Math Connections Worksheets

MAT0028C Developmental Math II

Chapter 2

Solving Linear Equations and Inequalities

Chapter 2 SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.1 Equations, Formulas, and the Problem-Solving Process

KEY VOCABULARY

Term	Definition	Example
Equation		
Solution		
Formula		
Perimeter		
Area		
Volume		
Circumference		
Radius		
Diameter		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Checking a possible solution

Problem-Solving Outline

Calculating the Area of Composite Figures

GUIDED EXAMPLE
Check to see if the given value is a solution to the equation.

$6.7n - 3.09 = 2.6n + 9.21$; $n = 3$

Solution

$6.7n - 3.09 = 2.6n + 9.21$

$6.7(3) - 3.09 \overset{?}{=} 2.6(3) + 9.21$

Replace n with 3 and see if the equation is true.

	?	
	=	

	?	
	=	

3 [is / is not] a solution to the equation.

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PRACTICE PROBLEMS

Check to see if the given number is a solution to the given equation.

1. $5x + 7 = 30$; $x = 5$ 1._____

2. $7(y - 3) = -2y + 60$; $y = 10$ 2._____

3. $6.3u - 4.13 = 2.6u + 3.64$; $u = 2.1$ 3._____

4. $p^4 - 5p = p^3 + 5$; $p = -6$ 4._____

5. $|v^2 - 81| = -v + 9$; $v = 9$ 5._____

Solve using geometric formulas.

6. A contractor needs to put up a wallpaper border
around a rectangular room. The room is 12 feet by
22 feet.
a. What is the total length of wallpaper border
needed?

6a._____

b. If the wallpaper border comes in packages of 12
feet, how many packages are needed to finish the
project?

b._____

c. What is the total cost of the border if the
packages are priced at $12.66 each?

c._____

7. One of the large rectangular rooms in a hotel has
dimensions 52 feet by 119 feet. What is the total
square footage of the floor of the room?

7._____

8. A flight departs from city A at 7:00 A.M. EST to
arrive in city B at 1:30 P.M. PST. If the plane flies
an average rate of $330\frac{1}{4}$ mph, what distance does it
travel, rounded to the nearest tenth of a mile? Use
the formula relating distance, rate, and time:
$d = rt$. (Hint: There is a three-hour time difference
between EST and PST.)

8._____

Chapter 2   SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.2 The Addition Principle of Equality

KEY VOCABULARY

Term	Definition	Example
Linear equation		
Linear equation in one variable		
Identity		
Contradiction		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

The Addition Principle of Equality

In the Language of Math	In Your Own Words

Using the Addition Principle of Equality

Name: Date:
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PRACTICE PROBLEMS

Determine whether each equation is linear.

1. $7x + 7 = 5x - 4$ 1._____

2. $6x^2 + x^6 = 18$ 2._____

3. $13x - 11y = 12$ 3._____

Solve and check.

4. $-13 = x + 14$ 4._____

5. $x - \dfrac{3}{10} = -\dfrac{3}{5}$ 5._____

6. $8(y + 7) - 7y = 16 - 8$ 6._____

7. $1.3(m + 8) - (6.6 + 0.3m) = -9 + 6$ 7._____

8. $6x = 7x - 1$ 8._____

9. $-8p - 3 = -11 - 7p$ 9._____

10. $10x + 4 + 4x + 8 = 13x + 3$ 10._____

11. $25 + w + 8w - 10 = 15w + 19 - 6w - 4$ 11._____

12. $10.5 - 0.9z - 1.2 - 1.2z = 13 - 2.1z - 7.1$ 12._____

Translate to an equation and then solve.

13. Dorota knows the distance from her home to work   13._____
is 34 miles. Unfortunately, she gets a flat tire 18
miles from work. How far did Dorota drive before
her tire went flat?

14. Robert is playing a dice game. To earn points, he   14._____
needs to correctly add up the total value of five dice
he rolls on each turn. If he has a total of 22 on four
of the dice, what does the fifth die need to be so that
his score will be 26?

Chapter 2   SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.3 The Multiplication Principle of Equality

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

The Multiplication Principle of Equality

In the Language of Math	In Your Own Words

Using the Multiplication Principle of Equality

Solving Linear Equations

Name: Date:

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PRACTICE PROBLEMS

Solve and check.

1. $9x = 90$ **1.**_____

2. $-2x = -44$ **2.**_____

3. $\dfrac{x}{6} = 9$ **3.**_____

4. $\dfrac{1}{14}p = \dfrac{7}{6}$ **4.**_____

5. $-5x + 6 = 41$ **5.**_____

6. $\dfrac{1}{2}y + 6 = -11$ **6.**_____

7. $8x - (3x + 7) = 28$ **7.**_____

8. $2(y-2)-1=3(y-3)$ 8._____

9. $\dfrac{2}{3}+\dfrac{1}{2}t=\dfrac{1}{3}$ 9._____

10. $\dfrac{8}{5}(m+1)=\dfrac{3}{5}-m$ 10._____

11. $0.8y-0.3y=7.5$ 11._____

12. $0.2(b-12)=0.6b$ 12._____

Solve for the unknown amount.

13. A truck's cargo area contains 1638 cubic feet of   13._____
space. If the cargo area is 7 feet wide and 9 feet
high, how long must it be? (Use $V=lwh.$)

Chapter 2   SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.4 Applying the Principles to Formulas

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Isolating a Variable in a Formula

GUIDED EXAMPLES

1. Isolate d in the formula $\dfrac{4}{5} + 9g = \dfrac{d}{h}$.

   Solution

   $$\frac{4}{5} + 9g = \frac{d}{h}$$

   To isolate d, we must clear h.
   Because h is dividing d, we

   _____ both

   sides by h.

   Simplify.

2. Isolate t in the formula $\dfrac{Q}{t} = \pi$.

   Solution

   $$\frac{Q}{t} = \pi$$

   To isolate t, we must get it out of
   the denominator. Multiply both
   sides by t. Then clear π.

   Simplify.

PRACTICE PROBLEMS

Solve for the indicated variable.

1. $v - 9b = m; v$

2. $3x - 4 = n; x$

2._____

3. $10x + 9y = 3; y$

3._____

4. $\dfrac{rs}{19} - C = t; C$

4._____

5. $9(s + 5z) = g - jh; s$

5._____

6. $\dfrac{c}{9} + \dfrac{d}{7} = 5; d$

6._____

7. $b = \dfrac{S - Q}{ny}; n$

7._____

8. $P = a + 2b + 4c; a$

8. _____

9. $C = \dfrac{5}{3}\pi g^4; g^4$

9. _____

10. $b = \dfrac{1}{2} gr; g$

10. _____

11. $U = \dfrac{x}{9}(c + p); p$

11. _____

12. $A = y + ytk; t$

12. _____

13. $Q = \dfrac{7}{4} M + 21; M$

13. _____

14. $q = 5g + 5v; g$

14. _____

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Chapter 2   SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.5 Translating Word Sentences to Equations

Key Words for an Equal Sign

Translating Algebraic Equations to English Sentences

Equation	Translation
	Equations Involving Addition
$x + 8 = 15$	
	Equations Involving Subtraction
$z - 4 = 11$	
	Equations Involving Multiplication
$0.9y = 15$	
	Equations Involving Division
$\dfrac{a}{7} = 10$	
	Equations That Involve More Than One Operation
$6m + 6 = 2$	
	Equations Involving Parentheses
$4(c - 3) = 12$	

PRACTICE PROBLEMS

Translate each sentence to an equation and then solve.

1. A number multiplied by five is negative twenty.   1._____

2. Sixteen less than a number is twelve.   2._____

3. A number divided by ten is seven-elevenths.   3._____

4. One-half of a number is five-sixths.   4._____

5. Four more than the product of five and x yields   5._____
    fifty-four.

6. Twelve less than four times a number is twelve.   6._____

7. Three times the sum of b and six is equal to negative twenty-four.

7._____

8. One-fourth of the sum of a number and two is seven.

8._____

9. Fifteen less than nine times a number is equal to that number added to one.

9._____

10. Six is the result when eight is subtracted from the ratio of a number to ten.

10._____

11. The difference of a number and fifteen subtracted from the difference of twice the number and nine is three.

11._____

12. The sum of eleven and four times t is the same as the difference of six times t and seventeen.

12._____

Chapter 2   SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.6 Solving Linear Inequalities

KEY VOCABULARY

Term	Definition	Example
Linear inequality		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

The Addition Principle of Inequality

In the Language of Math	In Your Own Words

The Multiplication Principle of Inequality

In the Language of Math	In Your Own Words

Graphing Inequalities

PRACTICE PROBLEMS

Write the solution set in set-builder notation and interval notation, then graph the solution set.

1. $x \leq -1$

1._____

_____
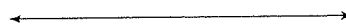
2. $y > 4$

2._____

_____
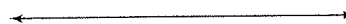
3. $-2 < n \leq 3$

3._____

_____

For each graph, write the inequality in set-builder notation and interval notation.

4.

4._____

_____

5.

5._____

_____

6.

6._____

_____
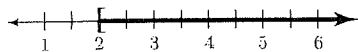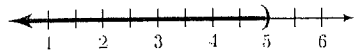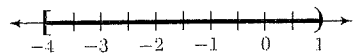
Name: _____   Date: _____
Instructor: _____   Section: _____

Solve each inequality. Write the solution set in set-builder notation and interval notation. Graph the solution set.

7. $7 - 9x < 61$

7._____

_____

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8. $7 - w < 16 + w$

8._____

_____

<--------------------->

9. $4(4k + 2) - 8(k - 2) \geq 3(2k + 3) - 1$

9._____

_____

<--------------------->

Chapter 2 SOLVING LINEAR EQUATIONS AND INEQUALITIES

2.1 Equations, Formulas, and the Problem-Solving Process

1. no   2. no   3. yes   4. no   5. yes   6a. 68 ft.

b. 6 packages   c. $75.96   7. 6188 ft^2 8. 3137.4 mi.

2.2 The Addition Principle of Equality

1. yes   2. no   3. yes   4. -27 5. $-\dfrac{3}{10}$ 6. -48

7. -6.8 8. 1   9. 8   10. -9 11. all real numbers

12. no solution   13. $18+x=34$; 16 mi.   14. $22+n=26$; 4

2.3 The Multiplication Principle of Equality

1. 10   2. 22   3. 54   4. $\dfrac{49}{3}$ 5. -7 6. -34 7. 7

8. 4   9. $-\dfrac{2}{3}$ 10. $-\dfrac{5}{13}$ 11. 15   12. -6 13. 26 ft.
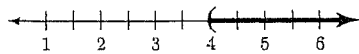
2.4 Applying the Principles to Formulas
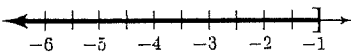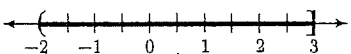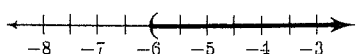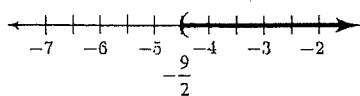
1. $v=m+9b$ 2. $x=\dfrac{n+4}{3}$ 3. $y=\dfrac{-10x+3}{9}$ 4. $C=\dfrac{rs}{19}-t$

5. $s=\dfrac{g-jh-45z}{9}$ 6. $d=\dfrac{315-7c}{9}$ 7. $n=\dfrac{S-Q}{by}$

8. $a=P-2b-4c$ 9. $g^4=\dfrac{3C}{5\pi}$ 10. $g=\dfrac{2b}{r}$ 11. $p=\dfrac{9U-xc}{x}$

12. $t=\dfrac{A-y}{yk}$ 13. $M=\dfrac{4}{7}(Q-21)$ 14. $g=\dfrac{q-5v}{5}$

Answers to Worksheets for Classroom or Lab Practice

2.5 Translating Word Sentences to Equations

1. $5n = -20$; -4
2. $n - 16 = 12$; 28
3. $\dfrac{x}{10} = \dfrac{7}{11}$; $\dfrac{70}{11}$

4. $\dfrac{1}{2}x = \dfrac{5}{6}$; $\dfrac{5}{3}$
5. $5x + 4 = 54$; 10
6. $4x - 12 = 12$; 6

7. $3(b+6) = -24$; -14
8. $\dfrac{1}{4}(x+2) = 7$; 26
9. $9x - 15 = x + 1$; 2

10. $6 = \dfrac{x}{10} - 8$; 140
11. $(2x - 9) - (x - 15) = 3$; -3
12. $4t + 11 = 6t - 17$; 14

2.6 Solving Linear Inequalities

1. $\{x \mid x \le -1\}$; $(-\infty, -1]$

2. $\{y \mid y > 4\}$; $(4, \infty)$

3. $\{n \mid -2 < n \le 3\}$; $(-2, 3]$

4. $\{x \mid x \ge 2\}$; $[2, \infty)$
5. $\{x \mid x < 5\}$; $(-\infty, 5)$

6. $\{x \mid -4 \le x < 1\}$; $[-4, 1)$
7. $\{x \mid x > -6\}$; $(-6, \infty)$;

8. $\left\{w \mid w > -\dfrac{9}{2}\right\}$; $\left(-\dfrac{9}{2}, \infty\right)$;

9. $\{k \mid k \ge -8\}$; $[-8, \infty)$;