Algebra Section 1.4

Pages 21-26

Goals: "I will translate verbal sentences into equations or inequalities"

"I will decide if a given value is a solution to an equation or inequality"

Vocabulary:

Inequality: An open sentence that contains one of these symbols

$$<, >, \leq, \geq$$

Writing an equation or inequality

Math Verbs:				
The same as	more than	less than	at least	at most
equal to	fewer than	no more than	no less than	greater than

Let's look at some inequalities.

<u>Example</u>: $x > 6$

What do we know? x is greater than 6

Can x be exactly 6?   No. There is not a $\geq$ sign.

<u>Try These</u>:

a) $y < 12$

What do we know? y is <u>less than</u> 12

Can y be exactly 12?   No

b) $b \geq 2$

What do we know? b is <u>greater than or equal to</u> 2

Can b be exactly 2?   Yes

Try These:

Write the equation or inequality. For each inequality give one value that will make the statement true. The first two have been done for you.

"A number *x* is 5"   *x*=5

"6 is more than a number *k*"   6>*k*   *k* can be 2

"A number *n* is at least 11" $n \geq 11$

                                                                                    n can be 18

"A number *m* is fewer than 14" $m < 14$

                                                                                    m can be 3

"23 is no more than the number *a*" $23 \leq a$

                                                                                    a can be 50

Try These: These are a bit more challenging.

Write the equation or inequality. For each inequality give at least one value that will make the statement true.

Hint: Write the expression(s) first and then choose the correct sign.

"The difference between 12 and a number k **is** 8." $12 - k = 8$

"The quotient of a number p and 12 **is** 3." $\frac{p}{12} = 3$

"The quotient of a number p and 12 **is at least** 3." $\frac{p}{12} \geq 3$ *p* can be 48

"The sum of a number y and 15 **is at most** 5." $y + 15 \leq 5$ *y* can be -12

"The product of 7 and a number q **is more than** 10." $7q > 10$ *q* can be 2

"The sum of a number *n* and 12 **is less than** 18"   n + 12 < 18   *n* can be 3

"Your math grade (g) needs to be at least a 75" $g \geq 75$ g can be 75

"The building (b) needs to be at greater than 80 feet tall" $b > 80$ b can be 90

"Your height (h) needs to be at least 48 inches to get on the ride" $h \geq 48$ h can be 66

"The cat (c) should eat no more than 2 cups of food a day" $c \leq 2$ c can be 1.5

"You need to make (p) more than \$120 to pay off your debt" $p > 120$ p can be 150

Solution (of an equation or inequality):

Determine if the number listed is a SOLUTION to the equation or inequality.

Example 1:

$$3 + 2x = 15 \quad \text{for} \quad x=3$$

Input the value $3 + 2 \cdot 3 = 15$ $x=3$

Simplify $3 + 6 = 15$ Always follow order of operations!!

$9 = 15$

Check   Does 9=15?   No! This **is not** a solution of the equation!

Example 2:

$$12 < 4x - 5 \quad \text{for} \quad x=7$$

Input the value $12 < 4 \cdot 7 - 5$ $x=7$

Simplify $12 < 28 - 5$ Always follow order of operations!!

$12 < 23$

Check   Is 12<23? Yes! This **is** a solution of the inequality.

Try These:

a) $8 - 2x = 2$ $x = 3$

Input: $8 - 2 \cdot 3 = 2$

Simplify: $8 - 6 = 2$

$2 = 2$

Yes or No?

Yes! 2=2
This is a solution of the equation.

b) $2z + 5 \geq 12$ $z = 1$

Input: $2 \cdot 1 + 5 > 12$

Simplify: $2 + 5 > 12$

$7 > 12$

Yes or No?

No! 7 is not > 12
This is not a solution of the equation.

c) $4 < 7 - q$ $q = 3$

$4 < 7 - 3$
$4 < 4$

Yes or No?

No! 4 is not < 4
This is not a solution of the equation.

d) $18 > 2x - 3$ $x=4$

$18 > 2 \cdot 4 - 3$
$18 > 8 - 3$
$18 > 5$

Yes or No?

Yes! 18 is > 5
This is a solution of the equation.

Check whether the given number is a solution:

(the number given comes after the semi-colon)

a) $9 - x = 4; 5$ $(x=5)$

$9 - 5 = 4$
$4 = 4$

Yes or No?

Yes! 5 is a solution of the equation.

b) $b + 5 < 15; 7$ $(b=7)$

$7 + 5 < 15$
$12 < 15$

Yes or No?

Yes! 7 is a solution of the equation.

Challenge:

Combining inequalities:

There will be two signs. Give at least one value that could be a solution of the inequality

<u>Example:</u>

A number *n* is greater than 5 and less than 13

Hint: Put the variable in the middle and the two numbers on either side. Then put in the signs.

$$5 < n < 13$$

<u>Try These:</u>

a) *x* is greater than 3 and less than 9

$3 < x < 9$ *x* could be 6

b) A number *y* is no less than 5 and no more than 13

$5 \leq y \leq 13$ *y* could be 8

c) A number *q* is at least 5 and less than 17

$5 \leq q < 17$ *q* could be 11

d) A number *g* is more than 5 and no less than 18

$5 < g \leq 18$ *g* could be 10

e) A number *n* is at least 1 and less than 2

$1 \leq n < 2$ *n* could be 1.4

Word Problems:

a) The last time you and 3 friends went to a mountain bike park, you had a coupon for $10 off the total purchase. Your final total was $17 for 4 tickets (after the $10 was taken off). How much was the bill before the $10 was taken off? $27

How much did each ticket cost? $6.75

$4x - 10 = 17$ 4 tickets cost $27.   1 ticket costs $6.75

b) A basketball player scored 351 points last year. She wants to beat her points from last year. If the player plays 18 games this year, will an average of 20 points per game be enough to beat least year's total?

How many points did she score last year?   351

How many points did she score this year?   360

Is that better than last year's total?   Yes!

$351 < 18 \cdot 20$
$351 < 360$

c) Tyler would like to make no less than $610 selling coffee mugs online. If he sells 28 mugs for $22 each, will he achieve his goal?

What is his goal? $610

How much did he make selling mugs online? $616

Is this more than his goal?   Yes!

$610 \leq 28 \cdot 22$
$610 \leq 616$