

# *Florida Algebra I EOC Online Practice Test*



**Directions:** This practice test contains 65 multiple-choice questions. Choose the best answer for each question. Detailed answer explanations appear at the end of the test.

- 1 A Universal set  $U$  contains 80 elements. Sets  $P$  and  $Q$  are disjoint subsets of  $U$ . There are 85 elements in the Cartesian product  $P \times Q$ . If each of  $P$  and  $Q$  contains more than one element, how many elements in  $U$  do NOT belong to either  $P$  or  $Q$ ?

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- 2  $\sqrt{98} + \sqrt{200} = \sqrt{y}$ . What is the value of  $y$ ?

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- 3 The perimeter of a square is  $4x + 8$ . Which of the following represents its area?

- (A)  $x^2 + 4$   
(B)  $x^2 + 4x + 4$   
(C)  $4x^2 + 64$   
(D)  $4x^2 + 64x + 64$

- 4 Tonya is a quality control manager in a large department store. In a recent shipment of 900 new blouses for women, there were 12 that had defects. If she randomly selects a sample of 225 of these blouses, how many of these would be expected NOT to have any defects?

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- 5 Which of the following is a factor of  $3x^2 - 48x$ ?

- (A)  $3x - 4$   
(B)  $16x$   
(C)  $x + 4$   
(D)  $x - 16$

- 6 Set  $R$  contains 65 elements, set  $R \cap T$  contains 14 elements, and set  $R \cup T$  contains 91 elements. How many elements does set  $T$  contain?

- (F) 12  
(G) 26  
(H) 40  
(I) 77

- 7 The slope of a line is  $-\frac{2}{3}$ . The coordinates of two of its points are (7, 9) and (x, 5). What is the value of x?

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- 8 Fred will write the expression  $\frac{(c^3d^{-1}e^5)^{-2}}{c^{-9}d^{-6}e^{-20}}$  in the form  $c^xd^ye^z$ . What is the least common multiple of x, y, and z?

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- 9 What is the value of x in the equation  $\frac{3}{2}(x-14) - 2(x+1) = 2x$ ?

- (A) -9.2  
 (B) -8.8  
 (C) -8.0  
 (D) -7.6

Over the last five months, Laura has been tracking the number of major projects she has managed each month and the corresponding total number of hours she spent on these projects. The following chart is to be used for questions 10 and 11.

Month	June	July	August	September	October
Number of Projects	5	4	7	10	6
Number of Hours	34.5	30	43.5	57	39

- 10 Assuming that the number of hours (y) is a linear function of the number of projects (x), which of the following equations matches the given data?

- (F)  $y = 3.5x + 17$   
 (G)  $y = 4.5x + 12$   
 (H)  $y = 5.5x + 5$   
 (I)  $y = 4.5x + 15$

- 11 Laura anticipates that she will manage 8 projects in November. Assuming that the linear function of question 10 applies, what will be the mean number of hours spent per project for all six months?

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- 12 Line  $m$  is parallel to line  $n$ . The slope of line  $m$  is  $\frac{5}{3}$ . One point on line  $n$  is  $(-4, -1)$ . Which of the following could represent another point on line  $n$ ?

- (F)  $(1, 2)$   
(G)  $(6, -7)$   
(H)  $(-1, -6)$   
(I)  $(-10, -11)$

- 13 What is the simplified expression for  $(x - y)(2x + y) - y(x - 6y)$ ?

- (A)  $2x^2 + 5y^2$   
(B)  $2x^2 - 2xy - 7y^2$   
(C)  $2x^2 - 2xy + 5y^2$   
(D)  $2x^2 - 7y^2$

- 14 At Joe's Hardware Store, a state tax of 5% is collected for every item. In addition, a municipal tax of 1.5% is collected for any item that exceeds \$100. Steve recently purchased two items, one for \$120 and the other for \$90. In dollars and cents, how much tax did he pay?

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- 15 What is the solution for  $y$  in the inequality  $-6(7 - y) < 2(y + 5)$ ?

- (A)  $y < 13$   
(B)  $y > -13$   
(C)  $y > -8.5$   
(D)  $y < 8.5$

- 16 Marcia operates a catering business. In preparing meals for a banquet, she uses the following table to determine the number of pounds of meat to prepare.

Number of Guests	Pounds of Meat
8	12
12	18
15	22.5
20	30

Based on the pattern in the table, how many pounds of meat are needed for 180 guests?

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- 17 What is the  $x$  value of the  $x$ -intercept of the line that has a slope of  $-4$  and contains the point  $(-2, -12)$ ?

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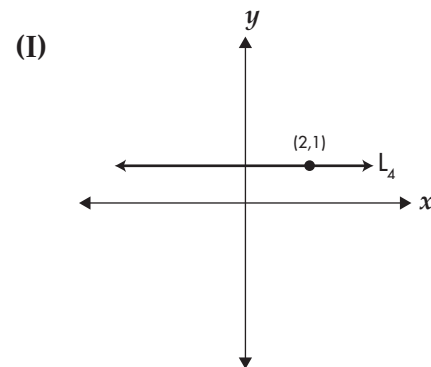
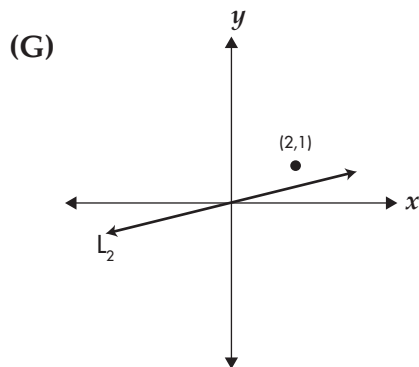
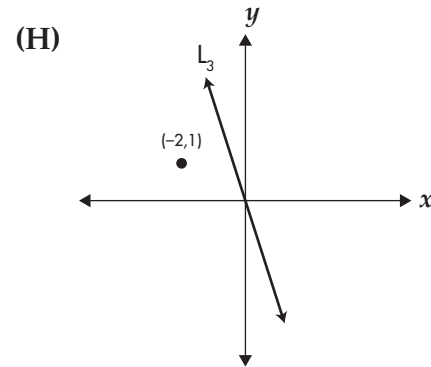
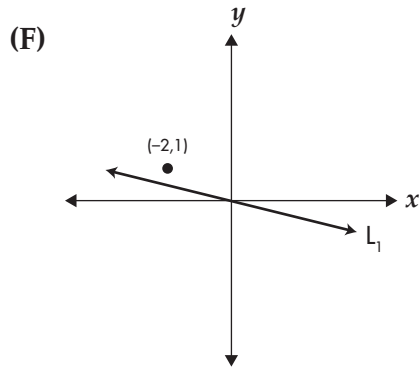
- 18 Velma is given the function  $f(x) = x^3 + 3x - 7$  and calculates the value of  $f(2)$ . Davey is given the function  $h(x) = 5x - 29$ . What value of  $x$  should Davey use so that  $h(x) = f(2)$ ?

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- 19 If the  $y$ -intercept of a line is  $(0, 8)$  and its  $x$ -intercept lies to the left of the origin, which of the following could be the equation of this line?

- (A)  $2x - 3y = 24$   
(B)  $5x + 4y = -32$   
(C)  $4x + 5y = 40$   
(D)  $3x - 2y = -16$

- 20 Which of the following represents the graph of a line whose slope is a negative number greater than  $-0.5$ ?



- 21 Given that  $V = W + \frac{3XY}{2}$ , which of the following is the correct expression for  $X$ ?

- (A)  $\frac{3V - 3W}{2Y}$   
 (B)  $\frac{2V - 2W}{3Y}$   
 (C)  $\frac{3V - W}{2Y}$   
 (D)  $\frac{2V - W}{3Y}$

- 22** The graph of a function is known to contain the points  $(-2, 4)$ ,  $(5, 3)$ , and  $(8, -7)$ . Which of the following points CANNOT lie on this graph?

(F)  $(4, -2)$   
(G)  $(-5, -3)$   
(H)  $(1, 4)$   
(I)  $(8, -3)$

- 23** If  $(2^{100})^7 < 8^m$ , and  $m$  is an integer, what is the MINIMUM value of  $m$ ?

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- 24** For which of the following intervals are ALL its values solutions to the inequality  $|3 - 4x| < 6$ ?

(F)  $-\frac{1}{3} < x < 3$

(G)  $-\frac{1}{2} < x < 2$

(H)  $-\frac{7}{8} < x < 1$

(I)  $-\frac{9}{10} < x < \frac{5}{2}$

- 25** The domain of the function  $f(x) = -2x^2 + 50$  is  $\{2, 3, 4\}$ . What is the least common multiple of the range values?

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- 26** The dimensions of a large rectangular storage tank are follows: 150 feet long, 100 feet wide, and 25 feet deep. A scale model of this tank has a length of 18 inches. What is the sum, in inches, of the length, width, and height of the scale model?

(F) 36  
(G) 33  
(H) 30  
(I) 27

- 27 The slope of line  $L$  is  $-5$  and its  $x$ -intercept is  $(6, 0)$ . Which of the following points lies on  $L$ ?
- (A)  $(5, 6)$   
(B)  $(4, 10)$   
(C)  $(3, -9)$   
(D)  $(2, -3)$

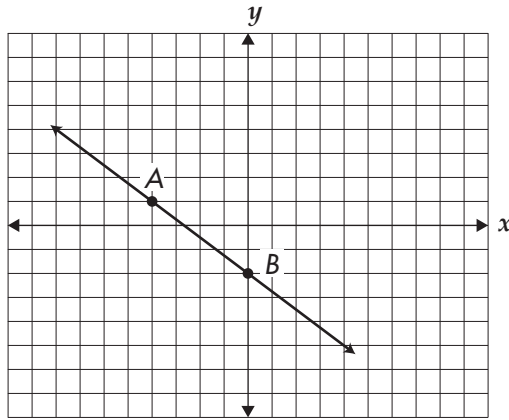
- 28 At 1:00 PM, car A traveled west at an average speed of 42 miles per hour from a certain location. One hour later, car B traveled east from that same location. At 6:00 PM, the two cars were 360 miles apart. What was the average speed in miles per hour of car B?

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- 29 Caitlin sells art paintings from a booth at a flea market. She pays \$100 per month to rent the booth. Each of her paintings sells for \$30. Her profit ( $P$ ) per month is given by  $P = 30x - 100$ , where  $x$  is the number of paintings sold. She sold 25 paintings in January and 32 paintings in February. What is the minimum number of paintings she must sell in March in order for her profit for all three months to be at least \$2000?
- (A) 18  
(B) 19  
(C) 20  
(D) 21



- 30 A line is shown on the coordinate grid below, including points A and B.



Which of the following points lies on this line?

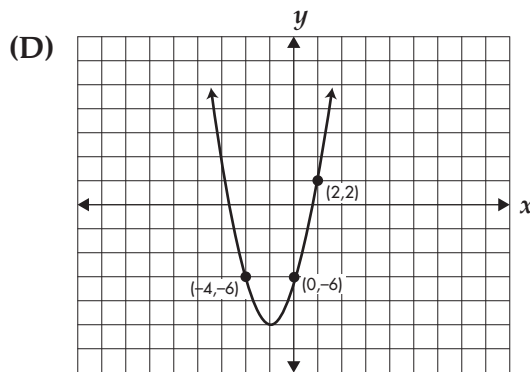
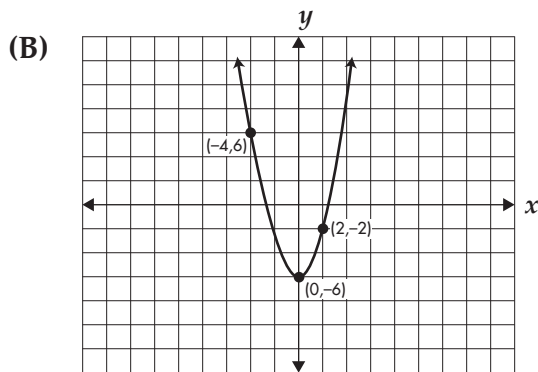
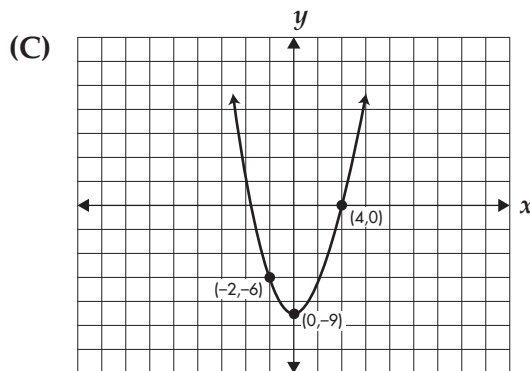
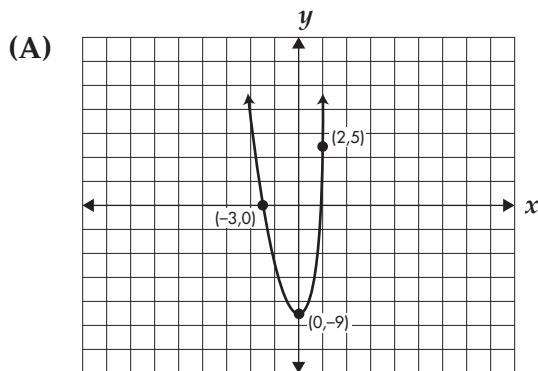
- (F)  $(60, -45)$   
 (G)  $(70, -56)$   
 (H)  $(80, -62)$   
 (I)  $(90, -66)$
- 31 Which of the following is equivalent to  $\frac{n^{-1}c^5 + (n^2c)^4}{n^3c^4}$ ?
- (A)  $\frac{c}{n^2} + n^3$   
 (B)  $\frac{c}{n^2} + n^5$   
 (C)  $\frac{c}{n^4} + n^5$   
 (D)  $\frac{c}{n^4} + n^3$
- 32 What is the simplified form for  $(mp^2r^3)^3 \times (m^{-3}p^{-2}r^5)^{-4}$ ?
- (F)  $\frac{m^{10}p^{11}}{r^5}$   
 (G)  $\frac{m^{10}p^{11}}{r^{11}}$   
 (H)  $\frac{m^{15}p^{14}}{r^5}$   
 (I)  $\frac{m^{15}p^{14}}{r^{11}}$

- 33** For which one of the following sets are ALL its elements included in the solution set for the inequality  $-6 < 12 - 4x < 20$ ?
- (A)  $\{x \mid x \text{ is a positive integer less than } 7\}$   
(B)  $\{x \mid x = \{-1, 0, 1, 2, 3, 4\}\}$   
(C)  $\{x \mid x \text{ is a negative number greater than } -3\}$   
(D)  $\{x \mid x = \{-0.5, 1.5, 2.5, 3.5, 4.5\}\}$
- 34** What is the simplified form for  $(3\sqrt{18x})(\sqrt{32x}) - 4\sqrt{2x} + \sqrt{98x}$ ?
- (F)  $24x + 3\sqrt{2x}$   
(G)  $72x + 3\sqrt{2x}$   
(H)  $21\sqrt{2x}$   
(I)  $75\sqrt{2x}$
- 35** For which of the following does the simplified form contain a radical sign?
- (A)  $\frac{\sqrt{90x^7}}{\sqrt{10x}}$   
(B)  $\frac{\sqrt{80x^6}}{\sqrt{5x^4}}$   
(C)  $\frac{\sqrt{72x^4}}{\sqrt{6x}}$   
(D)  $\frac{\sqrt{75x^{10}}}{\sqrt{3x^2}}$
- 36** Given that 5 and  $-2$  are zeros of the equation  $x^2 + ax + c = 0$ , which of the following represent the values of  $a$  and  $c$ ?
- (F)  $a = -3$  and  $c = -10$   
(G)  $a = 3$  and  $c = 10$   
(H)  $a = 10$  and  $c = -3$   
(I)  $a = -10$  and  $c = 3$

- 37 A company that makes home heating systems finds that its profit equation is  $P = -8x^2 + 160x + 500$ , where  $x$  represents the number of heating systems sold and  $P$  is the profit in thousands of dollars. If the company made a profit of \$148,000 last year, how many heating systems did it sell?

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- 38 Suppose that the Universal set  $U$  consists of all prime numbers less than 40. Set  $R$  consists of prime factors of 60, and set  $S$  consists of prime factors of 275. How many elements are in neither  $R$  nor  $S$ ?
- (F) 8  
 (G) 7  
 (H) 6  
 (I) 5
- 39 Which of the following is the graph of  $y = 2x^2 + 3x - 9$ ? Note that each box = 2 units.



- 40** According to several studies, the suggested number of calories per day that a person needs is between 1,800 and 2,200, inclusive. If  $x$  represents the number of calories, which one of the following inequalities models the preceding sentence?

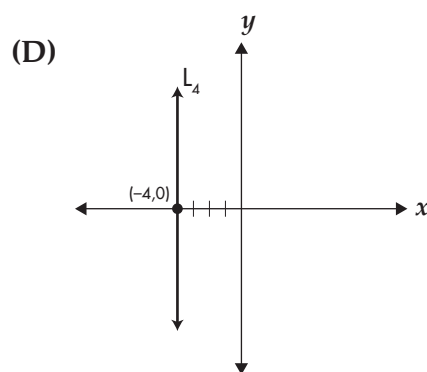
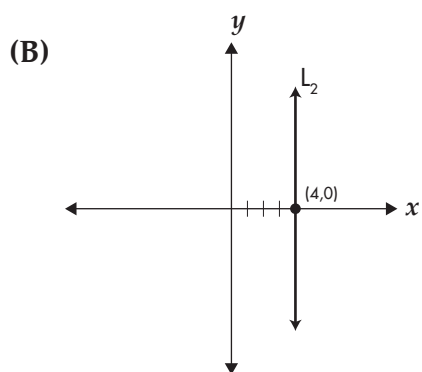
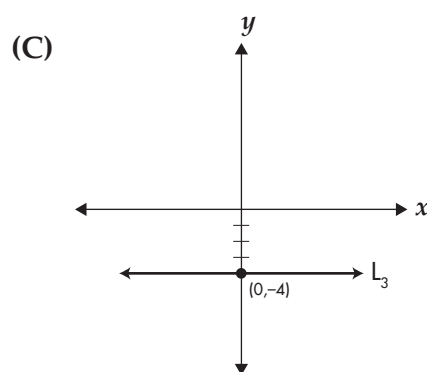
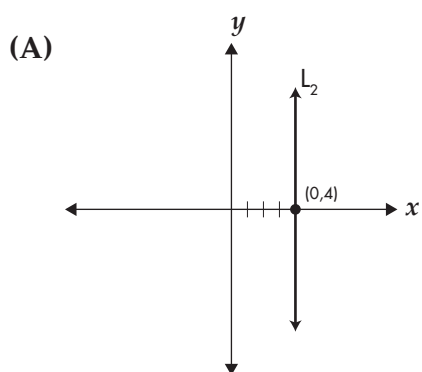
(F)  $-11,200 \leq 300 - 5x \leq -8,700$

(G)  $-6,100 \leq 500 - 3x \leq -4,900$

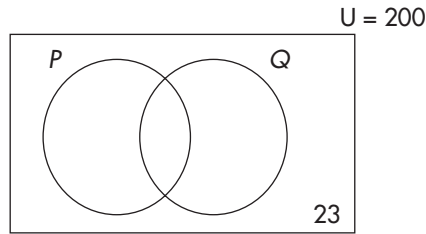
(H)  $-6,400 \leq 200 - 3x \leq -4,900$

(I)  $-11,100 \leq 400 - 5x \leq -8,350$

- 41** Which of the following represents a graph with a zero slope and a  $y$ -intercept of  $-4$ ?



- 42 Look at the following Venn diagram.



The Universal set has 200 elements and 23 of them do not belong to either set  $P$  or set  $Q$ . Set  $P$  has 75 elements and set  $Q$  has 110 elements. How many elements belong to exactly one of  $P$  and  $Q$ ?

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- 43 In simplifying  $(2x - 3y)(x + 7) - (x - 5y)(3x - 5)$ , which of the following will NOT be a final term?

- (A)  $-18xy$   
 (B)  $-x^2$   
 (C)  $-46y$   
 (D)  $19x$

- 44 What is the reduced form of the fraction  $\frac{8x^3 - 20x^2 - 48x}{8x^3 - 18x}$ ?

- (F)  $\frac{2x-8}{2x-3}$   
 (G)  $\frac{x-8}{x-3}$   
 (H)  $\frac{x-4}{2x+3}$   
 (I)  $\frac{2x}{2x+3}$

- 45** Jerry has joined a roller skating club for which he pays dues of \$75 each month, plus a daily rate of \$10 for each day that he uses the club's skating rink. The function shown below can be used to determine the cost in dollars per month for being a member of this club.

$$f(d) = 75 + 10d, \text{ where } d \text{ is the number of days.}$$

Jerry spent \$155 in January, \$195 in February, and \$225 in March. If he spent a total of \$850 for the months of January, February, March, and April, what was the total number of days that he spent at the club for those four months?

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- 46** At the Jolly World Entertainment Center, the cost of four children and three adults is \$15.00. The cost of four children and two senior citizens is \$10.00. The cost of one adult and one senior citizen is \$5.00. In dollars and cents, what is the cost of three children, five adults, and six senior citizens?

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- 47** A function is defined as follows:  $f(x) = \begin{cases} x^2 + 5, & \text{if } 0 < x \leq 5 \\ 2x - 5, & \text{if } x > 5 \end{cases}$ . What is the value of  $f(4) - f(6) + f(8)$ ?

- (A) 31  
(B) 25  
(C) 19  
(D) 13

- 48** What is the product of  $5x - 4$  and  $x + 2$  subtracted by one half of  $4x^2 - 10$ ?

- (F)  $x^2 - 6x - 18$   
(G)  $x^2 + 6x + 2$   
(H)  $3x^2 + 6x - 3$   
(I)  $3x^2 - 6x - 13$

- 49** A 40-gallon solution of acid and water contains 15% acid. How many gallons of water must be removed in order to increase the amount of acid to 20%?
- (A) 10  
 (B) 8  
 (C) 5  
 (D) 4

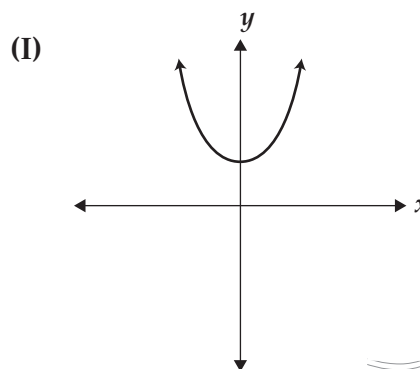
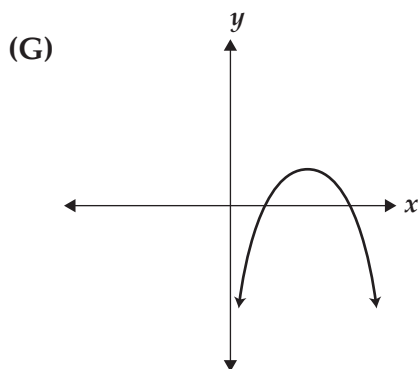
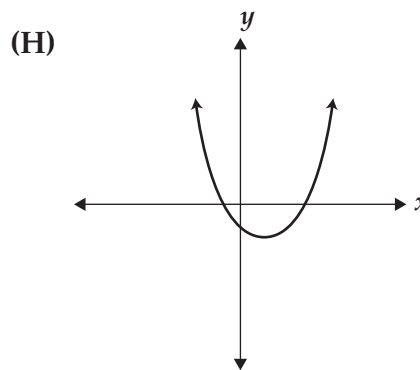
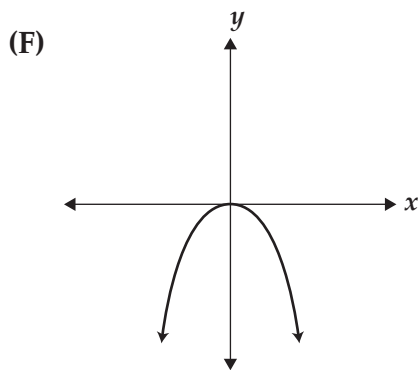
- 50**  $\sqrt{1280} + \sqrt{245}$  can be expressed in simplest form as  $m\sqrt{n}$ ? What is the value of  $mn$ ?

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- 51** Given that the relation  $\{(21, 10), (15, 8), (9, 12), (x, 18)\}$  is NOT a function, what is the MINIMUM value of the sum of the elements in the domain?

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- 52** Which of the following represents the graph of  $y = Ax^2 + Bx + C$ , for which  $B^2 < 4AC$ ?



- 53 The lines  $L_1$  and  $L_2$  are perpendicular to each other. The equation of line  $L_1$  is  $y = \frac{4}{3}x - 1$ . If line  $L_2$  contains the point  $(14, -5)$ , what is the  $y$ -intercept of  $L_2$ ?

- (A)  $(0, 4.5)$   
 (B)  $(0, 5.5)$   
 (C)  $(0, 6.5)$   
 (D)  $(0, 7.5)$

- 54 What is the product of the values of  $x$  that satisfy the following proportion?

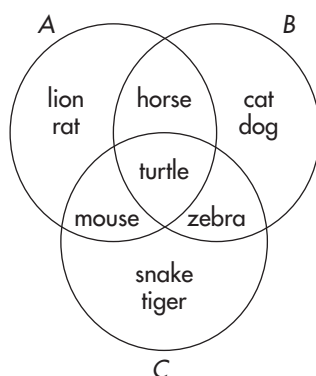
$$\frac{2x-3}{6} = \frac{2x+11}{x-2}$$

- (F)  $-36$   
 (G)  $-30$   
 (H)  $-24$   
 (I)  $-12$

- 55 Consider the function  $y = -x^2 + 3x - 2$ . What is the maximum  $y$  value?

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- 56 Look at the Venn diagram shown below of sets  $A$ ,  $B$ , and  $C$ . The Universal set  $U = \{\text{cat, dog, horse, lion, mouse, rat, snake, tiger, turtle, zebra}\}$



Which of the following is equivalent to  $\{\text{mouse, snake, tiger}\}$ ?

- (F)  $A - C$   
 (G)  $C - B$   
 (H)  $A \cap C$   
 (I)  $A \cap B \cap C$



- 57 Mr. Jung writes the following table of  $x$  and  $y$  values on the chalkboard. He tells his students that  $y$  is a linear function of  $x$ .

$x$	$y$
0	7
2	10
8	$p$
$q$	28

Which of the following statements is correct?

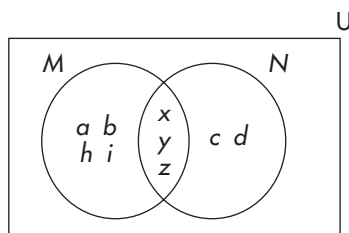
- (A) The sum of  $p$  and  $q$  is 30.  
(B) The product of  $p$  and  $q$  is 80.  
(B) The quotient of  $p$  and  $q$  is 15.  
(C) The difference of  $p$  and  $q$  is 5.
- 58 Joe and Johanna are owners of taxi companies. Let  $C$  represent the cost in dollars and cents and let  $x$  represent the number of miles of travel. Here are the equations for each of these companies.

$$\text{Joe: } C = 0.50x + 6. \quad \text{Johanna: } C = 0.30x + 10.50$$

What is the number of miles for which the cost is the same for both companies?

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- 59 Look at the following Venn diagram.



The Universal set  $U$  consists of all 26 letters of the alphabet. The elements  $a$ ,  $b$ ,  $h$ , and  $i$  belong to set  $M$  but not to set  $N$ . Likewise, the elements  $c$  and  $d$  belong to set  $N$  but not to set  $M$ . The elements that do not lie in either  $M$  or  $N$  are not shown.

Which of the following is a subset of  $\sim M$ ?

- (A)  $\{c, d, i, z\}$   
 (B)  $\{c, d, x, y, z\}$   
 (C)  $\{c, d, 1, 2\}$   
 (D)  $\{c, d, e, u, v\}$
- 60 Sally has a collection of nickels, dimes and quarters. She has five more dimes than nickels and twice as many quarters as dimes. The total value of her collection is \$10.80. How many coins does she have?

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- 61 Given the equation  $2d - 5\sqrt{e} - 1 = 0$ , which of the following is the correct expression for  $e$ ?
- (A)  $\frac{4d^2 + 1}{25}$   
 (B)  $\frac{4d^2 - 4d + 1}{25}$   
 (C)  $\sqrt{\frac{2d - 1}{5}}$   
 (D)  $\sqrt{\frac{5}{2d - 1}}$

- 62** Kenny had three more than twice as many coins as Marlene. After he gave her 27 of his coins, Marlene then had nine fewer coins than Kenny. How many coins did Kenny originally have?

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- 63** What is the value of  $y$  in the system of equations shown below?

$$\begin{cases} 3x - 2y = 30 \\ 2x - 5y = 53 \end{cases}$$

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- 64** Which of the following has zeros of  $-1$  and  $6$ ?

(F)  $x^2 - 5x + 6 = 0$

(G)  $x^2 - 5x - 6 = 0$

(H)  $x^2 + 5x + 6 = 0$

(I)  $x^2 + 5x - 6 = 0$

- 65** To the nearest hundredth, what is the larger of the two solutions to the following equation?

$$2x^2 - 11x + 8 = 0$$

(A) 0.86

(B) 2.12

(C) 3.38

(D) 4.64



*Answers*  
*for*  
*Practice Test*

**2**

## PRACTICE TEST 2

### FLORIDA ALGEBRA 1 END OF COURSE

Question Number	Benchmark	Answer
1	MA.912.D.7.1	58
2	MA.912.A.6.2	578
3	MA.912.A.4.2	B
4	MA.912.A.5.4	222
5	MA.912.A.4.3	D
6	MA.912.D.7.1	H
7	MA.912.A.3.9	13
8	MA.912.A.4.1	120
9	MA.912.A.3.1	A
10	MA.912.A.3.11	G
11	MA.912.A.3.11	6.3
12	MA.912.A.3.9	I
13	MA.912.A.4.2	C
14	MA.912.A.3.5	12.30
15	MA.912.A.3.4	A
16	MA.912.A.5.4	270
17	MA.912.A.3.9	-5
18	MA.912.A.2.3	7.2
19	MA.912.A.3.9	D
20	MA.912.A.3.8	F
21	MA.912.A.3.3	B
22	MA.912.A.2.3	I
23	MA.912.A.4.1	234
24	MA.912.A.3.4	G
25	MA.912.A.2.4	2,016
26	MA.912.A.5.4	G
27	MA.912.A.3.9	B
28	MA.912.A.3.1	37.5
29	MA.912.A.3.5	C
30	MA.912.A.3.10	H
31	MA.912.A.4.1	C
32	MA.912.A.4.1	I
33	MA.912.A.3.4	B

Question Number	Benchmark	Answer
34	MA.912.A.6.2	G
35	MA.912.A.6.2	C
36	MA.912.A.4.3	F
37	MA.912.A.7.2	22
38	MA.912.D.7.1	F
39	MA.912.A.7.1	A
40	MA.912.A.3.5	G
41	MA.912.A.3.8	C
42	MA.912.D.7.2	169
43	MA.912.A.4.2	A
44	MA.912.A.4.3	F
45	MA.912.A.2.3	55
46	MA.912.A.3.14	\$31.50
47	MA.912.A.2.3	B
48	MA.912.A.4.2	H
49	MA.912.A.3.5	A
50	MA.912.A.6.2	115
51	MA.912.A.2.4	54
52	MA.912.A.7.1	I
53	MA.912.A.3.10	B
54	MA.912.A.5.4	G
55	MA.912.A.2.3	0.25
56	MA.912.D.7.2	G
57	MA.912.A.2.3	D
58	MA.912.A.3.5	22.5
59	MA.912.D.7.2	D
60	MA.912.A.3.5	63
61	MA.912.A.3.3	B
62	MA.912.A.3.5	123
63	MA.912.A.3.14	-9
64	MA.912.A.7.2	G
65	MA.912.A.7.2	D

- 1** The correct answer is 58. The Cartesian product contains 85 elements, so the number of elements in each of  $P$  and  $Q$  can either be 1 and 85 or 5 and 17. Since each of  $P$  and  $Q$  contains more than one element, the only possible combination is 5 and 17. (It does not matter which of  $P$  and  $Q$  has either number.) We are given that  $P$  and  $Q$  are disjoint, so there are no common elements. Therefore, the number of elements that belong to neither  $P$  nor  $Q$  is  $80 - 5 - 17 = 58$ .
- 2** The correct answer is 578.  $\sqrt{98} = \sqrt{49} \times \sqrt{2} = 7\sqrt{2}$  and  $\sqrt{200} = \sqrt{100} \times \sqrt{2} = 10\sqrt{2}$ . Thus,  $7\sqrt{2} + 10\sqrt{2} = 17\sqrt{2} = \sqrt{289} \times \sqrt{2} = \sqrt{578}$ .
- 3** (B)  
Each side of the square is  $\frac{4x+8}{4} = x+2$ . Thus, the area is  $(x+2)^2 = x^2 + 4x + 4$ .
- 4** The correct answer is 222. Let  $x$  represent the expected number of defective blouses in a sample of 225. Then  $\frac{12}{900} = \frac{x}{225}$ . Cross-multiply to get  $900x = 2,700$ . Then  $x = 3$ . Therefore, the number of blouses that do not have defects is  $225 - 3 = 222$ .
- 5** (D)  
Using Common Term factoring,  $3x^2 - 48x = 3x(x - 16)$ . Thus, besides 1 and  $3x^2 - 48x$ , the factors of  $3x^2 - 48x$  are 3,  $x$ ,  $3x$ ,  $x - 16$ ,  $3x - 48$ , and  $x^2 - 16x$ .
- 6** (H)  
Let  $x$  represent the number of elements in set  $T$ . The cardinality of any set  $X$  is denoted as  $n(X)$ . For any two given sets  $R$  and  $T$ ,  $n(R \cup T) = n(R) + n(T) - n(R \cap T)$ . By substitution,  $91 = 65 + x - 14$ . Then  $91 = 51 + x$ , so  $x = 40$ .
- 7** The correct answer is 13. The slope ( $m$ ) is given by the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . By substitution, the slope is  $\frac{5-9}{x-7} = \frac{-2}{3}$ . Cross-multiply to get  $-2x + 14 = (-4)(3) = -12$ . Now subtracting 14 from each side results in  $-2x = -26$ . Thus,  $x = \frac{-26}{-2} = 13$ .
- 8** The correct answer is 120.  $\frac{(c^3d^{-1}e^5)^{-2}}{c^{-9}d^{-6}e^{-20}} = \frac{c^{-6}d^2e^{-10}}{c^{-9}d^{-6}e^{-20}} = c^{-6-(-9)}d^{2-(-6)}e^{-10-(-20)} = c^3d^8e^{10}$ . We can write 8 as  $2^3$  and 10 as  $2 \times 5$ . Thus, the least common multiple of 3, 8, and 10 is  $2^3 \times 3 \times 5 = 120$ .

**9 (A)**

Using the Distributive Law of Multiplication over Addition, we can simplify the equation to  $\frac{3}{2}x - 21 - 2x - 2 = 2x$ . Then  $-23 = 2x + 2x - \frac{3}{2}x$ , which becomes  $-23 = \frac{5}{2}x$ .

Thus,  $x = (-23)\left(\frac{2}{5}\right) = -9.2$ .

**10 (G)** The general form of the linear equation is  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept. Two of the points on the graph of this line are  $(5, 34.5)$  and  $(4, 30)$ . The slope equals  $\frac{30 - 34.5}{4 - 5} = 4.5$ . Then  $y = 4.5x + b$ . Now substitute either point to solve for  $b$ . Using the point  $(4, 30)$ , we have  $30 = (4.5)(4) + b$ . So  $30 = 18 + b$ , which means that  $b = 12$ . Thus, the correct equation is  $y = 4.5x + 12$ .

**11** The correct answer is 6.3. Using the linear model derived from question #10, the projected number of hours for November is  $(4.5)(8) + 12 = 48$ . Then the mean number of hours per project for all six months equals  $\frac{34.5 + 30 + 43.5 + 57 + 39 + 48}{5 + 4 + 7 + 10 + 6 + 8} = \frac{252}{40} = 6.3$ .

**12 (I)**

Since line  $n$  is parallel to line  $m$ , their slopes must be equal. By substituting the point  $(-10, -11)$  into the slope formula, we find that the slope is  $\frac{-11 - (-1)}{-10 - (-4)} = \frac{-10}{-6} = \frac{5}{3}$ . For answer choices (F), (G), and (H), in conjunction the point  $(-4, -1)$ , the slopes would be  $\frac{3}{5}$ ,  $-\frac{3}{5}$ , and  $-\frac{5}{3}$ , respectively.

**13 (C)**

$(x - y)(2x + y) - y(x - 6y) = 2x^2 + xy - 2xy - y^2 - xy + 6y^2 = 2x^2 + (xy - 2xy - xy) + (-y^2 + 6y^2) = 2x^2 - 2xy + 5y^2$ .

**14** The correct answer is 12.30. For the \$120 item, the tax is  $5\% + 1.5\% = 6.5\%$ . For the \$90 item, the tax is 5%. Thus, the total tax for Steve's purchases is  $(\$120)(0.065) + (\$90)(0.05) = \$7.80 + \$4.50 = \$12.30$ .

**15 (A)**

Using the Distributive Law, the inequality becomes  $-42 + 6y < 2y + 10$ . Subtract  $2y$  from each side to get  $-42 + 4y < 10$ . Next, add 42 to each side to get  $4y < 52$ . Thus,  $y < 13$ .

- 16** The correct answer is 270. First note that  $\frac{12}{8} = \frac{18}{12} = \frac{22.5}{15} = \frac{30}{20} = \frac{3}{2}$ . This means that 3 pounds of meat are needed for every 2 guests. Let  $x$  represent the number of pounds of meat needed for 180 guests. Then  $\frac{3}{2} = \frac{x}{180}$ . Cross-multiply to get  $2x = 540$ . Thus,  $x = 270$ .
- 17** The correct answer is  $-5$ . Since the slope is  $-4$ , we can write the equation as  $y = -4x + b$ . ( $b$  is the  $y$ -intercept.) Then, substituting  $(-2, -12)$ , we get  $-12 = (-4)(-2) + b$ . So  $b = -12 - 8 = -20$ . To determine the  $x$ -value of the  $x$ -intercept, substitute zero for  $y$  in the equation  $y = -4x - 20$ . Thus,  $0 = -4x - 20$ , which means that  $x = -5$ .
- 18** The correct answer is 7.2.  $f(2) = 2^3 + (3)(2) - 7 = 8 + 6 - 7 = 7$ . Then  $h(x) = 5x - 29 = 7$ . Add 29 to each side to get  $5x = 36$ . Thus,  $x = 7.2$ .
- 19** (D)  
To determine the  $y$ -intercept, substitute  $x = 0$ . Answer choices (A) and (B) are wrong because  $(0, -8)$  is the  $y$ -intercept for each of them. Each of answer choices (C) and (D) does have the  $y$ -intercept  $(0, 8)$ . The  $x$ -intercept is found by substituting  $y = 0$ . For answer choice (C), the  $x$ -intercept is  $(10, 0)$ , which lies to the right of the origin. This means that answer choice (C) is wrong. The  $x$ -intercept for answer choice (D) is  $(-\frac{16}{3}, 0)$ , which does lie to the left of the origin.
- 20** (F)  
This line has a negative slope. With respect to points on this line, notice that for  $x = -2$ , the corresponding  $y$  value is less than 1. This implies that the slope is greater than  $-0.5$ . For example, assume that  $L_1$  contains the point  $(-2, 0.75)$ . Now use the fact that  $(0, 0)$  lies on  $L_1$ . Then the slope would be  $\frac{0.75 - 0}{-2 - 0} = -0.375$ , which is greater than  $-0.5$ . The slopes of  $L_2$ ,  $L_3$ , and  $L_4$  are a positive number, a negative number less than  $-0.5$ , and zero, respectively.
- 21** (B)  
First multiply the entire equation by 2 to get  $2V = 2W + 3XY$ . Subtracting  $2W$ , leads to  $2V - 2W = 3XY$ . The last step is to divide by  $3Y$ , so that  $\frac{2V - 2W}{3Y} = X$ .



**22 (I)**

For any function, each  $x$  value may correspond to only one  $y$  value. Thus, for the graph of any function, no two points may have the same  $x$ -coordinate. Since  $(8, -7)$  is a point on the graph, this means that  $(8, -3)$  cannot be a point on the graph.

**23** The correct answer is 234. The left side of the inequality can be written as  $2^{700}$  and the right side can be written as  $(2^3)^m = 2^{3m}$ . Then  $700 < 3m$ , which simplifies to  $m > 233.\bar{3}$ . Since  $m$  must be an integer, the minimum value would be 234.**24 (G)**

$|3 - 4x| < 6$  is equivalent to  $-6 < 3 - 4x < 6$ . Then  $-9 < -4x < 3$ , so its solution is  $-\frac{3}{4} < x < \frac{9}{4}$ . All the members of the inequality in answer choice (G) are contained in  $-\frac{3}{4} < x < \frac{9}{4}$ . Answer choice (F) is wrong because its upper bound of 3 exceeds  $\frac{9}{4}$ .

So, for example an  $x$  value of  $\frac{11}{4}$  belongs to choice (F) but not to  $-\frac{3}{4} < x < \frac{9}{4}$ . An  $x$  value such as  $-\frac{4}{5}$  belongs to each of answer choices (H) and (I) but does not belong to  $-\frac{3}{4} < x < \frac{9}{4}$ . So, (H) and (I) are wrong.

**25** The correct answer is 2,016. The range values are as follows:  $-2(2)^2 + 50 = 42$ ,  $-2(3)^2 + 50 = 32$ , and  $-2(4)^2 + 50 = 18$ . Using prime factorization,  $42 = 2 \times 3 \times 7$ ,  $32 = 2^5$ , and  $18 = 2 \times 3^2$ . Thus, the least common multiple is  $2^5 \times 3^2 \times 7 = 2016$ .**26 (G)**

Let  $w$  and  $d$  represent the width and depth, respectively, of the scale model. Then  $\frac{150}{100} = \frac{18}{w}$ . Reduce  $\frac{150}{100}$  to  $\frac{3}{2}$ , so that  $\frac{3}{2} = \frac{18}{w}$ . Cross-multiply to get  $3w = 36$ . So,  $w = 12$ . Similarly,  $\frac{150}{25} = \frac{18}{d}$ . We can reduce  $\frac{150}{25}$  to  $\frac{6}{1}$ . Then  $\frac{6}{1} = \frac{18}{d}$ , which leads to  $6d = 18$ . So,  $d = 3$ . Therefore, the sum of the length, width, and depth of the scale model is  $18 + 12 + 3 = 33$  inches.

**27 (B)**

The equation may be written as  $y = -5x + b$ , where  $b$  is the  $y$ -intercept. Substitute  $(6, 0)$  so that  $0 = -5(6) + b$ . Then  $b = 30$ . Now the equation becomes  $y = -5x + 30$ . Note that  $(4, 10)$  satisfies this equation because  $10 = -5(4) + 30$ . None of answer choices (A), (C), and (D) satisfy this equation.

**28**

The correct answer is 37.5. Let  $x$  represent the average speed in miles per hour of car B. Since car A traveled for 5 hours (1:00 PM to 6:00 PM), the distance traveled was  $(42)(5) = 210$  miles. Car B traveled for 4 hours, so its distance was  $4x$ . The two cars traveled in opposite directions, so  $210 + 4x = 360$ . Then  $4x = 150$ , which means that  $x = 37.5$  miles per hour.

**29 (C)**

Caitlin's profit in January was  $(30)(25) - 100 = \$650$ . Her profit in February was  $(30)(32) - 100 = \$860$ . In order that her profit for January, February, and March exceed \$2000, she must make a profit of at least  $\$2000 - \$650 - \$860 = \$490$  in March. Let  $x$  represent the number of paintings sold in March. Then  $30x - 100 \geq 490$ . This inequality becomes  $30x \geq 590$  so  $x \geq 19.\bar{6}$ . Since we must round up, she must sell at least 20 paintings.

**30 (H)**

Point A is located at  $(-4, 1)$  and point B is located at  $(0, -2)$ . Then the slope of the line is  $\frac{-2-1}{0-(-4)} = -\frac{3}{4}$ . The equation of this line becomes  $y = -\frac{3}{4}x - 2$ . By substitution, we find that  $-62 = -\frac{3}{4}(80) - 2$ . This implies that  $(80, -62)$  is a point on this line. Each of answer choices (F), (G), and (I) is wrong because  $-45 \neq -\frac{3}{4}(60) - 2$ ,  $-56 \neq -\frac{3}{4}(70) - 2$ , and  $-66 \neq -\frac{3}{4}(90) - 2$ .

**31 (C)**

$$\frac{n^{-1}c^5 + (n^2c)^4}{n^3c^4} = \frac{n^{-1}c^5}{n^3c^4} + \frac{n^8c^4}{n^3c^4} = \frac{c^{5-4}}{n^{1+3}} + n^{8-3}c^{4-4} = \frac{c}{n^4} + n^5. \text{ (Remember that } c^0 = 1.\text{)}$$

**32 (I)**

$$(mp^2r^3)^3 \times (m^{-3}p^{-2}r^5)^{-4} = (m^3p^6r^9)(m^{12}p^8r^{-20}) = m^{15}p^{14}r^{-11} = \frac{m^{15}p^{14}}{r^{11}}.$$

**33 (B)**

Given  $-6 < 12 - 4x < 20$ , subtract 12 from each part to get  $-18 < -4x < 8$ . Then divide each part by  $-4$  (and reverse the sense of the inequality) to get the solution of  $-2 < x < \frac{9}{2}$ . Each element of answer choice (B) is contained in  $-2 < x < \frac{9}{2}$ . Answer choice (A) is wrong because it contains 5 and 6. Answer choice (C) is wrong because numbers such as  $-2.5$  do not belong to  $-2 < x < \frac{9}{2}$ . Answer choice (D) is wrong because it contains 4.5, which is equal to  $\frac{9}{2}$ .

**34 (G)**

$$\begin{aligned}(3\sqrt{18x})(\sqrt{32x}) - 4\sqrt{2x} + \sqrt{98x} &= (3)(\sqrt{9})(\sqrt{2x})(\sqrt{16})(\sqrt{2x}) - 4\sqrt{2x} + (\sqrt{49})(\sqrt{2x}) \\ &= (3)(3)(4)(2x) - 4\sqrt{2x} + 7\sqrt{2x} = 72x + 3\sqrt{2x}.\end{aligned}$$

**35 (C)**

$\frac{\sqrt{72x^4}}{\sqrt{6x}} = \sqrt{36x^3} = (6)(\sqrt{x^2})(\sqrt{x}) = 6x\sqrt{x}$ , which still contains a radical sign. For answer choice (A),  $\frac{\sqrt{90x^7}}{\sqrt{10x}} = \sqrt{9x^6} = 3x^3$ . For answer choice (B),  $\frac{\sqrt{80x^6}}{\sqrt{5x^4}} = \sqrt{16x^2} = 4x$ . For answer choice (D),  $\frac{\sqrt{75x^{10}}}{\sqrt{3x^2}} = \sqrt{25x^8} = 5x^4$ .

**36 (F)**

Since 5 and  $-2$  are zeros of the equation  $x^2 + ax + c = 0$ , the factors must be  $(x - 5)$  and  $(x + 2)$ . So we can write  $(x - 5)(x + 2) = 0$ . We note that  $(x - 5)(x + 2) = x^2 - 5x + 2x - 10 = x^2 - 3x - 10$ . Thus,  $a = -3$  and  $c = -10$ .

**37** The correct answer is 22. Substituting 148 for  $P$ , we get  $148 = -8x^2 + 160x + 500$ , which becomes  $-8x^2 + 160x + 352 = 0$ . Dividing by  $-8$  leads to  $x^2 - 20x - 44 = 0$ . Then  $(x - 22)(x + 2) = 0$ . The two answers are 22 and  $-2$ , but we reject any negative answer.

**38 (F)**

The Universal set =  $\{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37\}$  Since  $60 = 2^2 \times 3 \times 5$ ,  $R = \{2, 3, 5\}$ . Since  $275 = 5^2 \times 11$ ,  $S = \{5, 11\}$ . Therefore, the set that does not contain any elements from  $R$  or  $S$  must contain the eight elements 7, 13, 17, 19, 23, 29, 31, and 37.

**39 (A)**

First note that when  $x = 0$ ,  $y = -9$ . This means that only answer choices (A) and (C) are possible. Assume that choice (C) is correct and substitute the point  $(4, 0)$ . We need to check if  $0 = 2(4)^2 + 3(4) - 9$ . However, the right side simplifies to  $(2)(16) + 12 - 9 = 35$ . This means that  $(4, 0)$  does not lie on the graph of  $y = 2x^2 + 3x - 9$ . Only answer choice (A) could be correct. We note that by substitution,  $2(-3)^2 + 3(-3) - 9 = (2)(9) - 9 - 9 = 0$  and  $2(2)^2 + 3(2) - 9 = (2)(4) + 6 - 9 = 5$ . Thus, both  $(-3, 0)$  and  $(2, 5)$  lie on the graph of  $y = 2x^2 + 3x - 9$ .

**40 (G)**

In order to solve  $-6,100 \leq 500 - 3x \leq -4,900$ , first subtract 500 from each part to get  $-6,600 \leq -3x \leq -5,400$ . The last step is to divide each part by  $-3$  and reverse the inequality symbols. Thus, the solution is  $1,800 \leq x \leq 2,200$ . The solutions to answer choices (F), (H), and (I) are  $1,800 \leq x \leq 2,300$ ,  $1,700 \leq x \leq 2,200$ , and  $1,750 \leq x \leq 2,300$ , respectively.

**41 (C)**

A horizontal line has a slope of zero, so this eliminates answer choices (B) and (D). Answer choice (A) is wrong because the line crosses the  $y$ -axis at  $(0, 4)$ . Note that the graph in answer choice (C) crosses the  $y$ -axis at  $(0, -4)$ .

**42** The correct answer is 169. Let  $x$  represent the number of elements that belong to both  $P$  and  $Q$ . Then  $75 - x$  represents the number of elements that belong only to  $P$ . Similarly,  $110 - x$  represents the number of elements that belong only to  $Q$ . So,  $(75 - x) + x + (110 - x) + 23 = 200$ . This equation simplifies to  $208 - x = 200$ . Solving, we get  $x = 8$ , which represents the number of elements in both  $P$  and  $Q$ . Thus, the number of elements that belong to exactly one of  $P$  and  $Q$  is  $200 - 23 - 8 = 169$ .

An alternative solution after finding that  $x = 8$  is as follows: The number of elements that belong to only  $P$  is  $75 - 8 = 67$ . Likewise, the number of elements that belong to only  $Q$  is  $110 - 8 = 102$ . Thus, the number of elements that belong to exactly one of  $P$  and  $Q$  is  $67 + 102 = 169$ .

**43 (A)**

$(2x - 3y)(x + 7) - (x - 5y)(3x - 5) = 2x^2 + 14x - 3xy - 21y - 3x^2 + 5x + 15xy - 25y = -x^2 + 19x + 12xy - 46y$ . Thus,  $-18xy$  is not a part of the final simplified result.

**44 (F)**

$\frac{8x^3 - 20x^2 - 48x}{8x^3 - 18x} = \frac{(4x)(2x^2 - 5x - 12)}{(2x)(4x^2 - 9)} = \frac{(4x)(2x+3)(x-4)}{(2x)(2x+3)(2x-3)} = \frac{(2)(x-4)}{2x-3}$ , which is equivalent to  $\frac{2x-8}{2x-3}$ . (Note that  $2x$  CANNOT be canceled from the numerator and denominator because it is not a factor of either binomial.)

**45**

The correct answer is 55. The dollar amount in April was  $\$850 - \$155 - \$195 - \$225 = \$275$ . The number of days for January can be found by solving the equation  $155 = 75 + 10d$ . Subtract 75 from each side to get  $80 = 10d$ . Then  $d = 8$ . In a similar manner, the number of days for each of February, March and April can be determined by solving the equations  $195 = 75 + 10d$ ,  $225 = 75 + 10d$ , and  $275 = 75 + 10d$ , respectively. We find that Jerry spent 12 days in February, 15 days in March, and 20 days in April. Thus, the total number of days spent at the club was  $8 + 12 + 15 + 20 = 55$ .

**46**

The correct answer is \$31.50. Let  $x$  = number of children,  $y$  = number of adults, and  $z$  = number of senior citizens. Then we can form three equations, namely:  $4x + 3y = 15$ ,  $4x + 2z = 10$ , and  $y + z = 5$ . Subtract the second equation from the first equation to get  $3y - 2z = 5$ . Next, double all terms of the third equation to get  $2y + 2z = 10$ . Adding this equation to  $3y - 2z = 5$  will result in  $5y = 15$ . So,  $y = 3$ , which is the cost per adult. Using the equation  $y + z = 5$ , we can easily find that  $z = 2$ , which is the cost per senior citizen. Use the first equation to find the value of  $x$ . Then  $4x + (3)(3) = 15$ , which simplifies to  $4x = 6$ . So  $x = 1.50$ . Thus, the cost of three children, five adults, and six senior citizens is  $(3)(\$1.50) + (5)(\$3) + (6)(\$2) = \$31.50$ .

**47****(B)**

$f(4) = 4^2 + 5 = 21$ ,  $f(6) = (2)(6) - 5 = 7$ , and  $f(8) = (2)(8) - 5 = 11$ . Then  $21 - 7 + 11 = 25$ .

**48****(H)**

$(5x - 4)(x + 2) = 5x^2 + 10x - 4x - 8 = 5x^2 + 6x - 8$ . One half of  $4x^2 - 10$  is  $2x^2 - 5$ . Then  $5x^2 + 6x - 8 - (2x^2 - 5) = 3x^2 + 6x - 3$ .

**49 (A)**

Let  $x$  represent the number of gallons of water that must be removed. The original 40-gallon solution contains  $(0.15)(40) = 6$  gallons of acid. When  $x$  gallons of water are removed, the resulting solution will contain  $40 - x$  gallons of both water and acid. Since no acid is being removed, there will still be 6 gallons of acid. Then  $\frac{6}{40-x} = 0.20$ . Multiply both sides by  $(40 - x)$  to get  $6 = (0.20)(40 - x) = 8 - 0.20x$ . Subtracting 8 from each side leads to  $-2 = -0.20x$ . Thus,  $x = \frac{-2}{-0.20} = 10$  gallons.

**50** The correct answer is 115. By using a factor tree, we can determine that  $128 = 2^8 \times 5$  and  $245 = 5 \times 7^2$ . So  $\sqrt{1280} + \sqrt{245} = \sqrt{2^8 \times 5} + \sqrt{5 \times 7^2} = 2^4\sqrt{5} + 7\sqrt{5} = 23\sqrt{5}$ . Therefore,  $mn = (23)(5) = 115$ .

**51** The correct answer is 54. In order that the relation not be a function, there must be at least two different ordered pairs in which the first element is repeated. The lowest given domain value is 9. Thus, if the fourth ordered pair is  $(9, 18)$ , then the sum of the domain values is  $21 + 15 + 9 + 9 = 54$ .

**52 (I)**

$B^2 < 4AC$  is equivalent to  $B^2 - 4AC < 0$ . The quantity  $B^2 - 4AC$  is called the discriminant of the quadratic formula used to determine the solutions to  $0 = Ax^2 + Bx + C$ . Whenever the discriminant is less than zero, both solutions must be complex. This implies that the graph of  $y = Ax^2 + Bx + C$  does not intersect the  $x$ -axis, as shown in answer choice (I).

**53 (B)**

The slope of  $L_2$  must be the negative reciprocal of the slope of  $L_1$ . So the slope of  $L_2$  must be  $-\frac{3}{4}$ . The equation of  $L_2$  must be of the form  $y = -\frac{3}{4}x + b$ , where  $b$  is the  $y$ -intercept. Now substituting the point  $(14, -5)$ , we get  $-5 = \left(-\frac{3}{4}\right)(14) + b$ . Then  $-5 = -10.5 + b$ , which means that  $b = 5.5$ . The  $y$ -intercept is therefore  $(0, 5.5)$ .

**54 (G)**

Using cross-multiplication for the given proportion, we have  $(2x - 3)(x - 2) = 6(2x + 11)$ . This equation becomes  $2x^2 - 7x + 6 = 12x + 66$ , which simplifies to  $2x^2 - 19x - 60 = 0$ . For any quadratic equation of the form  $ax^2 + bx + c = 0$ , the product of the roots is given by the quantity  $\frac{c}{a}$ . Thus, for  $2x^2 - 19x - 60 = 0$ , the product of the roots is  $\frac{-60}{2} = -30$ . Note that an alternative solution, following  $2x^2 - 19x - 60 = 0$ , is to use factoring on the left side of this equation. Then  $(2x + 5)(x - 12) = 0$ , from which we get the values of  $-\frac{5}{2}$  and 12. Thus, the product is  $\left(-\frac{5}{2}\right)(12) = -30$ .

**55** The correct answer is 0.25. Since the coefficient of  $x^2$  is negative, the graph has a maximum  $y$  value at its vertex. The  $x$ -value of the vertex of any function in the form  $y = ax^2 + bx + c$  is given by the quotient  $-\frac{b}{2a}$ . For our current function, this  $x$  value is  $-\frac{3}{(2)(-1)} = \frac{3}{2}$ . Thus, the corresponding  $y$  value is  $-\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) - 2 = -\frac{9}{4} + \frac{9}{2} - 2 = \frac{1}{4}$ , which is equivalent to 0.25.

**56 (G)**

Note that  $C - B$  means the set of all elements in  $C$  that do not exist in  $B$ . This is equivalent to listing all elements of  $C$ , then subtracting out those elements common to both  $B$  and  $C$ . Now  $C = \{\text{mouse, snake, tiger, turtle, zebra}\}$  and the elements common to  $B$  and  $C$  are turtle and zebra. Thus,  $C - B = \{\text{mouse, snake, tiger}\}$ . Answer choice (F) is wrong because its elements are lion, rat, and horse. Answer choice (H) is wrong because its elements are mouse and turtle. Answer choice (I) is wrong because its only element is turtle.

**57 (D)**

Let the graph of the line be represented by  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept. Since  $(0, 7)$  is a point on this line, we know that  $b = 7$ . We can substitute the point  $(2, 10)$  to find  $m$ . Then  $10 = (m)(2) + 7$ , which simplifies to  $3 = 2m$ . This means that  $m = 1.5$ , so the equation of this line is  $y = 1.5x + 7$ . To find the value of  $p$ , substitute  $x = 8$ . Then  $p = (1.5)(8) + 7 = 19$ . To find the value of  $q$ , substitute  $y = 28$ . Then  $28 = 1.5q + 7$ . This equation simplifies to  $21 = 1.5q$ . So  $q = \frac{21}{1.5} = 14$ . Finally, we note that the difference of  $p$  and  $q$  is 5.

- 58** The correct answer is 22.5. We need to solve the equation  $0.50x + 6 = 0.30x + 10.50$ . Subtract 6 from each side to get  $0.50x = 0.30x + 4.50$ . Next, subtract  $0.30x$  from each side to get  $0.20x = 4.50$ . Thus,  $x = \frac{4.50}{0.20} = 22.5$  miles. (Note that for 22.5 miles, the cost for each company is \$17.25).
- 59 (D)**  
The set  $\sim M$  consists of all elements that do not belong to  $M$ . This includes  $c$ ,  $d$ , and all elements that are not listed in either  $M$  or  $N$ . Each element in answer choice (D) is either  $c$ ,  $d$ , or an element outside of  $M$  and  $N$ , (but within  $U$ ). Answer choice (A) is wrong because it contains the elements  $i$  and  $z$ . Answer Choice (B) is wrong because it contains the elements  $x$ ,  $y$ , and  $z$ . Answer choice (C) is wrong because the elements 1 and 2 do not belong to the Universal set.
- 60** The correct answer is 63. Let  $x =$  number of nickels,  $x + 5 =$  number of dimes, and  $2(x + 5) = 2x + 10 =$  number of quarters. The value of each of her nickels, dimes, and quarters is  $0.05x$ ,  $(0.10)(x + 5)$ , and  $(0.25)(2x + 10)$ , respectively. Then  $0.05x + 0.10(x + 5) + (0.25)(2x + 10) = 10.80$ , which becomes  $0.05x + 0.10x + 0.50 + 0.50x + 2.50 = 10.80$ . This equation simplifies to  $0.65x + 3.00 = 10.80$ . Then  $0.65x = 7.80$ , so  $x = 12$ , the number of nickels. So Sally must also have  $12 + 5 = 17$  dimes and  $(2)(17) = 34$  quarters. Therefore, Sally has a total of  $12 + 17 + 34 = 63$  coins.
- 61 (B)**  
Rewrite the given equation by adding  $5\sqrt{e}$  to each side to get  $2d - 1 = 5\sqrt{e}$ . Now divide both sides by 5, which results in  $\frac{2d - 1}{5} = \sqrt{e}$ . Finally, square both sides so that a  
$$e = \left(\frac{2d - 1}{5}\right)^2 = \frac{4d^2 - 4d + 1}{25}.$$
- 62** The correct answer is 123. Let  $n =$  number of coins Marlene originally had and let  $2n + 3 =$  number of coins Kenny originally had. After Kenny gave Marlene 27 coins, he had  $2n + 3 - 27 = 2n - 24$ , and she had  $n + 27$ . Since she still had nine fewer coins, we can write  $2n - 24 = n + 27 + 9$ . Subtracting  $n$  from each side leads to  $n - 24 = 27 + 9$ . So  $n = 27 + 9 + 24 = 60$ . Thus, the number of coins that Kenny originally had was  $(2)(60) + 3 = 123$ .



- 63** The correct answer is  $-9$ . Multiply the first equation by 2 and the second equation by  $-3$ . The result is the following set of equations:

$$\begin{cases} 6x - 4y = 60 \\ -6x + 15y = -159 \end{cases}$$

Adding these equations yields  $11y = -99$ . Thus,  $y = -9$ .

- 64** (G)

Factoring the left side of the equation, we get  $(x + 1)(x - 6) = 0$ . So  $x + 1 = 0$  or  $x - 6 = 0$ . Thus, the solutions (zeros) are  $-1$  and  $6$ . Answer choice (F) is wrong because its zeros are  $2$  and  $3$ . Answer choice (H) is wrong because its zeros are  $-2$  and  $-3$ . Answer choice (I) is wrong because its zeros are  $1$  and  $-6$ .

- 65** (D)

Using the Quadratic equation, the solutions are given by  $\frac{-(-11) \pm \sqrt{(-11)^2 - (4)(2)(8)}}{(2)(2)} = \frac{11 \pm \sqrt{121 - 64}}{4} = \frac{11 \pm \sqrt{57}}{4} \approx \frac{11 \pm 7.55}{4} \approx 0.86$  and  $4.64$ . The larger solution is  $4.64$ .