

Standardized Test Practice

27. If $2x + y = 5$, what is the value of $4x$?

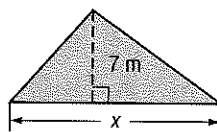
- A $10 - y$
- B $10 - 2y$
- C $\frac{5 - y}{2}$
- D $\frac{10 - y}{2}$

28. Which expression is equivalent to $7x^2 3x^{-4}$?

- F $21x^{-8}$
- G $21x^2$
- H $21x^{-6}$
- J $21x^{-2}$

29. **GEOMETRY** What is the base of the triangle if the area is 56 square meters?

- A 4 m
- B 8 m
- C 16 m
- D 28 m



30. **SHORT RESPONSE** Brianne makes blankets for a baby store. She works on the blankets 30 hours per week. The store pays her \$9.50 per hour plus 30% of the profit. If her hourly rate is increased by \$0.75 and her commission is raised to 40%, how much will she earn for a week in which there was a \$300 profit?

Spiral Review

Solve each equation or formula for x . (Lesson 2-8)

31. $2bx - b = -5$

32. $3x - r = r(-3 + x)$

33. $A = 2\pi r^2 + 2\pi r x$

34. **SKIING** Yuji is registering for ski camp. The cost of the camp is \$1254, but there is a sales tax of 7%. What is the total cost of the camp including tax? (Lesson 2-7)

Translate each equation into a sentence. (Lesson 2-1)

35. $\frac{n}{-6} = 2n + 1$

36. $18 - 5h = 13h$

37. $2x^2 + 3 = 21$

Refer to the graph.

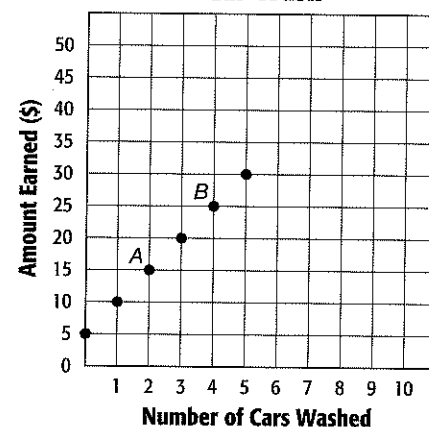
38. Name the ordered pair at point A and explain what it represents. (Lesson 1-6)

39. Name the ordered pair at point B and explain what it represents. (Lesson 1-6)

40. Identify the independent and dependent variables for the function. (Lesson 1-6)

41. **BASEBALL** Tickets to a baseball game cost \$18.95, \$12.95, or \$9.95. A hot dog and soda combo costs \$5.50. The Madison family is having a reunion. They buy 10 tickets in each price category and plan to buy 30 combos. What is the total cost for the tickets and meals? (Lesson 1-4)

**Touchdown Club
Car Wash**



Skills Review

Solve each equation.

42. $a - 8 = 15$

43. $9m - 11 = -29$

44. $18 - 2k = 24$

45. $5 - 8y = 61$

46. $7 = \frac{h}{2} + 3$

47. $\frac{n}{6} + 1 = 5$

2 Study Guide and Review

Study Guide

Key Concepts

Writing Equations (Lesson 2-1)

- Identify the unknown you are looking for and assign a variable to it. Then, write the sentence as an equation.

Solving Equations (Lessons 2-2 to 2-4)

- Addition and Subtraction Properties of Equality:** If an equation is true and the same number is added to or subtracted from each side, the resulting equation is true.
- Multiplication and Division Properties of Equality:** If an equation is true and each side is multiplied or divided by the same nonzero number, the resulting equation is true.
- Steps for Solving Equations:**

Step 1 Simplify the expression on each side. Use the Distributive Property as needed.

Step 2 Use the Addition and/or Subtraction Properties of Equality to get the variables on one side and the numbers without variables on the other side.

Step 3 Use the Multiplication or Division Property of Equality to solve.

Absolute Value Equations (Lesson 2-5)

- For any real numbers a and b , if $|a| = b$ and $b \geq 0$, then $a = b$ or $a = -b$.

Ratios and Proportions (Lesson 2-6)

- The Means-Extremes Property of Proportion states that in a proportion, the product of the extremes is equal to the product of the means.

Percent of Change (Lesson 2-7)

- percent of change = $\frac{\text{the change in an amount}}{\text{the original amount}}$ expressed as a percent

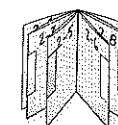
Weighted Averages (Lesson 2-9)

- the weighted average M of a set of data

$$= \frac{\text{sum of (units} \times \text{the value per unit)}}{\text{the total number of units}}$$

FOLDABLES Study Organizer

Be sure the Key Concepts are noted in your Foldable.



Key Vocabulary

consecutive integers (p. 92)	percent of decrease (p. 119)
dimensional analysis (p. 128)	percent of increase (p. 119)
equivalent equations (p. 83)	proportion (p. 111)
extremes (p. 112)	rate (p. 113)
formula (p. 76)	ratio (p. 111)
identity (p. 98)	scale (p. 114)
literal equation (p. 127)	scale model (p. 114)
means (p. 112)	solve an equation (p. 83)
multi-step equations (p. 91)	unit analysis (p. 128)
number theory (p. 92)	unit rate (p. 113)
percent of change (p. 119)	weighted average (p. 132)

Vocabulary Check

State whether each sentence is *true* or *false*. If *false*, replace the underlined term to make a true sentence.

- In order to write an equation to solve a problem, identify the unknown for which you are looking and assign a(n) number to it.
- To solve an equation means to find the value of the variable that makes the equation true.
- The numbers 10, 12, and 14 are an example of consecutive even integers.
- The absolute value of any number is simply the distance the number is away from zero on a number line.
- A(n) equation is a comparison of two numbers by division.
- An equation stating that two ratios are equal is called a(n) proportion.
- If the new number is less than the original number, the percent of change is a percent of increase.
- The weighted average of a set of data is the sum of the product of the number of units and the value per unit divided by the sum of the number of units.

Lesson-by-Lesson Review

2-1 Writing Equations

Translate each sentence into an equation.

9. The sum of five times a number x and three is the same as fifteen.
10. Four times the difference of b and six is equal to b squared.
11. One half of m cubed is the same as four times m minus nine.

Translate each equation into a sentence.

12. $3p + 8 = 20$
13. $h^2 - 5h + 6 = 0$
14. $\frac{3}{4}w^2 + \frac{2}{3}w - \frac{1}{5} = 2$
15. **FENCING** Adrienne wants to create an outdoor rectangular kennel. The length will be three feet more than twice the width. Write and use an equation to find the length and the width of the kennel if Adrienne has 54 feet of fencing.

Example 1

Translate the following sentence into an equation.

Six times the sum of a number n and four is the same as the difference between two times n to the second power and ten.

$$6(n + 4) = 2n^2 - 10$$

Example 2

Translate $3d^2 - 9d + 8 = 4(d + 2)$ into a sentence.

Three times a number d squared minus nine times d increased by eight is equal to four times the sum of d and two.

2-2 Solving One-Step Equations

Solve each equation. Check your solution.

16. $x - 9 = 4$
17. $-6 + g = -11$
18. $\frac{5}{9} + w = \frac{7}{9}$
19. $3.8 = m + 1.7$
20. $\frac{a}{12} = 5$
21. $8y = 48$
22. $\frac{2}{5}b = -4$
23. $-\frac{t}{16} = -\frac{7}{8}$
24. **AGE** Max is four years younger than his sister Brenda. Max is 16 years old. Write and solve an equation to find Brenda's age.

Example 3

Solve $x - 13 = 9$. Check your solution.

$$\begin{array}{ll} x - 13 = 9 & \text{Original equation} \\ x - 13 + 13 = 9 + 13 & \text{Add 13 to each side.} \\ x = 22 & -13 + 13 = 0 \text{ and } 9 + 13 = 22 \end{array}$$

To check that 22 is the solution, substitute 22 for x in the original equation.

$$\begin{array}{ll} \text{CHECK } x - 13 = 9 & \text{Original equation} \\ 22 - 13 \stackrel{?}{=} 9 & \text{Substitute 22 for } x. \\ 9 = 9 \checkmark & \text{Subtract.} \end{array}$$

2-3 Solving Multi-Step Equations

Solve each equation. Check your solution.

25. $2d - 4 = 8$
26. $-9 = 3t + 6$
27. $14 = -8 - 2k$
28. $\frac{n}{4} - 7 = -2$
29. $\frac{r+4}{3} = 7$
30. $-18 = \frac{9-a}{2}$
31. $6g - 3.5 = 8.5$
32. $0.2c + 4 = 6$
33. $\frac{f}{3} - 9.2 = 3.5$
34. $4 = \frac{-3u - (-7)}{-8}$
35. **CONSECUTIVE INTEGERS** Find three consecutive odd integers with a sum of 63.
36. **CONSECUTIVE INTEGERS** Find three consecutive integers with a sum of -39 .

Example 4

Solve $7y - 9 = 33$. Check your solution.

$$\begin{array}{ll} 7y - 9 = 33 & \text{Original equation} \\ 7y - 9 + 9 = 33 + 9 & \text{Add 9 to each side.} \\ 7y = 42 & \text{Simplify.} \\ \frac{7y}{7} = \frac{42}{7} & \text{Divide each side by 7.} \\ y = 6 & \text{Simplify.} \end{array}$$

CHECK $7y - 9 = 33$ Original equation
 $7(6) - 9 \stackrel{?}{=} 33$ Substitute 6 for y .
 $42 - 9 \stackrel{?}{=} 33$ Multiply.
 $33 = 33 \checkmark$ Subtract.

2-4 Solving Equations with the Variable on Each Side

Solve each equation. Check your solution.

37. $8m + 7 = 5m + 16$
38. $2h - 14 = -5h$
39. $21 + 3j = 9 - 3j$
40. $\frac{x-3}{4} = \frac{x}{2}$
41. $\frac{6r-7}{10} = \frac{r}{4}$
42. $3(p + 4) = 33$
43. $-2(b - 3) - 4 = 18$
44. $4(3w - 2) = 8(2w + 3)$

Write an equation and solve each problem.

45. Find the sum of three consecutive odd integers if the sum of the first two integers is equal to twenty-four less than four times the third integer.
46. **TRAVEL** Mr. Jones drove 480 miles to a business meeting. His travel time to the meeting was 8 hours and from the meeting was 7.5 hours. Find his rate of travel for each leg of the trip.

Example 5

Solve $9w - 24 = 6w + 18$.

$$\begin{array}{ll} 9w - 24 = 6w + 18 & \text{Original equation} \\ 9w - 24 - 6w = 6w + 18 - 6w & \text{Subtract } 6w \text{ from each side.} \\ 3w - 24 = 18 & \text{Simplify.} \\ 3w - 24 + 24 = 18 + 24 & \text{Add 24 to each side.} \\ 3w = 42 & \text{Simplify.} \\ \frac{3w}{3} = \frac{42}{3} & \text{Divide each side by 3.} \\ w = 14 & \text{Simplify.} \end{array}$$

Example 6

Write an equation to find three consecutive integers such that three times the sum of the first two integers is the same as thirteen more than four times the third integer.

Let x , $x + 1$, and $x + 2$ represent the three consecutive integers.

$$3(x + x + 1) = 4(x + 2) + 13$$

2-5 Solving Equations Involving Absolute Value

Evaluate each expression if $m = -8$, $n = 4$, and $p = -12$.

47. $|3m - n|$
48. $|-2p + m| - 3n$
49. $-3|6n - 2p|$
50. $4|7m + 3p| + 4n$

Solve each equation. Then graph the solution set.

51. $|x - 6| = 11$
52. $|-4w + 2| = 14$
53. $|\frac{1}{3}d - 6| = 15$
54. $|\frac{2b}{3} + 8| = 20$

Example 7

Solve $|y - 9| = 16$. Then graph the solution set.

Case 1

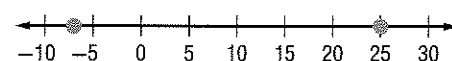
$$\begin{aligned} y - 9 &= 16 && \text{Original equation} \\ y - 9 + 9 &= 16 + 9 && \text{Add 9 to each side.} \\ y &= 25 && \text{Simplify.} \end{aligned}$$

Case 2

$$\begin{aligned} y - 9 &= -16 && \text{Original equation} \\ y - 9 + 9 &= -16 + 9 && \text{Add 9 to each side.} \\ y &= -7 && \text{Simplify.} \end{aligned}$$

The solution set is $\{-7, 25\}$.

Graph the points on a number line.



2-6 Ratios and Proportions

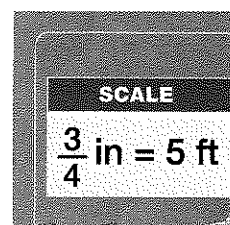
Determine whether each pair of ratios are equivalent ratios. Write *yes* or *no*.

55. $\frac{27}{45}, \frac{3}{5}$
56. $\frac{18}{32}, \frac{3}{4}$

Solve each proportion. If necessary, round to the nearest hundredth.

57. $\frac{4}{9} = \frac{a}{45}$
58. $\frac{3}{8} = \frac{21}{t}$
59. $\frac{9}{12} = \frac{g}{16}$

60. **CONSTRUCTION** A new gym is being built at Greenfield Middle School. The length of the gym as shown on the builder's blueprints is 12 inches. Find the actual length of the new gym.



Example 8

Determine whether $\frac{7}{9}$ and $\frac{42}{54}$ are equivalent ratios. Write *yes* or *no*. Justify your answer.

First, simplify each ratio. $\frac{7}{9}$ is already in simplest form.

$$\frac{42}{54} = \frac{42 \div 6}{54 \div 6} = \frac{7}{9}$$

When expressed in simplest form, the ratios are equivalent. The answer is *yes*.

Example 9

Solve $\frac{r}{8} = \frac{3}{4}$. If necessary, round to the nearest hundredth.

$$\begin{aligned} \frac{r}{8} &= \frac{3}{4} && \text{Original equation} \\ r(4) &= 3(8) && \text{Find the cross products.} \\ 4r &= 24 && \text{Simplify.} \\ \frac{4r}{4} &= \frac{24}{4} && \text{Divide each side by 4.} \\ r &= 6 && \text{Simplify.} \end{aligned}$$

2-7 Percent of Change

State whether each percent of change is a percent of *increase* or a percent of *decrease*. Then find the percent of change. Round to the nearest whole percent.

61. original: 40, new: 50
62. original: 36, new: 24
63. original: \$72, new: \$60

Find the total price of each item.

64. boots: \$64, tax: 7%
65. video game: \$49, tax: 6.5%
66. hockey skates: \$199, tax: 5.25%

Find the discounted price of each item.

67. digital media player: \$69.00, discount: 20%
68. jacket: \$129, discount: 15%
69. backpack: \$45, discount: 25%

70. **ATTENDANCE** An amusement park recorded attendance of 825,000 one year. The next year, the attendance increased to 975,000. Determine the percent of increase in attendance.

Example 10

State whether the percent of change is a percent of *increase* or a percent of *decrease*. Then find the percent of change. Round to the nearest whole percent.

original: 80
final: 60

Subtract the original amount from the final amount to find the amount of change. $60 - 80 = -20$. Since the new amount is less than the original, this is a percent of decrease.

Use the original number, 80, as the base.

$$\begin{aligned} \frac{\text{change}}{\text{original amount}} &= \frac{20}{80} = \frac{r}{100} && \text{Percent proportion} \\ 20(100) &= r(80) && \text{Find cross products.} \\ 2000 &= 80r && \text{Simplify.} \\ \frac{2000}{80} &= \frac{80r}{80} && \text{Divide each side by 80.} \\ 25 &= r && \text{Simplify.} \end{aligned}$$

The percent of decrease is 25%.

2-8 Literal Equations and Dimensional Analysis

Solve each equation or formula for the variable indicated.

71. $3x + 2y = 9$, for y
72. $P = 2\ell + 2w$, for ℓ
73. $-5m + 9n = 15$, for m
74. $14w + 15x = y - 21w$, for w
75. $m = \frac{2}{5}y + n$, for y
76. $7d - 3c = f + 2d$, for d

77. **GEOMETRY** The formula for the area of a trapezoid is $A = \frac{1}{2}h(a + b)$, where h represents the height and a and b represent the lengths of the bases. Solve for h .

Example 11

Solve $6p - 8n = 12$ for p .

$$\begin{aligned} 6p - 8n &= 12 && \text{Original equation} \\ 6p - 8n + 8n &= 12 + 8n && \text{Add } 8n \text{ to each side.} \\ 6p &= 12 + 8n && \text{Simplify.} \\ \frac{6p}{6} &= \frac{12 + 8n}{6} && \text{Divide each side by 6.} \\ \frac{6p}{6} &= \frac{12}{6} + \frac{8n}{6} && \text{Simplify.} \\ p &= 2 + \frac{4}{3}n && \text{Simplify.} \end{aligned}$$