

Important Concepts . . .

Preview Review



Mathematics Grade 7 TEACHER KEY
**W2 - Lesson 3: Algebra and Verifying
Linear Equations**

Important Concepts of Grade 7 Mathematics

W1 - Lesson 1	Divisibility Rules
W1 - Lesson 2	Decimal Numbers
W1 - Lesson 3	Fractions
W1 - Lesson 4	Improper Fractions, Mixed Numbers, Percents, and Decimals
W1 - Lesson 5	Integers, Number Lines, and Sequencing
W1 - Quiz	
W2 - Lesson 1	Table of Values and Graphing Linear Equations
W2 - Lesson 2	Modeling Expressions, Equations, and the Preservation of Equality
W2 - Lesson 3	Algebra and Linear Equations
W2 - Lesson 4	Statistics
W2 - Lesson 5	Circle Graphs and Calculating Probability
W2 - Quiz	
W3 - Lesson 1	Circles
W3 - Lesson 2	Area of Triangles and Parallelograms
W3 - Lesson 3	Line Segments
W3 - Lesson 4	Parts and Plotting on a Cartesian Plane
W3 - Lesson 5	Transformations
W3 - Quiz	

Materials Required

Math Set
Calculator

**No Textbook
Required**

**This is a stand-
alone course.**

Mathematics Grade 7

Version 6

Preview/Review W2 - Lesson 3

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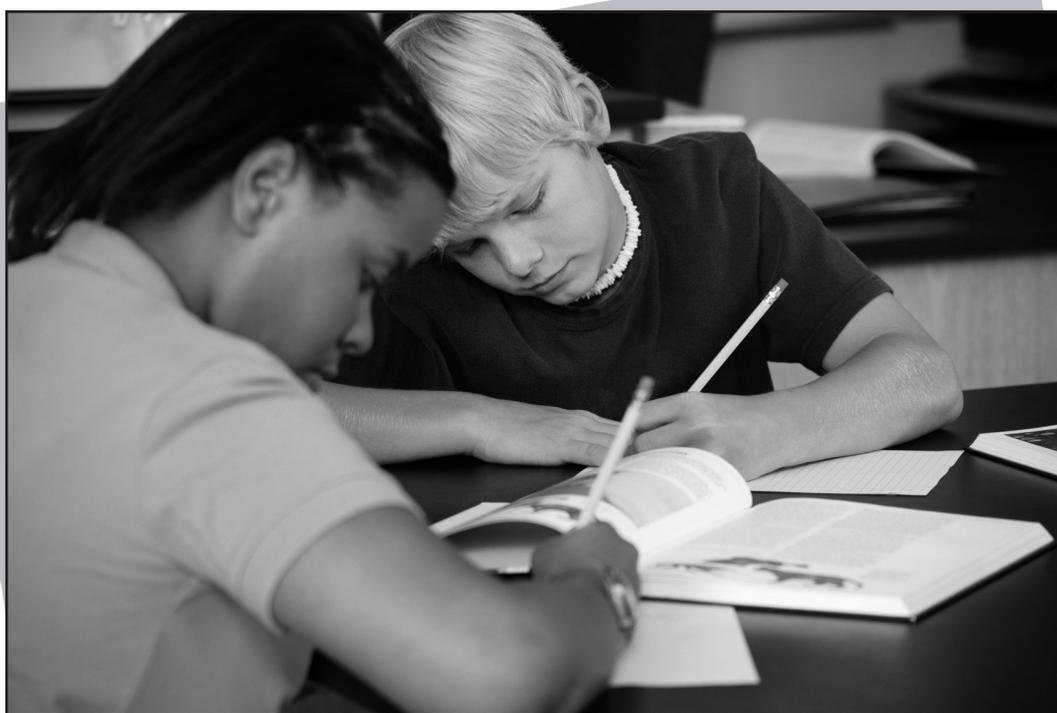
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Preview/Review Concepts for Grade Seven Mathematics

Teacher Key



W2 - Lesson 3:

*Algebra and Verifying Linear
Equations*

Introductory Information for Teachers

Preview/Review courses are aimed mainly at students who have completed the regular course but who need to review some of the material before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new concepts they will study in their next grade.

No Preview/Review course is intended to replace the regular course because each covers only what the writers have decided are the top 15 concepts from the Program of Studies for that course.

Preview/Review materials are intended for use by teachers and students in one-subject and one-grade classrooms. This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons. A short quiz is provided at the end of each section to test student knowledge of the material studied. In a classroom the course will likely be completed in three weeks.

This Preview/Review course is written to be stand-alone. There is no textbook required.

W2 – Lesson 3: Algebra and Verifying Linear Equations

Objective:

- *I can solve and verify the solution to a linear equation.*

Solving equations using algebra

To solve an equation, isolate the variable by “undoing” the operations surrounding the variable

Do	Un-do
+	-
-	+
×	÷
÷	×

Example: $2x + 9 = 13$

Undo addition: subtract 9 from both sides of the equal sign.

$$2x + 9 - 9 = 13 - 9$$

$$2x = 4$$

Undo multiplication: divide both sides by 2.

$$\frac{2x}{2} = \frac{4}{2}$$

$$x = 2$$

Example 2: $\frac{x}{3} - 4 = 2$

Undo subtraction: add 4 to both sides.

$$\frac{x}{3} - 4 + 4 = 2 + 4$$

$$\frac{x}{3} = 6$$

Undo division: multiply both sides by 3.

$$\frac{x}{3} \times 3 = 6 \times 3$$

$$x = 18$$

Remember: whatever you do to one side, you do to the other side too.

Practice:

Solve each equation, showing each algebra step.

a. $4x - 2 = 14$

$$4x - 2 + 2 = 14 + 2$$

$$4x = 16$$

$$x = 4$$

b. $3n + 5 = 11$

$$3n + 5 - 5 = 11 - 5$$

$$3n = 6$$

$$n = 2$$

c. $w + 45 = 50$

$$w + 45 - 45 = 50 - 45$$

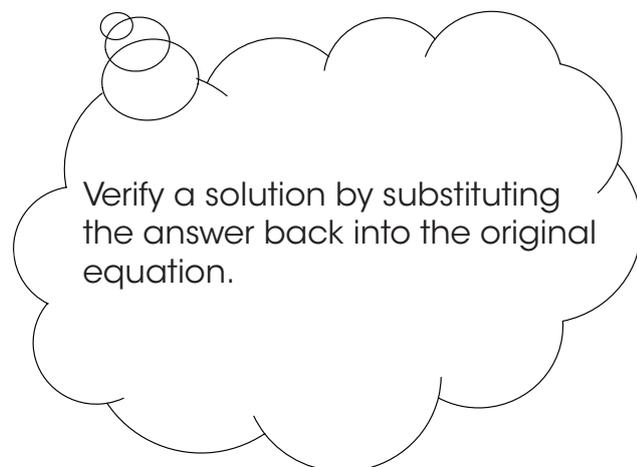
$$w = 5$$

d. $2d - 6 = 2$

$$2d - 6 + 6 = 2 + 6$$

$$2d = 8$$

$$d = 4$$

Verifying a solution

Example: $2x + 9 = 13$

Our solution was $x = 2$.

Verify: Left side: $2(2) + 9$ Right side: 13
 $4 + 9$
 13

Since the left side of the equal sign ends up being the same as the right side, we know the solution is correct.

Example 2: $x/3 - 4 = 2$

Our solution was $x = 18$.

Verify: Left side: $(18)/3 - 4$
 $6 - 4$
 2

Right side: 2

Practice:

Verify if the given solution is correct. Show all steps. **Note: Some will be incorrect**

a. $2x - 7 = 11, x = 9$

Left side:

$$\begin{aligned} 2(9) - 7 \\ 18 - 7 \\ 11 \end{aligned}$$

Right side: 11**Correct**

b. $\frac{y}{3} - 5 = 1, y = 18$

Left side:

$$\begin{aligned} \frac{(18)}{3} - 5 \\ 6 - 5 \\ 1 \end{aligned}$$

Right side: 1**Correct**

c. $\frac{n}{2} + 3 = 8, n = 6$

Left side:

$$\begin{aligned} \frac{(6)}{2} + 3 \\ 3 + 3 \\ 6 \end{aligned}$$

Right side: 8**Incorrect**

d. $2d + 7 = 17, d = 7$

Left side:

$$\begin{aligned} 2(7) + 7 \\ 14 + 7 \\ 21 \end{aligned}$$

Right side: 17**Incorrect**

e. $\frac{g}{4} + 6 = 11, g = 20$

Left side:

$$\begin{aligned} \frac{(20)}{4} + 6 \\ 5 + 6 \\ 11 \end{aligned}$$

Right side: 11**Correct**

f. $6d - 11 = 13, d = 2$

Left side:

$$\begin{aligned} 6(2) - 11 \\ 12 - 11 \\ 1 \end{aligned}$$

Right side: 13**Incorrect**

Objective:

- *I can verify the solution to a linear equation using manipulatives.*

Unit tile: represented by a single tile. Each one tile represents +1.



Variable tile: represented by a long rectangular tile. Each tile represents one unit of a variable.



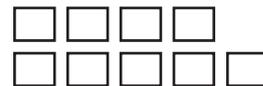
Verifying equations with algebra tiles

Solve: $x + 4 = 9$

Left side:



Right side



Remove 4 unit tiles from each side to isolate the x-tile



Each x-tile equals 5 unit tiles ($x = 5$)

Verify: $x + 4 = 9$, $x = 5$

Left side



Right side



Since the left side has the same number of tiles as the right side, we know the solution is correct.

Practice:

Verify each given solution using Algebra tiles.

Verify: $x - 2 = 3$, $x = 5$

Left side



Right side



Correct

Verify: $2x + 1 = 3$, $x = 1$

Left side

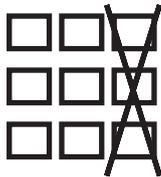


Right side



Verify: $3x - 3 = 6$, $x = 3$

Left side



Right side



Objective:

- *I can use equations to solve word problems.*

Writing and solving equations from word problems**Example:**

At the bakery loaves of bread cost \$2.00 per loaf.
How many loaves can be bought with \$10.00?

- a. Write the equation representing the solution.

$$2b = 10$$

- b. Solve the equation, verify the equation.

$$2b = 10$$

$$\frac{2b}{2} = \frac{10}{2}$$

$$b = 5$$

$$\text{Left side: } 2b \rightarrow 2(5) \rightarrow 10$$

$$\text{Right side: } 10$$

LS = RS, therefore the solution is correct

Practice:

1. In Greg's class, 13 people play hockey. The class has 21 students.
 - a. Write an equation to find the number of students who don't play hockey.

$$13 + h = 21$$

- b. Solve the equation, verify the solution.

$$13 - 13 + h = 21 - 13$$
$$h = 8$$

Verify:

Left side:

$$13 + (8)$$
$$21$$

Right side: 21

1. Jake is thinking of a number. He multiplies it by two and then subtracts five. The result is seven.
 - a. Write an equation to represent the solution.

$$2n - 5 = 7$$

- b. Solve the equation to find the mystery number.

$$2n - 5 + 5 = 7 + 5$$
$$2n = 12$$
$$n = 6$$

The mystery number is 6

Summary and Practice:

- *I can use equations to solve word problems.*

1. Fill in the blanks.

- A variable, x , has 4 added to it, we need to subtract 4 from both sides to isolate x .
- A variable, n , has 6 subtracted from it; we need to add 6 to both sides to isolate n .
- A variable, g , is multiplied by 3, to isolate g we need to divide by 3 on both sides.
- A variable, w , is divided by 2; to isolate w we need to multiply by 2 on both sides.

2. Solve and verify, showing all steps.

a. $5x - 7 = 18$

$$5x - 7 = 18$$

$$5x - 7 + 7 = 18 + 7$$

$$5x = 25$$

$$x = 5$$

Verify:

Left side:

$$5(5) - 7$$

$$25 - 7$$

$$18$$

Right side:

$$18$$

b. $4n + 8 = 20$

$$4n + 8 = 20$$

$$4n + 8 - 8 = 20 - 8$$

$$4n = 12$$

$$n = 3$$

Verify:

Left side:

$$4(3) + 8$$

$$12 + 8$$

$$20$$

Right side:

$$20$$

3. Solve. Verify your solution using Algebra tiles.

a. $w + 4 = 11$

$w + 4 - 4 = 11 - 4$

$w = 7$

Left side



Right side



b. $2y + 6 = 16$

$2y + 6 - 6 = 16 - 6$

$2y = 10$

$y = 5$

Left side



Right side



c. $\frac{h}{2} + 3 = 6$

$\frac{h}{2} + 3 - 3 = 6 - 3$

$\frac{h}{2} = 3$

$\frac{h}{2} \times 2 = 3 \times 2$

$h = 6$

Left side



Right side



4. Sarah invited some friends over to play video games. Three friends left after one game, but seven friends stayed to play more. How many friends did Sarah have over?

a. Write an equation

$$f - 3 = 7$$

b. Solve the equation, verify the solution.

$$f - 3 + 3 = 7 + 3$$

$$f = 10$$

Verify:

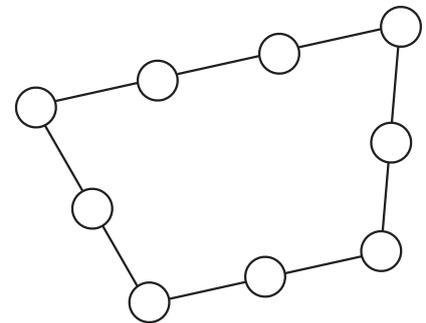
Left side:

$$(10) - 3$$

$$7$$

Right side: 7

5. Peter wants to build a fence around his garden. He needs 3 cross pieces between each fence post, except the gate which needs 5 pieces. Before going to the lumber store, Peter determines he will need $3p + 5$ pieces of wood, where p is the number of posts.



- a. If Peter’s garden has 9 fence posts, he decides he’ll need 32 pieces of wood. Is Peter correct? Why or why not?

No, Peter is incorrect because p needs to stand for the number of spaces between the posts not including the gate space.

- b. How many pieces of wood does Peter actually need?

$$3(8) + 5$$

$$24 + 5$$

$$29$$

He actually needs 29 pieces.

6. Beth is setting up a restaurant with large and small tables. She decides that each small table will have 4 chairs, and each large table will have 6 chairs.
- a. Write an expression for the number of chairs (c) using s for small tables, and l for large tables.

$$c = 4S + 6L$$

- b. How many tables of the other size can Beth set up if she has:
- i. 2 large tables and 44 chairs?

$$44 = 4S + 6(2)$$

$$44 = 4S + 12$$

$$44 - 12 = 4S + 12 - 12$$

$$32 = 4S$$

$$8 = S$$

She can have 8 small tables

- ii. 3 large tables and 38 chairs?

$$38 = 4S + 6(3)$$

$$38 = 4S + 18$$

$$38 - 18 = 4S + 18 - 18$$

$$20 = 4S$$

$$5 = S$$

She can have 5 small tables

- iii. 6 small tables and 48 chairs?

$$48 = 4(6) + 6L$$

$$48 = 24 + 6L$$

$$48 - 24 = 24 - 24 + 6L$$

$$24 = 6L$$

$$4 = L$$

She can have 4 large tables

7. Warren has 15 songs downloaded to his MP3 player. He downloads 8 new songs each month. After how many months will Warren have 71 songs?

$$8m + 15 = 71$$

$$8m + 15 - 15 = 71 - 15$$

$$8m = 56$$

$$m = 7$$

It will take 7 months to get 71 songs.



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