





- 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, ...  
2) 14, 11, 8, 5, ...  
3) -2, -6, -18, -54, ...  
4) 4, -12, 36, -108, ...
- 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)  $5^a \cdot 5^2 \cdot 5^b$

2)  $5^a \cdot 25^b$

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?

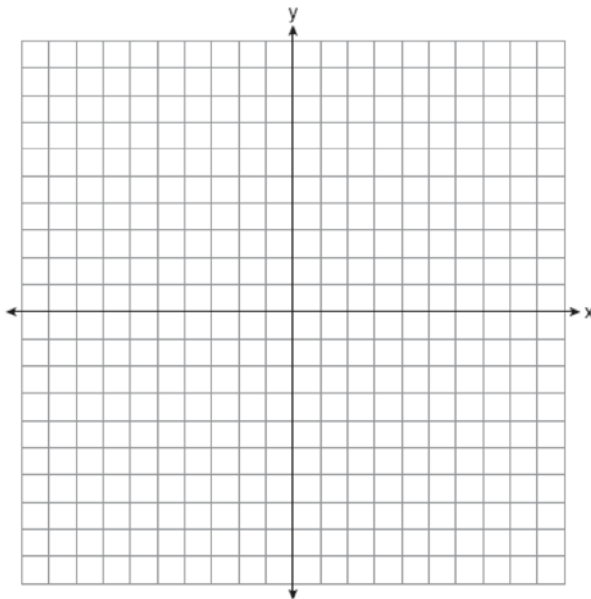
1)  $\frac{3240 \text{ ft}^3}{1 \text{ pool}} \cdot \frac{1 \text{ ft}^3}{7.5 \text{ gal}} \cdot \frac{6000 \text{ gal}}{1 \text{ truck load}}$

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

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.

<b>x</b>	-1	0	1	2
<b>y</b>	2	4	4	5

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

<b>x</b>	-1	0	1	2	
<b>y</b>	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.

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

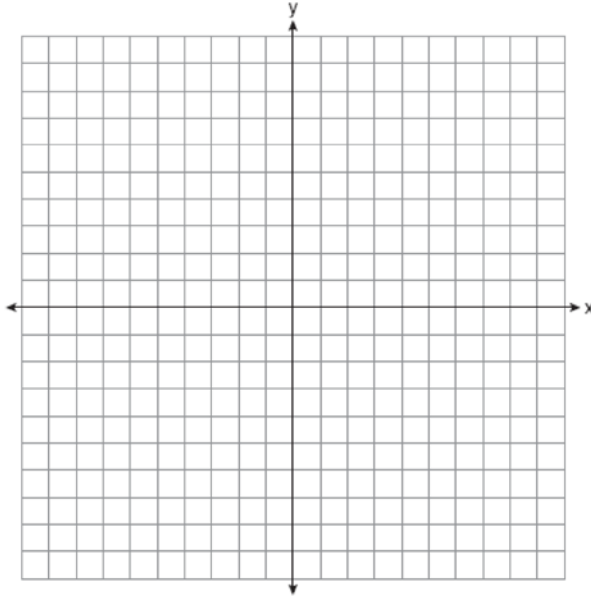
State the linear regression equation for these data, rounding all values to the *nearest hundredth*. State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data. State what this correlation coefficient indicates about the linear fit of the data.

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

$$y > 3x - 4$$

$$x + 2y \leq 6$$

Label the solution set  $S$ .



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.

## 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  
 $2m - 4 \leq 3(2m + 4)$   
 $2m - 4 \leq 6m + 12$   
 $-16 \leq 4m$   
 $-4 \leq m$
- 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.CED.A.4 TOP: Transforming Formulas



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

22 ANS: 2  
 $5^{a+2b} = 5^a \cdot 5^{2b} = 5^a \cdot 25^b$

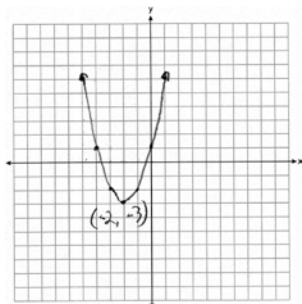
PTS: 2                      REF: 082422ai                      NAT: A.APR.A.1                      TOP: Multiplication of Powers

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:

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

PTS: 4

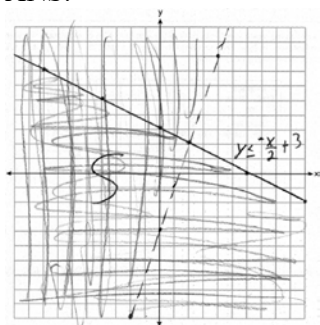
REF: 082431ai

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:

$$t = \frac{-64}{2(-16)} = 2 \quad h(2) = -16(2)^2 + 64(2) + 80 = -64 + 128 + 80 = 144 \quad (2, 144). \text{ At 2 seconds, the object is 144 feet}$$

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:

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

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

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

$$x = -4, 2$$

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

35 ANS:

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

$$6m + r = 47.5$$

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

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

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

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