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REGENTS BY DATE

NY Algebra I Regents Exam Questions
from Fall 2023 to January 2025 Sorted by Date

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2023 Algebra I Sample Items

1 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) $5x^2\sqrt{14}$

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

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

4 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.

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

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

Algebra I Regents Exam 0624
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0624AI

1 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.

2 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) $a + c \leq 48$
$18a + 12c \leq 650$

3 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) $7^a \bullet 7^b = 7^{ab}$

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

5 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) $\sqrt{49} + 3\sqrt{121}$

6 The solution to $\frac{4(x-5)}{3} + 2 = 14$ is

1) 15
2) 14
3) 6
4) 4

7 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

8 What is the degree of the polynomial $2x - x^2 + 4x^3$?

1) 1
2) 2
3) 3
4) 4

9 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

10 What is the y-intercept of the line that passes through the points $(-1,5)$ and $(2,-1)$?

1) –1
2) –2
3) 3
4) 5

11 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.

$a(t) = 2^t + 25$
$b(t) = 10t + 75$
$c(t) = \sqrt{400t} + 80$
$d(t) = 2(t+1)^2 - 10t + 50$

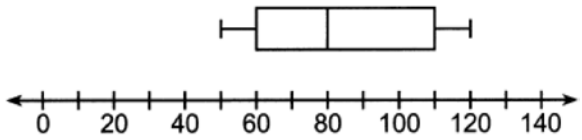
Which pay plan should Nancy choose in order to have the highest salary in her eighth year?

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

12 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

13 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.



Winter of 2021 Snowfall (inches)

What is the interquartile range?

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

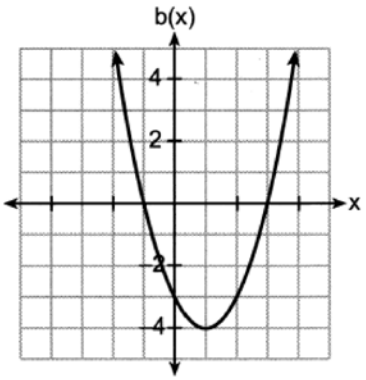
14 Four quadratic functions are represented below.

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

I

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

III



II

x	d(x)
–4	–1
–3	–4
–2	–5
–1	–4
0	–1

IV

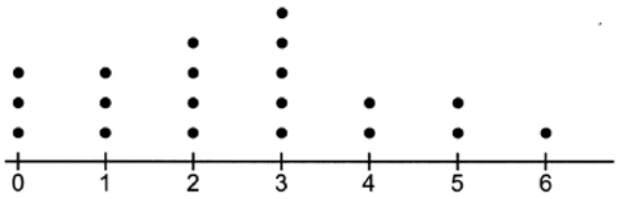
Which function has the *smallest* minimum value?

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

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

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

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



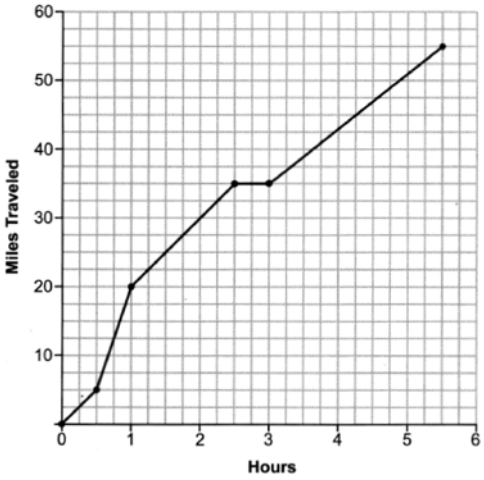
Which statement about the dot plot is correct?

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

17 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.

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



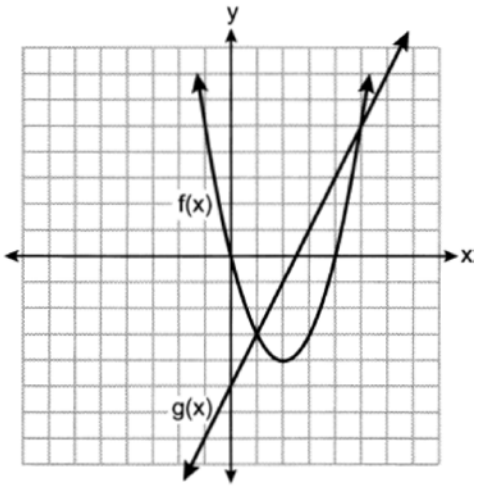
What was Dave's average rate of change, in miles per hour, on this trip?

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

19 Which expression is equivalent to $(x-5)(2x+7)-(x+5)$?

1) $2x^2-2x-30$
2) $2x^2-2x-40$
3) $2x^2-4x-30$
4) $2x^2-4x-40$

20 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

21 When babysitting, Nicole charges an hourly rate and an additional charge for gas. She uses the function $C(h) = 6h + 5$ to determine how much to charge for babysitting. The constant term of this function represents

1) the additional charge for gas
2) the hourly rate Nicole charges
3) the number of hours Nicole babysits
4) the total Nicole earns from babysitting

22 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) $\frac{3-a}{12}$

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

24 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) $m(x) = |x + 3|$

25 Solve $5(x - 2) \le 3x + 20$ algebraically.

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

27 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.

28 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			

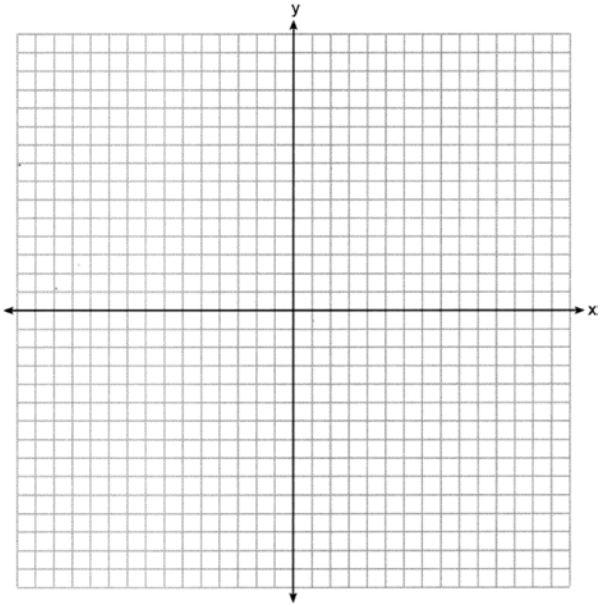
29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

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

31 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.

32 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

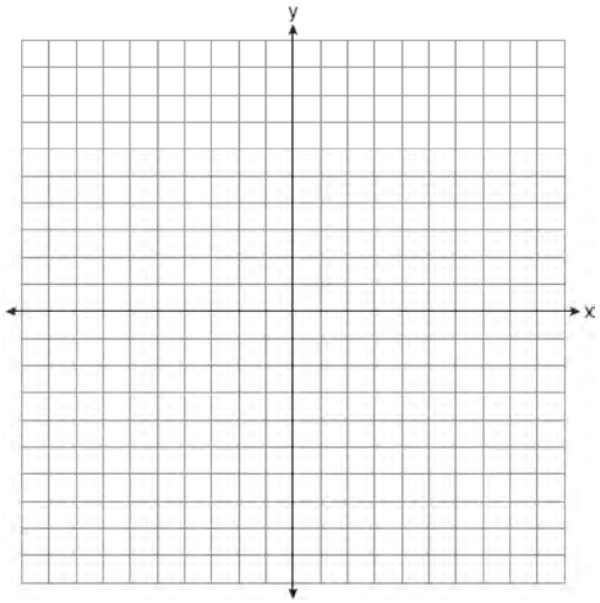
Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*. State the correlation coefficient to the *nearest hundredth*. State what this correlation coefficient indicates about the linear fit of the data.

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

34 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.

35 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.

Algebra I Regents Exam 0824
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0824AI

1 What is the correct factorization of $x^2 + 4x - 12$?
1) $(x+3)(x-4)$
2) $(x-3)(x+4)$
3) $(x+2)(x-6)$
4) $(x-2)(x+6)$

2 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.

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

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

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

6 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

7 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) $\frac{1}{3} + \sqrt{3}$

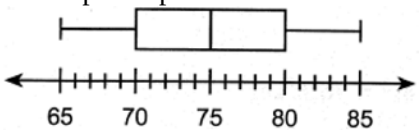
8 Which equation has the same solutions as $x^2 + 6x - 18 = 0$?

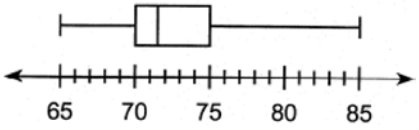
1) $(x+3)^2 = 24$
2) $(x+3)^2 = 27$
3) $(x+6)^2 = 24$
4) $(x+6)^2 = 27$

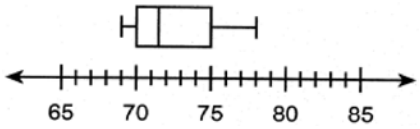
9 The heights, in inches, of eight football players are given below.

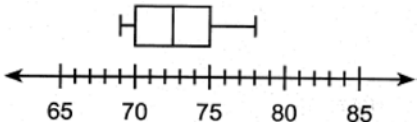
76, 70, 72, 70, 69, 71, 78, 74

Which box plot represents these data?

1) 

2) 

3) 

4) 

10 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
2) 0.67
3) 1.50
4) 2.00

11 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) $k(x) = (x-4)^2 + 3$

12 The amount of money a plumber charges is represented by the function $p(h) = 45 + 90h$. The best interpretation of the *y*-intercept of this function is that the plumber charges

1) $45 to come to the house
2) $45 per hour that he works
3) $90 to come to the house
4) $90 per hour that he works

13 What is the solution to the inequality $2m - 4 \le 3(2m + 4)$?

1) $m \le -2$
2) $m \ge -2$
3) $m \le -4$
4) $m \ge -4$

14 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

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

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

16 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

17 If $x = 4a^2 - a + 3$ and $y = a - 5$, then which polynomial is equivalent to the product of x and y?

1) $-17a^2 - 2a - 15$
2) $-17a^2 + 8a - 15$
3) $4a^3 - 21a^2 - 2a - 15$
4) $4a^3 - 21a^2 + 8a - 15$

18 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) $y + 3 = 2(x + 7)$

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

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

20 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) $\frac{2}{a}$

21 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) $k(x) = (x-1)(x+3)(x+4)$

22 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}

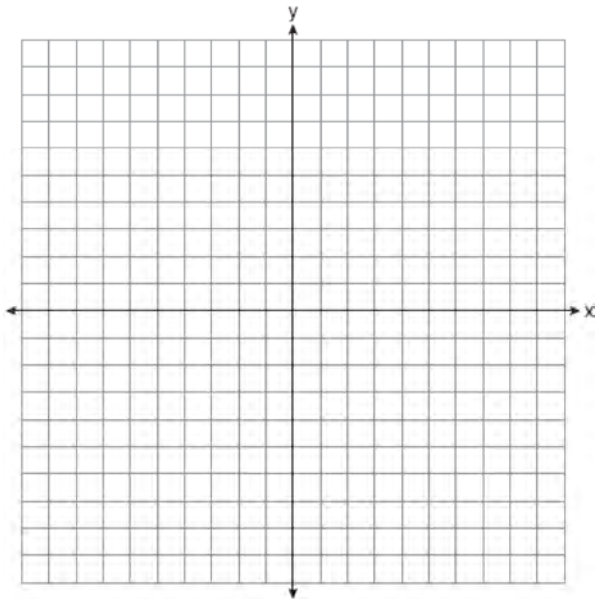
23 In an arithmetic sequence, the first term is 4 and the third term is –2. What is the common difference?

1) –1
2) –2
3) –3
4) –6

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

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



State the coordinates of the minimum.

26 If $f(x) = \frac{30x^2}{x+2}$, determine the value of $f\left(\frac{1}{2}\right)$.

27 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	

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

29 Use the quadratic formula to determine the exact roots of the equation $x^2 + 3x - 6 = 0$.

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

31 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.

32 Graph the system of inequalities on the set of axes below:

$$y > 3x - 4$$

$$x + 2y \leq 6$$

Label the solution set *S*.

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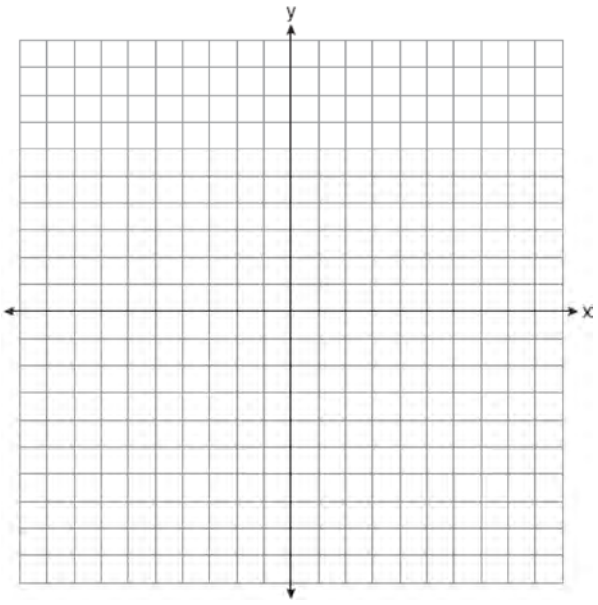


Is the point $(2, 2)$ a solution to the system? Justify your answer.

33 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.

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

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

$$y = 2x + 7$$

35 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.

Algebra I Regents Exam 0125
www.jmap.org

0125AI

1 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) $x(x+18)(x-18)$

2 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) $y = -0.5x + 8.5$

3 A geometric sequence is shown below.

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

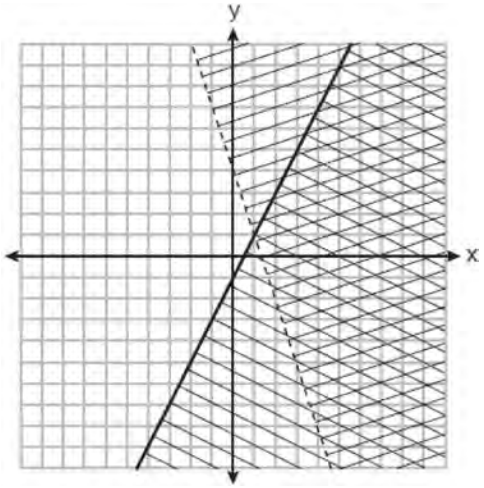
What is the common ratio?
1) $\frac{1}{4}$
2) 2
3) $\frac{1}{2}$
4) 4

4 What is the constant term of the polynomial $2x^3 - x + 5 + 4x^2$?
1) 5
2) 2
3) 3
4) 4

5 A landscaping company charges a set fee for a spring cleanup, plus an hourly labor rate. The total cost is modeled by the function $C(x) = 55x + 80$. In this function, what does the 55 represent?
1) the set fee for the cleanup
2) the hourly labor rate for a cleanup
3) the profit earned by the company for one cleanup
4) the number of hours of labor required for one cleanup

6 Which expression is equivalent to $(5x^2 - 2x + 4) - (3x^2 + 3x - 1)$?
1) $2x^2 + x + 3$
2) $2x^2 - 5x + 5$
3) $2x^4 + x^2 + 3$
4) $2x^4 - 5x^2 + 5$

7 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) $(4,2)$

8 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

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

10 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%

11 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) $-\frac{16}{3}$

12 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) $x^{a+b}\bullet x^{a+b}$

13 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

14 Stephanie is solving the equation $x^2-12=7x-8$. Her first step is shown below.

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

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

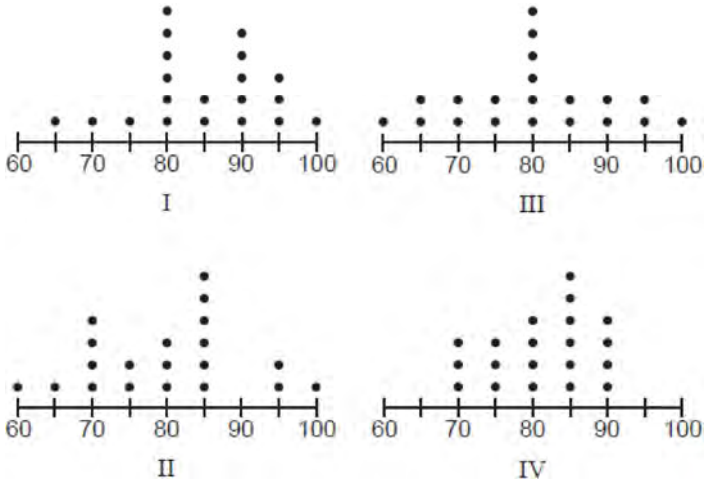
Which property justifies her first step?

1) associative property
2) commutative property
3) distributive property
4) addition property of equality

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

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

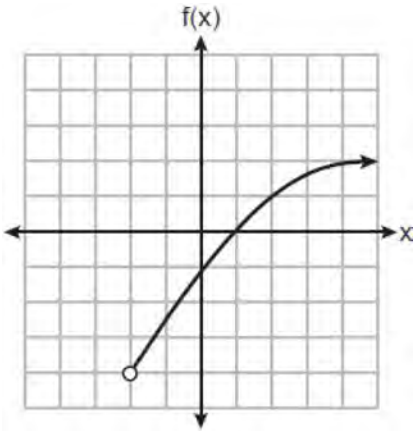
16 The dot plots below represent test scores for 20 students on a math test.



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

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

17 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) $\{x|x \geq -4\}$

18 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) $(4, -9.5)$

19 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) $\frac{7\text{ sec}}{50\text{ meters}} \bullet \frac{60\text{ sec}}{1\text{ min}} \bullet \frac{1\text{ meter}}{39.37\text{ in}}$

2) $\frac{7\text{ sec}}{50\text{ meters}} \bullet \frac{1\text{ min}}{60\text{ sec}} \bullet \frac{39.37\text{ in}}{1\text{ meter}}$

3) $\frac{50\text{ meters}}{7\text{ sec}} \bullet \frac{60\text{ sec}}{1\text{ min}} \bullet \frac{1\text{ meter}}{39.37\text{ in}}$

4) $\frac{50\text{ meters}}{7\text{ sec}} \bullet \frac{60\text{ sec}}{1\text{ min}} \bullet \frac{39.37\text{ in}}{1\text{ meter}}$

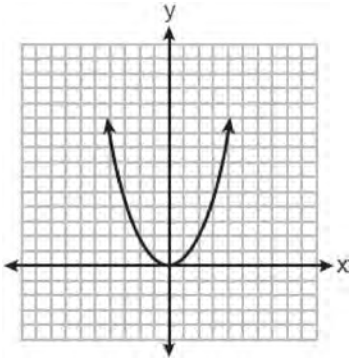
20 The table below shows the highest temperatures recorded in August for several years in one town.

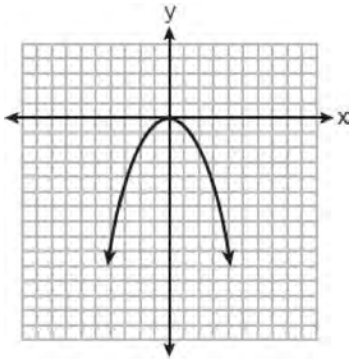
Year	**Temperature** (°F)
1990	86
1991	78
1992	84
1993	95
1994	81
1995	77
1996	88
1997	93

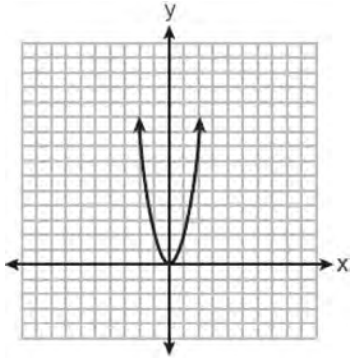
The interquartile range of these data is

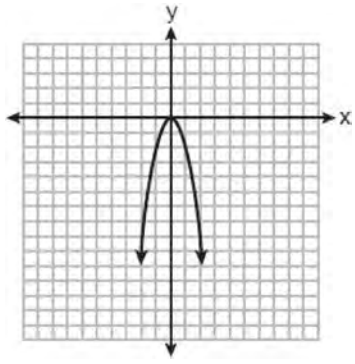
1) 7
2) 10
3) 11
4) 18

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

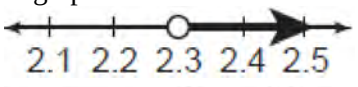
1) 

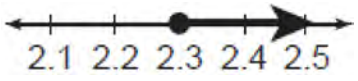
2) 

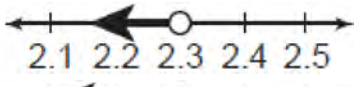
3) 

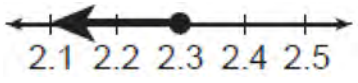
4) 

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

1) 

2) 

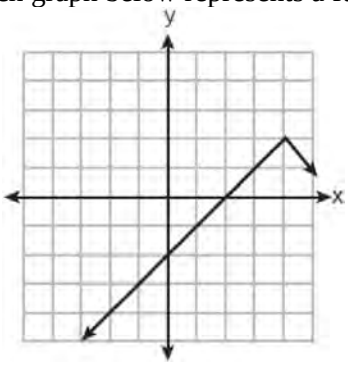
3) 

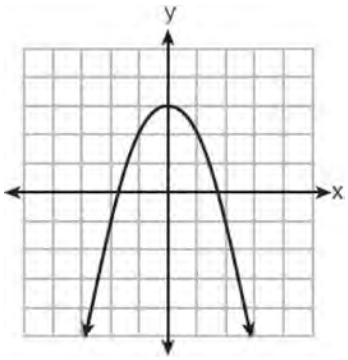
4) 

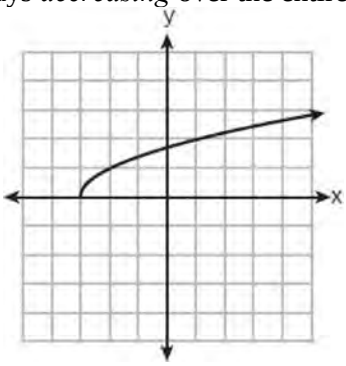
23 The number of fish in a pond is eight more than the number of frogs. The total number of fish and frogs in the pond is at least 20. If x represents the number of frogs, which inequality can be used to represent this situation?

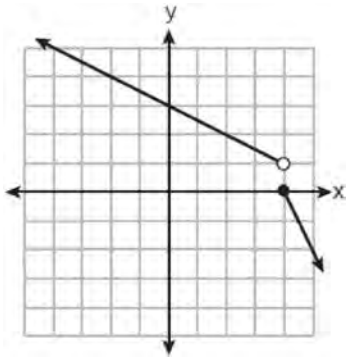
1) $x + 8x \geq 20$
2) $2x + 8 \geq 20$
3) $x + 8x \leq 20$
4) $2x + 8 \leq 20$

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

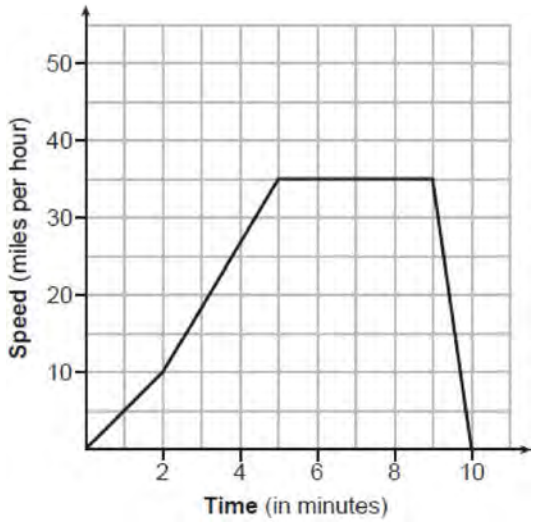
1) 

2) 

3) 

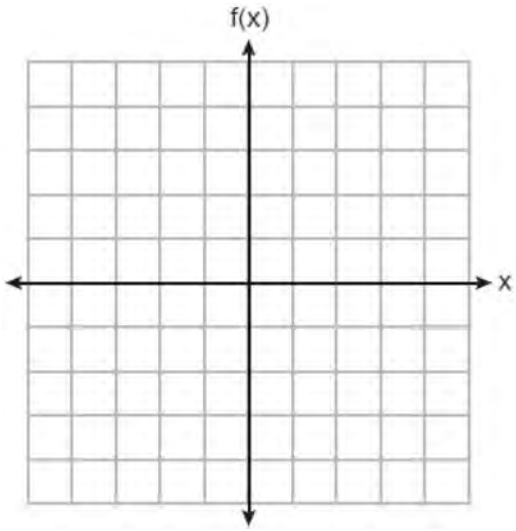
4) 

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



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

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



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

27 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.

28 Solve $x^2 + 8x = 33$ for x by completing the square.

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

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

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

31 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.

32 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.

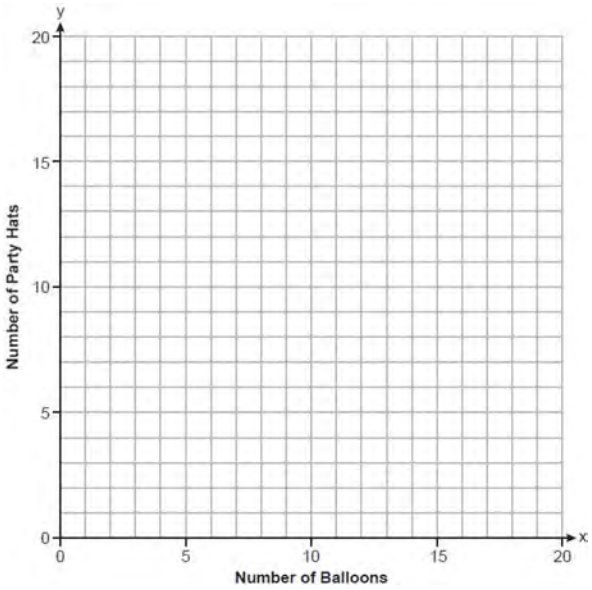
33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$. Express your solution in simplest radical form.

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

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

$$y = 2x - 6$$

35 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.

2023 Algebra I Sample Items
Answer Section

1 ANS: 1 PTS: 2 REF: fall2301ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: addition

2 ANS: 4

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

PTS: 2 REF: fall2302ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

3 ANS:

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

PTS: 2 REF: fall2303ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: division

4 ANS:

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

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

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

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

PTS: 4 REF: fall2304ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

5 ANS:

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

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

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

$x = -6, 2$

PTS: 4 REF: fall2305ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

0624AI
Answer Section

1 ANS: 4 PTS: 2 REF: 062401ai NAT: F.IF.B.4
TOP: Graphing Quadratic Functions KEY: key features

2 ANS: 2 PTS: 2 REF: 062402ai NAT: A.CED.A.3
TOP: Modeling Systems of Linear Inequalities

3 ANS: 1 PTS: 2 REF: 062403ai NAT: A.APR.A.1
TOP: Multiplication of Powers

4 ANS: 4

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

PTS: 2 REF: 062404ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: addition

5 ANS: 1 PTS: 2 REF: 062405ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify

6 ANS: 2

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

$4x - 20 = 36$

$4x = 56$

$x = 14$

PTS: 2 REF: 062406ai NAT: A.REI.B.3 TOP: Solving Linear Equations

7 ANS: 3 PTS: 2 REF: 062407ai NAT: F.LE.A.1
TOP: Families of Functions

8 ANS: 3 PTS: 2 REF: 062408ai NAT: A.SSE.A.1
TOP: Modeling Expressions

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

10 ANS: 3

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

$3 = b$

PTS: 2 REF: 062410ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

11 ANS: 1

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

PTS: 2 REF: 062411ai NAT: F.LE.A.3 TOP: Families of Functions

12 ANS: 2

$25r^2 = 625$

$r^2 = 25$

$r = \pm 5$

PTS: 2 REF: 062412ai NAT: F.IF.A.3 TOP: Sequences
KEY: difference or ratio

13 ANS: 2

$110 - 60 = 50$

PTS: 2 REF: 062413ai NAT: S.ID.A.1 TOP: Box Plots
KEY: interpret

14 ANS: 1

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

PTS: 2 REF: 062414ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

15 ANS: 2 PTS: 2 REF: 062415ai NAT: F.BF.A.1
TOP: Sequences KEY: explicit

16 ANS: 2

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

PTS: 2 REF: 062416ai NAT: S.ID.A.1 TOP: Dot Plots

17 ANS: 4 PTS: 2 REF: 062417ai NAT: F.BF.B.3
TOP: Transformations with Functions

18 ANS: 1

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

PTS: 2 REF: 062418ai NAT: F.IF.B.6 TOP: Rate of Change

19 ANS: 4

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

PTS: 2 REF: 062419ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

20 ANS: 1 PTS: 2 REF: 062420ai NAT: A.REI.D.11
TOP: Quadratic-Linear Systems

21 ANS: 1 PTS: 2 REF: 062421ai NAT: F.LE.B.5
TOP: Modeling Linear Functions

22 ANS: 2

$3x - ax = 12$

$x(3 - a) = 12$

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

PTS: 2 REF: 062422ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: coefficients represented by letters

23 ANS: 3 PTS: 2 REF: 062423ai NAT: N.Q.A.1
TOP: Conversions

24 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.

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

25 ANS:

$5x - 10 \le 3x + 20$

$2x \le 30$

$x \le 15$

PTS: 2 REF: 062425ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

26 ANS:

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

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

27 ANS:

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

PTS: 2 REF: 062427ai NAT: F.IF.A.1 TOP: Defining Functions

28 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

PTS: 2 REF: 062428ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

29 ANS:

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

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

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

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

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

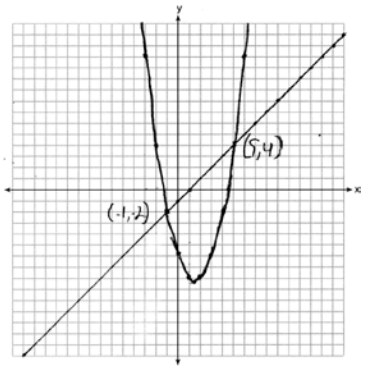
PTS: 2 REF: 062429ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

30 ANS:

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

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

31 ANS:



PTS: 4 REF: 062431ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

32 ANS:

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

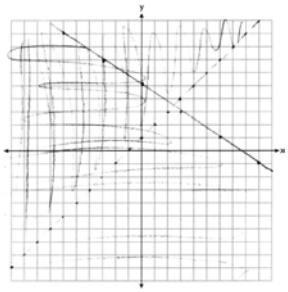
PTS: 4 REF: 062432ai NAT: S.ID.B.6 TOP: Regression
KEY: linear with correlation coefficient

33 ANS:

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

PTS: 4 REF: 062433ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

34 ANS:



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

PTS: 4 REF: 062434ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

35 ANS:

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

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

$14x = 41.3$

$x = 2.95$

$4(2.95) + 2y = 15.5$

$11.8 + 2y = 15.5$

$2y = 3.7$

$y = 1.85$

PTS: 6 REF: 062435ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

0824AI
Answer Section

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

2 ANS: 1 PTS: 2 REF: 082402ai NAT: F.LE.A.1
TOP: Families of Functions

3 ANS: 4

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

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

$-x^2 - 9x + 10$

PTS: 2 REF: 082403ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: subtraction

4 ANS: 2 PTS: 2 REF: 082404ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

5 ANS: 1 PTS: 2 REF: 082405ai NAT: A.SSE.A.1
TOP: Modeling Expressions

6 ANS: 4 PTS: 2 REF: 082406ai NAT: A.REI.A.1
TOP: Identifying Properties

7 ANS: 4 PTS: 2 REF: 082407ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify

8 ANS: 2

$x^2 + 6x = 18$

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

$(x + 3)^2 = 27$

PTS: 2 REF: 082408ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

9 ANS: 3

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

PTS: 2 REF: 082409ai NAT: S.ID.A.1 TOP: Box Plots
KEY: represent

10 ANS: 3

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

PTS: 2 REF: 082410ai NAT: F.IF.B.6 TOP: Rate of Change

11 ANS: 3 PTS: 2 REF: 082411ai NAT: F.BF.B.3
TOP: Transformations with Functions

12 ANS: 1 PTS: 2 REF: 082412ai NAT: F.LE.B.5
TOP: Modeling Linear Functions

13 ANS: 4

$2m - 4 \le 3(2m + 4)$

$2m - 4 \le 6m + 12$

$-16 \le 4m$

$-4 \le m$

PTS: 2 REF: 082413ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

14 ANS: 3

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

PTS: 2 REF: 082414ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

15 ANS: 4

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

PTS: 2 REF: 082415ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: addition

16 ANS: 3

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

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

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

$x = 8, -2$

PTS: 2 REF: 082416ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

17 ANS: 4

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

PTS: 2 REF: 082417ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

18 ANS: 1 PTS: 2 REF: 082418ai NAT: A.REI.D.10
TOP: Writing Linear Equations KEY: other forms

19 ANS: 4 PTS: 2 REF: 082419ai NAT: F.IF.A.3
TOP: Sequences KEY: difference or ratio

20 ANS: 2

$6 - ax = ax - 2$

$8 = 2ax$

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

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

PTS: 2 REF: 082420ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: coefficients represented by letters

21 ANS: 3 PTS: 2 REF: 082421ai NAT: A.APR.B.3
TOP: Zeros of Polynomials

22 ANS: 2

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

PTS: 2 REF: 082422ai NAT: A.APR.A.1 TOP: Multiplication of Powers

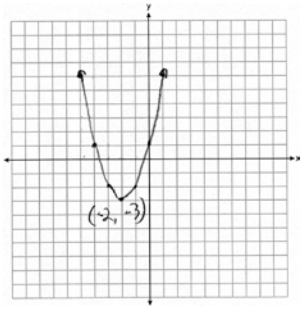
23 ANS: 3

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

PTS: 2 REF: 082423ai NAT: F.IF.A.3 TOP: Sequences
KEY: difference or ratio

24 ANS: 4 PTS: 2 REF: 082424ai NAT: N.Q.A.1
TOP: Conversions

25 ANS:



PTS: 2 REF: 082425ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions

26 ANS:

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

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

27 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.

PTS: 2 REF: 082427ai NAT: F.IF.A.1 TOP: Defining Functions

28 ANS:

$0.05(x-3) = 0.35x - 7.5$

$x - 3 = 7x - 150$

$147 = 6x$

$24.5 = x$

PTS: 2 REF: 082428ai NAT: A.REI.B.3 TOP: Solving Linear Equations

29 ANS:

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

PTS: 4 REF: 082429ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

30 ANS:

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

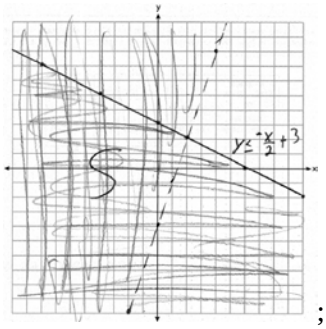
PTS: 2 REF: 082430ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares

31 ANS:

$y = 15.13x - 959.63$, 0.99, strong

PTS: 4 REF: 082431ai NAT: S.ID.B.6 TOP: Regression
KEY: linear with correlation coefficient

32 ANS:



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

PTS: 4 REF: 082432ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

33 ANS:

$t = \dfrac{-64}{2(-16)} = 2$ $h(2) = -16(2)^2 + 64(2) + 80 = -64 + 128 + 80 = 144$ $(2, 144)$. At 2 seconds, the object is 144 feet above the ground. $0 = -16t^2 + 64t + 80$

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

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

$t = 5$

PTS: 4 REF: 082433ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: key features

34 ANS:

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

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

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

$x = -4, 2$

PTS: 4 REF: 082434ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

35 ANS:

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

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

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

$r = 8.50$ $m = 6.50$

PTS: 6 REF: 082435ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

0125AI
Answer Section

1 ANS: 3

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

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

2 ANS: 1

$m = \frac{8 - -2}{-1 - 4} = \frac{10}{-5} = -2 \quad y = mx + b$

$8 = -2(-1) + b$

$6 = b$

PTS: 2 REF: 012502ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: slope-intercept form

3 ANS: 4

$\frac{8}{2} = 4$

PTS: 2 REF: 012503ai NAT: F.IF.A.3 TOP: Sequences
KEY: difference or ratio

4 ANS: 1 PTS: 2 REF: 012504ai NAT: A.SSE.A.1
TOP: Modeling Expressions

5 ANS: 2 PTS: 2 REF: 012505ai NAT: F.LE.B.5
TOP: Modeling Linear Functions

6 ANS: 2 PTS: 2 REF: 012506ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: subtraction

7 ANS: 4 PTS: 2 REF: 012507ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities

8 ANS: 1

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

PTS: 2 REF: 012508ai NAT: F.BF.A.1 TOP: Sequences
KEY: explicit

9 ANS: 2

$p = 2l + 2w$

$p - 2l = 2w$

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

PTS: 2 REF: 012509ai NAT: A.CED.A.4 TOP: Transforming Formulas

10 ANS: 1

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

PTS: 2 REF: 012510ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

11 ANS: 1

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

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

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

$$24 = 21x$$

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

PTS: 2 REF: 012511ai NAT: A.REI.B.3 TOP: Solving Linear Equations

12 ANS: 3 PTS: 2 REF: 012512ai NAT: A.APR.A.1
TOP: Multiplication of Powers

13 ANS: 3 PTS: 2 REF: 012513ai NAT: F.LE.A.1
TOP: Families of Functions

14 ANS: 4 PTS: 2 REF: 012514ai NAT: A.REI.A.1
TOP: Identifying Properties

15 ANS: 4 PTS: 2 REF: 012515ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: addition

16 ANS: 1 PTS: 2 REF: 012516ai NAT: S.ID.A.1
TOP: Dot Plots

17 ANS: 1 PTS: 2 REF: 012517ai NAT: F.IF.B.5
TOP: Domain and Range KEY: graph

18 ANS: 2

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

$$3 = 3$$

PTS: 2 REF: 012518ai NAT: A.REI.D.10 TOP: Identifying Solutions

19 ANS: 4 PTS: 2 REF: 012519ai NAT: N.Q.A.1
TOP: Conversions

20 ANS: 3
77 78 81 84 86 88 93 95
79.5 90.5
90.5-79.5=11

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

21 ANS: 4 PTS: 2 REF: 012521ai NAT: F.BF.B.3
TOP: Transformations with Functions KEY: bimodalgraph

22 ANS: 4

$6.4 - 4x \geq -2.8$

$9.2 \geq 4x$

$2.3 \geq x$

PTS: 2 REF: 012522ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

23 ANS: 2

$x + x + 8 \geq 20$

PTS: 2 REF: 012523ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

24 ANS: 4 PTS: 2 REF: 012524ai NAT: F.IF.C.7

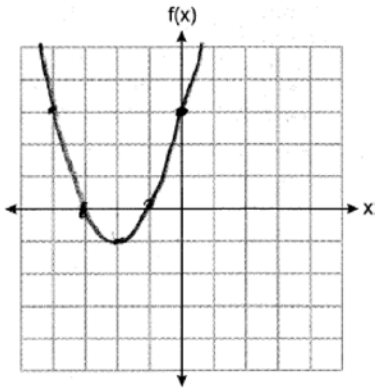
TOP: Graphing Piecewise-Defined Functions

25 ANS:

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

PTS: 2 REF: 012525ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

26 ANS:



$x = -2$

PTS: 2 REF: 012526ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions

27 ANS:

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

PTS: 2 REF: 012527ai NAT: F.IF.A.1 TOP: Defining Functions

28 ANS:

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

$(x + 4)^2 = 49$

$x + 4 = \pm 7$

$x = -11, 3$

PTS: 2 REF: 012528ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

29 ANS:

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

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

$$-39 = -3x$$

$$13 = x$$

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

30 ANS:

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

PTS: 2 REF: 012530ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: division

31 ANS:

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

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

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

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

$$5d = 45$$

$$d = 9$$

PTS: 4 REF: 012531ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

32 ANS:

$y = 9.1x - 527.6$, 0.9, strong relationship

PTS: 4 REF: 012532ai NAT: S.ID.B.6 TOP: Regression
KEY: linear with correlation coefficient

33 ANS:

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

PTS: 4 REF: 012533ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

34 ANS:

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

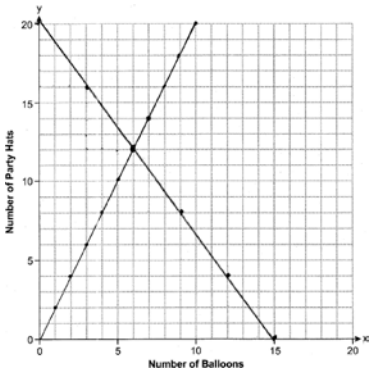
$x^2 - 9x + 18 = 0 \quad y = 2(3) - 6 = 0$

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

$x = 6, 3$

PTS: 4 REF: 012534ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

35 ANS:



$2x + 1.5y = 30$ (6,12) is the intersection, meaning Anna bought 6 baloons and 12 hats.
$y = 2x$

PTS: 6 REF: 012535ai NAT: A.REI.C.6 TOP: Graphing Linear Systems