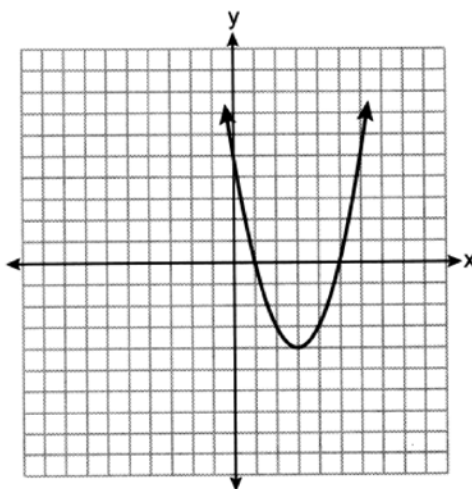


0126AI

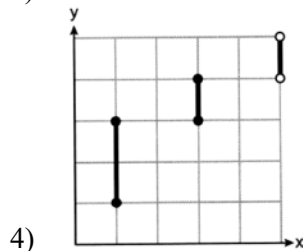
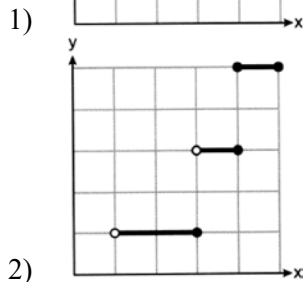
- 1 A parabola is graphed on the set of axes below.



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

- | | |
|--------------------------|---------------------------|
| 1) $x = 3$ and $(3, -4)$ | 3) $x = -4$ and $(-4, 3)$ |
| 2) $y = 3$ and $(3, -4)$ | 4) $y = -4$ and $(-4, 3)$ |
- 2 The product of $\sqrt{25}$ and $\sqrt{2}$ will result in
- | | |
|-------------------------|---------------------|
| 1) an irrational number | 3) a natural number |
| 2) a rational number | 4) an integer |
- 3 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 | 3) 3 |
| 2) 2 | 4) 14 |
- 4 The expression $x^2 - 26x - 120$ is equivalent to
- | | |
|----------------------|----------------------|
| 1) $(x + 4)(x - 30)$ | 3) $(x - 20)(x + 6)$ |
| 2) $(x - 4)(x + 30)$ | 4) $(x + 20)(x - 6)$ |
- 5 The expression $3 - 2\sqrt{5} + 6\sqrt{5}$ is equivalent to
- | | |
|-----------------|---------------------|
| 1) $7\sqrt{5}$ | 3) $3 + 4\sqrt{5}$ |
| 2) $7\sqrt{10}$ | 4) $3 + 4\sqrt{10}$ |
- 6 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) $4x - 6 + 3x^2$ | 3) $4 - 6x + 2x^3$ |
| 2) $3x^2 - 6x + 4$ | 4) $4x^2 + 2x^3 - 6$ |

7 Which graph below represents a function?



8 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

9 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 ?

- $$\begin{array}{ll} 1) & h = \frac{S - 2\pi r^2}{2\pi r} \\ 2) & h = S - r \\ 3) & h = \frac{2\pi r^2 - S}{2\pi r} \\ 4) & h = r - S \end{array}$$

10 When solving the following system of equations algebraically, Mason used the substitution method.

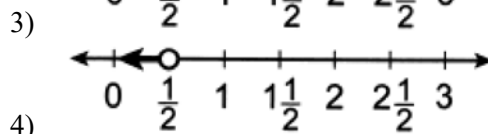
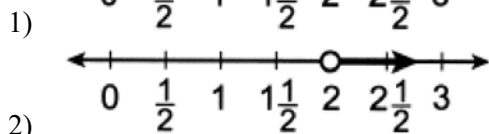
$$3x - y = 10$$

$$2x + 5y = 1$$

Which equation could he have used?

- $$\begin{array}{ll} 1) & 2(3x - 10) + 5x = 1 \\ 2) & 2(-3x + 10) + 5x = 1 \end{array} \quad \begin{array}{ll} 3) & 2x + 5(3x - 10) = 1 \\ 4) & 2x + 5(-3x + 10) = 1 \end{array}$$

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



- 12 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

- 13 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)

- 14 If $f(x) = \sqrt{x+1} + 5$, then what is the value of $f(3)$?

1) 9
 2) 7
 3) 3
 4) 10

- 15 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) $g(x) = (x+5)^2 + 1$

- 16 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

- 17 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

- 18 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
- 19 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?

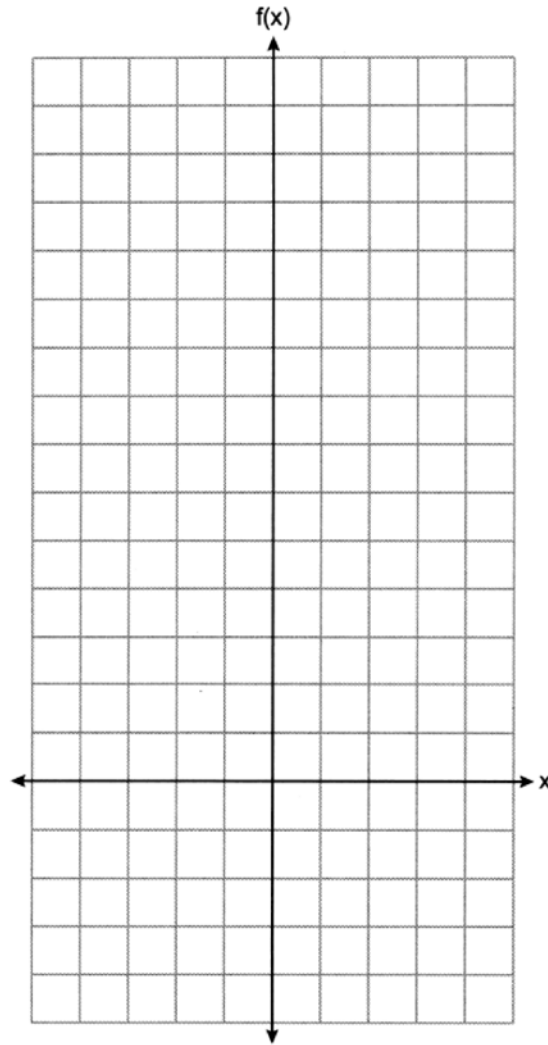
- 1) feet per second
2) feet per minute
3) seconds per foot
4) minutes per foot
- 20 Which expression is equivalent to $(-2x^2)^3$?
- 1) $-2x^5$
2) $-2x^6$
3) $-8x^5$
4) $-8x^6$
- 21 The table below shows the amount of a radioactive substance that remained for selected years.

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

To the *nearest tenth*, the average rate of change, in grams per year, from 2000 to 2014 is

- 1) 39.1
2) 51.8
3) -39.1
4) -51.8
- 22 When $2x^2 - 3x + 4$ is subtracted from $x^2 + 2x - 5$, the result is
- 1) $x^2 - 5x + 9$
2) $x^2 - x + 1$
3) $-x^2 + 5x - 9$
4) $-x^2 - x - 1$
- 23 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) $(x - 6)^2 = 60$

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

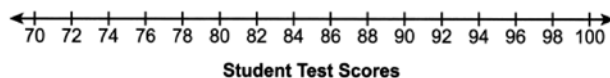


- 27 Determine the product of $(2x + 3)$ and $(-6x^2 + 5x - 1)$. Express the product in standard form.

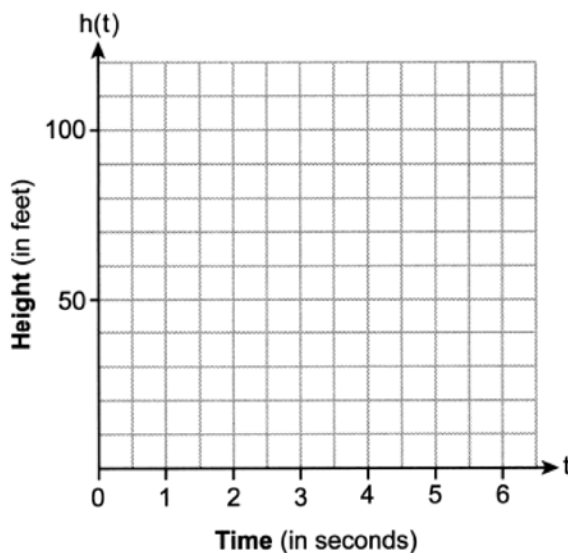
- 28 A student's test scores for the semester are listed below.

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.



- 29 Write an equation, in slope-intercept form, of a line that passes through the point $(6,3)$ and has a slope of $\frac{2}{3}$.
- 30 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.
- 31 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.

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

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

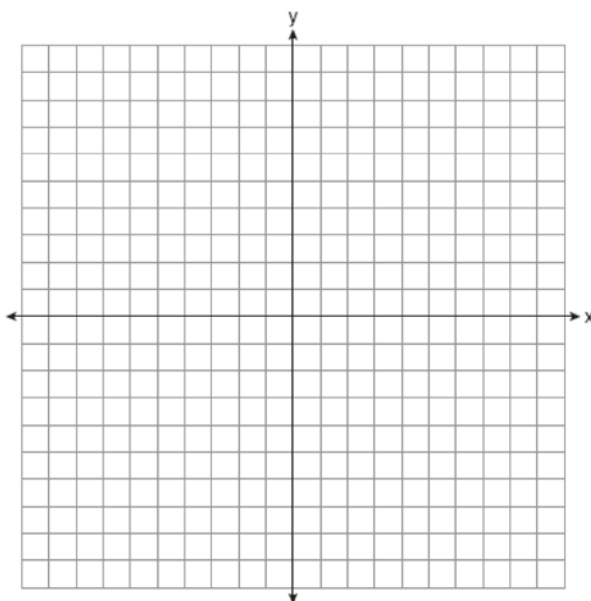
Age (x) (in years)	16	17	18	18	21	22	30
Annual Cost of Car Insurance (y) (in dollars)	1452	1332	1284	1320	1200	1188	600

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.

- 34 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.

- 35 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.

0126AI

Answer Section

1 ANS: 1 PTS: 2
TOP: Graphing Quadratic Functions

REF: 012601ai

NAT: F.IF.C.7

2 ANS: 1
 $5\sqrt{2}$ is irrational.

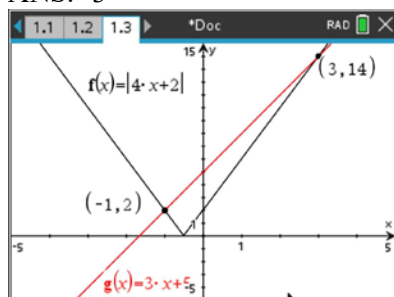
PTS: 2
KEY: classify

REF: 012602ai

NAT: N.RN.B.3

TOP: Operations with Radicals

3 ANS: 3



PTS: 2 REF: 012603ai

NAT: A.REI.D.11

TOP: Other Systems

4 ANS: 1 PTS: 2
TOP: Factoring Polynomials

REF: 012604ai

NAT: A.SSE.A.2

KEY: quadratic

5 ANS: 3 PTS: 2
TOP: Operations with Radicals

REF: 012605ai

NAT: N.RN.B.3

KEY: subtraction

6 ANS: 4 PTS: 2
TOP: Modeling Expressions

REF: 012606ai

NAT: A.SSE.A.1

7 ANS: 1 PTS: 2
TOP: Defining Functions

REF: 012607ai

NAT: F.IF.A.1

8 ANS: 3 PTS: 2
TOP: Modeling Exponential Functions

REF: 012608ai

NAT: F.LE.B.5

9 ANS: 1
 $S = 2\pi r^2 + 2\pi rh$

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

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

PTS: 2 REF: 012609ai
KEY: basic

NAT: A.CED.A.4

TOP: Transforming Formulas

10 ANS: 3 PTS: 2
TOP: Solving Linear Systems

REF: 012610ai

NAT: A.REI.C.6

- 11 ANS: 3
 $4 + 3x > 9 - 7x$
 $10x > 5$
 $x > \frac{1}{2}$
- PTS: 2 REF: 012611ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities
- 12 ANS: 1 PTS: 2 REF: 012612ai NAT: A.REI.A.1
 TOP: Identifying Properties
- 13 ANS: 2 PTS: 2 REF: 012613ai NAT: F.LE.A.1
 TOP: Families of Functions
- 14 ANS: 2
 $f(3) = \sqrt{3+1} + 5 = 7$
- PTS: 2 REF: 012614ai NAT: F.IF.A.2 TOP: Functional Notation
- 15 ANS: 2 PTS: 2 REF: 012615ai NAT: F.BF.B.3
 TOP: Transformations with Functions
- 16 ANS: 4
 $f(x) = x(x+6)(x-6)$
- PTS: 2 REF: 012616ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
- 17 ANS: 2
 $-6 = -x^2 - x + 6$
 $x^2 + x - 12 = 0$
 $(x+4)(x-3) = 0$
 $x = -4, 3$
- PTS: 2 REF: 012617ai NAT: A.REI.D.10 TOP: Identifying Solutions
- 18 ANS: 4
 $\frac{58}{400} = 0.145$
- PTS: 2 REF: 012618ai NAT: S.ID.B.5 TOP: Frequency Tables
 KEY: two-way
- 19 ANS: 1 PTS: 2 REF: 012619ai NAT: N.Q.A.1
 TOP: Conversions
- 20 ANS: 4 PTS: 2 REF: 012620ai NAT: A.APR.A.1
 TOP: Powers of Powers
- 21 ANS: 4
 $\frac{25-750}{2014-2000} = \frac{-725}{14} \approx -51.8$
- PTS: 2 REF: 012621ai NAT: F.IF.B.6 TOP: Rate of Change

22 ANS: 3 PTS: 2 REF: 012622ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: subtraction

23 ANS: 3

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

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

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

PTS: 2 REF: 012623ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

24 ANS: 4

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

PTS: 2 REF: 012624ai NAT: F.BF.A.1 TOP: Sequences

25 ANS:

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

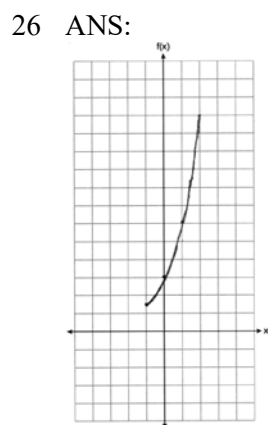
$$14x = 3 + 6x - 4x$$

$$14x = 3 + 2x$$

$$12x = 3$$

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

PTS: 2 REF: 012625ai NAT: A.REI.B.3 TOP: Solving Linear Equations



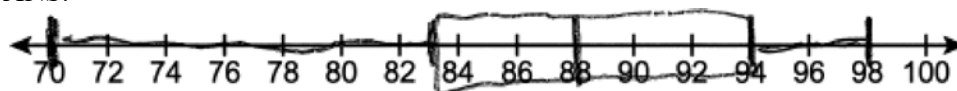
PTS: 2 REF: 012626ai NAT: F.IF.C.7 TOP: Graphing Exponential Functions

27 ANS:

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

PTS: 2 REF: 012627ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

28 ANS:



PTS: 4

REF: 012628ai

NAT: S.ID.A.1

TOP: Box Plots

KEY: represent

29 ANS:

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

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

$$3y = 2x - 3$$

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

PTS: 2

REF: 012629ai

NAT: A.REI.D.10

TOP: Writing Linear Equations

KEY: slope-intercept form

30 ANS:

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

$$2.25x \leq 11.50$$

$$x \leq 5.1$$

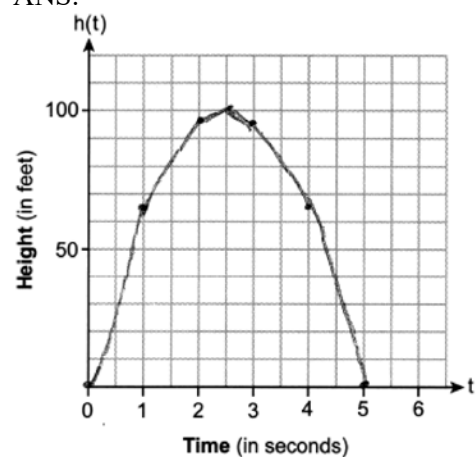
PTS: 2

REF: 012630ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

31 ANS:



2.5, 100

PTS: 4

REF: 012631ai

NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

32 ANS:

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

PTS: 4

REF: 012632ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: quadratic formula

33 ANS:

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

PTS: 4

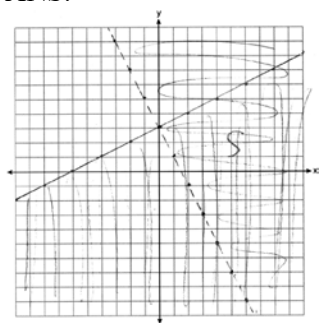
REF: 012633ai

NAT: S.ID.B.6

TOP: Regression

KEY: linear with correlation coefficient

34 ANS:

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

PTS: 4

REF: 012634ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

35 ANS:

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

$$15x + 20y = 3575$$

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

$$30x + 1150 = 3700$$

$$30y = 3450$$

$$30x = 2550$$

$$y = 115$$

$$x = 85$$

PTS: 6

REF: 012635ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems