

Name: _____

Start date: _____

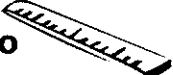
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Math 8 K&E

Equations

Equations

Unit: Equations	I Can	Do 
1. Describe everyday situations using variables	I can change identify variables and translate words to equations.	Practice: pp. 102–104
2. Represent equality by balancing or using models and diagrams	I can use algebra tiles to solve type I equations.	Practice: pp. 106–108 Mathpower 8: p. 175 Practice: pp. 110, 112, 114
3. Use Pre-Algebra strategies to solve equations with one unknown and with whole numbers	I can solve type I equations mathematically.	Practice: pp. 116–117 Mathpower 8: p. 181 Practice: pp. 119, 121 Mathpower 8: p. 183 Practice: pp. 126–128 Mathpower 8: pp. 181 (1–28), 182 (1–31), 183 (1–24)
4. Assessment		Unit Test: pp. 131–136

↳ NOTES:

I can... pick out variables and change words to equations.

Variables: are letters or symbols used to represent a number

Example: x , y , z

The following are KEY words used in equation solving.

Add	more, add, plus, sum, greater, increase	+
Subtract	minus, difference, less, decrease	-
Multiply	times, product	\times
Divide	divide, quotient	\div
Equal to	is, equals	=

Translate the equation to words:

Look at the operation being used (+, -, \times , \div) and use one of the key words to replace it.

$x - 5 = 7$ \longrightarrow a number **decreased** by 5 is 7

Translate the sentence into an equation:

Look for key words and change them to symbols.

Four **more** than a **number is** 2 \longrightarrow $4 + x = 2$

Six times a number is 12 \longrightarrow $6x = 12$



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Practice: Translate the Equation to Words and an Equation

1. Pick out the variable in each equation.

- Example:**
- $x + 5 = 8$ Variable = x
 - $6 - x = 4$ _____
 - $10 \div y = 2$ _____
 - $w \times 3 = 9$ _____

2. Write each equation in words.

- a. $x - 2 = 8$ _____
- b. $2m = 10$ _____
- c. $\frac{n}{4} = 3$ _____
- d. $y + 2 = 11$ _____

3. Write an equation for each sentence.

- a. A number plus six is nine. _____
- b. A number decreased by one is five. _____
- c. Four times a number is twelve. _____
- d. A number divided by six is three. _____

**Practice: Writing Equations**

Use page two of your notes to help you change the words into numbers.

Translate the words to an equation	Numbers
1. Five more than a number is ten.	$5 + n = 10$
2. Six less than a number is five.	
3. The product of a number and five is thirty.	
4. When three is added to twice a number, the result is nineteen.	
5. When five is subtracted from three times a number, the result is thirteen.	
6. The length (l) increased by four is eleven.	
7. The perimeter (p) decreased by six is forty.	
8. Five times the width (w) is sixty.	



Name: _____ Date: _____

Practice: Variables and Equations

Using your notes on the next page, sketch the following tiles:


positive one
negative one
positive x
negative x

NOTES:

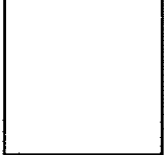
I can use algebra tiles to solve type 1 equations.

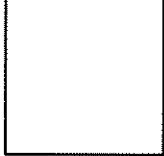
Algebra Tiles Activity

Key:

 = 1 (positive)  = x (positive)

 = -1 (negative)  = $-x$ (negative)

 = x^2

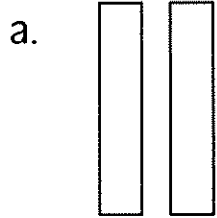
 = $-x^2$

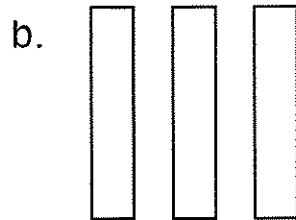


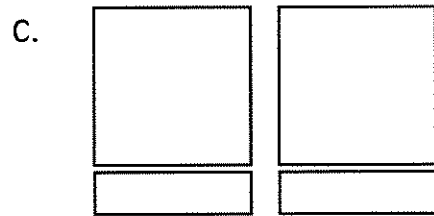
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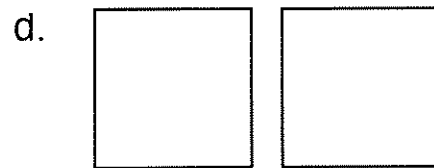
Practice: Writing Equations

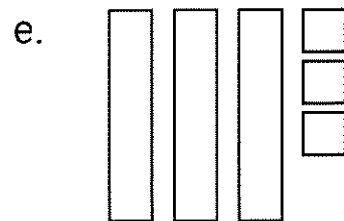
1. Write the expression represented by each group of tiles.











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Practice: Writing Equations

2. Use tiles to model the following expressions. Draw your solution.

a. $4x$

b. $2x^2$

c. $-4x$

d. $3x^2 - 2x$

e. $2x - x^2$

f. $\frac{x}{2} = 3$

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Page 175—Text

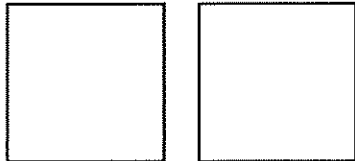


Name: _____ Date: _____

Practice: Writing Equations

$\square \square = 0$

$\begin{array}{c} \text{---} \\ \text{---} \end{array} = 0$



$= 0$

Each pair represents zero!

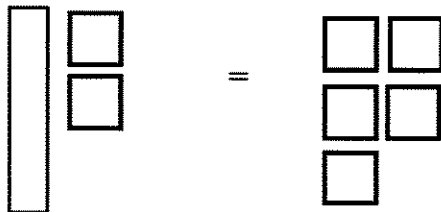
3. Complete the following table.

Tile Display	Simplified Form	Expression
<p>a.</p>		
<p>b.</p>		<p>2x</p>
<p>c.</p>		

NOTES:

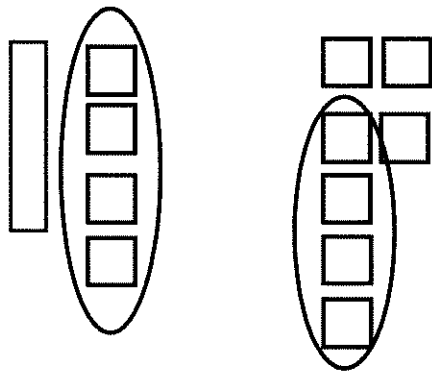
The goal of solving any equation is to get the variable (the letter) by itself.

Solve $x + 2 = 5$ by using algebra tiles.

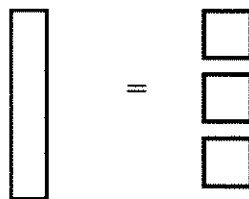


How do you get (x) or the black tile by itself?

Get rid of the two black tiles on the left by adding two white small tiles on each side of the equal sign and cancel your zero tiles.



This is what you have left:



This is the same as saying $x = 3$.



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Practice: Equations

Practice using algebra tiles. Draw out the equation where it says tile display.

Equation	Tile Display
$x + 1 = 3$	
$x + 3 = 4$	
$x + 2 = 5$	
$x - 1 = 2$	
$x - 2 = 2$	
$x - 1 = 4$	

NOTES:

Equal Equations

How do you know if equations are equal?

For example: $3 \times 4 = 2 \times 6$

We can check to see if the equation is true by multiplying each side of the equation.

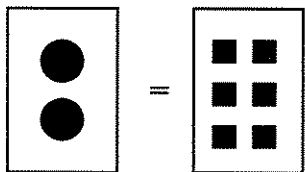
$$3 \times 4 = 2 \times 6$$

$$12 = 12$$

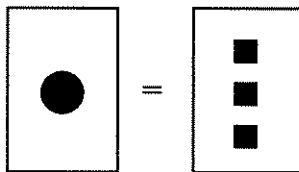
If the sides are equal, the equation is true.

We can show the same thing with shapes.

1. If



Then



2. Try again.

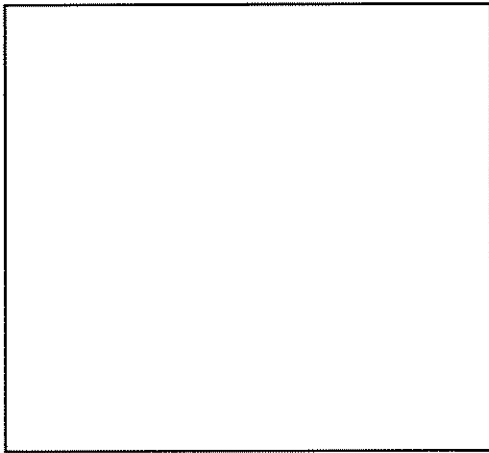




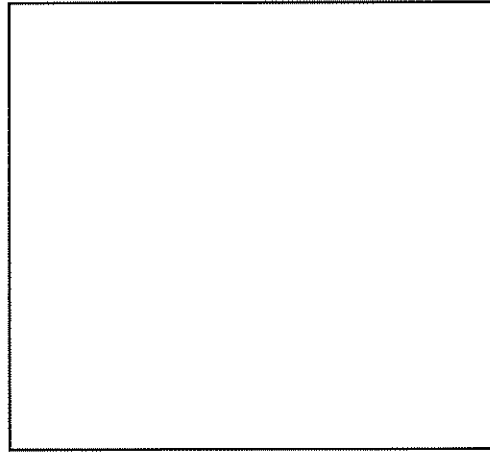
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Practice: Equal Equations

1. Draw your own.



=



NOTES:

Equal Equations

Prove that the equations below are equal.

Example 1: $8 \times 3 = 7 \times 4$

Step 1 ➤ Solve each side first.

$$\begin{aligned} 8 \times 3 &= 7 \times 4 \\ &= 24 \quad = 28 \end{aligned}$$

Step 2 ➤ $24 \neq 28$ (\neq means not equal)

Example 2: $10 \times 2 = 5 \times 4$

Step 1 ➤ Solve each side first.

$$\begin{aligned} 10 \times 2 &= 5 \times 4 \\ &= 20 \quad = 20 \end{aligned}$$

Step 2 ➤ $20 = 20$ (these equations are equal)



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Practice: Equal Equations

Solve. Don't forget to use your notes on the previous page.

1. $3 \times 4 = 5 \times 3$

2. $6 \times 4 = 8 \times 3$

3. $9 \times 3 = 4 \times 8$

4. $5 \times 5 = 6 \times 7$

5. $10 \times 3 = 5 \times 6$

↳ NOTES:

Solving Equations Using Addition

To solve an equation, you need to find the value of x (variable) in the equation.

Example: $x + 5 = 12$

Think: What plus 5 will give me 12?

Step 1 ➤ Look at the sign and do the opposite.

$$\begin{array}{r} x + 5 = 12 \\ - 5 \quad - 5 \end{array}$$

* What you do to one side, you must do to the other.

Step 2 ➤ Solve – subtract 5 from each side of the equation.

$$\begin{array}{r} x + 5 = 12 \\ - 5 \quad - 5 \\ \hline \end{array}$$

$$x = 7$$

Step 3 ➤ Check your work.

$$\underline{7} + 5 = 12$$



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Practice: Solving Equations Using Addition

1 of 2

Show your work.

1. $x + 3 = 11$

2. $y + 2 = 24$

3. $x + 14 = 28$

4. $x + 7 = 10$

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Practice: Solving Equations Using Addition

2 of 2

5. $x + 13 = 33$

6. $x + 4 = 16$

7. $x + 9 = 14$

8. $x + 6 = 17$

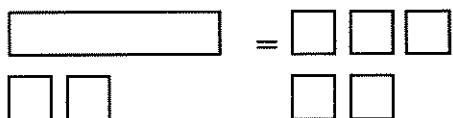
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Page 181—Adding &
Subtracting

NOTES:

Solving Equations Using Algebra Tiles

Concept:



The tiles to the left represent $x - 2 = 5$.

What happens if we add two black tiles to each side?

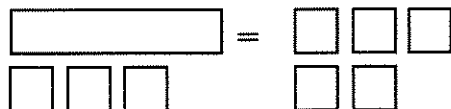
$$x - 2 = 5$$

What is the value of x ?

When we want to find out the value of x , we must arrange our equation so that x is alone. How do you get x alone?

Example 1: Solve $x - 3 = 5$

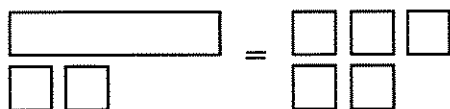
$$\begin{array}{r} x - 3 = 5 \\ + 3 \quad + 3 \\ \hline x \quad \quad 8 \end{array}$$



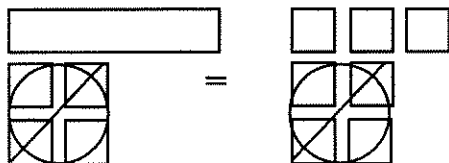
$$x = 8$$

Solution: Add 3 to both sides of the equation.

Example 2: Solve $x + 2 = 5$



Solution: Add -2 to both sides.





Practice: Solving Equations Using Algebra Tiles

Solve each of the following equations represented by the tiles.
(Hint: arrange x by itself.)

1. =

2. =

3. =

4. =

5. =

📌 NOTES:

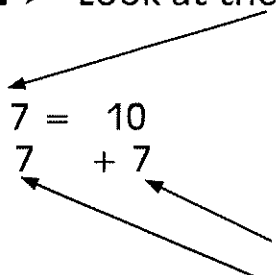
Solving Equations Using Subtraction

To solve an equation, you need to find the value of x (variable) in the equation.

Example 1: $x - 7 = 10$

Think, what minus 7 will give me 10?

Step 1 ➤ Look at the sign and do the opposite.

$$\begin{array}{r} x - 7 = 10 \\ + 7 \quad + 7 \end{array}$$


* What you do to one side, you must do to the other side.

Step 2 ➤ Solve – add 7 to each side of the equation.

$$\begin{array}{r} x - 7 = 10 \\ + 7 \quad + 7 \\ \hline x = 17 \end{array} \quad (-7 + 7 = 0) \quad (10 + 7 = 17)$$

Step 3 ➤ Check your work.

$$\underline{17} - 7 = 10$$

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Practice: Solving Equations Using Subtraction

Show your work.

1. $x - 7 = 14$

2. $y - 10 = 35$

3. $x - 3 = 1$

4. $x - 2 = 3$

5. $x - 15 = 12$

6. $x - 8 = 24$

7. $x - 4 = 16$

8. $y - 7 = 29$

NOTES:

Solving Equations Using Algebra Tiles

Concept:

$$\begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array} = \begin{array}{|c|c|c|c|} \hline \square & \square & \square & \square \\ \hline \square & \square & \square & \square \\ \hline \end{array}$$

The tiles to the left represent $2x = 8$.

$$2x = 8$$

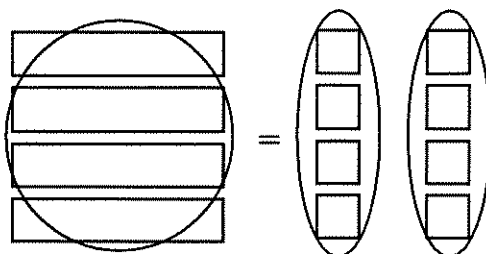
How many equal parts are on the left-hand side of the equation?

Divide the right-hand side of the equation into the same number of equal parts. What does x equal?

When we want to find the value of x , we must arrange our equation so that x is alone. How do you get x alone?

Hint: Whatever operation is being applied to x , we must apply the opposite operation to isolate x (add vs. subtract, multiply vs. divide).

Example 1: Solve $4x = 8$



Solution: Divide both sides by 4

$$\frac{4x}{4} = \frac{8}{4}$$

$$\square = \square \square$$

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



Solution: Multiply both sides by 3

$$3 \frac{x}{3} = 3(4)$$

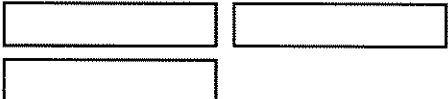
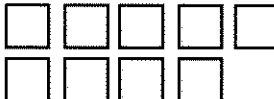
$$x = 12$$



$$\square = \begin{array}{|c|c|c|c|} \hline \square & \square & \square & \square \\ \hline \square & \square & \square & \square \\ \hline \square & \square & \square & \square \\ \hline \end{array}$$


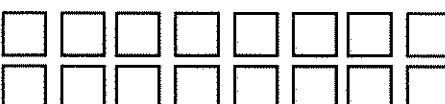


Practice: Solving Equations by Division and Multiplication

Solve each of the following equations represented by the tiles.

1.  = 

2.  = 

3.  = 

4.  = 



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Practice: Solving Equations by Multiplication

Solve the following equations using multiplication.

1. $\frac{x}{5} = 5$

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

3. $\frac{y}{7} = 4$

4. $\frac{m}{5} = 1$

5. $\frac{m}{7} = 8$

6. $\frac{y}{4} = 5$

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Practice: Solving Equations by Division

Solve the following equations using division.

1. $6x = 12$

2. $2y = 10$

3. $11r = 22$

4. $3s = 12$

5. $12m = 24$

6. $9q = 27$

7. $3x = 21$

8. $6r = 24$

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Practice: Solving Equations

1 of 3

1. $x - 3 = 8$

2. $y + 9 = 24$

3. $y - 5 = 3$

4. $x + 15 = 45$

Name: _____ Date: _____



Practice: Solving Equations 2 of 3

5. $p + 3 = 12$

6. $a - 5 = 7$

7. $2x = 12$

8. $3x = 18$



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Practice: Solving Equations

3 of 3

9. $5x = 45$

10. $\frac{x}{2} = 6$

11. $\frac{y}{4} = 2$

12. $\frac{y}{7} = 4$

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Page 181—#1-28

Page 182—#1-31

Page 183—#1-24

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Practice: One-step Equations—Addition, Subtraction,
Multiplication, and Division 1 of 2

1. $x + 11 = 23$	2. $y - 4 = 10$	3. $44 + z = 50$
4. $a - 14 = 14$	5. $73 + b = 83$	6. $c - 111 = 9$
7. $m + 5 = -10$	8. $169 = n - 32$	9. $p + 1 = 1$
10. $101 = 72 + d$	11. $500 = e + 413$	12. $13 = f - 65$



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Practice: One-step Equations—Addition, Subtraction,
Multiplication, and Division 2 of 2

13. $2.7 + g = 72$	14. $h - 3.2 = 5.2$	15. $i - 2.5 = 27.6$
16. $3j = 123$	17. $\frac{k}{5} = 45$	18. $7q = 91$
19. $\frac{r}{11} = 12$	20. $112 = 5s$	21. $\frac{t}{3} = 21$
22. $72 = \frac{x}{2.4}$	23. $7 = 2.5y$	24. $6z = 45$

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Equations – Unit Test

Part A > Multiple Choice

1. Seventeen decreased by a number is twelve can be written as

a. $17 - x = 12$ b. $x - 17 = 12$

c. $17x = 12$ d. $17 + x = 12$

2. A number less than five equals seven can be expressed as

a. $5x = 7$ b. $x - 5 = 7$

c. $5 - x = 7$ d. $x + 5 = 7$

3. $\frac{x}{5} = 11$ can be written as

a. the product of a number and five is eleven

b. a number decreased by five is eleven

c. a fifth of a number is eleven

d. a number increased by five is eleven

Part B ➤ Write each statement using numbers and variables (letters).

Example:

two times a number increased by one $\longrightarrow 2n + 1$

1. Six more than a number is ten.

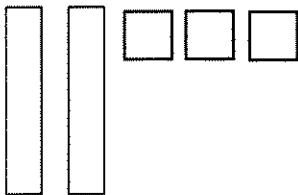
2. Carmen's age decreased by five is eighteen.

3. A number times three is twenty-one.

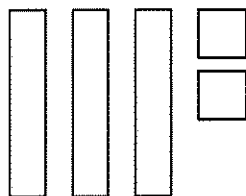
4. Will's age in three years will be fourteen.

Part C ➤ Write an expression for each of the following.

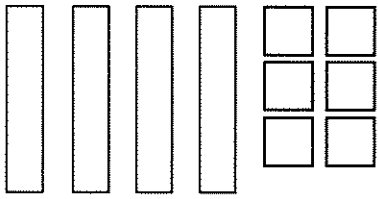
1.



2.



3.



Part D ➤ Model each expression using algebra tiles.

a. $x + 3$

b. $5x - 2$

Part E ➤ Solve the following equations.

Show all of your work!

a. $n - 11 = 3$

b. $7x = 35$

4. Which equation has a solution so that $x = 24$?

a. $x - 4 = 20$

b. $16 = 4x$

c. $x + 11 = 16$

d. $4 + x = -8$

Part F ➤ Write each of the following in words.

Example:

$x - 6 \longrightarrow$ a number decreased by six

a. $15 - x = 12$ _____

b. $\frac{n}{5} = 2$ _____

c. $m + 9 = 23$ _____

d. $\frac{k}{3} = 21$ _____

e. $14 + k = 20$

f. $m - 9 = 0$

g. $8w = 64$

h. $\frac{m}{4} = 10$
