Important Concepts . . .

Preview Review

Mathematics Grade 7 TEACHER KEY

W2 - Lesson 2: Expressions and Modeling Equations

Important Concepts of Grade 7 Mathematics

Materials Required

Math Set
Calculator

No Textbook Required

This is a stand-alone course.

Mathematics Grade 7
Version 6
Preview/Review W2 - Lesson 2
ISBN 1-894894-75-8

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Preview/Review Concepts for Grade Seven Mathematics

Teacher Key

W2 – Lesson 2:

Expressions and Modeling 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 2: Expressions and Modeling Equations

Objective:

- *I can identify the parts of an algebraic expression.*

Term: variables or constants separated by a plus or minus sign.

Example, 4x – 6 (has 2 terms)

Variable: a letter or symbol used to represent any number you want.

Example, x + 3 (means 3 more than any number). x is the variable

Constant term: the term in the expression that has a fixed value and does not contain variables.

Example, x – 9 (9 is the constant term)

Algebraic expression: is a math "sentence" containing algebraic terms that can be reused to solve similar problems even if the numbers change. It can include variables or constants but **does not** have an equal sign

Practice

Circle any numerical coefficients and **underline** any constant terms.

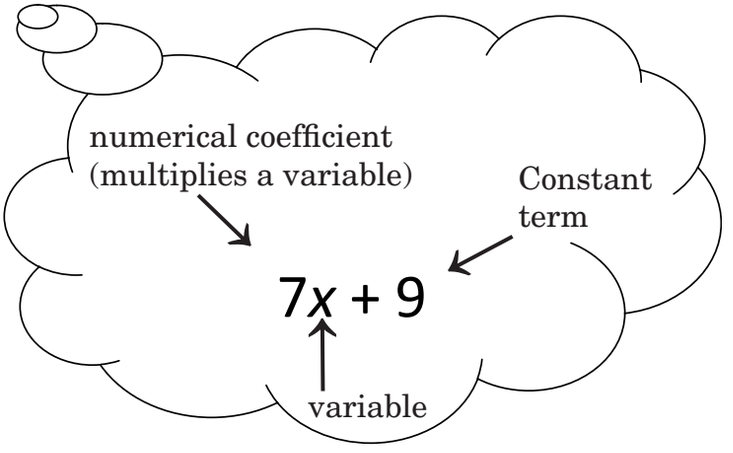
a. (4)x – 2

b. 5 + (3)n

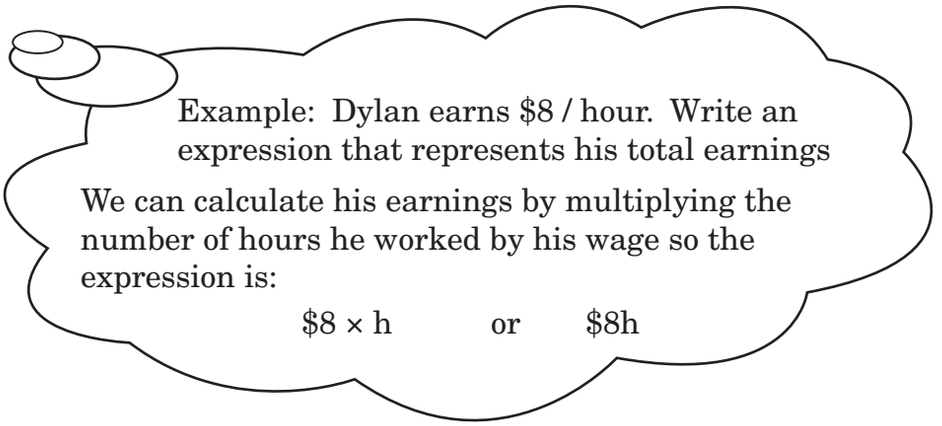
c. (23)w + 45

d. (12)d – (6)b

e. (3)g – (4)h + 15



Writing Expressions:



Practice:

Using **n** as the variable, write an expression for:

a. Five times a number
5n

b. Nine minus a number.
9 - n

c. A number subtracted from eight.
8 - n

d. A number decreased by two
n - 2

e. Twelve more than three times a number.
3n +12

f. Six less than a number divided by two.
(n ÷ 2) - 6

g. A number plus one then divided by three
(n + 1) ÷ 3

h. A number plus four, times ten.
(n + 4) × 10

i. Ronald buys CDs at $12 each. Write the expression for the price of n CDs.
12n

Objective:

- *I can evaluate an expression by using substitution.*

Evaluating expressions:

An expression can be evaluated, or solved, by substituting, or replacing, the variable with a number.

Use brackets ( ) to indicate which numbers are the substituted values.

Example 1: Evaluate the expression $\mathbf{7g - 4}$ for $g = 2$.

$7(2) - 4$

$= 14 - 4$

$\mathbf{= 10}$

Example 2:

Cory delivers flyers for his dad. His dad gives him \$5/h plus \$1 for every 100 flyers he delivers. The expression representing his earnings is $5h + n$ where h is number of hours, and n is the number of 100 flyers. If Cory spent 2 hours delivering 300 flyers, how much money did he earn?

$5h + n$

$= 5(2) + (3)$

$= 10 + 3$

$= \$13$

He earned \$13.

Practice:

1. Evaluate the expression

   a. 6a + b for a = 3 and b = 1

   6(3) + (1)
   = 18 + 1
   = 19

   b. 7(a-1) + b for b = 7 and a = 5.

   7(5 – 1) + (7)
   = 7(4) + 7
   = 28 + 7 = 35

   c. 3b-(a + 5) for a = 6 and b = 10

   3(10) – (6 + 5)
   = 30 – 11
   = 19

   d. 3(b - 1) + a for a = 1 and b = 5.

   3(5 – 1) + (1)
   = 3(4) + 1
   = 12 + 1 = 13

2. A movie costs $6.00 per adult and $4 per child to attend.

   a. What expression would represent the cost for the movie?

   6a + 4c, where a is the number of adults and c is the number of children

   b. How much would the total cost be if 3 adults and 7 children went?

   6(3) + 4(7)
   = 18 + 28
   = $46 It would cost $46.

3. Lorraine is renting a tent and chairs for a birthday party. The tent costs $250.00 for the day plus $3.00 for each chair.

   a. What algebraic expression would describe the cost of renting a tent and chairs for the day?

   3c + 250, where c is the number of chairs

   b. What is the cost of renting the tent and 26 chairs for the day?

   3(26) + 250
   = 78 + 250
   = 328 It would cost $328 for the day.

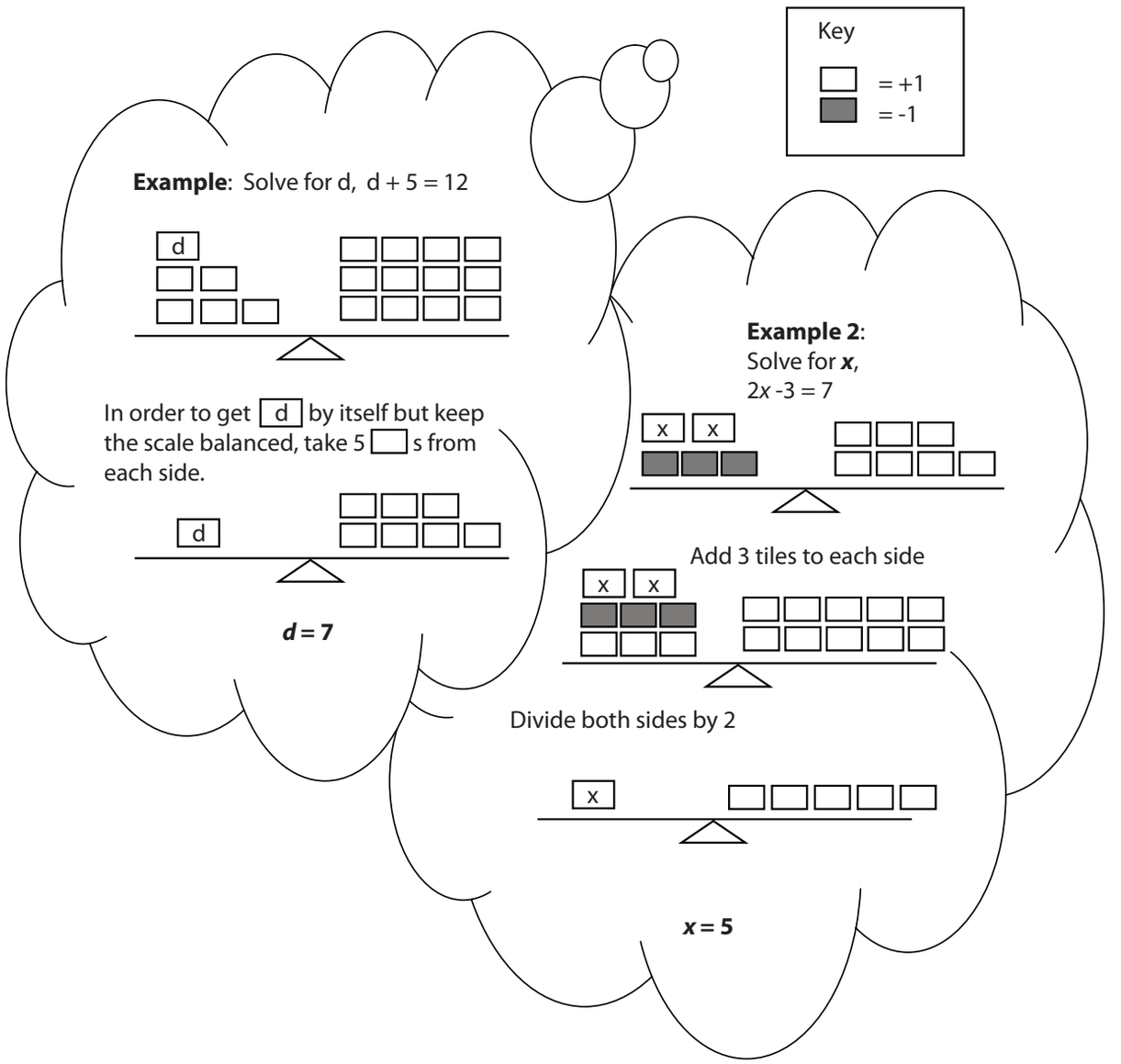
Objective:

- *I can model the preservation of equality.*

Equation: one quantity equal to another quantity. Each quantity may be a number or an algebraic expression.

Example: 8b + 4 = 16

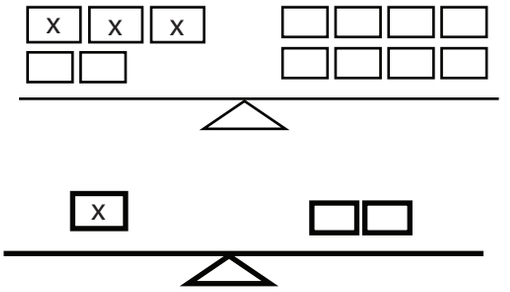
Balance Scale model:



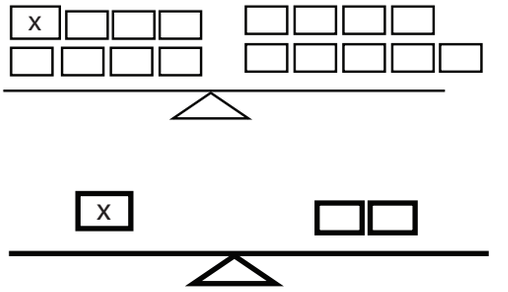
Practice:

Model the solution for the variable using a balance scale model

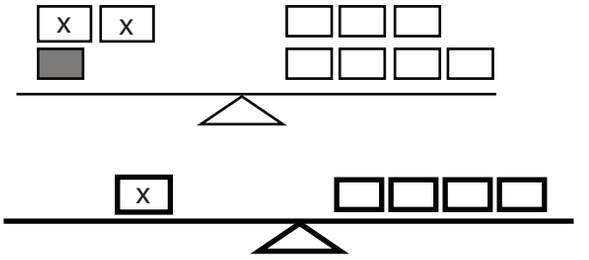
a. $3x + 2 = 8$



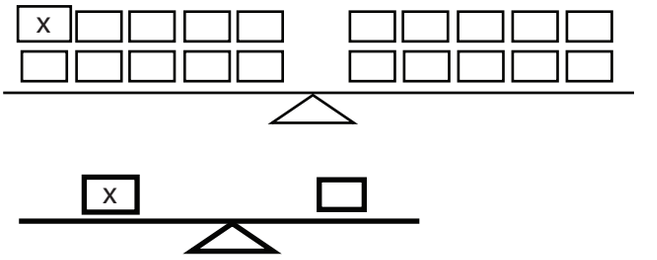
b. $x + 7 = 9$



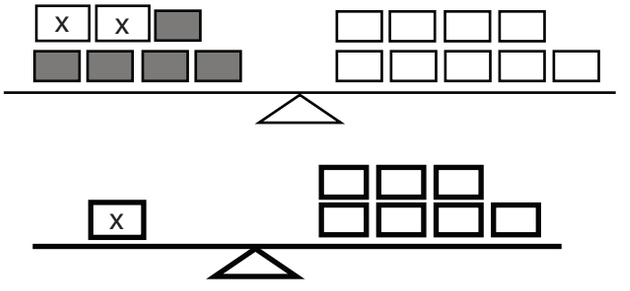
c. $2x - 1 = 7$



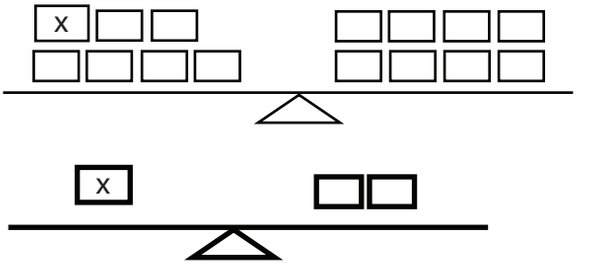
d. $x + 9 = 10$



e. $2x - 5 = 9$



f. $x + 6 = 8$



Unit tile: represented by a single tile.

Each one tile represents.

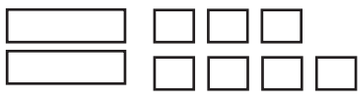
□ = +1 ■ = -1

Remember: □ ■ = 0

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

▭

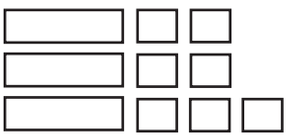
Example:



Means, 2*x* + 7

Practice:

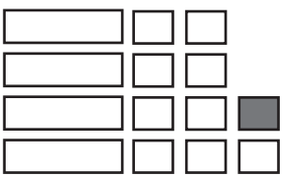
What expression is represented?

a. 

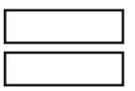
3x + 7

b. 

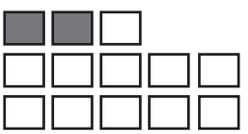
x + 2

c. 

4x + 8

d. 

2x

e. 

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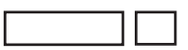
f. 

x + 1

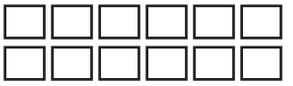
Model integer equations using algebra tiles:

Example:

h – 5 = 12

Left side: (h – 5)

Right side (12)



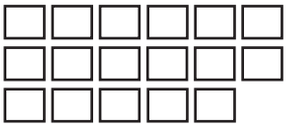
→ To take away tiles we need to make "zero pairs"

→ Whatever happens to one side must also happen to the other side to keep it equal

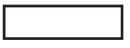
In this case, to get the variable by itself, add 5 positive tiles to both sides.

Left side:

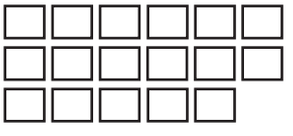
Right side



Left side:



Right side



Therefore, h = 17

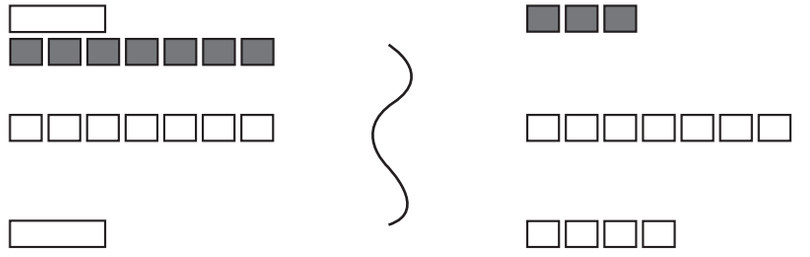
Practice:

Model and solve the equation using Algebra tiles

a. $x - 7 = -3$

Left side: Right side

1. **Equation**
2. **Add zero pairs, then cancel**
3. **Solution**

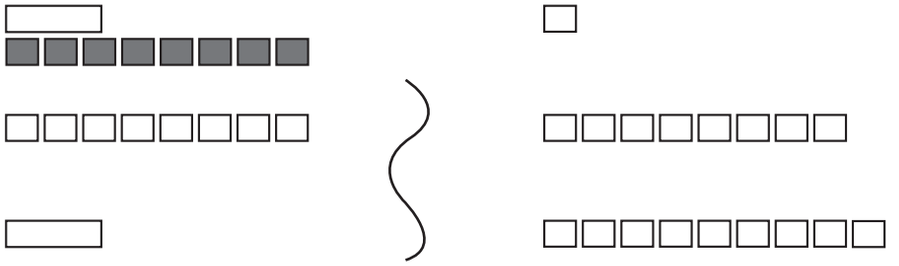


x = 4

b. $x - 8 = 1$

Left side: Right side

1. **Equation**
2. **Add zero pairs, then cancel**
3. **Solution**

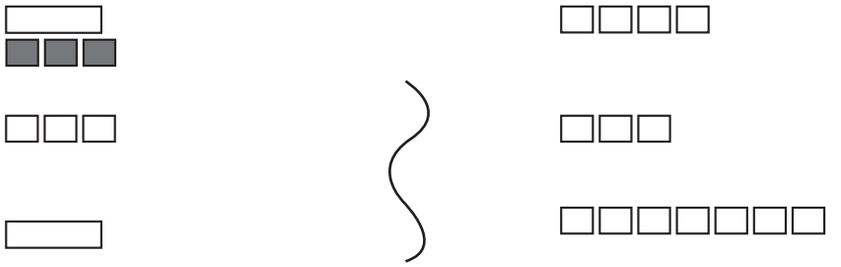


x = 9

c. $x - 3 = 4$

Left side: Right side

1. **Equation**
2. **Add zero pairs, then cancel**
3. **Solution**



x = 7

Summary and Practice:

- *Using what you've learned, answer the following questions.*

1. Compare expressions and equations. What is similar? What is different?

Expressions and Equations

Similarities	Differences
Answers may vary • **Can contain variables** • **Can contain constant terms** • **Used to solve similar problems with different numbers**	**Answers may vary** • **No equal sign in an expression** • **Equal sign in an equation** • **Equations can have two expressions (one on each side of the equal sign)**

2. Circle all numerical coefficients. Underline constant terms.

a. $4b + 5c - 12$

b. $3x - 8y + 3z - 34$

c. $7g + 2h + 25$

d. $6m - 9n$

3. Write an expression for each phrase:

a. Seven more than a number.

n + 7

b. A number multiplied by five.

5n

c. A number decreased by twelve.

n - 12

d. A number divided by four.

$$\frac{\mathbf{n}}{\mathbf{4}}$$

e. Double a number and add three.

2n + 3

f. A number is subtracted from thirty two

32 – n

4. Jillian makes $6 an hour babysitting.

a. Write an expression to represent her earnings.

6h

b. How much does Jillian make if she babysits for 4 hours?

6(4) = $24

c. 6 hours?

6(6) = $36

5. Marg's flower shop sells roses for $2 a stem, lilies for $1, and orchids for $3. If the customer wants a vase, it is an additional $10.

   a. Write an expression that would represent her total price for an arrangement with each flower type in a vase.

      2R + L + 3 OR + 10

   b. How much would Marg charge if a customer orders:

      i. 12 roses and 3 orchids with a vase?

      2(12) + 3(3) + 10 = 24 + 9 + 10 = $43

      ii. 5 roses, 7 lilies, and 2 orchids, no vase?

      2(5) + (7) + 2(2) = 10 + 7 + 4 = $21

      iii. 12 roses, 2 lilies, 2 orchids with a vase?

      2(12) + (2) + 2(2) + 10 = 24 + 2 + 4 + 10 = $40

6. Evaluate the expression.

   a. 8a + b for a = 2 and b = 4.

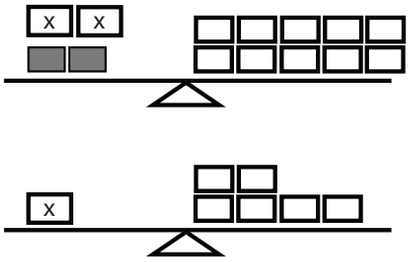
      8(2) + (4)
      = 16 + 4
      = 20

   b. 3(a - 2) + b for b = 8 and a = 5.

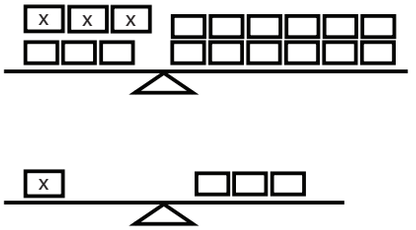
      3(5 -2) + 8
      = 3(3) + 8
      = 9 + 8
      = 17

7. Model the equation and the solution using a balance scale model.

   a. $2x - 2 = 10$



   b. $3x + 3 = 12$



8. Model and solve the equation using Algebra tiles

   a. $x - 2 = -3$

Left side: Right side

x = -1

   b. $2x + 2 = 6$

Left side: Right side

x = 2

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