







18 Three functions are given below.

$$f(x) = -|x + 2| + 7$$

$$g(x) = (x - 3)^2 - 4$$

x	h(x)
-4	5
-3	0
-2	-3
-1	-4
0	-3
1	0
2	5

Which functions have the same y-intercept?

- 1)  $f(x)$  and  $g(x)$
- 2)  $g(x)$  and  $h(x)$
- 3)  $f(x)$  and  $h(x)$
- 4) The functions all have different y-intercepts.

19 The sum of  $(x + 7)^2$  and  $(x - 3)^2$  is

- 1)  $2x^2 + 58$
- 2)  $2x^4 + 58$
- 3)  $2x^2 + 8x + 58$
- 4)  $2x^4 + 8x^2 + 58$

20 The product of  $2\sqrt{10}$  and  $3\sqrt{2}$  is

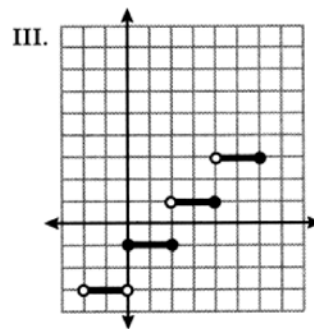
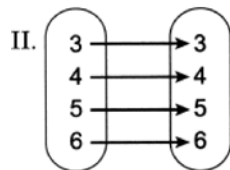
- 1)  $12\sqrt{5}$
- 2)  $5\sqrt{20}$
- 3)  $24\sqrt{5}$
- 4)  $5\sqrt{12}$

21 When  $6x^3 - 2x + 8$  is subtracted from  $5x^3 + 3x - 4$ , the result is

- 1)  $x^3 - 5x + 12$
- 2)  $x^3 + x + 4$
- 3)  $-x^3 + 5x - 12$
- 4)  $-x^3 + x + 4$

22 Three relations are shown below.

I.  $\{(0,1), (1,2), (2,3), (3,4)\}$



Which relations represent a function?

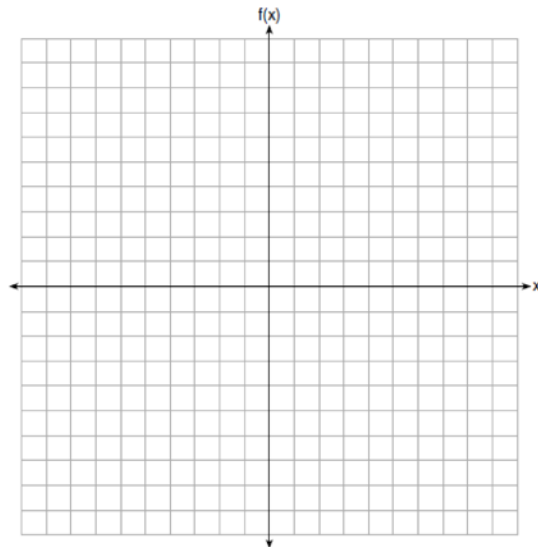
- 1) I and II, only
- 2) I and III, only
- 3) II and III, only
- 4) I, II, and III



- 28 A survey was given to 180 cell phone owners about the brand of phone they owned. The results showed that 59 adults owned Brand *B* and 32 teenagers owned Brand *A*. Of all the people surveyed, 40% owned Brand *A*. Complete the two-way frequency table below.

	Brand A	Brand B	Total
Adults			
Teenagers			
Total			

- 29 Determine the 8th term of a geometric sequence whose first term is 5 and whose common ratio is 3.
- 30 Using the method of completing the square, express  $x^2 + 14x - 28 = 0$  in the form  $(x - p)^2 = q$ .
- 31 Graph  $f(x) = -\frac{1}{3}x^2 + 4$  on the set of axes below.



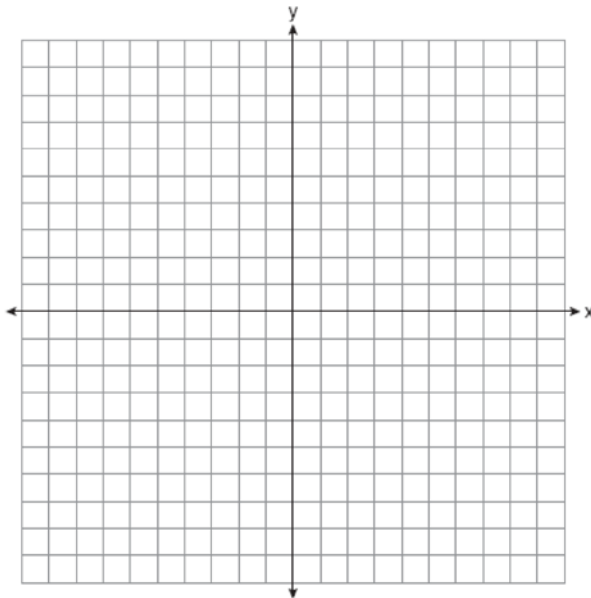
State the vertex of this function. State the equation of the axis of symmetry of this function.

- 32 Vince wants to rent a canoe while he is on vacation. The canoe rental company charges \$18 for the first hour and \$7.50 for each additional hour,  $x$ . If Vince has \$78 to spend on renting a canoe, write an inequality in terms of  $x$  that models this situation. Algebraically determine the maximum number of hours that Vince could rent a canoe.

- 33 Graph the following system of inequalities on the set of axes below:

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

$$y - 2x < 5$$



State the coordinates of a point that is in the solution to this system. Justify your answer.

- 34 Using the quadratic formula, solve  $x^2 - 6x + 3 = 0$ . Express the answer in simplest radical form.
- 35 Cameron sold hot dogs and sodas at a concession stand. He sold a total of 25 items for \$45.00. A hot dog sold for \$2.25 and a soda sold for \$1.50. All prices include tax. If  $x$  represents the number of hot dogs sold and  $y$  represents the number of sodas sold, write a system of equations that models this situation. Determine algebraically the number of hot dogs Cameron sold and the number of sodas he sold. A customer has \$20 to spend at the concession stand. Determine and state the maximum number of hot dogs he can purchase if he buys four sodas.

## 0825AI

## Answer Section

- 1 ANS: 3                      PTS: 2                      REF: 082501ai                      NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares
- 2 ANS: 3                      PTS: 2                      REF: 082502ai                      NAT: A.CED.A.1  
TOP: Modeling Linear Equations
- 3 ANS: 2  
 $g(-3) = -2(-3)^2 + 16 = -18 + 16 = -2$
- PTS: 2                      REF: 082503ai                      NAT: F.IF.A.2                      TOP: Functional Notation
- 4 ANS: 2  
 $x^2 - 8x - 20 = 0$   
 $(x - 10)(x + 2) = 0$   
 $x = 10, -2$
- PTS: 2                      REF: 082504ai                      NAT: A.APR.B.3                      TOP: Zeros of Polynomials
- 5 ANS: 1  
 $3(-2)^2 - \frac{1}{4}(-2) + 3 = 12 + \frac{1}{2} + 3 = 15.5$
- PTS: 2                      REF: 082505ai                      NAT: A.REI.D.10                      TOP: Identifying Solutions
- 6 ANS: 3  
 $x^2 = 8x - 15$   
 $x^2 - 8x + 15 = 0$   
 $(x - 3)(x - 5) = 0$   
 $x = 3, 5$
- PTS: 2                      REF: 082506ai                      NAT: A.REI.D.11                      TOP: Quadratic-Linear Systems
- 7 ANS: 4                      PTS: 2                      REF: 082507ai                      NAT: A.SSE.A.1  
TOP: Modeling Expressions
- 8 ANS: 4                      PTS: 2                      REF: 082508ai                      NAT: A.REI.A.1  
TOP: Identifying Properties
- 9 ANS: 4  
 $f(x) = (x - 1)^2 - 3; g(x) = |x + 1|; h(x) = -4(2)^x; j(x) = 4x + 1$
- PTS: 2                      REF: 082509ai                      NAT: F.LE.A.1                      TOP: Families of Functions

10 ANS: 2

$$3x^2 - 24x = 0$$

$$3x(x - 8) = 0$$

$$x = 0, 8$$

PTS: 2 REF: 082510ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

11 ANS: 2

$$\frac{2.5 - 10}{3 - 1} = \frac{-7.5}{2} = -3.75$$

PTS: 2 REF: 082511ai NAT: F.IF.B.6 TOP: Rate of Change

12 ANS: 1

PTS: 2

REF: 082512ai

NAT: S.ID.C.8

TOP: Correlation Coefficient

13 ANS: 4

PTS: 2

REF: 082513ai

NAT: F.BF.B.3

TOP: Transformations with Functions

14 ANS: 2

$$\text{mean: } \frac{0 + 4 + 12 + 12 + 12 + 10}{20} = \frac{50}{20} = 2.5, \text{ mode: } 2, \text{ median: } \frac{2 + 2}{2} = 2$$

PTS: 2 REF: 082514ai NAT: S.ID.A.1 TOP: Dot Plots

15 ANS: 1

PTS: 2

REF: 082515ai

NAT: F.IF.A.2

TOP: Domain and Range

16 ANS: 3

PTS: 2

REF: 082516ai

NAT: A.APR.A.1

TOP: Powers of Powers

17 ANS: 1

$$2A = h(b_1 + b_2)$$

$$\frac{2A}{b_1 + b_2} = h$$

PTS: 2 REF: 082517ai NAT: A.CED.A.4 TOP: Transforming Formulas

KEY: basic

18 ANS: 1

$$f(0) = 5, g(0) = 5, h(0) = -3$$

PTS: 2 REF: 082518ai NAT: F.IF.C.9 TOP: Comparing Functions

19 ANS: 3

$$(x + 7)^2 + (x - 3)^2 = x^2 + 14x + 49 + x^2 - 6x + 9 = 2x^2 + 8x + 58$$

PTS: 2 REF: 082519ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

20 ANS: 1

$$2\sqrt{10} \cdot 3\sqrt{2} = 6\sqrt{20} = 6\sqrt{4}\sqrt{5} = 12\sqrt{5}$$

PTS: 2 REF: 082520ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: multiplication

21 ANS: 3 PTS: 2 REF: 082521ai NAT: A.APR.A.1  
TOP: Operations with Polynomials KEY: subtraction

22 ANS: 4 PTS: 2 REF: 082522ai NAT: F.IF.A.1  
TOP: Defining Functions

23 ANS: 1 PTS: 2 REF: 082523ai NAT: A.REI.C.6  
TOP: Solving Linear Systems

24 ANS: 4 PTS: 2 REF: 082524ai NAT: N.Q.A.1  
TOP: Conversions

25 ANS:

$$\frac{1}{6}(4x + 12) = 9$$

$$4x + 12 = 54$$

$$4x = 42$$

$$x = 10.5$$

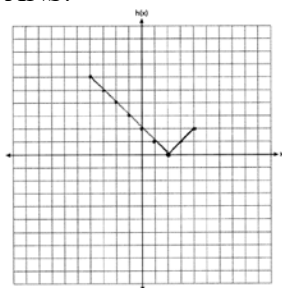
PTS: 2 REF: 082525ai NAT: A.REI.B.3 TOP: Solving Linear Equations

26 ANS:

Irrational because the sum can not be written as the ratio of two integers.

PTS: 2 REF: 082526ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

27 ANS:



PTS: 2 REF: 082527ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

28 ANS:

	Brand A	Brand B	Total
Adults	40	59	99
Teenagers	32	49	81
Total	72	108	180

PTS: 2 REF: 082528ai NAT: S.ID.B.5 TOP: Frequency Tables  
KEY: two-way

29 ANS:

$$a_8 = 5(3)^{8-1} = 10935$$

PTS: 2

REF: 082529AI

NAT: F.BF.A.1

TOP: Sequences

30 ANS:

$$x^2 + 14x = 28$$

$$x^2 + 14x + 49 = 28 + 49$$

$$(x + 7)^2 = 77$$

PTS: 2

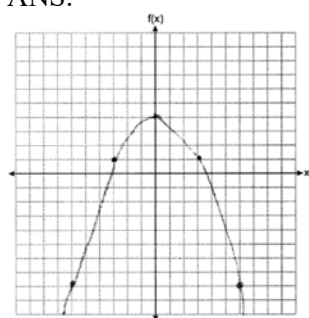
REF: 082530ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

31 ANS:

(0,4),  $x = 0$ 

PTS: 2

REF: 082531sai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

32 ANS:

$$7.5x + 18 \leq 78 \quad 9 \text{ hours}$$

$$7.5x \leq 60$$

$$x \leq 8$$

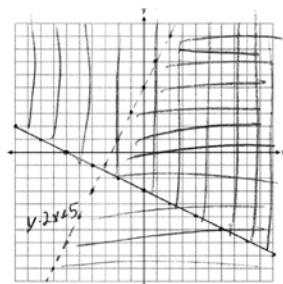
PTS: 2

REF: 082532ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

33 ANS:



$$(0,0) \quad 0 \geq -\frac{1}{2}(0) - 3 \quad y - 2x < 5$$

$$0 \geq -3 \quad 0 - 2(0) < 5$$

$$0 < 5$$

PTS: 4

REF: 082533ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

34 ANS:

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(3)}}{2(1)} = \frac{6 \pm \sqrt{24}}{2} = \frac{6 \pm 2\sqrt{6}}{2}$$

PTS: 4 REF: 082534ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

35 ANS:

$$\begin{array}{ll} x + y = 25 & y = 25 - x \quad y = 25 - 10 = 15 \quad 2.25x + 1.5(4) \leq 20 \quad 6 \text{ hot dogs} \\ 2.25x + 1.5y = 45 & 2.25x + 1.5(25 - x) = 45 \quad 2.25x + 6 \leq 20 \\ & 2.25x + 37.5 - 1.5x = 45 \quad 2.25x \leq 14 \\ & .75x = 7.5 \quad x \leq 6.\bar{2} \\ & x = 10 \end{array}$$

PTS: 6 REF: 082535ai NAT: A.CED.A.3 TOP: Modeling Linear Systems