Honors Algebra II / Trig

Summer Assignment

Complete the problems listed below. Complete the work on separate sheets of paper and bring the packet and all work to class on the first day of school.

Pages 37-40 #1-62

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1 SUMMARY

KEY TERMS

1.1 set
elements (members)
finite set
infinite set
empty set (null set)
variable
set-builder notation
number line
coordinate
graph
additive inverse (opposite, negative)
signed numbers
absolute value
equation
inequality
interval
interval notation
three-part inequality

1.2 sum
difference
product
quotient
reciprocal (multiplicative inverse)

1.3 factors
exponent (power)
base
exponential expression
square root
principal (positive) square root
negative square root
algebraic expression

1.4 identity element for addition
identity element for multiplication
term
coefficient (numerical coefficient)
like terms
unlike terms
combining like terms

NEW SYMBOLS

$\{a, b\}$	set containing the elements a and b
$\emptyset$ or $\{\ \}$	empty set
$\in$	is an element of (a set)
$\notin$	is not an element of
$\neq$	is not equal to
$\{x \mid x \text{ has property } P\}$	set-builder notation
$\lvert x \rvert$	absolute value of x
$<$	is less than
$\leq$	is less than or equal to
$>$	is greater than
$\geq$	is greater than or equal to
∞	infinity
$-\infty$	negative infinity
$(-\infty, \infty)$	set of all real numbers
(a, ∞)	the interval $\{x \mid x > a\}$
$(-\infty, a)$	the interval $\{x \mid x < a\}$
$(a, b]$	the interval $\{x \mid a < x \leq b\}$
a^m	m factors of a
$\sqrt{\ }$	radical sign
$\sqrt{a}$	positive (or principal) square root of a

QUICK REVIEW

CONCEPTS	EXAMPLES
1.1 Basic Concepts	
Sets of Numbers	
Natural Numbers $\{1, 2, 3, 4, \ldots\}$	$10, 25, 143$
Whole Numbers $\{0, 1, 2, 3, 4, \ldots\}$	$0, 8, 47$
Integers $\{\ldots, -2, -1, 0, 1, 2, \ldots\}$	$-22, -7, 0, 4, 9$
Rational Numbers $\left\{\frac{p}{q} \mid p \text{ and } q \text{ are integers, } q \neq 0\right\}$ (all terminating or repeating decimals)	$-\frac{2}{3}, -0.14, 0, 6, \frac{5}{8}, 0.33333\ldots$
Irrational Numbers $\{x \mid x \text{ is a real number that is not rational}\}$ (all nonterminating, nonrepeating decimals)	$\pi, \sqrt{3}, -\sqrt{22}$
Real Numbers $\{x \mid x \text{ is a rational or an irrational number}\}$	$-3, 0.7, \pi, -\frac{2}{3}$
Absolute Value $\lvert a \rvert = \begin{cases} a & \text{if } a \text{ is positive or } 0 \\ -a & \text{if } a \text{ is negative} \end{cases}$	$\lvert 12 \rvert = 12$ $\lvert -12 \rvert = 12$

(continued)

CONCEPTS	EXAMPLES

1.2 Operations on Real Numbers

Addition

Same Sign: Add the absolute values. The sum has the same sign as the given numbers.

$$-2 + (-7) = -(2 + 7) = -9$$

Different Signs: Find the absolute values of the numbers, and subtract the smaller absolute value from the larger. The sum has the same sign as the number with the larger absolute value.

$$-5 + 8 = 8 - 5 = 3$$
$$-12 + 4 = -(12 - 4) = -8$$

Subtraction

For all real numbers a and b,

$$a - b = a + (-b).$$

$$-5 - (-3) = -5 + 3 = -2$$

Multiplication and Division

Same Sign: The answer is positive when multiplying or dividing two numbers with the same sign.

$$-3(-8) = 24 \qquad \frac{-15}{-5} = 3$$

Different Signs: The answer is negative when multiplying or dividing two numbers with different signs.

$$-7(5) = -35 \qquad \frac{-24}{12} = -2$$

Division

For all real numbers a and b (where $b \neq 0$),

$$a \div b = \frac{a}{b} = a \cdot \frac{1}{b}.$$

$$\frac{2}{3} \div \frac{5}{6} = \frac{2}{3} \cdot \frac{6}{5} = \frac{4}{5}$$ Multiply by the reciprocal.

1.3 Exponents, Roots, and Order of Operations

The product of an even number of negative factors is positive. The product of an odd number of negative factors is negative.

$(-5)^2$ is positive: $(-5)^2 = (-5)(-5) = 25$
$(-5)^3$ is negative: $(-5)^3 = (-5)(-5)(-5) = -125$

Order of Operations

1. Work separately above and below any fraction bar.
2. If parentheses, brackets, or absolute value bars are present, start with the innermost set and work outward.
3. Evaluate all exponents, roots, and absolute values.
4. Multiply or divide in order from left to right.
5. Add or subtract in order from left to right.

$$\frac{12 + 3}{5 \cdot 2} = \frac{15}{10} = \frac{3}{2}$$

$$\begin{aligned}(-6)[2^2 - (3 + 4)] + 3 &= (-6)[2^2 - 7] + 3 \\ &= (-6)[4 - 7] + 3 \\ &= (-6)[-3] + 3 \\ &= 18 + 3 \\ &= 21\end{aligned}$$

1.4 Properties of Real Numbers

For real numbers a, b, and c,

Distributive Property

$$a(b + c) = ab + ac$$

$$12(4 + 2) = 12 \cdot 4 + 12 \cdot 2$$

Inverse Properties

$a + (-a) = 0$ and $-a + a = 0$

$$5 + (-5) = 0 \qquad -12 + 12 = 0$$

$a \cdot \frac{1}{a} = 1$ and $\frac{1}{a} \cdot a = 1$

$$5 \cdot \frac{1}{5} = 1 \qquad -\frac{1}{3}(-3) = 1$$

(continued)

CONCEPTS	EXAMPLES
Identity Properties	
$a + 0 = 0 + a = a$ and $a \cdot 1 = 1 \cdot a = a$	$-32 + 0 = -32$ $\quad 17.5 \cdot 1 = 17.5$
Commutative Properties	
$a + b = b + a$ and $ab = ba$	$9 + (-3) = -3 + 9$ $\quad 6(-4) = (-4)6$
Associative Properties	
$a + (b + c) = (a + b) + c$ and $a(bc) = (ab)c$	$7 + (5 + 3) = (7 + 5) + 3$ $\quad -4(6 \cdot 3) = (-4 \cdot 6)3$
Multiplication Property of 0	
$a \cdot 0 = 0$ and $0 \cdot a = 0$.	$4 \cdot 0 = 0$ $\quad 0(-3) = 0$

1 REVIEW EXERCISES

Graph the elements of each set on a number line.

1. $\left\{-4, -1, 2, \frac{9}{4}, 4\right\}$

2. $\left\{-5, -\frac{11}{4}, -0.5, 0, 3, \frac{13}{3}\right\}$

Find the value of each expression.

3. $|-16|$

4. $-|-4|$

5. $|-8| - |-3|$

Let $S = \left\{-9, -\frac{4}{3}, -\sqrt{4}, -0.25, 0, 0.\overline{35}, \frac{5}{3}, \sqrt{7}, \sqrt{-9}, \frac{12}{3}\right\}$. *Simplify the elements of S as necessary, and then list those elements of S that belong to the specified set.*

6. Whole numbers

7. Integers

8. Rational numbers

9. Real numbers

Write each set by listing its elements.

10. $\{x | x$ is a natural number between 3 and 9$\}$

11. $\{y | y$ is a whole number less than 4$\}$

True or False Indicate whether each inequality is true *or* false.

12. $4 \cdot 2 \leq |12 - 4|$

13. $2 + |-2| > 4$

14. $4(3 + 7) > -|40|$

Write each set in interval notation and graph the interval.

15. $\{x | x < -5\}$

16. $\{x | -2 < x \leq 3\}$

Add or subtract as indicated.

17. $-\frac{5}{8} - \left(-\frac{7}{3}\right)$

18. $-\frac{4}{5} - \left(-\frac{3}{10}\right)$

19. $-5 + (-11) + 20 - 7$

20. $-9.42 + 1.83 - 7.6 - 1.9$

21. $-15 + (-13) + (-11)$

22. $-1 - 3 - (-10) + (-7)$

23. $\frac{3}{4} - \left(\frac{1}{2} - \frac{9}{10}\right)$

24. $-|-12| - |-9| + (-4) - |10|$

Multiply or divide as indicated.

25. $-\frac{3}{7}\left(-\frac{14}{9}\right)$

26. $2(-5)(-3)(-3)$

27. $\frac{-2.3754}{-0.74}$

28. $\frac{75}{-5}$

29. *Concept Check* Which one of the following is undefined: $\frac{5}{7-7}$ or $\frac{7-7}{5}$?

Evaluate each expression.

30. $\left(\frac{3}{7}\right)^3$

31. 10^4

32. $(-5)^3$

33. -5^3

Find each square root. If it is not a real number, say so.

34. $\sqrt{\frac{64}{121}}$

35. $\sqrt{400}$

36. $\sqrt{-64}$

37. $-\sqrt{0.81}$

Simplify each expression.

38. $-\frac{2}{3}[5(-2) + 8 - 4^3]$

39. $-14\left(\frac{3}{7}\right) + 6 \div 3$

40. $\frac{-5(3^2) + 9\left(\sqrt{4}\right) - 5}{6 - 5(-2)}$

Evaluate each expression if $k = -4$, $m = 2$, and $n = 16$.

41. $4k - 7m$

42. $-3\sqrt{n} + m + 5k$

43. $\frac{4m^3 - 3n}{7k^2 - 10}$

Simplify each expression.

44. $2q + 19q$

45. $13z - 17z$

46. $-m + 6m$

47. $5p - p$

48. $-2(k + 3)$

49. $6(r + 3)$

50. $9(2m + 3n)$

51. $-(-p + 6q) - (2p - 3q)$

52. $-3y + 6 - 5 + 4y$

53. $2a + 3 - a - 1 - a - 2$

54. $-3(4m - 2) + 2(3m - 1) - 4(3m + 1)$

Fill in the Blanks Complete each statement so that the indicated property is illustrated. Simplify each answer if possible.

55. $2x + 3x =$ _____ (distributive property)

56. $-4 \cdot 1 =$ _____ (identity property)

57. $2(4x) =$ _____ (associative property)

58. $-3 + 13 =$ _____ (commutative property)

59. $-3 + 3 =$ _____ (inverse property)

60. $5(x + z) =$ _____ (distributive property)

61. $0 + 7 =$ _____ (identity property)

62. $8 \cdot \frac{1}{8} =$ _____ (inverse property)

2 SUMMARY

KEY TERMS

2.1 linear (first-degree) equation in one variable
solution
solution set
equivalent equations
conditional equation
identity
contradiction
2.2 mathematical model
formula
percent
2.4 inequality
linear inequality in one variable
equivalent inequalities
three-part inequality
2.5 intersection
compound inequality
union
2.6 absolute value equation
absolute value inequality

NEW SYMBOLS

1° one degree
$\cap$ set intersection
$\cup$ set union

QUICK REVIEW

CONCEPTS	EXAMPLES

2.1 Linear Equations in One Variable

Addition and Multiplication Properties of Equality

The same number may be added to (or subtracted from) each side of an equation to obtain an equivalent equation. Similarly, the same nonzero number may be multiplied by or divided into each side of an equation to obtain an equivalent equation.

Solve.

$x - 5 = 10$

$x - 5 + 5 = 10 + 5$

$x = 15$

The solution set is $\{15\}$.

$\frac{1}{2}x = 10$

$2\left(\frac{1}{2}x\right) = 2(10)$

$x = 20$

The solution set is $\{20\}$.

Solving a Linear Equation in One Variable

Step 1 Clear fractions.

Step 2 Simplify each side separately.

Step 3 Isolate the variable terms on one side.

Step 4 Isolate the variable.

Step 5 Check.

Solve $4(8 - 3t) = 32 - 8(t + 2)$.

$32 - 12t = 32 - 8t - 16$ Distributive property

$32 - 12t = 16 - 8t$

$32 - 12t + 12t = 16 - 8t + 12t$ Add $12t$.

$32 = 16 + 4t$

$32 - 16 = 16 + 4t - 16$ Subtract 16.

$16 = 4t$

$\frac{16}{4} = \frac{4t}{4}$ Divide by 4.

$4 = t$

The solution set is $\{4\}$. This can be checked by substituting 4 for t in the original equation.

(continued)

CONCEPTS

EXAMPLES

2.2 Formulas

Solving a Formula for a Specified Variable

Step 1 Get all terms with the specified variable on one side and all terms without that variable on the other side.

Step 2 If necessary, use the distributive property to combine terms with the specified variable.

Step 3 Divide both sides by the factor that is the coefficient of the specified variable.

Solve $A = \frac{1}{2}bh$ for h.

$$A = \frac{1}{2}bh$$

$$2A = 2\left(\frac{1}{2}bh\right) \qquad \text{Multiply by 2.}$$

$$2A = bh$$

$$\frac{2A}{b} = h, \quad \text{or} \quad h = \frac{2A}{b} \qquad \text{Divide by } b.$$

2.3 Applications of Linear Equations

Solving an Applied Problem

Step 1 Read the problem.

Step 2 Assign a variable.

How many liters of 30% alcohol solution and 80% alcohol solution must be mixed to obtain 100 L of 50% alcohol solution?

Let x = number of liters of 30% solution needed;
then $100 - x$ = number of liters of 80% solution needed.

Liters of Solution	Percent (as decimal)	Liters of Pure Alcohol
x	0.30	$0.30x$
$100 - x$	0.80	$0.80(100 - x)$
100	0.50	$0.50(100)$

Step 3 Write an equation.

Step 4 Solve the equation.

Step 5 State the answer.

Step 6 Check.

The equation is $0.30x + 0.80(100 - x) = 0.50(100)$.

The solution of the equation is 60. Thus, 60 L of 30% solution and $100 - 60 = 40$ L of 80% solution are needed.

$0.30(60) + 0.80(100 - 60) = 50$ is true.

2.4 Linear Inequalities in One Variable

Solving a Linear Inequality in One Variable

Step 1 Simplify each side of the inequality by clearing parentheses and combining like terms.

Step 2 Use the addition property of inequality to get all terms with variables on one side and all terms without variables on the other side.

Step 3 Use the multiplication property of inequality to write the inequality in the form $x < k$ or $x > k$.

If an inequality is multiplied or divided by a negative number, the inequality symbol must be reversed.

Solve $3(x + 2) - 5x \leq 12$.

$$3x + 6 - 5x \leq 12 \qquad \text{Distributive property}$$

$$-2x + 6 \leq 12$$

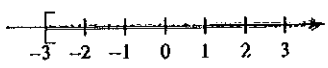
$$-2x + 6 - 6 \leq 12 - 6 \qquad \text{Subtract 6.}$$

$$-2x \leq 6$$

$$\frac{-2x}{-2} \geq \frac{6}{-2} \qquad \text{Divide by } -2; \text{ change } \leq \text{ to } \geq.$$

$$x \geq -3$$

The solution set $[-3, \infty)$ is graphed here.



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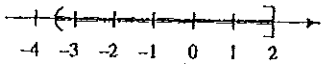
CONCEPTS	EXAMPLES
To solve a three-part inequality, work with all three parts at the same time.	Solve $-4 < 2x + 3 \le 7$. $-4 - 3 < 2x + 3 - 3 \le 7 - 3$ Subtract 3. $-7 < 2x \le 4$ $\frac{-7}{2} < \frac{2x}{2} \le \frac{4}{2}$ Divide by 2. $-\frac{7}{2} < x \le 2$ The solution set, $\left(-\frac{7}{2}, 2\right]$, is graphed here. 

2.5 Set Operations and Compound Inequalities

Solving a Compound Inequality

Step 1 Solve each inequality in the compound inequality individually.

Step 2 If the inequalities are joined with *and*, then the solution set is the intersection of the two individual solution sets.

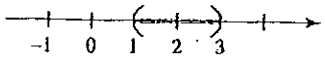
If the inequalities are joined with *or*, then the solution set is the union of the two individual solution sets.

Solve $x + 1 > 2$ and $2x < 6$.

$x + 1 > 2$ and $2x < 6$

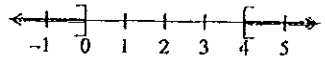
$x > 1$ and $x < 3$

The solution set is $(1, 3)$.



Solve $x \ge 4$ or $x \le 0$.

The solution set is $(-\infty, 0] \cup [4, \infty)$.



2.6 Absolute Value Equations and Inequalities

Solving Absolute Value Equations and Inequalities

Let k be a positive number.

To solve $|ax + b| = k$, solve the compound equation

$$ax + b = k \quad \text{or} \quad ax + b = -k.$$

To solve $|ax + b| > k$, solve the compound inequality

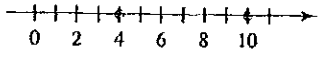
$$ax + b > k \quad \text{or} \quad ax + b < -k.$$

Solve $|x - 7| = 3$.

$x - 7 = 3$ or $x - 7 = -3$

$x = 10$ or $x = 4$

The solution set is $\{4, 10\}$.

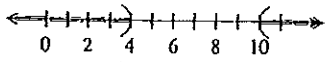


Solve $|x - 7| > 3$.

$x - 7 > 3$ or $x - 7 < -3$

$x > 10$ or $x < 4$

The solution set is $(-\infty, 4) \cup (10, \infty)$.



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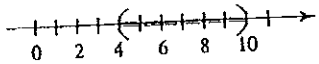
CONCEPTS	EXAMPLES
To solve $\lvert ax + b\rvert < k$, solve the compound inequality $-k < ax + b < k.$	Solve $\lvert x - 7\rvert < 3.$ $-3 < x - 7 < 3$ $4 < x < 10$ Add 7. The solution set is (4, 10). 
To solve an absolute value equation of the form $\lvert ax + b\rvert = \lvert cx + d\rvert,$ solve the compound equation $ax + b = cx + d$ or $ax + b = -(cx + d).$	Solve $\lvert x + 2\rvert = \lvert 2x - 6\rvert.$ $x + 2 = 2x - 6$ or $x + 2 = -(2x - 6)$ $x = 8$ $x + 2 = -2x + 6$ $3x = 4$ $x = \frac{4}{3}$ The solution set is $\left\{\frac{4}{3}, 8\right\}.$

Solve each equation.

1. $-(8 + 3z) + 5 = 2z + 6$
2. $-\frac{3}{4}x = -12$
3. $\frac{2q + 1}{3} - \frac{q - 1}{4} = 0$
4. $5(2x - 3) = 6(x - 1) + 4x$

Solve each equation. Then tell whether the equation is conditional, *an* identity, *or a* contradiction.

5. $7r - 3(2r - 5) + 5 + 3r = 4r + 20$
6. $8p - 4p - (p - 7) + 9p + 6 = 12p - 7$
7. $-2r + 6(r - 1) + 3r - (4 - r) = -(r + 5) - 5$

Solve each formula for the specified variable.

8. $V = LWH$ for L
9. $A = \frac{1}{2}h(b + B)$ for b

Solve each equation for x.

10. $M = -\frac{1}{4}(x + 3y)$
11. $P = \frac{3}{4}x - 12$
12. Give the steps you would use to solve $-2x + 5 = 7.$

Solve each problem.

13. A rectangular solid has a volume of 180 ft^3. Its length is 6 ft and its width is 5 ft. Find its height.

14. The total number of deaths from AIDS in the United States in 2003 was 17,849. In 2004, this figure had decreased to 15,798. What approximate percent decrease did this represent? (*Source:* U.S. Centers for Disease Control.)

15. Find the simple-interest rate that Francesco Castellucio is earning if his principal of $30,000 earns $7800 interest in 4 yr.

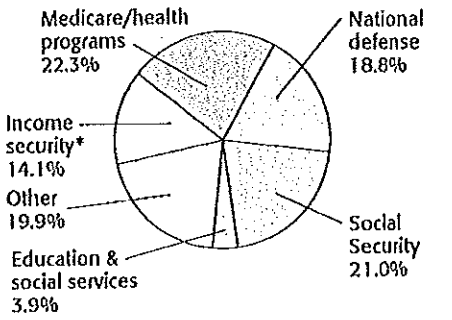
16. If the Fahrenheit temperature is 77°, what is the corresponding Celsius temperature?

For 2005, total U.S. government spending was about $2500 billion (or $2.5 trillion). The circle graph shows how the spending was divided.

17. About how much was spent on Social Security?

18. About how much did the U.S. government spend on education and social services in 2005?

2005 U.S. Government Spending



*Includes pensions for government workers, unemployment compensation, food stamps, and other such programs.

Source: U.S. Office of Management and Budget.

Write each phrase as a mathematical expression, using x as the variable.

19. One-third of a number, subtracted from 9

20. The product of 4 and a number, divided by 9 more than the number

Solve each problem.

21. The length of a rectangle is 3 m less than twice the width. The perimeter of the rectangle is 42 m. Find the length and width of the rectangle.

22. In a triangle with two sides of equal length, the third side measures 15 in. less than the sum of the two equal sides. The perimeter of the triangle is 53 in. Find the lengths of the three sides.

23. A candy clerk has three times as many kilograms of chocolate creams as peanut clusters. The clerk has 48 kg of the two candies altogether. How many kilograms of peanut clusters does the clerk have?

24. How many liters of a 20% solution of a chemical should be mixed with 15 L of a 50% solution to get a 30% mixture?

25. How much water should be added to 30 L of a 40% acid solution to reduce it to a 30% solution?

	0.40	
x		
	0.30	

26. Jay Jenkins invested some money at 6% and $4000 less than that amount at 4%. Find the amount invested at each rate if his total annual interest income is $840.

x	0.06	
	0.04	

Solve each inequality. Express the solution set in interval form.

27. $-\frac{2}{3}k < 6$

28. $-5x - 4 \geq 11$

29. $\frac{6a + 3}{-4} < -3$

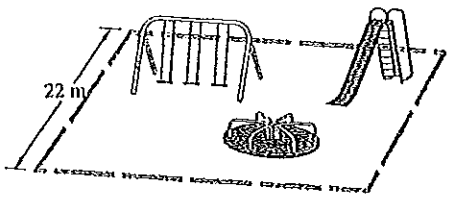
30. $5 - (6 - 4k) \geq 2k - 7$

31. $8 \leq 3z - 1 < 14$

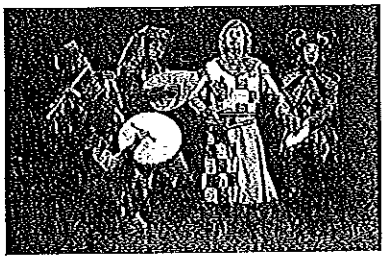
32. $\frac{5}{3}(m - 2) + \frac{2}{5}(m + 1) > 1$

Solve each problem.

33. The perimeter of a rectangular playground must be no greater than 120 m. One dimension of the playground must be 22 m. Find the possible lengths of the other dimension of the playground.



34. A group of college students wants to buy tickets to attend a performance of Monty Python's *Spamalot* at the Cadillac Palace Theatre in Chicago. The best price they can find is a group rate of \$89 per ticket if 10 or more tickets are purchased at the same time. If they have \$2000 available to spend on tickets and they qualify for a \$50 group discount, how many tickets can they purchase?



35. To pass algebra, a student must have an average of at least 70 on five tests. On the first four tests, a student has scores of 75, 79, 64, and 71. What possible scores on the fifth test would guarantee the student a passing grade in the class?

36. While solving the inequality

$$10x + 2(x - 4) < 12x - 13,$$

a student did all the work correctly and obtained the statement $-8 < -13$. The student did not know what to do at this point, because the variable "disappeared." How would you explain to the student the interpretation of this result?

Let $A = \{a, b, c, d\}$, $B = \{a, c, e, f\}$, *and* $C = \{a, e, f, g\}$. *Find each set.*

37. $A \cap B$

38. $A \cap C$

39. $B \cup C$

40. $A \cup C$

Solve each compound inequality. Give the solution set in both interval and graph form.

41. $x > 6$ and $x < 9$

42. $x + 4 > 12$ and $x - 2 < 12$

43. $x > 5$ or $x \leq -3$

44. $x \geq -2$ or $x < 2$

45. $x - 4 > 6$ and $x + 3 \leq 10$

46. $-5x + 1 \geq 11$ or $3x + 5 \geq 26$

Express each union or intersection in simplest interval form.

47. $(-3, \infty) \cap (-\infty, 4)$

48. $(-\infty, 6) \cap (-\infty, 2)$

49. $(4, \infty) \cup (9, \infty)$

50. $(1, 2) \cup (1, \infty)$

Solve each absolute value equation.

51. $|x| = 7$

52. $|x + 2| = 9$

53. $|3k - 7| = 8$

54. $|z - 4| = -12$

55. $|2k - 7| + 4 = 11$

56. $|4a + 2| - 7 = -3$

57. $|3p + 1| = |p + 2|$

58. $|2m - 1| = |2m + 3|$

Solve each absolute value inequality. Give the solution set in interval form.

59. $|p| < 14$
60. $|-t + 6| \le 7$
61. $|2p + 5| \le 1$
62. $|x + 1| \ge -3$

Solve each equation.

1. $3(2x - 2) - 4(x + 6) = 3x + 8 + x$
2. $0.08x + 0.06(x + 9) = 1.24$
3. $\frac{x + 6}{10} + \frac{x - 4}{15} = \frac{x + 2}{6}$
4. Solve each equation. Then tell whether the equation is a *conditional equation*, an *identity*, or a *contradiction*.
   (a) $3x - (2 - x) + 4x + 2 = 8x + 3$
   (b) $\frac{x}{3} + 7 = \frac{5x}{6} - 2 - \frac{x}{2} + 9$
   (c) $-4(2x - 6) = 5x + 24 - 7x$
5. Solve $-16t^2 + vt - S = 0$ for v.
6. Solve $ar + 2 = 3r - 6t$ for r.

Solve each problem.

7. The 2005 Indianapolis 500 (mile) race was won by Dan Wheldon, who averaged 157.603 mph. What was Wheldon's time to the nearest thousandth of an hour? (*Source: World Almanac and Book of Facts.*)
8. A certificate of deposit pays $2281.25 in simple interest for 1 yr on a principal of $36,500. What is the rate of interest?
9. In 2005, there were 37,142 offices, stations, and branches of the U.S. Postal Service, of which 27,385 were actually classified as post offices. What percent, to the nearest tenth, were classified as post offices? (*Source:* U.S. Postal Service.)
10. Tyler McGinnis invested some money at 3% simple interest and some at 5% simple interest. The total amount of his investments was $28,000, and the interest he earned during the first year was $1240. How much did he invest at each rate?

Solve each inequality. Give the solution set in both interval and graph form.

11. $4 - 6(x + 3) \le -2 - 3(x + 6) + 3x$
12. $-\frac{4}{7}x > -16$
13. $-6 \le \frac{4}{3}x - 2 \le 2$
14. *Multiple Choice* Which one of the following inequalities is equivalent to $x < -3$?
    A. $-3x < 9$ B. $-3x > -9$ C. $-3x > 9$ D. $-3x < -9$

Solve each problem.

15. A student must have an average of at least 80 on the four tests in a course to get a B. The student had scores of 83, 76, and 79 on the first three tests. What minimum score on the fourth test would guarantee the student a B in the course?
16. A product will break even or produce a profit only if the revenue R (in dollars) from selling the product is at least equal to the cost C (in dollars) of producing it. Suppose that the cost to produce x units of carpet is $C = 50x + 5000$, while the revenue is $R = 60x$. For what values of x is R at least equal to C?

CONCEPTS	EXAMPLES
3.5 Introduction to Functions	
A function is a set of ordered pairs such that, for each first component, there is one and only one second component. The set of first components is called the **domain**, and the set of second components is called the **range**.	$y = f(x) = x^2$ defines a function f with domain $(-\infty, \infty)$ and range $[0, \infty)$.
To evaluate a function f, where $f(x)$ defines the range value for a given value of x in the domain, substitute the value wherever x appears.	If $f(x) = x^2 - 7x + 12$, then $f(1) = 1^2 - 7(1) + 12 = 6$.
To write an equation that defines a function f in function notation, do the following: *Step 1* Solve the equation for y. *Step 2* Replace y with $f(x)$.	Write $2x + 3y = 12$ using notation for a function f. $3y = -2x + 12$ Subtract $2x$. $y = -\frac{2}{3}x + 4$ Divide by 3. $f(x) = -\frac{2}{3}x + 4$ Function notation

REVIEW EXERCISES

Complete the table of ordered pairs for each equation. Then graph the equation.

1. $3x + 2y = 10$

x	y
0	
	0
2	
	−2

2. $x - y = 8$

x	y
2	
	−3
3	
	−2

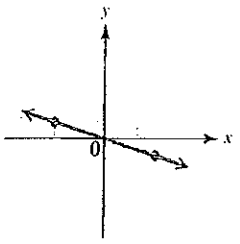
Find the x- and y-intercepts and then graph each equation.

3. $4x - 3y = 12$
4. $5x + 7y = 28$
5. $2x + 5y = 20$
6. $x - 4y = 8$
7. Explain how the signs of the x- and y-coordinates of a point determine the quadrant in which the point lies.

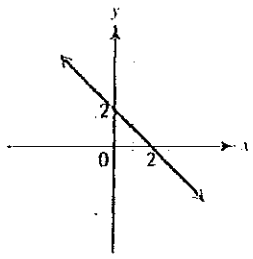
Find the slope of each line.

8. Through $(-1, 2)$ and $(4, -5)$
9. Through $(0, 3)$ and $(-2, 4)$
10. $y = 2x + 3$
11. $3x - 4y = 5$
12. $x = 5$
13. Parallel to $3y = 2x + 5$
14. Perpendicular to $3x - y = 4$
15. Through $(-1, 5)$ and $(-1, -4)$

16.

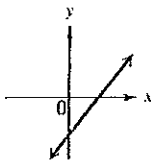


17.



Tell whether each line has positive, negative, 0, *or* undefined *slope.*

18.



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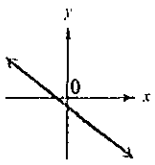

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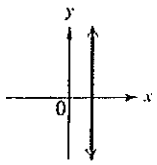

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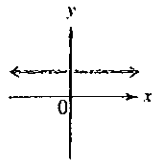
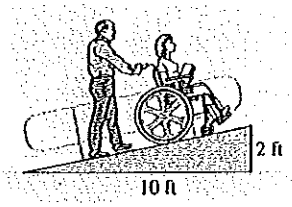


22. ***Multiple Choice*** If a walkway rises 2 ft for every 10 ft on the horizontal, which of the following express its slope (or grade)? (There are several correct choices.)

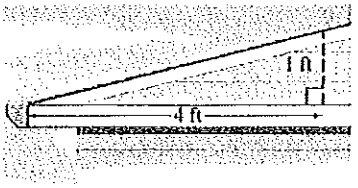
A. 0.2 B. $\frac{2}{10}$ C. $\frac{1}{5}$

D. 20% E. 5 F. $\frac{20}{100}$

G. 500% H. $\frac{10}{2}$ I. -5



23. ***Concept Check*** If the pitch of a roof is $\frac{1}{4}$, how many feet in the horizontal direction correspond to a rise of 3 ft?



24. Family income in the United States has increased steadily for many years (primarily due to inflation). In 1980, the median family income was about \$21,000 per year. In 2003, it was about \$52,700 per year. Find the average rate of change of median family income to the nearest dollar over that period. (*Source:* U.S. Census Bureau.)

Find an equation for each line. (a) Write the equation in slope-intercept form. (b) Write the equation in standard form.

25. Slope $-\frac{1}{3}$; y-intercept $(0, -1)$

26. Slope 0; y-intercept $(0, -2)$

27. Slope $-\frac{4}{3}$; through $(2, 7)$

28. Slope 3; through $(-1, 4)$

29. Vertical; through $(2, 5)$

30. Through $(2, -5)$ and $(1, 4)$

31. Through $(-3, -1)$ and $(2, 6)$

32. The line pictured in Exercise 17

33. Parallel to $4x - y = 3$ and through $(7, -1)$

34. Perpendicular to $2x - 5y = 7$ and through $(4, 3)$