Unit 6 Summary

Prior Learning	Grade 7, Unit 6	Future Learning
Grade 6 • Solving one-step equations • Distributive property Grade 7, Unit 5 • Operations with positive and negative numbers	• Creating equations and tape diagrams • Solving equations • Writing, solving, and graphing inequalities	Grade 7, Unit 7 • Writing equations and solving problems with angle relationships Grade 8 • Solving linear equations with variables on both sides • Solving systems of linear equations • Solving equations with no solution and infinitely many solutions

Equations and Tape Diagrams

There are many different ways to represent the same situation.

Here are two similar situations:

Situation	Equation	Tape Diagram
Some decks of playing cards in Italy and Spain have 40 cards. There are four suits. Each suit has 3 face cards and x non-face cards.	$40 = 4(x + 3)$	40 $x+3$ | $x+3$ | $x+3$ | $x+3$
A chef at a Burmese restaurant makes 40 quarts of mohinga, a noodle and fish soup. She uses 3 quarts now and divides the rest equally into 4 containers to freeze.	$40 = 4x + 3$	40 x | x | x | x | 3

In the first situation, each part of the tape diagram is 10 units, so $x = 7$ because $7 + 3 = 10$.

In the second situation, the part of the tape diagram with 4 groups of x is 37 units, so $x = 9.25$ because $4(9.25) = 37$.

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Solving Equations

Some equations can be represented by hangers where both sides are balanced. Solving an equation is like determining an unknown weight of a shape on a hanger.

$$14 = 2x + 6$$

$14 = 2x + 6$

$8 = 2x$

$$14 = 2(x + 3)$$

$14 = 2(x+3)$

$7 = x + 3$
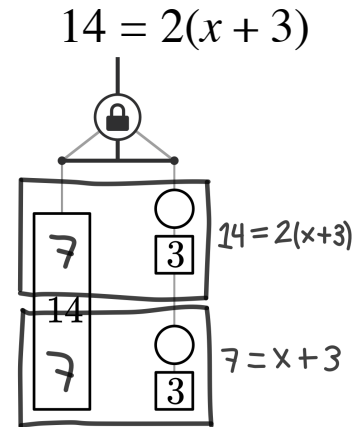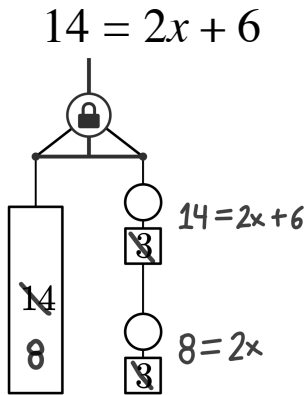
For some equations, it can be helpful to write one side using fewer terms first so that the equation looks more familiar before we start solving steps. For example:

$$-2(x-5) + 8x = 14 \quad \text{Multiply } (x-5) \text{ by } -2.$$
$$-2x + 10 + 8x = 14 \quad \text{Add } -2x \text{ and } 8x.$$
$$6x + 10 = 14 \quad \text{This equation looks more familiar.}$$

Inequalities

We can use inequalities to describe a range of numbers. Here is an example of a situation that could be described using an inequality.

The cost to rent a scooter is $2.00, plus another $0.30 per minute you ride.

Callen has a $10 credit.

For how many minutes could he ride?

$$0.30x + 2 \leq 10$$

Determine when he would spend exactly $10.

$$0.30x + 2 = 10$$

$$x = 26.\overline{66}$$

Since he cannot ride part of a minute, Callen could ride anywhere between 0 and 26 minutes.

Try This at Home

Equations and Tape Diagrams

1.1 Draw a tape diagram to represent the equation $3x + 6 = 24$.

1.2 Draw a tape diagram to represent the equation $24 = 3(x + 6)$.

1.3 Decide which equation-diagram pair above matches this story. Explain your reasoning.

> *Diya made three different-flavored pastries for her family. She made the pastries one at a time. For each, she measured 6 tablespoons of flour and a little more to keep the dough from sticking. In total, she used 24 tablespoons of flour.*

1.4 Write a story that goes with the other equation-diagram pair.

Solving Equations

Solve each equation.

2.1 $3x + 6 = 24$ 2.2 $24 = 3(y + 6)$ 2.3 $-2(x + 6) = 30$ 2.4 $5 - 2(x + 6) = 30$

Match each expression with an equivalent expression from the list. One expression in the list will be left over.

3.1 $5x + 8 - 2x + 1$ • $3x + 7$

3.2 $6(4x - 3)$ • $3x + 9$

3.3 $(5x + 8) - (2x + 1)$ • $-3(4x - 3)$

3.4 $-12x + 9$ • $24x + 3$

                                   • $24x - 18$

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Inequalities

Malik has saved 10.50. His elderly neighbor gives him 3 every time he does a chore at his house. Malik wants to know how many chores he needs to do in order to have at least 30.

4.1   Will Malik reach his goal if he does chores for his neighbor 8 times?

4.2   Which inequality could Malik write to represent his situation? Explain how you know.

     A. $3c + 10.50 \leq 30$

     B. $3c + 10.50 \geq 30$

     C. $3c - 10.50 \leq 30$

     D. $3c - 10.50 \geq 30$

4.3   Solve the inequality you chose.

4.4   Use your solution to answer Malik's question.

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Unit 7.6, Family Resource

Solutions:

1.1

24			
x	x	x	6

1.2

24		
$x+6$	$x+6$	$x+6$
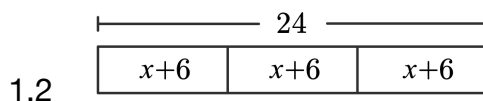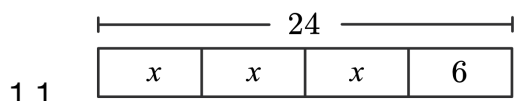
1.3 $3(x + 6) = 24$. *Explanations vary.* Each of the pastries uses 6 tablespoons plus a little more, so there are 3 groups and each group has more than 6 tablespoons in it.

1.4 *Responses vary.* My brother, my half sister, and I open up a new box of 24 cookies. Yum! We each eat the same number so it's fair. When we're done, there's 6 left over for our mom.

Strategies vary.

2.1	**2.2**	**2.3**	**2.4**
$3x + 6 = 24$	$24 = 3(x + 6)$	$-2(x + 6) = 30$	$5 - 2(x + 6) = 30$
$3x = 18$	$8 = x + 6$	$-2x - 12 = 30$	$5 - 2x - 12 = 30$
$x = 6$	$2 = x$	$-2x = 42$	$-2x - 7 = 30$
		$x = -21$	$-2x = 37$
			$x = -\dfrac{37}{2}$

3.1 $5x + 8 - 2x + 1 = 3x + 9$

3.2 $6(4x - 3) = 24x - 18$

3.3 $(5x + 8) - (2x + 1) = 3x + 7$

3.4 $-12x + 9 = -3(4x - 3)$

4.1 Yes! Malik will make $3(8) = 24$ dollars. If we add that to the $10.50 he already has, that is more than $30.

4.2 $3c + 10.50 \geq 30$. The $3c + 10.50$ is like how much money he earns, and he wants to earn *at least* $30, so the total needs to be greater than or equal to 30.

4.3 $3c + 10.50 \geq 30$

$$3c + 10.50 = 30$$
$$3c = 19.50$$
$$c = 6.5$$

$$c \geq 6.5$$

4.4 Since Malik cannot do half of a chore, he needs to do 7 or more chores to reach his goal.