cost of one pair of running shoes and y represents the cost of one pair of basketball shoes, write a system of equations that models this situation. Jacob says that a pair of running shoes costs the store \$80 each, and a pair of basketball shoes costs the store \$130 each. Is he correct? Justify your answer. Solve your system of equations algebraically to find the exact cost, in dollars, of one pair of running shoes and the exact cost, in dollars, of one pair of basketball shoes.

A.REI.6: SOLVING LINEAR SYSTEMS

- 131 The method of substitution was used to solve the system of equations below:

$$4x - 7y = 7$$

$$x - y = -1$$

Which equation is a correct first step when using this method?

- 1) $x = y - 1$
- 2) $y = x - 1$
- 3) $3x - 6y = 8$
- 4) $5x - 8y = 6$

- 132 Given the system of equations:
 $y + 4x = 5$

$$2x - 3y = 10$$

A step in solving this system by using the substitution method would be

- 1) $2(5 - 4x) + 4x = 5$
 - 2) $2(5 + 4x) + 4x = 5$
 - 3) $2x - 3(5 - 4x) = 10$
 - 4) $2x - 3(5 + 4x) = 10$
- 133 When solving the following system of equations algebraically, Mason used the substitution method.

$$3x - y = 10$$

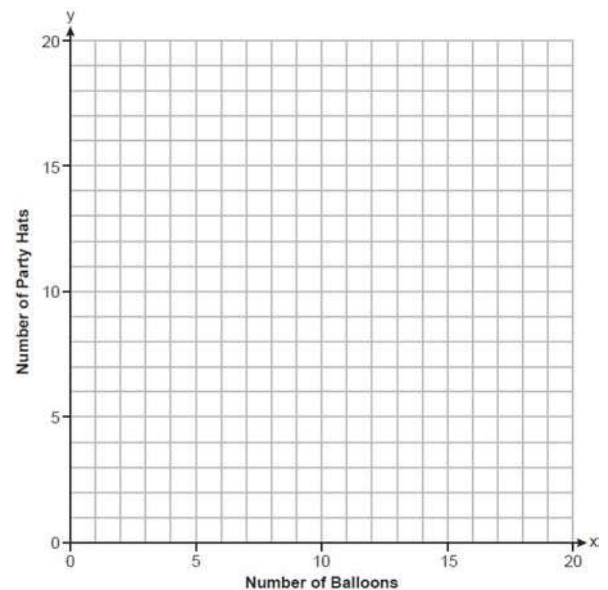
$$2x + 5y = 1$$

Which equation could he have used?

- 1) $2(3x - 10) + 5x = 1$
- 2) $2(-3x + 10) + 5x = 1$
- 3) $2x + 5(3x - 10) = 1$
- 4) $2x + 5(-3x + 10) = 1$

A.REI.C.6: GRAPHING LINEAR SYSTEMS

- 134 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons. If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation. Graph your system of equations on the set of axes below.



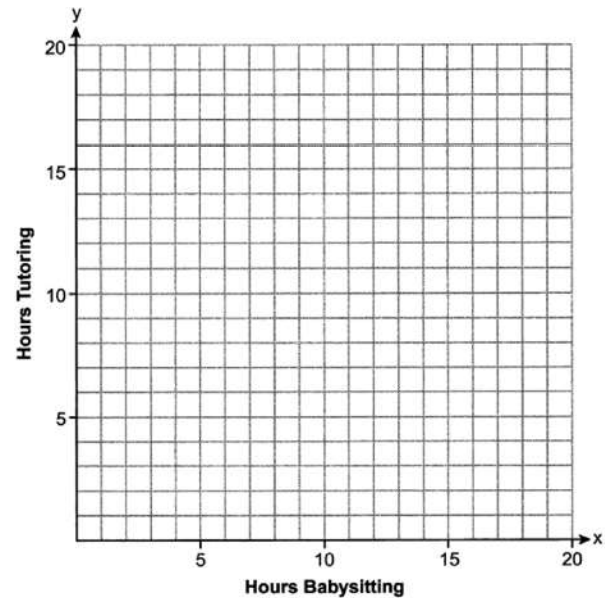
State the coordinates of the point of intersection of your lines. Explain what each coordinate means in the context of the problem.

A.CED.A.3: MODELING SYSTEMS OF LINEAR INEQUALITIES

- 135 A tour bus can seat, at most, 48 passengers. An adult ticket costs \$18 and a child ticket costs \$12. The bus company must collect at least \$650 to make a profit. If a represents the number of adult tickets sold and c represents the number of child tickets sold, which system of inequalities models this situation if they make a profit?

- 1) $a + c < 48$
 $18a + 12c > 650$
2) $a + c \leq 48$
 $18a + 12c \geq 650$
3) $a + c < 48$
 $18a + 12c < 650$
4) $a + c \leq 48$
 $18a + 12c \leq 650$

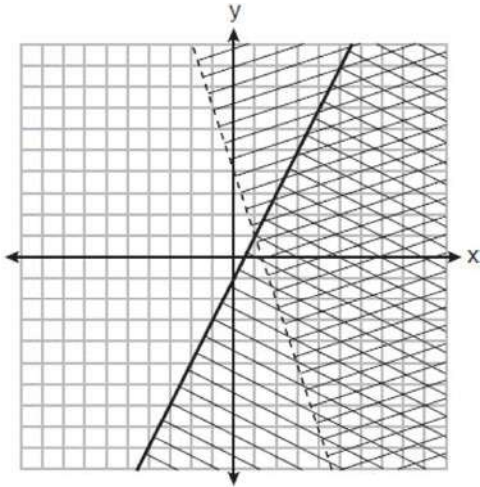
- 136 Sarah earns \$6 per hour babysitting and \$12 per hour tutoring. Her goal is to earn at least \$120 per week. Sarah is allowed to work a maximum of 14 hours per week doing both jobs. If x represents the number of hours Sarah babysits and y represents the number of hours she tutors, write a system of inequalities that could model this situation. On the set of axes below, graph the system of inequalities that you wrote.



State a combination of hours babysitting and tutoring that would satisfy this situation. Justify your answer.

A.REI.D.12: GRAPHING SYSTEMS OF LINEAR
INEQUALITIES

- 137 A system of inequalities is graphed on the set of axes below.



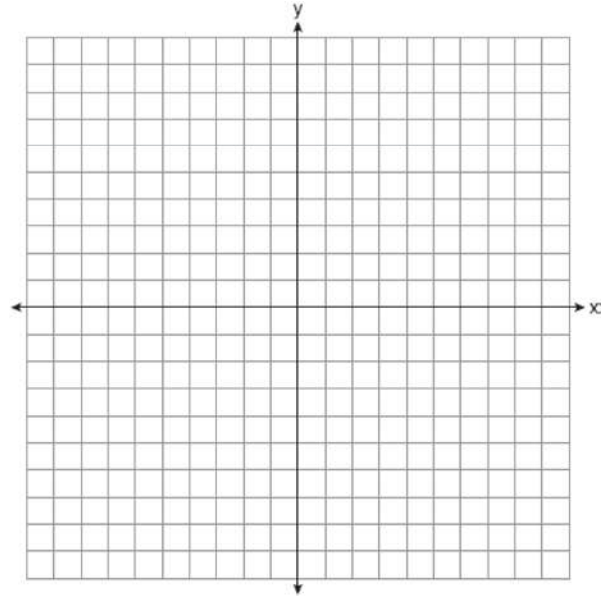
Which point is a solution to this system?

- 1) (1, 1)
- 2) (2, -2)
- 3) (1, 8)
- 4) (4, 2)

- 138 Graph the system of inequalities on the set of axes below.

$$3y + 2x \leq 15$$

$$y - x > 1$$



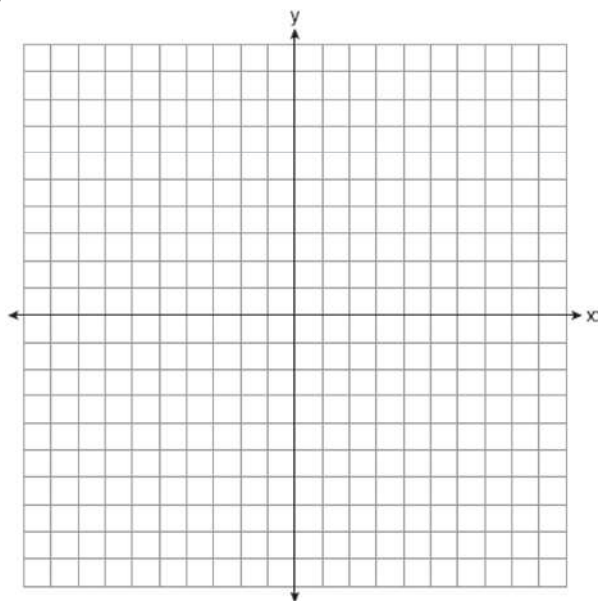
State the coordinates of a point in the solution to this system. Justify your answer.

- 139 Graph the system of inequalities on the set of axes below:

$$y > 3x - 4$$

$$x + 2y \leq 6$$

Label the solution set S .

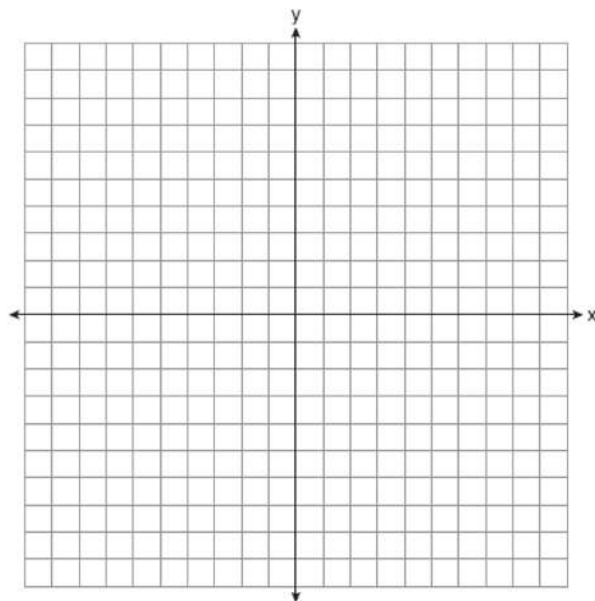


Is the point $(2,2)$ a solution to the system? Justify your answer.

- 140 Graph the following system of inequalities on the set of axes below:

$$y \geq -\frac{1}{2}x - 3$$

$$y - 2x < 5$$

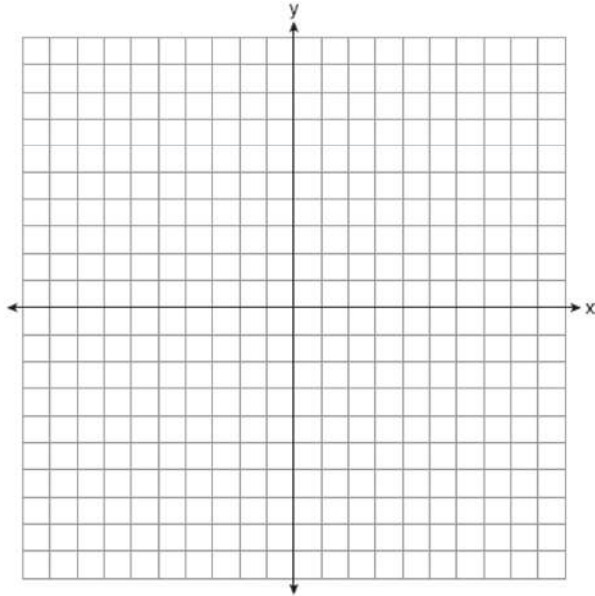


State the coordinates of a point that is in the solution to this system. Justify your answer.

- 141 Solve the following system of inequalities graphically. Label the solution set S .

$$2y \leq x + 6$$

$$2x + y > 3$$



Is the point $(0,3)$ in the solution set? Explain your answer.

A.REI.C.7: QUADRATIC-LINEAR SYSTEMS

- 142 Solve the following systems of equations algebraically for all values of x and y :

$$y = x^2 + 5x - 17$$

$$x - y = 5$$

- 143 Solve the systems of equations algebraically for all values of x and y :

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

$$y = 2x + 7$$

- 144 Solve the following system of equations algebraically for all values of x and y :

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

- 145 Solve the following system of equations algebraically for all values of x and y :

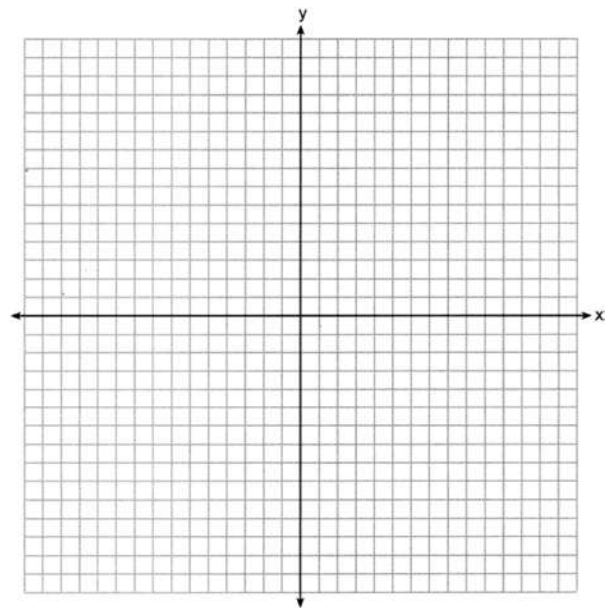
$$y = x^2 + 9x + 4$$

$$y - 2x = -6$$

- 146 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

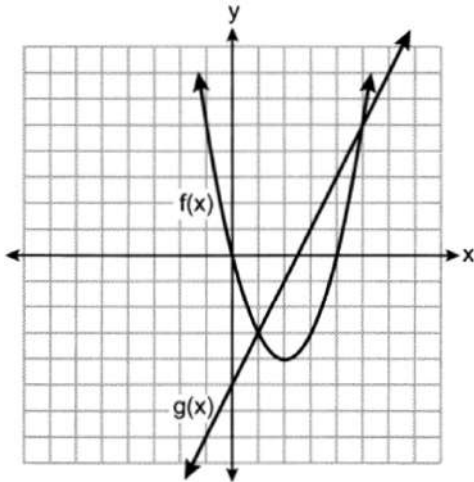
$$y = x - 1$$



State the coordinates of all solutions.

A.REI.D.11: QUADRATIC-LINEAR SYSTEMS

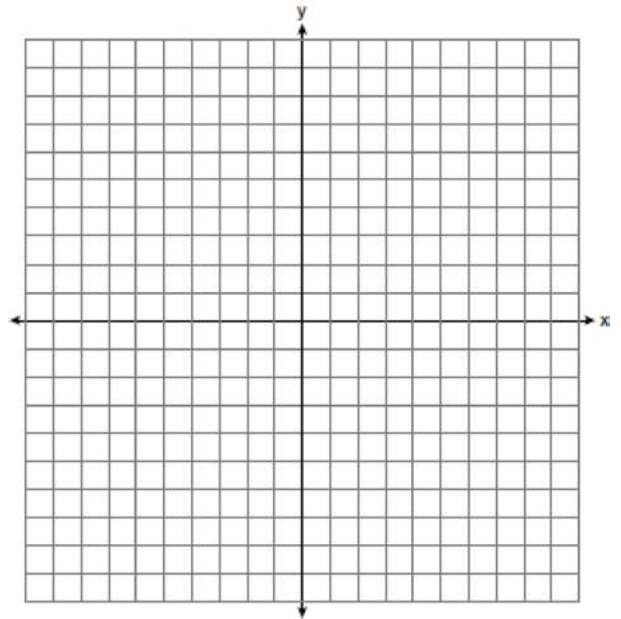
- 147 The functions $f(x)$ and $g(x)$ are graphed on the set of axes below.



What is the solution to the equation $f(x) = g(x)$?

- 1) 1 and 5
 - 2) -5 and 0
 - 3) -3 and 5
 - 4) 0 and 4
- 148 Given $f(x) = x^2$ and $g(x) = 8x - 15$ graphed on the same set of axes, which value(s) of x will make $f(x) = g(x)$?
- 1) 3, only
 - 2) 9, only
 - 3) 3 and 5
 - 4) 9 and 25
- 149 The functions $f(x) = x^2 - 5x - 14$ and $g(x) = x + 2$ are graphed on the same set of axes. What are the solutions to the equation $f(x) = g(x)$?
- 1) -14 and 0
 - 2) 0 and 2
 - 3) -2 and 8
 - 4) -2 and 7

- 150 Graph $f(x) = -3x$ and $g(x) = x^2 + 2$ on the set of axes below.



State the values of x that satisfy the equation $f(x) = g(x)$.

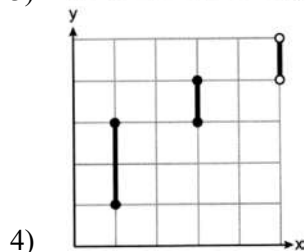
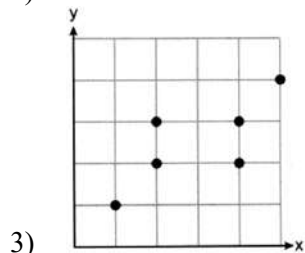
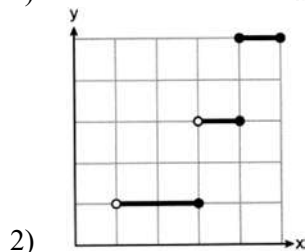
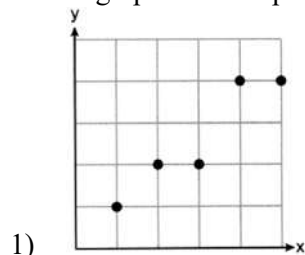
A.REI.D.11: OTHER SYSTEMS

- 151 When $f(x) = |4x + 2|$ and $g(x) = 3x + 5$ are graphed on the same set of axes, for which value of x is $f(x) = g(x)$?
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 14

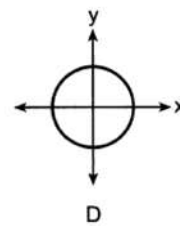
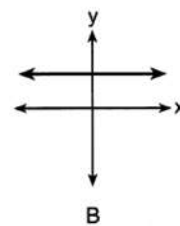
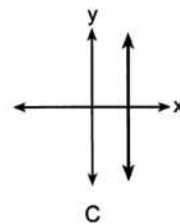
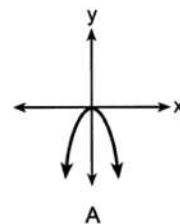
FUNCTIONS

F.IF.A.1: DEFINING FUNCTIONS

152 Which graph below represents a function?



153 Four graphs are shown below.

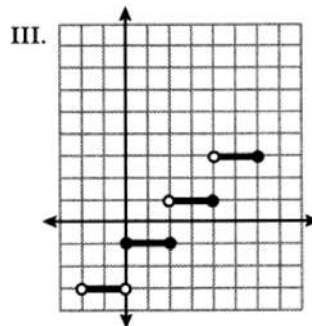
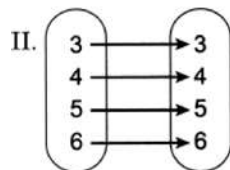


Which of the graphs represent(s) a function?

- 1) *A*, only
- 2) *A* and *B*, only
- 3) *A*, *B*, and *C*, only
- 4) *A*, *B*, *C*, and *D*

154 Three relations are shown below.

I. $\{(0,1), (1,2), (2,3), (3,4)\}$



Which relations represent a function?

- 1) I and II, only
- 2) I and III, only
- 3) II and III, only
- 4) I, II, and III

155 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$. State a value for x that will make this relation a function. Explain why your answer makes this a function.

156 Explain why the relation shown in the table below is a function.

x	-1	0	1	2
y	2	4	4	5

Complete the table below with values for both x and y so that this new relation is *not* a function.

x	-1	0	1	2	
y	2	4	4	5	

157 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function. Explain your reasoning.

F.IF.A.2: FUNCTIONAL NOTATION

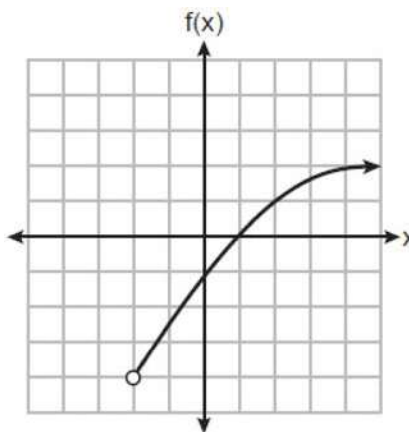
- 158 If $f(x) = \sqrt{x+1} + 5$, then what is the value of $f(3)$?
- 1) 9
 - 2) 7
 - 3) 3
 - 4) 10
- 159 If $g(x) = -2x^2 + 16$ then $g(-3)$ equals
- 1) -20
 - 2) -2
 - 3) 34
 - 4) 52
- 160 Given the function $g(x) = \frac{2^{x+3}}{x^2 - 2}$, what is the value of $g(-2)$?
- 1) 1
 - 2) $\frac{1}{3}$
 - 3) -1
 - 4) $-\frac{1}{3}$
- 161 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.
- 162 If $f(x) = \frac{30x^2}{x+2}$, determine the value of $f\left(\frac{1}{2}\right)$.
- 163 If $f(x) = \frac{-3x-5}{2}$, algebraically determine the value of x when $f(x) = -22$.

F.IF.A.2: DOMAIN AND RANGE

- 164 The range of $f(x) = |x+2| - 5$ is
- 1) $y \geq -5$
 - 2) $y \geq 2$
 - 3) $x \geq -5$
 - 4) $x \geq 2$
- 165 Which function has a domain of all real numbers and a range greater than or equal to three?
- 1) $f(x) = -x + 3$
 - 2) $g(x) = x^2 + 3$
 - 3) $h(x) = 3^x$
 - 4) $m(x) = |x+3|$

F.IF.B.5: DOMAIN AND RANGE

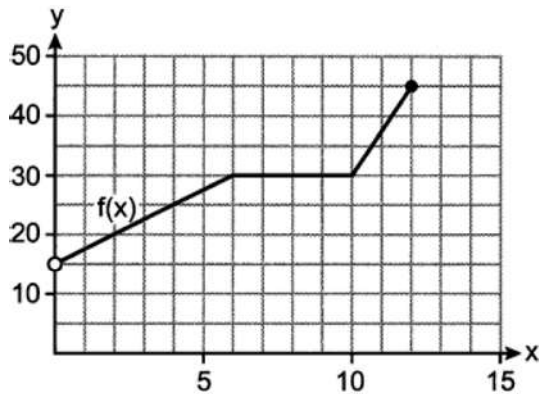
- 166 A function is graphed on the set of axes below.



The domain of this function is

- 1) $\{x|x > -2\}$
- 2) $\{x|x \geq -2\}$
- 3) $\{x|x > -4\}$
- 4) $\{x|x \geq -4\}$

167 The graph of $f(x)$ is shown below.



The domain of this function is

- 1) $[0, 12]$
- 2) $[15, 45]$
- 3) $0 < x \leq 12$
- 4) $15 < x \leq 45$

169 The tables below show the input and output values of four different functions.

x	$f(x)$	x	$g(x)$	x	$h(x)$	x	$j(x)$
-2	6	-4	3	-2	-1	-3	-11
-1	1	-3	2	-1	-2	-2	-7
0	-2	-2	1	0	-4	-1	-3
1	-3	-1	0	1	-8	0	1
2	-2	0	1	2	-16	1	5
3	1	1	2	3	-32	2	9

Which table represents a linear function?

- 1) $f(x)$
- 2) $g(x)$
- 3) $h(x)$
- 4) $j(x)$

F.LE.A.1: FAMILIES OF FUNCTIONS

168 Which situation can be modeled by a linear function?

- 1) A printer can print one page every three seconds.
- 2) A bank account earns 0.5% interest each year, compounded annually.
- 3) The number of cells in an organism doubles every four days.
- 4) The attendance at a professional sports team's games decreases by 1.5% each year.

- 170 Which table of values best models an exponential decay function?

x	f(x)
-2	7
-1	4
0	1
1	-2
2	-5
3	-8

1)

m	f(m)
0	200
1	180
2	162
3	146
4	131
5	118

2)

n	f(n)
0	200
0.5	210
1	220
1.5	231
2	242
2.5	254

3)

p	f(p)
-3	-2
-2	-5
-1	-6
0	-5
1	-2
2	3

4)

- 171 Which scenario represents an exponential relationship?

- 1) Kirsten's New Year's resolution is to lose one pound each week.
- 2) Sarah wants to increase her grade by 5 points each quarter.
- 3) Tommy wants to reduce his spending by \$50 each month.
- 4) Dylan hopes to grow his business by 5% each month.

- 172 On an island, a rare breed of rabbit doubled its population each month for two years. Which type of function best models the increase in population at the end of two years?

- 1) linear growth
- 2) linear decay
- 3) exponential growth
- 4) exponential decay

173 The inputs and outputs of a function are shown in the table below.

x	$f(x)$
0	0.0625
1	0.125
2	0.25
3	0.5
4	1
5	2

This function can best be described as

- 1) linear
- 2) quadratic
- 3) exponential
- 4) absolute value

F.LE.A.3: FAMILIES OF FUNCTIONS

174 Nancy has just been hired for her first job. Her company gives her four choices for how she can collect her annual salary over the first eight years of employment. Each function below represents the four choices she has for her annual salary in thousands of dollars, where t represents the number of years after she is hired.

$$a(t) = 2^t + 25$$

$$b(t) = 10t + 75$$

$$c(t) = \sqrt{400t} + 80$$

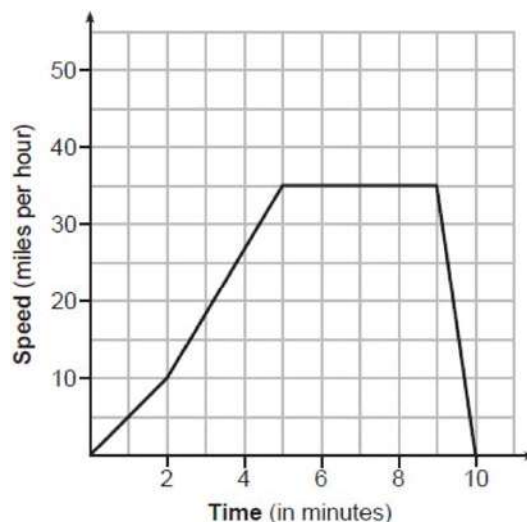
$$d(t) = 2(t+1)^2 - 10t + 50$$

Which pay plan should Nancy choose in order to have the highest salary in her eighth year?

- 1) $a(t)$
- 2) $b(t)$
- 3) $c(t)$
- 4) $d(t)$

F.IF.B.4: RELATING GRAPHS TO EVENTS

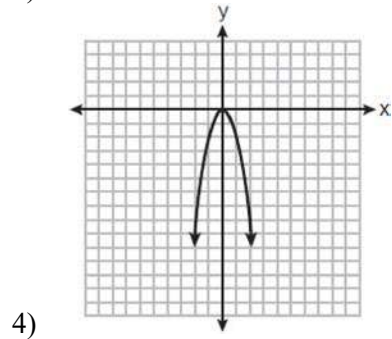
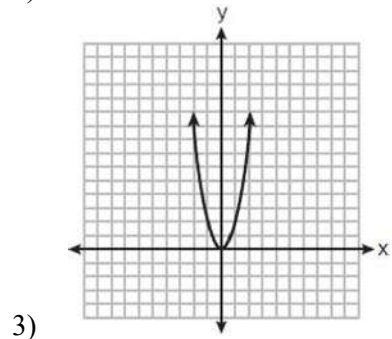
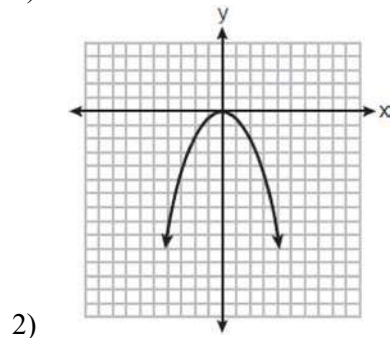
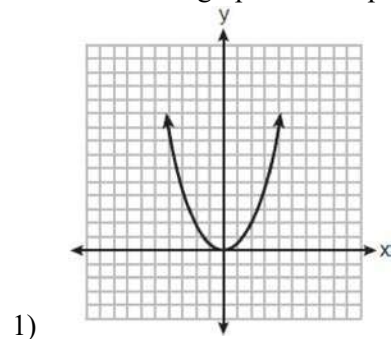
175 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed. Explain your reasoning.

F.BF.B.3: TRANSFORMATIONS WITH
 FUNCTIONS

- 176 The function $f(x) = x^2$ is multiplied by k , where $k < -1$. Which graph could represent $g(x) = kf(x)$?



- 177 Given $f(x) = x^2$, which function will shift $f(x)$ to the left 3 units?

- 1) $g(x) = x^2 + 3$
- 2) $h(x) = x^2 - 3$
- 3) $j(x) = (x - 3)^2$
- 4) $k(x) = (x + 3)^2$

- 178 If $f(x) = x^2$, then which function represents a shift of the graph of $f(x)$ 4 units to the right and 3 units down?

- 1) $g(x) = (x + 4)^2 + 3$
- 2) $j(x) = (x + 4)^2 - 3$
- 3) $h(x) = (x - 4)^2 - 3$
- 4) $k(x) = (x - 4)^2 + 3$

- 179 Isabella wants to shift the graph of the function $f(x) = (x + 5)^2 - 2$ left 3 units. Which function represents the shifted graph?

- 1) $g(x) = (x + 2)^2 - 2$
- 2) $g(x) = (x + 8)^2 - 2$
- 3) $g(x) = (x + 5)^2 - 5$
- 4) $g(x) = (x + 5)^2 + 1$

- 180 The students in Mrs. Smith's algebra class were asked to describe the graph of $g(x) = 2(x - 3)^2$ compared to the graph of $f(x) = x^2$. Which student response is correct?

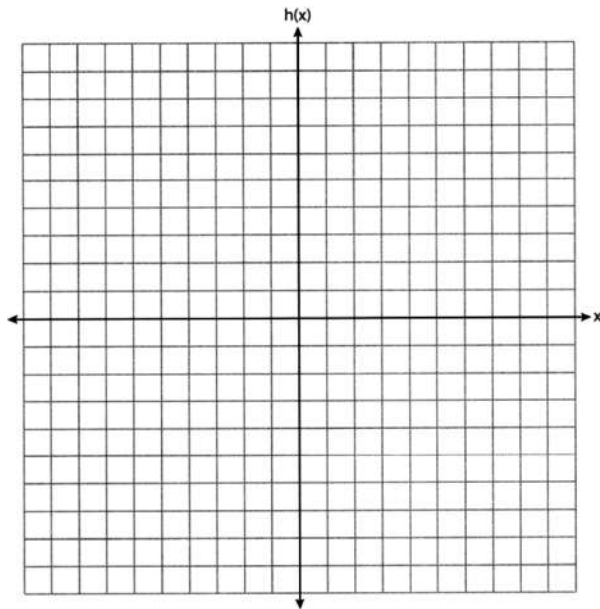
- 1) Ashley said that the graph of $g(x)$ is wider and shifted left 3 units.
- 2) Beth said that the graph of $g(x)$ is narrower and shifted left 3 units.
- 3) Carl said that the graph of $g(x)$ is wider and shifted right 3 units.
- 4) Don said that the graph of $g(x)$ is narrower and shifted right 3 units.

- 181 Which function represents the graph of $w(x) = |x|$ shifted 2 units to the right?

- 1) $g(x) = |x + 2|$
- 2) $h(x) = |x - 2|$
- 3) $q(x) = |x| + 2$
- 4) $r(x) = |x| - 2$

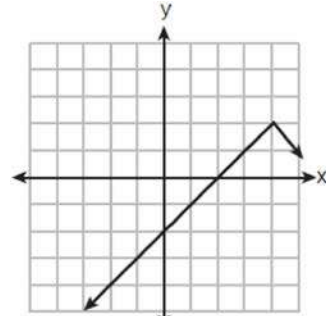
F.IF.C.7: GRAPHING ABSOLUTE VALUE FUNCTIONS

- 182 Graph $h(x) = |x - 2|$ over the domain $-4 \leq x \leq 4$.

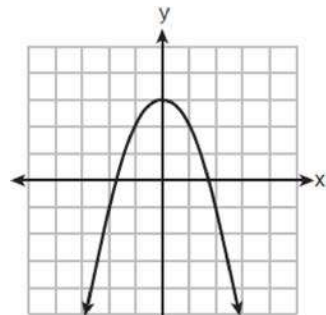


F.IF.C.7: GRAPHING PIECEWISE-DEFINED FUNCTIONS

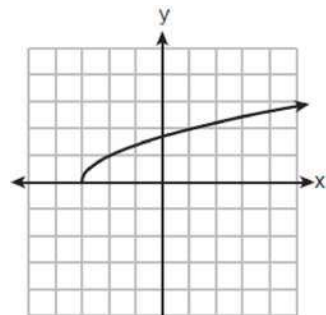
- 183 Which graph below represents a function that is always *decreasing* over the entire interval $-3 < x < 3$?



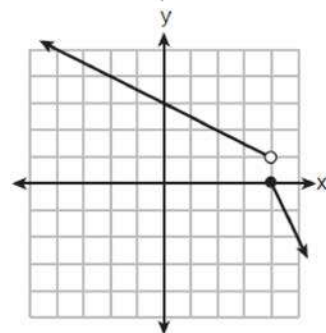
1)



2)



3)



4)

F.IF.C.9: COMPARING FUNCTIONS

- 184 Three functions are given below.

$$f(x) = -|x + 2| + 7$$

$$g(x) = (x - 3)^2 - 4$$

x	h(x)
-4	5
-3	0
-2	-3
-1	-4
0	-3
1	0
2	5

Which functions have the same y -intercept?

- 1) $f(x)$ and $g(x)$
- 2) $g(x)$ and $h(x)$
- 3) $f(x)$ and $h(x)$
- 4) The functions all have different y -intercepts.

SEQUENCES AND SERIES

F.IF.A.3: SEQUENCES

- 185 In an arithmetic sequence, the first term is 4 and the third term is -2 . What is the common difference?

- 1) -1
- 2) -2
- 3) -3
- 4) -6

- 186 The third term in a sequence is 25 and the fifth term is 625. Which number could be the common ratio of the sequence?

- 1) $\frac{1}{5}$
- 2) 5
- 3) $\frac{1}{25}$
- 4) 25

- 187 A geometric sequence is shown below.

$$\frac{1}{2}, 2, 8, 32, \dots$$

What is the common ratio?

- 1) $\frac{1}{4}$
- 2) 2
- 3) $\frac{1}{2}$
- 4) 4

- 188 A geometric sequence with a common ratio of -3 is

- 1) $-10, -7, -4, -1, \dots$
- 2) $14, 11, 8, 5, \dots$
- 3) $-2, -6, -18, -54, \dots$
- 4) $4, -12, 36, -108, \dots$

F.BF.A.1: SEQUENCES

- 189 The equation that represents the sequence $-2, -5, -8, -11, -14, \dots$ is

- 1) $a_n = -3 + (-2)(n - 1)$
- 2) $a_n = -2 + (-3)(n - 1)$
- 3) $a_n = 3 + (-2)(n - 1)$
- 4) $a_n = -2 + (3)(n - 1)$

- 190 In an arithmetic sequence, the first term is 25 and the third term is 15. What is the tenth term in this sequence?

- 1) -20
- 2) -25
- 3) 70
- 4) 75

- 191 Which equation represents the sequence

12, 6, 3, $\frac{3}{2}$, ..., where $a_1 = 12$?

1) $a_n = 12 \cdot \left(\frac{1}{2}\right)^{n-1}$

2) $a_n = 12 \cdot \left(\frac{1}{2}\right)^n$

3) $a_n = 12 \cdot (2)^{n-1}$

4) $a_n = 12 \cdot (2)^n$

- 192 In a sequence, the first term is
- -2
- and the common ratio is
- -3
- . The fourth term in this sequence is

1) -162

2) -11

3) 24

4) 54

- 193 The first and fourth terms in an arithmetic sequence are given below.

$-20, _, _, -2$

Determine the eighth term.

- 194 Determine the 8th term of a geometric sequence whose first term is 5 and whose common ratio is 3.

GRAPHS AND STATISTICS

S.ID.A.2: CENTRAL TENDENCY AND DISPERSION

- 195 The table below shows the highest temperatures recorded in August for several years in one town.

Year	Temperature (°F)
1990	86
1991	78
1992	84
1993	95
1994	81
1995	77
1996	88
1997	93

The interquartile range of these data is

1) 7

2) 10

3) 11

4) 18

196 The geometry test scores for Andrea and Joe are shown in the table below.

Andrea	Joe
82	91
87	78
90	94
84	67

Which statement about their test scores is correct?

- 1) Both the mean and standard deviation of Andrea's test scores are higher than Joe's.
- 2) Both the mean and standard deviation of Joe's test scores are higher than Andrea's.
- 3) The mean of Andrea's test scores is higher than Joe's, but Joe's standard deviation is higher than Andrea's.
- 4) The mean of Joe's test scores is higher than Andrea's, but Andrea's standard deviation is higher than Joe's.

S.ID.B.5: FREQUENCY TABLES

197 A survey of students at West High School was taken to determine a theme for the prom. The results of the survey are summarized in the table below.

	Beach Party	Hollywood	Broadway
Girls	86	112	68
Boys	123	77	79

Approximately what percentage of the students who chose the Broadway theme were girls?

- 1) 26
- 2) 27
- 3) 46
- 4) 68

198 Market Street Pizza kept a record of pizza sales for the month of February. The results are shown in the table below.

Type	Plain	Veggie	Meat Only	The Works
Thin Crust	300	80	120	100
Deep-dish	200	25	105	70

Of all the pizzas sold in February, what percent were plain, deep-dish pizzas?

- 1) 20%
- 2) 30%
- 3) 40%
- 4) 50%

- 199 The two-way frequency table below is a summary of concession stand sales for a football game.

Concession Stand Sales				
	Soda	Water	Coffee	Total
Hot Dogs	50	62	46	158
Pizza	120	58	4	182
No Food	30	20	10	60
Total	200	140	60	400

Of the people making a purchase at the concession stand, what is the relative frequency of them buying pizza and a water?

- 1) 0.58
 2) 0.35
 3) 0.455
 4) 0.145
- 200 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games. Of the students that play video games, 85 also use social media. Of the students that do not play video games, 20% do not use social media. Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media			
No Social Media			
Total			

- 201 A survey was taken to determine whether students preferred to watch videos or listen to music. Of the 100 students surveyed, 44 were seniors. Of the 65 students who preferred to watch videos, 42 were juniors. Use this information to complete the frequency table below.

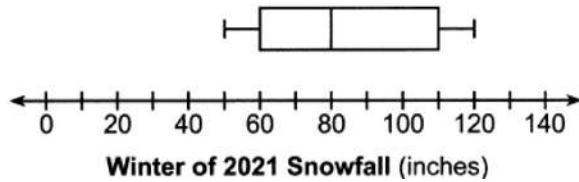
	Juniors	Seniors	Total
Watch Videos			
Listen to Music			
Total			

- 202 A survey was given to 180 cell phone owners about the brand of phone they owned. The results showed that 59 adults owned Brand B and 32 teenagers owned Brand A. Of all the people surveyed, 40% owned Brand A. Complete the two-way frequency table below.

	Brand A	Brand B	Total
Adults			
Teenagers			
Total			

S.ID.A.1: BOX PLOTS

- 203 The box plot below summarizes the data for the amount of snowfall, in inches, during the winter of 2021 for 12 locations in western New York.



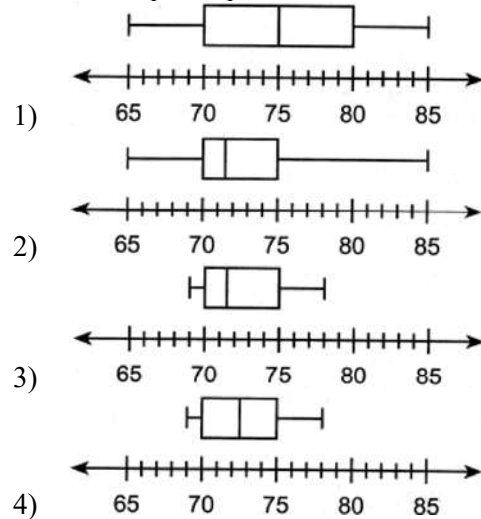
What is the interquartile range?

- 1) 30
- 2) 50
- 3) 80
- 4) 110

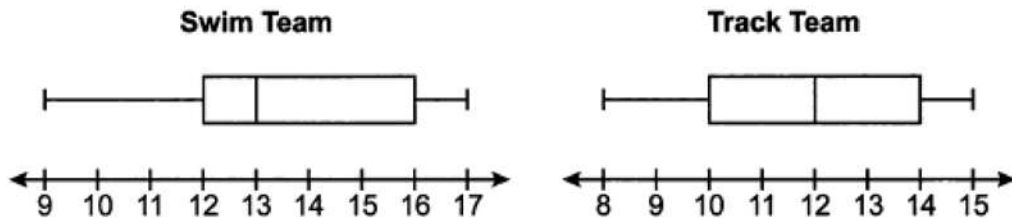
- 204 The heights, in inches, of eight football players are given below.

76, 70, 72, 70, 69, 71, 78, 74

Which box plot represents these data?



- 205 The box plots below summarize the ages of athletes on the swim team and the track team.



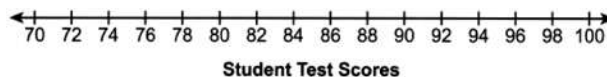
Based on the box plots, which statement must be true?

- 1) The IQR of both teams is the same.
- 2) There are more athletes on the swim team than on the track team.
- 3) The median age of the swim team is less than the median age of the track team.
- 4) The range of ages of the swim team is smaller than the range of ages of the track team.

- 206 A student's test scores for the semester are listed below.

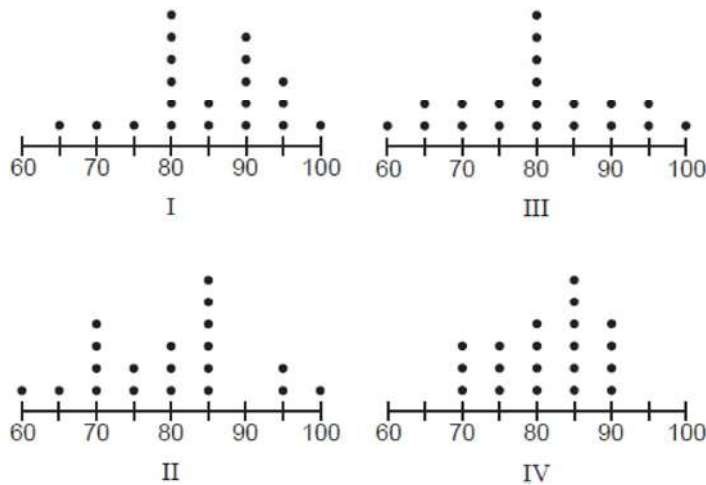
83, 87, 90, 94, 94, 93, 95, 70, 72, 83, 85, 88, 98

Construct a box plot for this data set, using the number line below.



S.ID.A.1: DOT PLOTS

207 The dot plots below represent test scores for 20 students on a math test.



The mode for this math test is 80 and the median is 85. Which dot plot correctly represents this data?

- | | |
|-------|--------|
| 1) I | 3) III |
| 2) II | 4) IV |

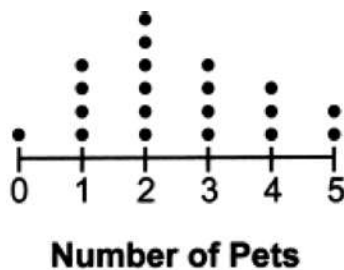
208 The dot plot below shows the number of goals Jessica scored in each lacrosse game last season.



Which statement about the dot plot is correct?

- | | |
|------------------|------------------|
| 1) mean > mode | 3) mode = median |
| 2) mean = median | 4) median > mean |

- 209 A class of 20 students was surveyed to determine the number of pets each student owned. The data are represented in the dot plot below.



Which statement about the data is correct?

- 1) The mean and the median are the same. 3) The mean and the mode are the same.
 2) The median and the mode are the same. 4) The mean, median, and mode are all the same.

S.ID.B.6: REGRESSION

- 210 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*. State the correlation coefficient to the *nearest hundredth*. State what this correlation coefficient indicates about the linear fit of the data.

- 211 The owner of an ice cream stand kept track of the number of ice cream cones that were sold each day of the first week in June. She compared the ice cream sales to the average daily temperature. The data are shown in the table below.

Average Daily Temp. (x)	72	75	81	78	77	76	80
Daily Ice Cream Cone Sales (y)	126	183	263	229	200	185	249

State the linear regression equation for these data, rounding all values to the *nearest hundredth*. State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data. State what this correlation coefficient indicates about the linear fit of the data.

- 212 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*. State the correlation coefficient, rounded to the *nearest tenth*. State what the correlation coefficient suggests about the linear fit of these data.

- 213 The table below shows the price of a new cell phone and the length of time, in months, since its release.

Time Since Release, in Months (x)	0	3	6	9	12
Price, in Dollars (y)	1200	1150	1100	1000	920

State the linear regression equation for this set of data. Round all values to the *nearest hundredth*. State the correlation coefficient for this data set, to the *nearest hundredth*. State what the correlation coefficient indicates about the linear fit of the data.

- 214 The table below shows the ages of drivers and the annual cost of their car insurance.

Age (x) (in years)	16	17	18	18	21	22	30
Annual Cost of Car Insurance (y) (in dollars)	1452	1332	1284	1320	1200	1188	600

Write the linear regression equation for this set of data. Round all values to the *nearest hundredth*. State the correlation coefficient of this line of best fit, to the *nearest hundredth*. State what this correlation coefficient indicates about the linear fit of the data set.

S.ID.C.8: CORRELATION COEFFICIENT

- 215 Fred recorded the number of minutes he read each day, from Monday through Friday. His results are shown in the table.

Day	Number of Minutes Read
1	12
2	16
3	19
4	27
5	29

What is the correlation coefficient, to the *nearest thousandth*, and strength of the linear model of these data?

- | | |
|---------------------|-------------------|
| 1) 0.984 and strong | 3) 0.984 and weak |
| 2) 0.968 and strong | 4) 0.968 and weak |

Algebra I Regents Exam Questions by State Standard: Topic Answer Section

1	ANS: 4	REF: 082406ai	NAT: A.REI.A.1	TOP: Identifying Properties
2	ANS: 4	REF: 012514ai	NAT: A.REI.A.1	TOP: Identifying Properties
3	ANS: 4	REF: 062508ai	NAT: A.REI.A.1	TOP: Identifying Properties
4	ANS: 4	REF: 082508ai	NAT: A.REI.A.1	TOP: Identifying Properties
5	ANS: 1	REF: 012612ai	NAT: A.REI.A.1	TOP: Identifying Properties

6 ANS: 2

$$\frac{4(x-5)}{3} = 12$$

$$4x - 20 = 36$$

$$4x = 56$$

$$x = 14$$

REF: 062406ai NAT: A.REI.B.3 TOP: Solving Linear Equations

7 ANS: 1

$$-2(3x - 5) = \frac{9}{2}x - 2$$

$$-4(3x - 5) = 9x - 4$$

$$-12x + 20 = 9x - 4$$

$$24 = 21x$$

$$x = \frac{24}{21} = \frac{8}{7}$$

REF: 012511ai NAT: A.REI.B.3 TOP: Solving Linear Equations

8 ANS: 4

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

$$6x - 2 = 3x + 6$$

$$3x = 8$$

$$x = \frac{8}{3}$$

REF: 062521ai NAT: A.REI.B.3 TOP: Solving Linear Equations

9 ANS: 2
 $3x - ax = 12$
 $x(3 - a) = 12$

$$x = \frac{12}{3 - a}$$

REF: 062422ai NAT: A.REI.B.3 TOP: Solving Linear Equations

KEY: coefficients represented by letters

10 ANS: 2
 $6 - ax = ax - 2$

$$8 = 2ax$$

$$\frac{8}{2a} = x$$

$$\frac{4}{a} = x$$

REF: 082420ai NAT: A.REI.B.3 TOP: Solving Linear Equations

KEY: coefficients represented by letters

11 ANS:
 $14x = 3(1 + 2x) - 4x$

$$14x = 3 + 6x - 4x$$

$$14x = 3 + 2x$$

$$12x = 3$$

$$x = \frac{3}{12}$$

REF: 012625ai NAT: A.REI.B.3 TOP: Solving Linear Equations

12 ANS:
 $0.05(x - 3) = 0.35x - 7.5$

$$x - 3 = 7x - 150$$

$$147 = 6x$$

$$24.5 = x$$

REF: 082428ai NAT: A.REI.B.3 TOP: Solving Linear Equations

13 ANS:

$$\frac{1}{6}(4x + 12) = 9$$

$$4x + 12 = 54$$

$$4x = 42$$

$$x = 10.5$$

REF: 082525ai

NAT: A.REI.B.3

TOP: Solving Linear Equations

14 ANS: 1

REF: 062517ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

15 ANS: 3

REF: 082502ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

16 ANS: 2

REF: 082404ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

17 ANS: 2

$$p = 2l + 2w$$

$$p - 2l = 2w$$

$$\frac{p - 2l}{2} = w$$

REF: 012509ai

NAT: A.CED.A.4

TOP: Transforming Formulas

KEY: basic

18 ANS: 1

$$K = \frac{1}{2}mv^2$$

$$2K = mv^2$$

$$m = \frac{2K}{v^2}$$

REF: 062520ai

NAT: A.CED.A.4

TOP: Transforming Formulas

KEY: basic

19 ANS: 1

$$2A = h(b_1 + b_2)$$

$$\frac{2A}{b_1 + b_2} = h$$

REF: 082517ai

NAT: A.CED.A.4

TOP: Transforming Formulas

KEY: basic

20 ANS: 1

$$S = 2\pi r^2 + 2\pi rh$$

$$S - 2\pi r^2 = 2\pi rh$$

$$\frac{S - 2\pi r^2}{2\pi r} = h$$

REF: 012609ai

NAT: A.CED.A.4

TOP: Transforming Formulas

KEY: basic

21 ANS: 3

REF: 062423ai

NAT: N.Q.A.1

TOP: Conversions

22 ANS: 4

REF: 082424ai

NAT: N.Q.A.1

TOP: Conversions

23 ANS: 4

REF: 012519ai

NAT: N.Q.A.1

TOP: Conversions

24 ANS: 3

REF: 062524ai

NAT: N.Q.A.1

TOP: Conversions

25 ANS: 4

REF: 082524ai

NAT: N.Q.A.1

TOP: Conversions

26 ANS: 1

REF: 012619ai

NAT: N.Q.A.1

TOP: Conversions

27 ANS: 1

$$\frac{55 - 0}{5.5 - 0} = 10$$

REF: 062418ai

NAT: F.IF.B.6

TOP: Rate of Change

28 ANS: 3

$$\frac{425 - 50}{350 - 100} = 1.5$$

REF: 082410ai

NAT: F.IF.B.6

TOP: Rate of Change

29 ANS: 1

$$\frac{60 - 12}{12 - 4} = \frac{48}{8} = 6$$

REF: 062507ai

NAT: F.IF.B.6

TOP: Rate of Change

30 ANS: 2

$$\frac{2.5 - 10}{3 - 1} = \frac{-7.5}{2} = -3.75$$

REF: 082511ai

NAT: F.IF.B.6

TOP: Rate of Change

31 ANS: 4

$$\frac{25 - 750}{2014 - 2000} = \frac{-725}{14} \approx -51.8$$

REF: 012621ai

NAT: F.IF.B.6

TOP: Rate of Change

32 ANS: 1

REF: 062421ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

33 ANS: 1

REF: 082412ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

34 ANS: 2

REF: 012505ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

35 ANS: 3

$$\frac{5-1}{-1-2} = \frac{6}{-3} = -2 \quad 5 = -2(-1) + b$$

$$3 = b$$

REF: 062410ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

36 ANS: 1 REF: 082418ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

37 ANS: 4

$$m = \frac{7-3}{2-1} = \frac{4}{1}$$

REF: fall2302ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

38 ANS: 1

$$m = \frac{8-2}{-1-4} = \frac{6}{-5} = -\frac{6}{5} \quad y = mx + b$$

$$8 = -\frac{6}{5}(-1) + b$$

$$6 = b$$

REF: 012502ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: slope-intercept form

39 ANS:

$$y - 5 = -3(x + 2)$$

$$y = -3x - 6 + 5$$

$$y = -3x - 1$$

REF: 062529ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: slope-intercept form

40 ANS:

$$y - 3 = \frac{2}{3}(x - 6)$$

$$3y - 9 = 2x - 12$$

$$3y = 2x - 3$$

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

REF: 012629ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: slope-intercept form

41 ANS: 4
 $2m - 4 \leq 3(2m + 4)$
 $2m - 4 \leq 6m + 12$
 $-16 \leq 4m$
 $-4 \leq m$

REF: 082413ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

42 ANS: 4
 $6.4 - 4x \geq -2.8$
 $9.2 \geq 4x$
 $2.3 \geq x$

REF: 012522ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

43 ANS: 3
 $4 + 3x > 9 - 7x$
 $10x > 5$
 $x > \frac{1}{2}$

REF: 012611ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

44 ANS:
 $5x - 10 \leq 3x + 20$
 $2x \leq 30$
 $x \leq 15$

REF: 062425ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

45 ANS:
 $5(2 - y) > -11y - 8$
 $10 - 5y > -11y - 8$
 $6y > -18$
 $y > -3$

REF: 062526ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

46 ANS: 2
 $x + x + 8 \geq 20$

REF: 012523ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

47 ANS:

$$8.50 + 2.25x \leq 20 \quad 5 \text{ tickets}$$

$$2.25x \leq 11.50$$

$$x \leq 5.\overline{1}$$

REF: 012630ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

48 ANS:

$$7.5x + 18 \leq 78 \quad 9 \text{ hours}$$

$$7.5x \leq 60$$

$$x \leq 8$$

REF: 082532ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

49 ANS: 2

$$3x^2 - 24x = 0$$

$$3x(x - 8) = 0$$

$$x = 0, 8$$

REF: 082510ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

50 ANS: 2 REF: 062511ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

51 ANS: 3

$$x^2 - 6x = 24$$

$$x^2 - 6x + 9 = 24 + 9$$

$$(x - 3)^2 = 33$$

REF: 012623ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

52 ANS: 2

$$x^2 + 6x = 18$$

$$x^2 + 6x + 9 = 18 + 9$$

$$(x + 3)^2 = 27$$

REF: 082408ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

53 ANS:

$$x^2 + 14x = 28$$

$$x^2 + 14x + 49 = 28 + 49$$

$$(x + 7)^2 = 77$$

REF: 082530ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

54 ANS:

$$x^2 + 8x + 16 = 33 + 16$$

$$(x + 4)^2 = 49$$

$$x + 4 = \pm 7$$

$$x = -11, 3$$

REF: 012528ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

55 ANS:

$$x^2 + 6x + 9 = 41 + 9$$

$$(x + 3)^2 = 50$$

$$x + 3 = \pm \sqrt{50}$$

$$x = -3 \pm 5\sqrt{2}$$

REF: fall2304ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

56 ANS:

$$x^2 + 10x = 30$$

$$x^2 + 10x + 25 = 30 + 25$$

$$(x + 5)^2 = 55$$

$$x + 5 = \pm \sqrt{55}$$

$$x = -5 \pm \sqrt{55}$$

REF: 062429ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

57 ANS:

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(1)(-6)}}{2(1)} = \frac{-3 \pm \sqrt{33}}{2}$$

REF: 082429ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

58 ANS:

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-3)}}{2(1)} = \frac{-4 \pm \sqrt{28}}{2} = \frac{-4 \pm 2\sqrt{7}}{2} = -2 \pm \sqrt{7}$$

REF: 012533ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

59 ANS:

$$x = \frac{-2 \pm \sqrt{2^2 - 4(6)(-1)}}{2(6)} = \frac{-2 \pm \sqrt{4 + 24}}{12} = \frac{-2 \pm \sqrt{28}}{12} = \frac{-2 \pm 2\sqrt{7}}{12} = \frac{-1 \pm \sqrt{7}}{6}$$

REF: 062532ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

60 ANS:

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(3)}}{2(1)} = \frac{6 \pm \sqrt{24}}{2} = \frac{6 \pm 2\sqrt{6}}{2}$$

REF: 082534ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

61 ANS:

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-3)}}{2(2)} = \frac{4 \pm \sqrt{40}}{4} = \frac{4 \pm 2\sqrt{10}}{4}$$

REF: 012632ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

62 ANS:

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)} = \frac{10 \pm \sqrt{40}}{6} = \frac{10 \pm 2\sqrt{10}}{6} = \frac{5 \pm \sqrt{10}}{3}$$

REF: 062433ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

63 ANS: 4 REF: 062401ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: key features

64 ANS:

$$t = \frac{-64}{2(-16)} = 2 \quad h(2) = -16(2)^2 + 64(2) + 80 = -64 + 128 + 80 = 144 \quad (2, 144).$$

above the ground. $0 = -16t^2 + 64t + 80$

$$0 = t^2 - 4t - 5$$

$$0 = (t - 5)(t + 1)$$

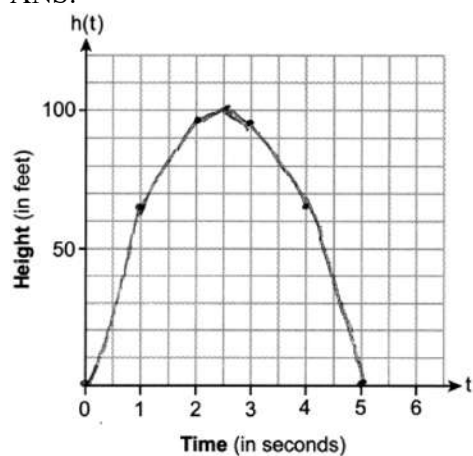
$$t = 5$$

REF: 082433ai NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

KEY: key features

65 ANS:



2.5, 100

REF: 012631ai

NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

66 ANS: 2

REF: 062502ai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

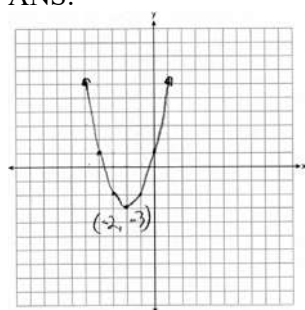
67 ANS: 1

REF: 012601ai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

68 ANS:

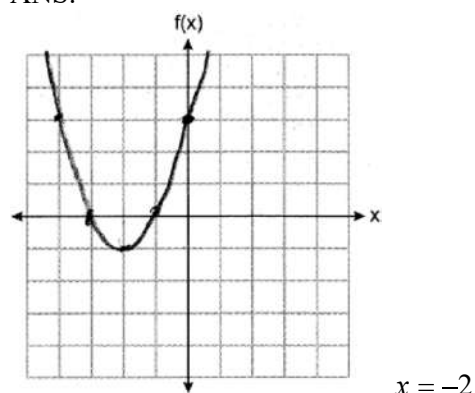


REF: 082425ai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

69 ANS:

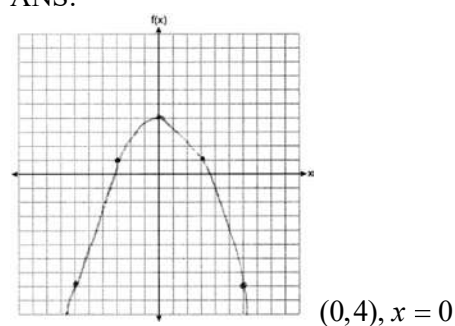


REF: 012526ai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

70 ANS:



REF: 082531sai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

71 ANS: 4

$$x = \frac{-(-4)}{2(1)} = 2$$

REF: 062523ai

NAT: F.IF.C.9

TOP: Comparing Quadratic Functions

72 ANS: 1

$$1) -7; 2) -4; 3) x = \frac{-6}{2(1)} = -3, c(-3) = (-3)^2 + 6(-3) + 3 = -6; 4) -5$$

REF: 062414ai

NAT: F.IF.C.9

TOP: Comparing Quadratic Functions

73 ANS: 2

$$5^{a+2b} = 5^a \bullet 5^{2b} = 5^a \bullet 25^b$$

REF: 082422ai

NAT: A.APR.A.1

TOP: Multiplication of Powers

74 ANS: 3

REF: 012512ai

NAT: A.APR.A.1

TOP: Multiplication of Powers

75 ANS: 1

REF: 062403ai

NAT: A.APR.A.1

TOP: Multiplication of Powers

76 ANS: 4

REF: 012620ai

NAT: A.APR.A.1

TOP: Powers of Powers

77 ANS: 3

REF: 082516ai

NAT: A.APR.A.1

TOP: Powers of Powers

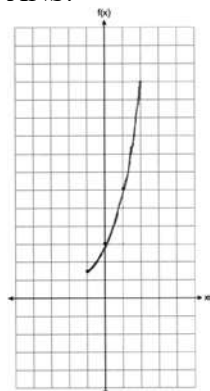
78 ANS: 3

REF: 012608ai

NAT: F.LE.B.5

TOP: Modeling Exponential Functions

79 ANS:



REF: 012626ai

NAT: F.IF.C.7

TOP: Graphing Exponential Functions

80 ANS: 3

REF: 062408ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

81 ANS: 1

REF: 012504ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

82 ANS: 1

REF: 082405ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

83 ANS: 4

REF: 062505ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

84 ANS: 4

REF: 082507ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

85 ANS: 4

REF: 012606ai

NAT: A.SSE.A.1

TOP: Modeling Polynomials

86 ANS: 2

$$4 - 1 = 2 \left(\frac{5}{4} + \frac{1}{4} \right)$$

$$3 = 3$$

REF: 012518ai

NAT: A.REI.D.10

TOP: Identifying Solutions

87 ANS: 2

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

$$x^2 + x - 12 = 0$$

$$(x + 4)(x - 3) = 0$$

$$x = -4, 3$$

REF: 012617ai

NAT: A.REI.D.10

TOP: Identifying Solutions

88 ANS: 1

$$3(-2)^2 - \frac{1}{4}(-2) + 3 = 12 + \frac{1}{2} + 3 = 15.5$$

REF: 082505ai

NAT: A.REI.D.10

TOP: Identifying Solutions

89 ANS: 4

$$-2x^2 + 4x - 2 + 3x^2 + 3x - 5 = x^2 + 7x - 7$$

REF: 062404ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: addition

90 ANS: 4

$$3(x^2 - 2x + 3) - (4x^2 + 3x - 1)$$

$$3x^2 - 6x + 9 - 4x^2 - 3x + 1$$

$$-x^2 - 9x + 10$$

REF: 082403ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

91 ANS: 2 REF: 012506ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

92 ANS: 1 REF: 062506ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

93 ANS: 3 REF: 082521ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

94 ANS: 3 REF: 012622ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

95 ANS: 4

$$(4a^2 - a + 3)(a - 5) = 4a^3 - 20a^2 - a^2 + 5a + 3a - 15 = 4a^3 - 21a^2 + 8a - 15$$

REF: 082417ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

96 ANS: 3

$$(x + 7)^2 + (x - 3)^2 = x^2 + 14x + 49 + x^2 - 6x + 9 = 2x^2 + 8x + 58$$

REF: 082519ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

97 ANS: 4

$$2x^2 + 7x - 10x - 35 - x - 5 = 2x^2 - 4x - 40$$

REF: 062419ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

98 ANS:

$$(5x - 3)(-2x + 7) = -10x^2 + 35x + 6x - 21 = -10x^2 + 41x - 21$$

REF: 062527ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

99 ANS:

$$(2x + 3)(-6x^2 + 5x - 1) = -12x^3 + 10x^2 - 2x - 18x^2 + 15x - 3 = -12x^3 - 8x^2 + 13x - 3$$

REF: 012627ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

100 ANS: 4 REF: 082401ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

101 ANS: 1 REF: 012604ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

KEY: quadratic

102 ANS: 3 REF: 082501ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

103 ANS: 3

$$x^3 - 36x = x(x^2 - 36) = x(x + 6)(x - 6)$$

REF: 012501ai NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

104 ANS: 3 REF: 062515ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

105 ANS:

$$x(x^2 - 36) = x(x + 6)(x - 6)$$

REF: 062530ai NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

106 ANS:

$$5x^3 - 80x = 5x(x^2 - 16) = 5x(x + 4)(x - 4)$$

REF: 082430ai NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

107 ANS:

$$20x^3 - 45x = 5x(4x^2 - 9) = 5x(2x + 3)(2x - 3)$$

REF: 062430ai NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

108 ANS: 2 REF: 062409ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

109 ANS: 4

$$f(x) = x(x + 6)(x - 6)$$

REF: 012616ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

110 ANS: 2

$$x^2 - 8x - 20 = 0$$

$$(x - 10)(x + 2) = 0$$

$$x = 10, -2$$

REF: 082504ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

111 ANS: 3 REF: 082421ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

112 ANS: 1

$5\sqrt{2}$ is irrational.

REF: 012602ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

113 ANS: 1 REF: 062405ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

114 ANS: 4 REF: 082407ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

115 ANS: 4 REF: 062514ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

116 ANS:

Irrational because the sum can not be written as the ratio of two integers.

REF: 082526ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

117 ANS: 1

$$2\sqrt{10} \cdot 3\sqrt{2} = 6\sqrt{20} = 6\sqrt{4}\sqrt{5} = 12\sqrt{5}$$

REF: 082520ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: multiplication

118 ANS: 3

$$\frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$$

REF: 062501ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: division

119 ANS:

$$\frac{3}{2\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{3\sqrt{6}}{12}$$

REF: fall2303ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: division

120 ANS:

$$\frac{4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$

REF: 012530ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: division

121 ANS: 1 REF: fall2301ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: addition

122 ANS: 4

$$2\sqrt{54} + 2\sqrt{6} = 2\sqrt{9}\sqrt{6} + 2\sqrt{6} = 6\sqrt{6} + 2\sqrt{6} = 8\sqrt{6}$$

REF: 082415ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: addition

123 ANS: 4 REF: 012515ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: addition

124 ANS: 1

$$2\sqrt{27} + 4\sqrt{12} = 2\sqrt{9}\sqrt{3} + 4\sqrt{4}\sqrt{3} = 6\sqrt{3} + 8\sqrt{3} = 14\sqrt{3}$$

REF: 062516ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: addition

125 ANS: 3 REF: 012605ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: subtraction

126 ANS:

$$n + d = 25 \quad n + 9 = 25$$

$$5n + 10d = 170 \quad n = 16$$

$$5(25 - d) + 10d = 170$$

$$125 - 5d + 10d = 170$$

$$5d = 45$$

$$d = 9$$

REF: 012531ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

127 ANS:

$4x + 2y = 15.5$ $5(4x + 2y = 15.5)$ Courtney is incorrect because of the following calculations: $20x + 10y = 77.5$

$3x + 5y = 18.1$ $2(3x + 5y = 18.1)$ $6x + 10y = 36.2$

$$14x = 41.3$$

$$x = 2.95$$

$$4(2.95) + 2y = 15.5$$

$$11.8 + 2y = 15.5$$

$$2y = 3.7$$

$$y = 1.85$$

REF: 062435ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

128 ANS:

$2m + 3r = 38.5$ Jen is not correct because the prices are $6m + 9r = 115.5$ $2m + 3(8.5) = 38.5$

$$6m + r = 47.5 \quad 6m + r = 47.5 \quad 2m + 25.5 = 38.5$$

$$8r = 68 \quad 2m = 13$$

$$r = 8.50 \quad m = 6.50$$

REF: 082435ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

129 ANS:

$$x + y = 25 \quad y = 25 - x \quad y = 25 - 10 = 15 \quad 2.25x + 1.5(4) \leq 20 \quad 6 \text{ hot dogs}$$

$$2.25x + 1.5y = 45 \quad 2.25x + 1.5(25 - x) = 45 \quad 2.25x + 6 \leq 20$$

$$2.25x + 37.5 - 1.5x = 45 \quad 2.25x \leq 14$$

$$.75x = 7.5 \quad x \leq 6.\bar{2}$$

$$x = 10$$

REF: 082535ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

130 ANS:

$$30x + 10y = 3700 \quad \text{No, because } 15(80) + 20(130) \neq 3575. \quad 30x + 10y = 3700 \quad 30x + 10(115) = 3700$$

$$15x + 20y = 3575$$

$$\underline{30x + 40y = 7150}$$

$$30x + 1150 = 3700$$

$$30y = 3450$$

$$30x = 2550$$

$$y = 115$$

$$x = 85$$

REF: 012635ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems

131 ANS: 1

REF: 082523ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

132 ANS: 3

REF: 062510ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

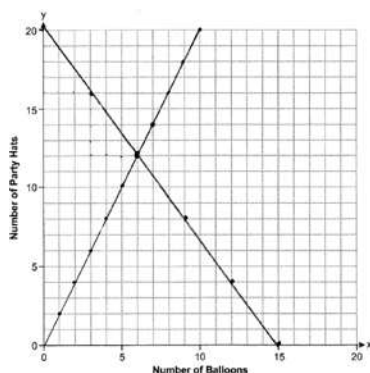
133 ANS: 3

REF: 012610ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

134 ANS:



$$2x + 1.5y = 30$$

$$y = 2x$$

hats.

(6,12) is the intersection, meaning Anna bought 6 balloons and 12

REF: 012535ai

NAT: A.REI.C.6

TOP: Graphing Linear Systems

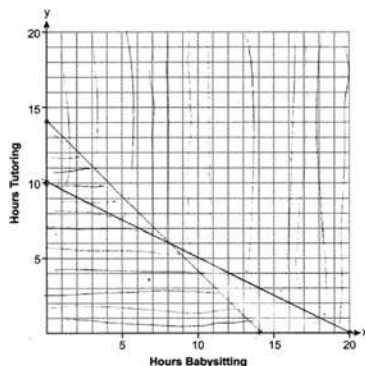
135 ANS: 2

REF: 062402ai

NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

136 ANS:



$$6x + 12y \geq 120$$

$$x + y \leq 14$$

8 hours of babysitting and 6 hours of tutoring. $6(8) + 12(6) \geq 120$

$$8 + 6 \leq 14$$

REF: 062535ai

NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

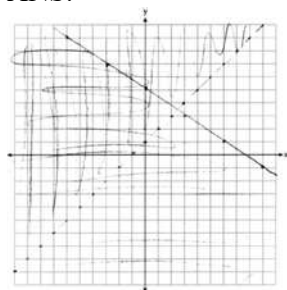
137 ANS: 4

REF: 012507ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

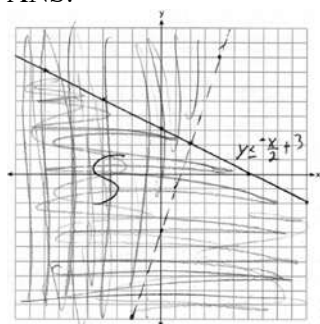
138 ANS:



$(-1, 1)$ is a solution as it is in the overlap area.

REF: 062434ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

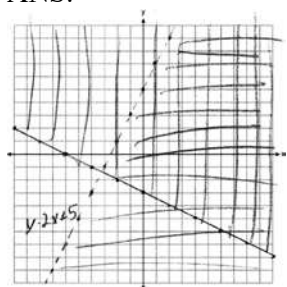
139 ANS:



; No, because $2 > 3(2) - 4$ is false.

REF: 082432ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

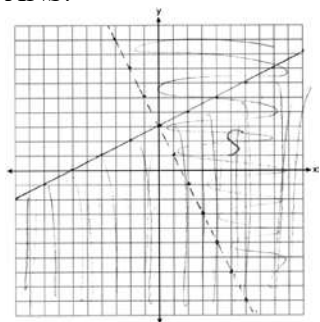
140 ANS:



$$\begin{aligned} (0,0) \quad 0 &\geq -\frac{1}{2}(0) - 3 & y - 2x < 5 \\ 0 &\geq -3 & 0 - 2(0) < 5 \\ & & 0 < 5 \end{aligned}$$

REF: 082533ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

141 ANS:

No, because $2(0) + 3 > 3$ is not true.

REF: 012634ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

142 ANS:

$$x^2 + 5x - 17 = x - 5 \quad -6 - y = 5 \quad 2 - y = 5 \quad (-6, -11), (2, -3)$$

$$x^2 + 4x - 12 = 0 \quad y = -11 \quad y = -3$$

$$(x + 6)(x - 2) = 0$$

$$x = -6, 2$$

REF: fall2305ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

143 ANS:

$$x^2 + 4x - 1 = 2x + 7 \quad y = 2(-4) + 7 = -1 \quad (-4, -1), (2, 11)$$

$$x^2 + 2x - 8 = 0 \quad y = 2(2) + 7 = 11$$

$$(x + 4)(x - 2) = 0$$

$$x = -4, 2$$

REF: 082434ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

144 ANS:

$$x^2 - 7x + 12 = 2x - 6 \quad y = 2(6) - 6 = 6 \quad (6, 6), (3, 0)$$

$$x^2 - 9x + 18 = 0 \quad y = 2(3) - 6 = 0$$

$$(x - 6)(x - 3) = 0$$

$$x = 6, 3$$

REF: 012534ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

145 ANS:

$$x^2 + 9x + 4 = 2x - 6 \quad y = 2(-5) - 6 = -16 \quad (-5, -16), (-2, -10)$$

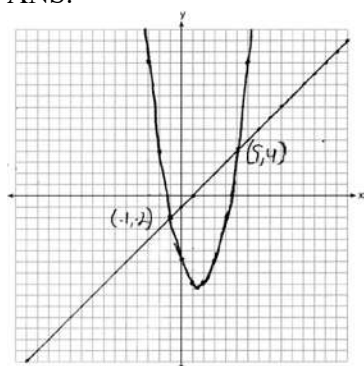
$$x^2 + 7x + 10 = 0 \quad y = 2(-2) - 6 = -10$$

$$(x + 5)(x + 2) = 0$$

$$x = -5, -2$$

REF: 062534ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

146 ANS:



REF: 062431ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

147 ANS: 1 REF: 062420ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

148 ANS: 3

$$x^2 = 8x - 15$$

$$x^2 - 8x + 15 = 0$$

$$(x - 3)(x - 5) = 0$$

$$x = 3, 5$$

REF: 082506ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

149 ANS: 3

$$x^2 - 5x - 14 = x + 2$$

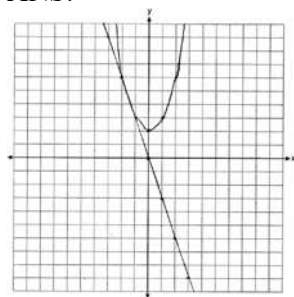
$$x^2 - 6x - 16 = 0$$

$$(x - 8)(x + 2) = 0$$

$$x = 8, -2$$

REF: 082416ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

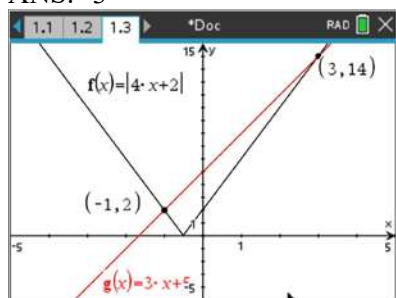
150 ANS:



-2 and -1

REF: 062531ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

151 ANS: 3



REF: 012603ai NAT: A.REI.D.11 TOP: Other Systems

152 ANS: 1 REF: 012607ai NAT: F.IF.A.1 TOP: Defining Functions

153 ANS: 2 REF: 062519ai NAT: F.IF.A.1 TOP: Defining Functions

154 ANS: 4 REF: 082522ai NAT: F.IF.A.1 TOP: Defining Functions

155 ANS:

x may be any value other than $-2, -1, 0$, so that for any value of x , there is a unique y .

REF: 062427ai NAT: F.IF.A.1 TOP: Defining Functions

156 ANS:

x	-1	0	1	2	2
y	2	4	4	5	4

For every value of x , there is a unique value of y .

REF: 082427ai NAT: F.IF.A.1 TOP: Defining Functions

157 ANS:

7, as for each value of x , there is a unique value of y .

REF: 012527ai NAT: F.IF.A.1 TOP: Defining Functions

158 ANS: 2

$$f(3) = \sqrt{3+1} + 5 = 7$$

REF: 012614ai NAT: F.IF.A.2 TOP: Functional Notation

159 ANS: 2

$$g(-3) = -2(-3)^2 + 16 = -18 + 16 = -2$$

REF: 082503ai NAT: F.IF.A.2 TOP: Functional Notation

160 ANS: 1

$$g(-2) = \frac{2^{(-2)+3}}{(-2)^2 - 2} = \frac{2^1}{4-2} = 1$$

REF: 062518ai NAT: F.IF.A.2 TOP: Functional Notation

161 ANS:

$$g(-3) = (-3)^3 + 2(-3)^2 - (-3) = -27 + 18 + 3 = -6$$

REF: 062426ai NAT: F.IF.A.2 TOP: Functional Notation

162 ANS:

$$f\left(\frac{1}{2}\right) = \frac{30\left(\frac{1}{2}\right)^2}{\frac{1}{2} + 2} = \frac{\frac{30}{4}}{\frac{5}{2}} = \frac{15}{2} \times \frac{2}{5} = 3$$

REF: 082426ai NAT: F.IF.A.2 TOP: Functional Notation

163 ANS:

$$-22 = \frac{-3x - 5}{2}$$

$$-44 = -3x - 5$$

$$-39 = -3x$$

$$13 = x$$

REF: 012529ai NAT: F.IF.A.2 TOP: Functional Notation

164 ANS: 1 REF: 082515ai NAT: F.IF.A.2 TOP: Domain and Range

165 ANS: 2

All four functions have a real domain. f has a real range. h has a positive real range. m has a nonnegative real range.

REF: 062424ai NAT: F.IF.A.2 TOP: Domain and Range

166 ANS: 1 REF: 012517ai NAT: F.IF.B.5 TOP: Domain and Range

KEY: graph

167 ANS: 3 REF: 062513ai NAT: F.IF.B.5 TOP: Domain and Range

KEY: graph

168 ANS: 1 REF: 082402ai NAT: F.LE.A.1 TOP: Families of Functions

169 ANS: 4

$$f(x) = (x - 1)^2 - 3; g(x) = |x + 1|; h(x) = -4(2)^x; j(x) = 4x + 1$$

REF: 082509ai NAT: F.LE.A.1 TOP: Families of Functions

170 ANS: 2 REF: 012613ai NAT: F.LE.A.1 TOP: Families of Functions

171 ANS: 4 REF: 062503ai NAT: F.LE.A.1 TOP: Families of Functions

172 ANS: 3 REF: 062407ai NAT: F.LE.A.1 TOP: Families of Functions

173 ANS: 3 REF: 012513ai NAT: F.LE.A.1 TOP: Families of Functions

174 ANS: 1

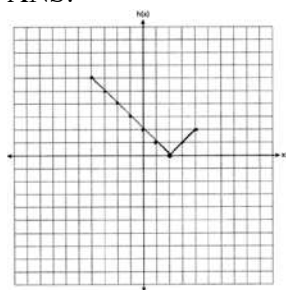
$$a(8) = 2^8 + 25 = 281 \quad b(8) = 10(8) + 75 = 155 \quad c(8) = \sqrt{400(8)} + 80 \approx 137 \quad d(8) = 2(8 + 1)^2 - 10(8) + 50 = 132$$

REF: 062411ai NAT: F.LE.A.3 TOP: Families of Functions

- 175 ANS:
5-6 minutes, as the speed remains at 35 mph during this interval.

REF: 012525ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

- 176 ANS: 4 REF: 012521ai NAT: F.BF.B.3 TOP: Transformations with Functions
 177 ANS: 4 REF: 082513ai NAT: F.BF.B.3 TOP: Transformations with Functions
 178 ANS: 3 REF: 082411ai NAT: F.BF.B.3 TOP: Transformations with Functions
 179 ANS: 2 REF: 012615ai NAT: F.BF.B.3 TOP: Transformations with Functions
 180 ANS: 4 REF: 062417ai NAT: F.BF.B.3 TOP: Transformations with Functions
 181 ANS: 2 REF: 062509ai NAT: F.BF.B.3 TOP: Transformations with Functions
 182 ANS:



REF: 082527ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

- 183 ANS: 4 REF: 012524ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions
 184 ANS: 1
 $f(0) = 5, g(0) = 5, h(0) = -3$

REF: 082518ai NAT: F.IF.C.9 TOP: Comparing Functions

- 185 ANS: 3
 $\frac{-2-4}{3-1} = \frac{-6}{2} = -3$

REF: 082423ai NAT: F.IF.A.3 TOP: Sequences KEY: difference or ratio

- 186 ANS: 2
 $25r^2 = 625$
 $r^2 = 25$
 $r = \pm 5$

REF: 062412ai NAT: F.IF.A.3 TOP: Sequences KEY: difference or ratio

- 187 ANS: 4
 $\frac{8}{2} = 4$

REF: 012503ai NAT: F.IF.A.3 TOP: Sequences KEY: difference or ratio

- 188 ANS: 4 REF: 082419ai NAT: F.IF.A.3 TOP: Sequences
 KEY: difference or ratio

- 189 ANS: 2 REF: 062415ai NAT: F.BF.A.1 TOP: Sequences

190 ANS: 1

$$\frac{15-25}{3-1} = \frac{-10}{2} = -5 \quad a_{10} = 25 + (10-1)(-5) = 25 - 45 = -20$$

REF: 012508ai NAT: F.BF.A.1 TOP: Sequences

191 ANS: 1 REF: 062522ai NAT: F.BF.A.1 TOP: Sequences

192 ANS: 4

$$a_4 = (-2)(-3)^{4-1} = 54$$

REF: 012624ai NAT: F.BF.A.1 TOP: Sequences

193 ANS:

$$d = \frac{-2 - (-20)}{4-1} = \frac{18}{3} = 6 \quad a_8 = -20 + (8-1)6 = 22$$

REF: 062528ai NAT: F.BF.A.1 TOP: Sequences

194 ANS:

$$a_8 = 5(3)^{8-1} = 10935$$

REF: 082529AI NAT: F.BF.A.1 TOP: Sequences

195 ANS: 3

77 78 81 84 86 88 93 95

79.5 90.5

$$90.5 - 79.5 = 11$$

REF: 012520ai NAT: S.ID.A.2 TOP: Dispersion KEY: basic

196 ANS: 3

	Andrea	Joe
mean	85.8	82.5
standard deviation	3.5	12.4

REF: 062504ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion
KEY: multiple data sets

197 ANS: 3

$$\frac{68}{68+79} \approx 0.46$$

REF: 082414ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

198 ANS: 1

$$\frac{200}{300+200+80+25+120+105+100+70} = \frac{200}{1000} = 20\%$$

REF: 012510ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

199 ANS: 4

$$\frac{58}{400} = 0.145$$

REF: 012618ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

200 ANS:

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	40	125
No Social Media	15	10	25
Total	100	50	150

REF: 062428ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

201 ANS:

	Juniors	Seniors	Total
Watch Videos	42	23	65
Listen to Music	14	21	35
Total	56	44	100

REF: 062525ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

202 ANS:

	Brand A	Brand B	Total
Adults	40	59	99
Teenagers	32	49	81
Total	72	108	180

REF: 082528ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

203 ANS: 2

$$110 - 60 = 50$$

REF: 062413ai NAT: S.ID.A.1 TOP: Box Plots KEY: interpret

204 ANS: 3

$$69, 70, 70, 71, 72, 74, 76, 78 \text{ ordered. median: } \frac{71 + 72}{2} = 71.5$$

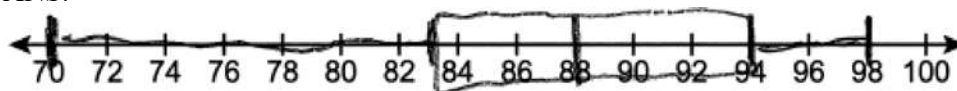
REF: 082409ai NAT: S.ID.A.1 TOP: Box Plots KEY: represent

205 ANS: 1

$$IRQ = 16 - 12 = 4 - 10$$

REF: 062512ai NAT: S.ID.A.1 TOP: Box Plots KEY: interpret

206 ANS:



REF: 012628ai NAT: S.ID.A.1 TOP: Box Plots KEY: represent

207 ANS: 1 REF: 012516ai NAT: S.ID.A.1 TOP: Dot Plots

208 ANS: 2

$$\text{mean: } \frac{3(0) + 3(1) + 4(2) + 5(3) + 2(4) + 2(5) + 1(6)}{3 + 3 + 4 + 5 + 2 + 2 + 1} = \frac{50}{20} = 2.5, \text{ mode: 3, median: } \frac{2+3}{2} = 2.5$$

REF: 062416ai NAT: S.ID.A.1 TOP: Dot Plots

209 ANS: 2

$$\text{mean: } \frac{0 + 4 + 12 + 12 + 12 + 10}{20} = \frac{50}{20} = 2.5, \text{ mode: 2, median: } \frac{2+2}{2} = 2$$

REF: 082514ai NAT: S.ID.A.1 TOP: Dot Plots

210 ANS:

$$y = -37.57x + 215.67, -0.98, \text{ strong}$$

REF: 062432ai NAT: S.ID.B.6 TOP: Regression KEY: linear with correlation coefficient

211 ANS:

$$y = 15.13x - 959.63, 0.99, \text{ strong}$$

REF: 082431ai NAT: S.ID.B.6 TOP: Regression KEY: linear with correlation coefficient

212 ANS:

$$y = 9.1x - 527.6, 0.9, \text{ strong relationship}$$

REF: 012532ai NAT: S.ID.B.6 TOP: Regression KEY: linear with correlation coefficient

213 ANS:

$$y = -23.67x + 1216, -0.99, \text{ strong}$$

REF: 062533ai NAT: S.ID.B.6 TOP: Regression KEY: linear with correlation coefficient

214 ANS:

$$y = -56.97x + 2352.22, -0.98, \text{ strong}$$

REF: 012633ai NAT: S.ID.B.6 TOP: Regression KEY: linear with correlation coefficient

215 ANS: 1 REF: 082512ai NAT: S.ID.C.8 TOP: Correlation Coefficient