

**0625AI**

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

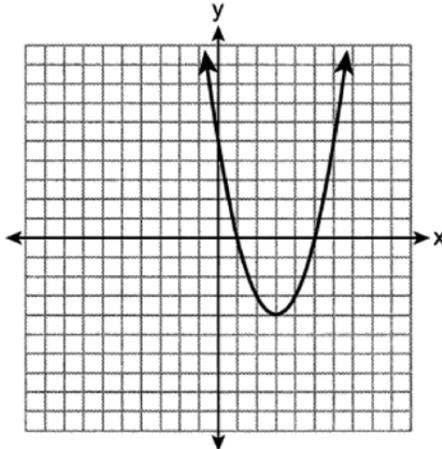
1) 5

2) 20

3)  $5\sqrt{2}$

4)  $10\sqrt{2}$

2 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)  $[-1, 1]$

3 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.

- 4 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.
- 5 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)  $2x^3 + x^2 + 4x$
- 6 The expression  $(-3x^2 + 9) - (7x^2 - 5x + 4)$  is equivalent to
- 1)  $-10x^2 + 5x + 5$
- 2)  $-10x^2 + 5x + 13$
- 3)  $-10x^2 - 5x + 5$
- 4)  $-10x^2 - 5x + 13$
- 7 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
- 2) 8
- 3) 48
- 4) 58

8 Chloe is solving the equation  $x^2 + 5x = 3x + 3$ . Her first step is shown below.

$$\text{Given: } x^2 + 5x = 3x + 3$$

$$\text{Step 1: } x^2 + 2x - 3 = 0$$

Which property justifies this step?

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

9 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)  $r(x) = |x| - 2$

10 Given the system of equations:

$$y + 4x = 5$$

$$2x - 3y = 10$$

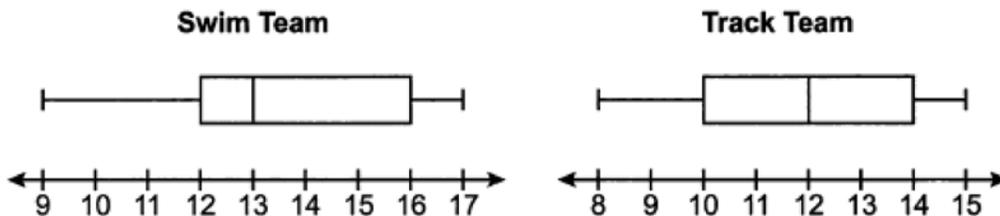
A step in solving this system by using the substitution method would be

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

11 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)  $(x - 3)^2 = 27 - 36$

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

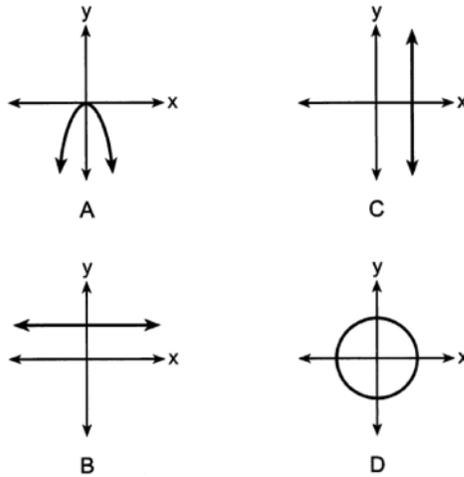


Based on the box plots, which statement must be true?

- 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.



19 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*
- 20 The formula to calculate kinetic energy is  $K = \frac{1}{2}mv^2$ , where  $K$  is kinetic energy,  $m$  is mass, and  $v$  is velocity.

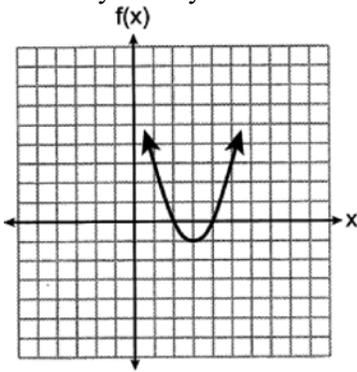
When  $m$  is written in terms of  $K$  and  $v$ , the equation is

- 1)  $m = \frac{2K}{v^2}$   
 2)  $m = 2Kv^2$   
 3)  $m = \sqrt{2Kv^2}$   
 4)  $m = \frac{K}{2v^2}$
- 21 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)  $\frac{8}{3}$

22 Which equation represents the sequence  $12, 6, 3, \frac{3}{2}, \dots$ , 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)  $a_n = 12 \cdot (2)^n$

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



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

1)

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

3)

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

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

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

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

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 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			

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

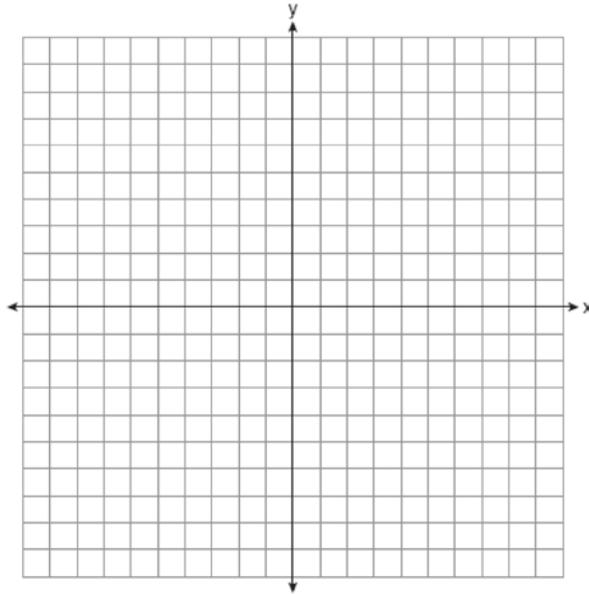
27 Express  $(5x - 3)(-2x + 7)$  as a trinomial in standard form.

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

$-20, \_, \_, -2$

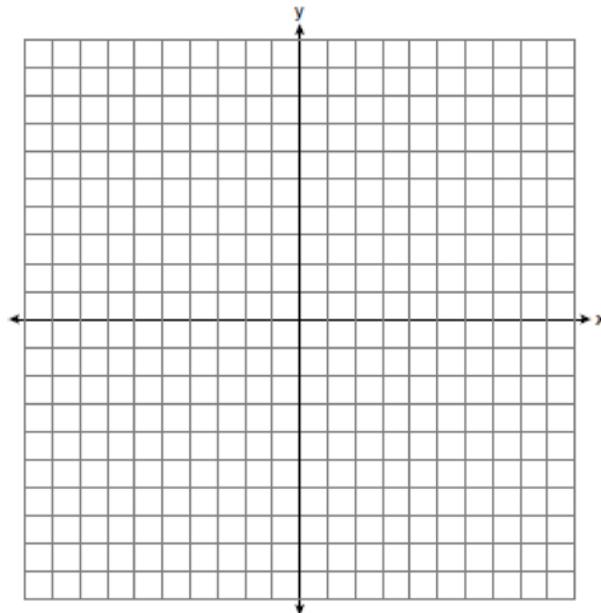
Determine the eighth term.

- 29 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.]



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

- 31 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  $f(x) = g(x)$ .

- 32 Using the quadratic formula, solve  $6x^2 + 2x - 1 = 0$ . Express the answer in simplest radical form.
- 33 The table below shows the price of a new cell phone and the length of time, in months, since its release.

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

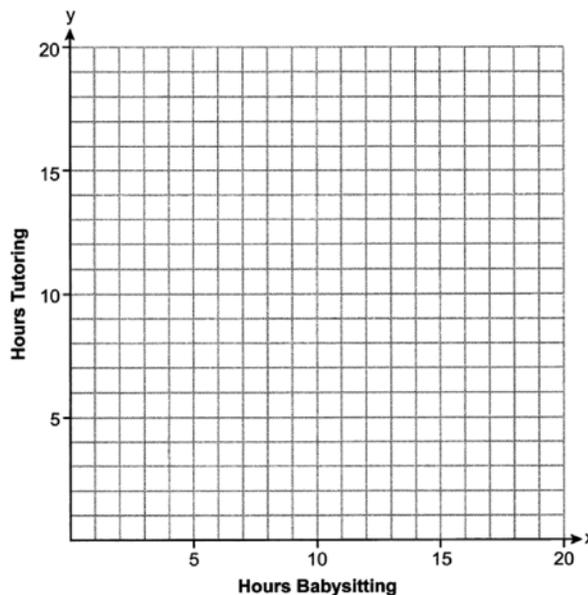
State the linear regression equation for this set of data. Round all values to the *nearest hundredth*. State the correlation coefficient for this data set, to the *nearest hundredth*. State what the correlation coefficient indicates about the linear fit of the data.

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

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

$$y - 2x = -6$$

- 35 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.

## 0625AI

## Answer Section

1 ANS: 3

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

PTS: 2 REF: 062501ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: division

2 ANS: 2 PTS: 2 REF: 062502ai NAT: F.IF.C.7  
TOP: Graphing Quadratic Functions

3 ANS: 4 PTS: 2 REF: 062503ai NAT: F.LE.A.1  
TOP: Families of Functions

4 ANS: 3

	Andrea	Joe
mean	85.8	82.5
standard deviation	3.5	12.4

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

5 ANS: 4 PTS: 2 REF: 062505ai NAT: A.SSE.A.1  
TOP: Modeling Expressions

6 ANS: 1 PTS: 2 REF: 062506ai NAT: A.APR.A.1  
TOP: Operations with Polynomials  
KEY: subtraction

7 ANS: 1

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

PTS: 2 REF: 062507ai NAT: F.IF.B.6 TOP: Rate of Change

8 ANS: 4 PTS: 2 REF: 062508ai NAT: A.REI.A.1  
TOP: Identifying Properties

9 ANS: 2 PTS: 2 REF: 062509ai NAT: F.BF.B.3  
TOP: Transformations with Functions

10 ANS: 3 PTS: 2 REF: 062510ai NAT: A.REI.C.6  
TOP: Solving Linear Systems

11 ANS: 2 PTS: 2 REF: 062511ai NAT: A.REI.B.4  
TOP: Solving Quadratics  
KEY: completing the square

12 ANS: 1

$$IRQ = 16 - 12 = 14 - 10$$

PTS: 2 REF: 062512ai NAT: S.ID.A.1 TOP: Box Plots  
KEY: interpret

13 ANS: 3 PTS: 2 REF: 062513ai NAT: F.IF.B.5  
TOP: Domain and Range  
KEY: graph

14 ANS: 4 PTS: 2 REF: 062514ai NAT: N.RN.B.3  
TOP: Operations with Radicals  
KEY: classify

15 ANS: 3                      PTS: 2                      REF: 062515ai                      NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares

16 ANS: 1  
 $2\sqrt{27} + 4\sqrt{12} = 2\sqrt{9}\sqrt{3} + 4\sqrt{4}\sqrt{3} = 6\sqrt{3} + 8\sqrt{3} = 14\sqrt{3}$

PTS: 2                      REF: 062516ai                      NAT: N.RN.B.3                      TOP: Operations with Radicals  
KEY: addition

17 ANS: 1                      PTS: 2                      REF: 062517ai                      NAT: A.CED.A.1  
TOP: Modeling Linear Equations

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

PTS: 2                      REF: 062518ai                      NAT: F.IF.A.2                      TOP: Functional Notation  
19 ANS: 2                      PTS: 2                      REF: 062519ai                      NAT: F.IF.A.1  
TOP: Defining Functions

20 ANS: 1  
 $K = \frac{1}{2}mv^2$

$$2K = mv^2$$

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

PTS: 2                      REF: 062520ai                      NAT: A.CED.A.4                      TOP: Transforming Formulas  
21 ANS: 4  
 $\frac{2(3x-1)}{3} = x + 2$

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

$$3x = 8$$

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

PTS: 2                      REF: 062521ai                      NAT: A.REI.B.3                      TOP: Solving Linear Equations  
22 ANS: 1                      PTS: 2                      REF: 062522ai                      NAT: F.BF.A.1  
TOP: Sequences

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

PTS: 2                      REF: 062523ai                      NAT: F.IF.C.9                      TOP: Comparing Quadratic Functions  
24 ANS: 3                      PTS: 2                      REF: 062524ai                      NAT: N.Q.A.1  
TOP: Conversions

25 ANS:

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

PTS: 2 REF: 062525ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

26 ANS:

$$5(2 - y) > -11y - 8$$

$$10 - 5y > -11y - 8$$

$$6y > -18$$

$$y > -3$$

PTS: 2 REF: 062526ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

27 ANS:

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

PTS: 2 REF: 062527ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

28 ANS:

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

PTS: 2 REF: 062528ai NAT: F.BF.A.1 TOP: Sequences

29 ANS:

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

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

$$y = -3x - 1$$

PTS: 3 REF: 062529ai NAT: A.REI.D.10 TOP: Writing Linear Equations

KEY: slope-intercept form

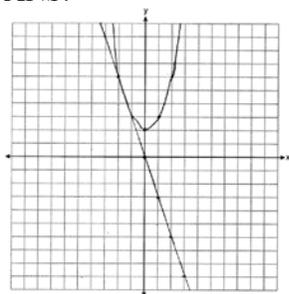
30 ANS:

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

PTS: 2 REF: 062530ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

31 ANS:



-2 and -1

PTS: 4 REF: 062531ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

32 ANS:

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

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

KEY: quadratic formula

33 ANS:

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

PTS: 4 REF: 062533ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

34 ANS:

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

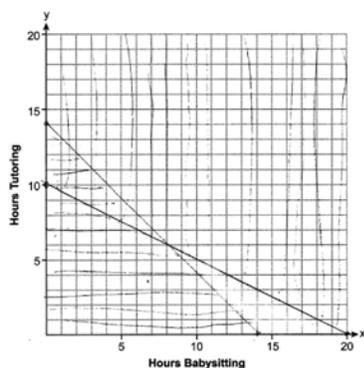
$$x^2 + 7x + 10 = 0 \quad y = 2(-2) - 6 = -10$$

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

$$x = -5, -2$$

PTS: 4 REF: 062534ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

35 ANS:



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

$$x + y \leq 14$$

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

$$8 + 6 \leq 14$$

PTS: 6 REF: 062535ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities