Name: _____

Concept and Vocabulary Check:

1. A letter that represents a variety of different numbers is called a/an _____.

2. A combination of numbers, letters that represent numbers, and operation symbols is called an algebraic _____.

3. By replacing x with 60 in $2.5x$, we are _____ 60 for x. The process of finding $2.5 \cdot 60$ is called _____ $2.5x$ for $x = 60$.

5. A statement that expresses a relationship between two or more variables, such as $T = 0.3x + 40$, is called a/an _____. The process of finding such statements to describe real-world phenomena is called mathematical _____. Such statements, together with the meaning assigned to the variables, are called mathematical _____.

Practice Exercises:

In exercises 1 - 13 odd, evaluate each expression for $x = 4$.

1. $x + 8$

9. $5 + 3x$

3. $12 - x$

11. $2(x + 5)$

5. $5x$

13. $\frac{12x - 8}{2x}$

7. $\frac{28}{x}$

In exercises 15 - 23 odd, evaluate each expression for $x = 7$ and $y = 5$.

15. $2x + y$

21. $\frac{21}{x} + \frac{35}{y}$

17. $2(x + y)$

23. $\frac{2x - y + 6}{2y - x}$

19. $4x - 3y$

In exercises 25-41 odd, write each English phrase as an algebraic expression. Let the variable x represent the number.

25. four more than a number

31. nine subtracted from a number

27. four less than a number

33. nine decreased by a number

29. the sum of a number and 4

35. three times a number, decreased by 5

37. one less than the product of 12 and a number

41. six more than the quotient of a number and 30

39. the sum of 10 divided by a number and that number divided by 10

In exercises 43 - 57 odd, determine whether the given number is a solution of the equation.

43. $x + 14 = 20$; 6

51. $4m + 3 = 23$; 6

45. $30 - y = 10$; 20

53. $5a - 4 = 2a + 5$; 3

47. $4z = 20$; 10

55. $6(p - 4) = 3p$; 8

49. $\frac{r}{6} = 8$; 48

57. $2(w + 1) = 3(w - 1)$; 7

In exercises 59 - 73 odd, write each sentence as an equation. Let the variable x represent the number.

59. Four times a number is 28.

61. The quotient of 14 and a number is $\frac{1}{2}$.

63. The difference between 20 and a number is 5.

65. The sum of twice a number and 6 is 16.

67. Five less than 3 times a number gives 7.

69. The product of 4 and a number, increased by 5, is 33.

71. The product of 4 and a number increased by 5 is 33.

73. Five times a number is equal to 24 decreased by the number.

Applications:

The bar graph shown on page 12 shows the average price of a movie ticket for selected years from 1980 through 2010. The mathematical model

$$T = 0.15n + 2.72$$

estimates the data displayed by the bar graph, where n is the number of years after 1980 and T is the average movie ticket price.

83. a. Use the formula to find the average ticket price 10 years after 1980, or in 1990. Does the mathematical model underestimate or overestimate the average ticket price shown by the bar graph for 1990? By how much?

  b. Does the mathematical model underestimate or overestimate the average ticket price shown by the bar graph for 2010? By how much?

Among the 2691 American adults surveyed by the Pew Research Center in 2010, 39% said marriage is optional and becoming obsolete, up from 28% who responded to the same survey in 1978. The bar graph on page 12 shows the percentage of Americans for four selected ages who say that marriage is obsolete. The mathematical model

$$p = 52 - 0.3a$$

approximates the data displayed by the bar graph, where p is the percentage of adults of age a who say that marriage is obsolete.

85. Does the mathematical model underestimate or overestimate the percentage of 24-year-olds who say that marriage is obsolete? By how much?

Supplemental Question:

1. What is the definition of a solution to an equation.