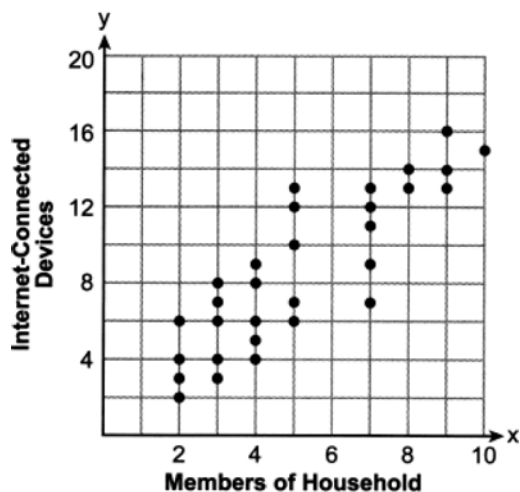


0826AI

- 1 The monarch butterfly population doubled every day during the month of June. Which kind of function best describes this situation?
- 1) linear
2) quadratic
3) exponential growth
4) exponential decay
- 2 The solution to $3x - 4 = 2.6x + 8.2$ is
- 1) 30.5
2) 10.5
3) 21.5
4) 3.05
- 3 Given: $2x + y = 6$
 $x = 4y + 12$
When solving by substitution, which equation could be a step in solving this system?
- 1) $2(4y + 12) + y = 6$
2) $2(-4y - 12) + y = 6$
3) $x = 4(-6 + 2x) + 12$
4) $x = 4(6 + 2x) + 12$
- 4 Which inequality represents 80 *decreased* by a number is *less* than 100?
- 1) $80 - n > 100$
2) $80 - n < 100$
3) $n - 80 < 100$
4) $n - 80 > 100$
- 5 Dave bought a new car for \$29,500. As soon as he drove it off the car lot, it began to depreciate in value. He was told that the car's value would continue to decline at an average yearly rate of 17.5% for the first 5 years. The function $V(t)$ represents the value of Dave's car in t years, where $t \leq 5$. Which function correctly models this situation?
- 1) $V(t) = 29,500(1 + 1.75)^t$
2) $V(t) = 29,500(1 - 1.75)^t$
3) $V(t) = 29,500(1 + 0.175)^t$
4) $V(t) = 29,500(1 - 0.175)^t$
- 6 Which expression is equivalent to $400 - x^2$?
- 1) $(200 - x)(200 + x)$
2) $(x - 200)(x + 200)$
3) $(20 - x)(20 + x)$
4) $(x - 20)(x + 20)$

- 7 The scatter plot below shows the relationship between the number of internet-connected devices and the number of members in a household.



For a household that has six members, what would be the best estimate for the number of internet-connected devices?

- 1) 6
2) 10
3) 14
4) 18
- 8 What is the equation of the axis of symmetry for $y = -x^2 + 6x$?
1) $y = 9$
2) $x = 9$
3) $y = 3$
4) $x = 3$
- 9 The first step in solving a quadratic equation is shown below.

$$x^2 - 2x + 3 = -12$$

$$x^2 - 2x + 15 = 0$$
 Which property was used?
 1) additive identity
 2) addition property of equality
 3) commutative property of addition
 4) associative property of addition
- 10 A fourth-degree polynomial with a leading coefficient of eight and a constant term of twelve written in standard form is
 1) $12 + 5x^2 + 8x^4$
 2) $8x^4 + 5x^2 + 12$
 3) $12 + 6x + 5x^2 + 8x^3$
 4) $8x^3 + 5x^2 + 6x + 12$
- 11 If $g(x) = x^2 - x$, then what is the value of $g(-4)$?
 1) -20
 2) -12
 3) 12
 4) 20

17 When using the method of completing the square to solve $x^2 + 4x - 11 = 0$, which equation is a correct step in the process?

$$1) \quad (x+2)^2 = -7$$

$$3) \quad (x+2)^2 = 15$$

$$2) \quad (x-2)^2 = -7$$

4) $(x - 2)^2 = 15$

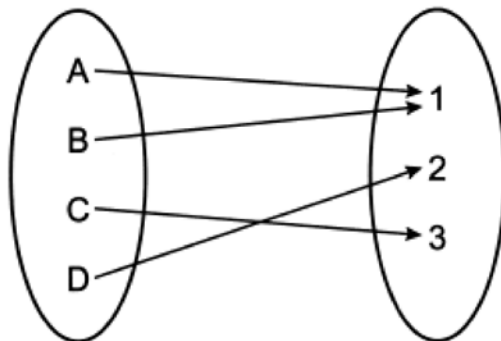
18 George and Henry are in a bowling league. Their top scores from each of the last nine weeks are listed below:

George	198	101	167	202	185	103	192	200	198
Henry	210	126	194	200	172	98	215	114	202

Which statement correctly describes the relationship between George and Henry's bowling scores?

- 1) The standard deviation for George's bowling scores is less than Henry's, but the mean for George's bowling scores is greater than Henry's.
- 2) The standard deviation for George's bowling scores is greater than Henry's, but the mean for George's bowling scores is less than Henry's.
- 3) The standard deviation and mean for George's bowling scores are both less than Henry's.
- 4) The standard deviation and mean for George's bowling scores are both greater than Henry's.

19 The mapping shown below demonstrates a relation.



Which statement about this relation is true?

- 1) It is a function because each element of the domain maps onto only one element of the range.
- 2) It is a function because each element of the range maps onto only one element of the domain.
- 3) It is not a function because each element of the domain maps onto only one element of the range.
- 4) It is not a function because each element of the range maps onto only one element of the domain.

20 The function $f(x) = |x + 6| - 5$ is shifted to the right 2 units to make the function $g(x)$. Which function represents $g(x)$?

$$1) \quad g(x) = |x + 4| - 5$$

3) $g(x) = |x + 6| - 3$

2) $g(x) = |x + 8| - 5$

4) $g(x) = |x + 6| - 7$

- | Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|-----------|------|------|------|------|------|------|------|------|
| Cost (\$) | 1.34 | 2.65 | 2.65 | 2.68 | 2.68 | 2.00 | 2.11 | 2.08 |

1) -0.11	3) 0.10
2) -0.10	4) 0.11

- 1) $(-10,0)$
- 2) $(10,0)$
- 3) $(3.5,-22.5)$
- 4) $(3.5,-22.25)$

- $$\begin{array}{ll} 1) & x(x^3 - 5x^2 - 36x) \\ 2) & x^2(x^2 - 5x - 36) \end{array} \quad \begin{array}{ll} 3) & x^2(x - 9)(x + 4) \\ 4) & (x^2 - 9)(x^2 + 4) \end{array}$$

- $$\begin{array}{ll} 1) & -x^2 + 3x - 5 \\ 2) & -x^2 - 7x + 7 \end{array} \quad \begin{array}{ll} 3) & x^2 + 3x - 5 \\ 4) & x^2 + 7x - 7 \end{array}$$

- | | Buy Lunch | Bring Lunch | Total |
|--------------------------|-----------|-------------|-------|
| Play Sports | | | |
| Don't Play Sports | | | |
| Total | | | |

- 27 Solve $\frac{3}{4}x + \frac{2}{5} < \frac{1}{4}x - \frac{2}{5}$ for x .

- Write an equation for the n th term of this sequence. State the tenth term of this sequence.

29 Use the quadratic formula to solve $2x^2 + 3x - 1 = 0$ for the exact values of x .

30 Perform the indicated operation and express your answer in simplest radical form.

$$5\sqrt{32} + 10\sqrt{2}$$

31 The following table shows the average length of a baby girl from birth to 24 months.

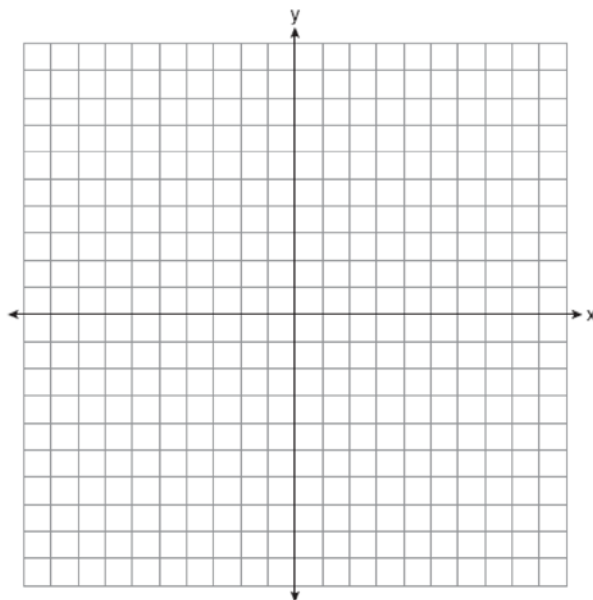
Age (months), x	0	3	6	9	12	15	18	21	24
Length (cm), y	53	64	70	75	79	83	86	90	93

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

32 Solve this system of inequalities graphically, on the set of axes below. Label the solution set S .

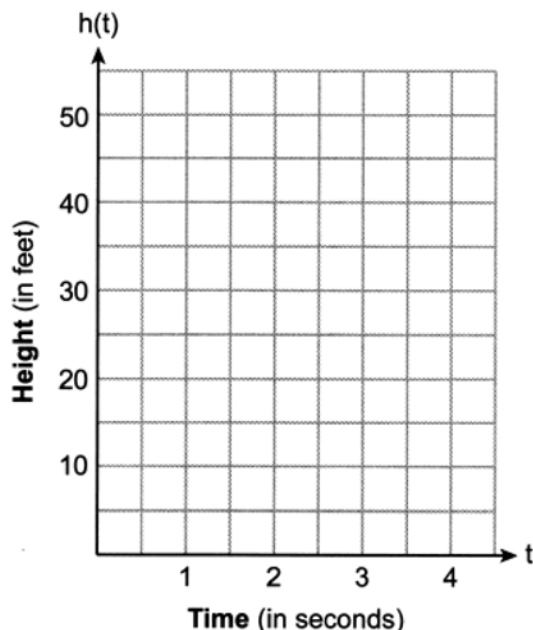
$$y + 5 > 2x$$

$$3y \leq 2x + 6$$



Is the point $(2, -1)$ a solution for this system of inequalities? Justify your answer.

- 33 Joey threw a basketball into the air. The height of the basketball can be represented by the equation $h(t) = -16t^2 + 48t + 5$, where h is the height of the ball, in feet, and t is the time, in seconds, after the ball was thrown. Sketch the graph of the equation on the set of axes below.



State the number of seconds it takes for the ball to reach its maximum height. State the maximum height, in feet, the ball reaches.

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

$$y = x^2 + 4x - 3$$

$$y = 2x + 5$$

- 35 Miguel is in charge of buying snacks for his office's morning meetings. On Monday, he buys six muffins and four doughnuts for \$20.70. On Tuesday, at the same store, he buys three muffins and six doughnuts for \$21.51. There is no sales tax. If m represents the cost of one muffin and d represents the cost of one doughnut, write a system of equations to represent this situation. Miguel thinks one muffin costs \$2.07 and one doughnut also costs \$2.07. Is Miguel correct? Justify your answer. Use your system of equations to algebraically determine the exact price of one muffin and the exact price of one doughnut.

0826AI**Answer Section**

- 1 ANS: 3 PTS: 2 REF: 082601ai NAT: F.LE.A.1
TOP: Families of Functions
- 2 ANS: 1
 $3x - 4 = 2.6x + 8.2$
 $.4x = 12.2$
 $x = 30.5$
- PTS: 2 REF: 082602ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: integral expressions
- 3 ANS: 1 PTS: 2 REF: 082603ai NAT: A.REI.C.6
TOP: Solving Linear Systems KEY: substitution
- 4 ANS: 2 PTS: 2 REF: 082604ai NAT: A.CED.A.1
TOP: Modeling Linear Inequalities
- 5 ANS: 4 PTS: 2 REF: 082605ai NAT: F.BF.A.1
TOP: Modeling Exponential Functions
- 6 ANS: 3 PTS: 2 REF: 082606ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares
- 7 ANS: 2 PTS: 2 REF: 082607ai NAT: S.ID.B.6
TOP: Scatter Plots KEY: line of best fit
- 8 ANS: 4
 $x = \frac{-6}{2(-1)} = 3$
- PTS: 2 REF: 082608ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions
- 9 ANS: 2 PTS: 2 REF: 082609ai NAT: A.REI.A.1
TOP: Identifying Properties
- 10 ANS: 2 PTS: 2 REF: 082610ai NAT: A.SSE.A.1
TOP: Modeling Polynomials
- 11 ANS: 4
 $g(-4) = (-4)^2 - (-4) = 20$
- PTS: 2 REF: 082611ai NAT: F.IF.A.2 TOP: Function Notation
- 12 ANS: 4
 $1.75 \times \frac{75}{25} \times 8 = 42$
- PTS: 2 REF: 082612ai NAT: N.Q.A.1 TOP: Conversions
- 13 ANS: 1 PTS: 2 REF: 082613ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify
- 14 ANS: 3 PTS: 2 REF: 082614ai NAT: F.IF.C.9
TOP: Comparing Functions
- 15 ANS: 4 PTS: 2 REF: 082615ai NAT: A.APR.B.3
TOP: Zeros of Polynomials

16 ANS: 2

I. $2^{x+6} = 2^x \cdot 2^6 = 64 \cdot 2^x$; II. $4^{x+3} = 4^x \cdot 4^3 = 64 \cdot 4^x$; III. $16 \cdot 2^{x+2} = 16 \cdot 2^x \cdot 2^2 = 64 \cdot 2^x$

PTS: 2 REF: 082616ai NAT: A.APR.A.1 TOP: Multiplication of Powers

17 ANS: 3

$$x^2 + 4x = 11$$

$$x^2 + 4x + 4 = 11 + 4$$

$$(x+2)^2 = 15$$

PTS: 2 REF: 082617ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

18 ANS: 1

George: $\bar{x} \approx 172$, $\sigma_x \approx 39$; Henry: $\bar{x} \approx 170$, $\sigma_x \approx 43$

PTS: 2 REF: 082618ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

19 ANS: 1

PTS: 2

REF: 082619ai

NAT: F.IF.A.1

TOP: Defining Functions

20 ANS: 1

PTS: 2

REF: 082620ai

NAT: F.BF.B.3

TOP: Transformations with Functions

21 ANS: 4

$$\frac{2.08 - 1.34}{2016 - 2009} \approx 0.11$$

PTS: 2 REF: 082621ai NAT: F.IF.B.6 TOP: Rate of Change

22 ANS: 4

$$(3.5)^2 - 7(3.5) - 10 = 12.25 - 24.5 - 10 = -22.25$$

PTS: 2 REF: 082622ai NAT: A.REI.D.10 TOP: Identifying Solutions

KEY: quadratic

23 ANS: 3

$$x^4 - 5x^3 - 36x^2 = x^2(x^2 - 5x - 36) = x^2(x - 9)(x + 4)$$

PTS: 2 REF: 082623ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

24 ANS: 4

PTS: 2

REF: 082624ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: subtraction

25 ANS:

	Buy Lunch	Bring Lunch	Total
Play Sports	50	90	140
Don't Play Sports	40	20	60
Total	90	110	200

PTS: 2 REF: 082625ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

26 ANS:

$$y = mx + b$$

$$y - b = mx$$

$$\frac{y - b}{m} = x$$

PTS: 2

REF: 082626ai

NAT: A.CED.A.4

TOP: Transforming Formulas

KEY: basic

27 ANS:

$$\frac{3}{4}x + \frac{2}{5} < \frac{1}{4}x - \frac{2}{5}$$

$$\frac{2}{4}x < -\frac{4}{5}$$

$$x < -\frac{8}{5}$$

PTS: 2

REF: 082627ai

NAT: A.REI.B.3

TOP: Solving Linear Inequalities

28 ANS:

$$a_n = -5 + 3(n - 1); a_{10} = -5 + 3(10 - 1) = -5 + 27 = 22$$

PTS: 2

REF: 082628ai

NAT: F.BF.A.1

TOP: Sequences

29 ANS:

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-1)}}{2(2)} = \frac{-3 \pm \sqrt{17}}{4}$$

PTS: 2

REF: 082629ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: quadratic formula

30 ANS:

$$5\sqrt{32} + 10\sqrt{2} = 5\sqrt{16}\sqrt{2} + 10\sqrt{2} = 20\sqrt{2} + 10\sqrt{2} = 30\sqrt{2}$$

PTS: 2

REF: 082630ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: subtraction

31 ANS:

$$y = 1.54x + 58.47, 0.98, \text{strong}$$

PTS: 4

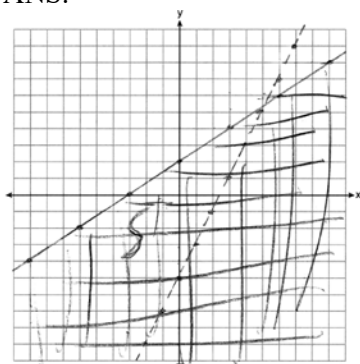
REF: 082631ai

NAT: S.ID.B.6

TOP: Regression

KEY: linear with correlation coefficient

32 ANS:

no, because $-1 + 5 > 2(2)$ is not true.

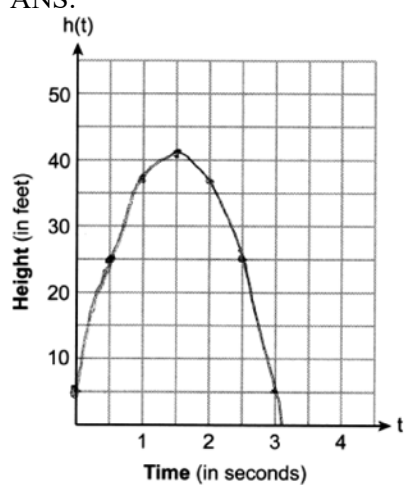
PTS: 4

REF: 082632ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

33 ANS:



1.5, 41

PTS: 4

REF: 082633ai

NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

34 ANS:

$$x^2 + 4x - 3 = 2x + 5 \quad y = 2(-4) + 5 = -3 \quad (-4, -3), (2, 9)$$

$$x^2 + 2x - 8 = 0 \quad y = 2(2) + 5 = 9$$

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

$$x = -4, 2$$

PTS: 4

REF: 082634ai

NAT: A.REI.C.7

TOP: Quadratic-Linear Systems

35 ANS:

$6m + 4d = 20.7$ No, because one muffin costs 1.59 and one donut costs 2.79. $6m + 12d = 43.02$

$$3m + 6d = 21.51$$

$$\underline{6m + 4d = 20.70}$$

$$8d = 22.32$$

$$d = 2.79$$

$$3m + 6(2.79) = 21.51$$

$$3m + 16.74 = 21.51$$

$$3m = 4.77$$

$$m = 1.59$$

PTS: 6

REF: 082635ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems