1. This year, a salesman sells a total of $60,000 worth of steak knives by going door-to-door. This represents a 20% increase from the year before. What was the value of his sales last year?

A. $45,000
B. $48,000
C. $50,000
D. $52,500
E. $56,000

2. Solve the equation for *x*.

$$\frac{x}{2x+3} = \frac{3}{7}$$

A. −3

B. 2

C. 3

D. $\frac{9}{4}$

E. 9

3. Solve the equation for *y*.

$3(2y + 4) = 8y$

A. −8
B. −6
C. −2
D. 2
E. 6

4. Solve the equation for *x*.

$|x + 5| = 3$

A. -8
B. -3
C. -2
D. -8 and -3
E. -8 and -2

5. If $3x + 8x + 4x = 6x + 63$, then what is $5x + 23$?

A. 28
B. 35
C. 38
D. 58
E. 62

6. What is the reciprocal of -3?

A. −3

B. $-\dfrac{1}{3}$

C. $\dfrac{1}{3}$

D. 3

E. undefined

7. If the positive square root of x is between 3 and 11, then what inequality represents all possible values of x?

A. $3 < x < 11$
B. $9 < x < 11$
C. $9 < x < 121$
D. $x < 3$ or $x < 11$
E. $x < 9$ or $x < 121$

8. Carol is three times older than Andrew. Brad is two years older than Andrew. In six years, the sum of Andrew's and Brad's ages will be the same as Carol's age. How old is Carol?

A. 24 years old
B. 27 years old
C. 30 years old
D. 36 years old
E. 42 years old

9. A cab ride costs $3.25 for the first half-mile and $0.70 for each mile after the first half-mile. How far can someone travel for $12?

A. 9 miles
B. 13 miles
C. 14 miles

D. 26 miles

E. 27 miles

10. Solve the equation for *x*.

$13 - 2(2x + 1) = 1$

A. $-\dfrac{7}{2}$

B. $-\dfrac{5}{2}$

C. $\dfrac{9}{4}$

D. $\dfrac{5}{2}$

E. $\dfrac{7}{2}$

Answer Key

1. C. Let *x* represent the total value of last year's sales, Set up an equation and solve it for *x*. Since the salesman's sales increased by 20% since last year's, his current sales 120% of *x*, or 1.2*x*. So,

$1.2x = 60,000$

Solve the equation for *x* by dividing both sides by 1.2.

$x = 50,000$

Therefore, the salesman sold $50,000 worth of steak knives last year.

2. E. This equation is a proportion, so it can be solved by cross-multiplication. Form a new equation by multiplying the numerator of each fraction by the denominator of the fraction on the other side. Then, simplify the result and solve for *x*.

$7x = 3(2x + 3)$
$7x = 6x + 9$
  $x = 9$

3. E. To begin, simplify the right side of the equation by distributing the 3.

$3(2y + 4) = 8y$

$6y + 12 = 8y$

Then, solve the equation by isolating the variable and dividing both sides by the coefficient.

$12 = 2y$

$y = 6$

4. E. This equation involves an absolute value function. The absolute value of a number is its distance from zero on a number line. Since distances are never negative, the absolute value of a number is always positive (or equal to zero). In order to make the equation true, the expression inside the absolute value, $x + 5$, can equal either -3 or 3 since the absolute value of both values is 3. Write two equations and solve each.

$x + 5 = -3$ $x + 5 = 3$

$x = -8$ $x = -2$

5. D. To begin, solve the given equation for x.

$3x + 8x + 4x = 6x + 63$

$15x = 6x + 63$

$9x = 63$

$x = 7$

Next, substitute 7 for x in the expression $5x + 23$ and simplify the result.

$5(7) + 23 = 35 + 23 = 58$

6. B. The product of a number and its reciprocal, or multiplicative inverse, is 1. For a fraction, the reciprocal can be found by inverting (or switching) the numerator and denominator. Since -3 can be written as $-\dfrac{3}{1}$, its reciprocal is $-\dfrac{1}{3}$.

7. C. Since the square root of x is between 3 and 11, we know that the inequality $3 < \sqrt{x} < 11$ is true. To find the value of x, square each part of the inequality. The result is the inequality $9 < x < 121$.

8. A. Write each piece of information as an equation using the variables A, B, and C for the current ages of Andrew, Brad, and Carol, respectively.

$C = 3A$

$B = A + 2$

$(A + 6) + (B + 6) = C + 6$

This is a system of equations. Since the first two equations are already solved for C and B, substitute the expressions on the right side into the third equation. Then, solve for A.

$$(A + 6) + (B + 6) = C + 6$$
$$(A + 6) + [(A + 2) + 6) = (3A) + 6$$
$$2A + 14 = 3A + 6$$
$$A = 8$$

Therefore, Andrew is 8 years old. To find Carol's age, multiply Andrew's age by three. Thus, Carol is currently 24 years old.

9. B. To begin, write an equation relating the cost C to the distance D. If one travels more than half a mile, the cost is \$3.25 plus the \$0.70 times the distance in miles, excluding the first half-mile. Because the first half-mile is excluded, ½, or 0.5 must be subtracted from the distance when multiplying by 0.70.

$C = 3.25 + 0.70(D - 0.5)$

To find how far someone can travel with \$12, substitute 12 for C and solve for D.

$12 = 3.25 + 0.70(D - 0.5)$
$12 = 3.25 + 0.7D - 0.35$
$9.1 = 0.7D$
$D = 13$

Therefore, someone can travel 13 miles on \$12.

10. D. First, simplify the left side of the equation.

$13 - 2(2x + 1) = 1$
$13 - 4x - 2 = 1$
$-4x + 11 = 1$

Then, isolate the variable and solve for x.

$-4x = -10$
$x = \dfrac{5}{2}$