## 1.4: Write Equations and Inequalities

Goals: *Translate verbal sentences into equations or inequalities
*Decide if a given value is a solution to an equation or inequality
Equation - a mathematical sentence with an $\qquad$ equals $\qquad$
$\qquad$ sign $\qquad$ -

Inequality - a mathematical sentence with an $\qquad$ inequality $\qquad$ sign $\qquad$ -
$<$ $\qquad$ less $\qquad$ than
$>$ __greater_ $\qquad$ than
$\leq$ $\qquad$ less $\qquad$ than or $\qquad$ equal $\qquad$ to
$\geq$ __ greater $\qquad$ than or $\qquad$ equal $\qquad$ to

## **IS**

The word __IS $\qquad$ MUST appear in order to have an $\qquad$ equation $\qquad$ or
$\qquad$
$\qquad$ _.
"is", "is the same as", "is equal to" means to put an $\qquad$ equals $\qquad$
$\qquad$ sign $\qquad$ .
"is less than (or equal to)", "is greater than (or equal to)" means to put an $\qquad$ inequality sign $\qquad$ .

Translate the following verbal phrases into equations or inequalities. Be sure to underline key words or phrases.

Ex: twice the sum of a number $x$ and 6 is greater than 5

$$
2(x+6)>5
$$



$$
3\left(\frac{y}{4}\right) \leq 3
$$

Ex: The product of $x$ and 5 , minus 4 , is greater than 6 .

$$
5 x-4>6
$$

Ex: The sum of $b$ and 11 , divided by 14 is 12 .

$$
\frac{b+11}{14}=12
$$

**Ex: 5 less than the product of 8 and $x$ $8 x-5$

Ex: The product of 6 and a number is at least 24

$$
6 x \geq 24
$$

Ex: The quotient of a number $p$ and 12 is at least 30

$$
\frac{p}{12} \geq 30
$$

Ex: The quotient of a number and 2 is at most 16

$$
\frac{x}{2} \leq 16
$$

## Write an inequality to represent the situation:

Ex: your math grade $g$, must be at least an 80 this year
$g \geq 80$

Ex: The temperature can be at most $105^{\circ}$ or you will get sick.

$$
T \leq 105
$$

Solution - the $\qquad$ value $\qquad$ of the variable that makes the equation $\qquad$ true $\qquad$ . (It $\qquad$ _works $\qquad$ when you $\qquad$ substitute $\qquad$ it in)

Check whether 3 is a solution to the equation or inequality. Yes or No.

Ex: $8-2 x=2$

$$
\begin{aligned}
8-2(3) & =2 \\
8-6 & =2 \\
2 & =2 \text { YES }
\end{aligned}
$$

Ex: $2 z+5>12$

$$
\begin{aligned}
2(3)+5 & >12 \\
6+5 & >12 \\
11 & >12 \quad \mathrm{NO}!
\end{aligned}
$$

Ex: $4 x-5=6$

$$
\begin{aligned}
4(3)-5 & =6 \\
12-5 & =6 \\
7 & =6 \mathrm{NO}!
\end{aligned}
$$

Ex: $5+3 n \leq 20$

$$
\begin{aligned}
5+3(3) & \leq 20 \\
5+9 & \leq 20 \\
14 & \leq 20 \text { YES! }
\end{aligned}
$$

Check whether 5 is a solution to the equation or inequality. Yes or No.

Ex: $24-3 d=9$
$9=9$
Yes

Ex: $2 w-7 \leq 3$
$3 \leq 3$
Yes

Ex: $3 x+4=18$

$$
\begin{gathered}
19=18 \\
\text { No }
\end{gathered}
$$

Ex: $4+3 p>19$
$19>19$
No

Check whether the given number is a solution: (the number given comes after the semi-colon)
Ex: $9-x=4 ; 5$
$9-5=4$
$4=4$
Yes
Ex: $b+5<15 ; 7$
$7+5<15$
$12<15$
Yes

Ex: $2 n+3 \geq 21 ; 9$
$21 \geq 21$
Yes

Ex: The last time you and 3 friends went to a mountain bike park, you had a coupon for $\$ 10$ off the total purchase and paid $\$ 17$ for 4 tickets.
a) Identify a variable to represent what you don't know.
$x$ : the cost of one ticket
b) Write an equation to represent the situation.
$4 x-10=17$
c) Can you find out what the cost would have been if the group did not have a coupon?
*Add 10 to the price the group paid, so they should have paid $\$ 27$ without a coupon.
d) Can you find the cost of one regular price ticket?

Divide the price they should have paid by 4 , since there are 4 people. So they each should have paid \$6.75

Ex: A basketball player scored 351 points last year. The player plans on playing in 18 games this year.
a) Choose a variable to represent what you don't know.
$p$ : the number of points he scores per game
b) Write an inequality to represent the situation.
$18 p>351$
c) Will an average of 20 points per game be enough to beat least year's total?

$$
\begin{gathered}
18(20)>351 \\
360>351 \\
\text { Yes }
\end{gathered}
$$

Ex: Tyler would like to make no less than $\$ 610$ selling coffee mugs online. He plans to sell mugs for $\$ 22$ each. Write an inequality to represent the situation, then decide if he sells 28 mugs if he will reach his goal.
$x$ : The number of mugs he sells
$22 x \geq 610$
Yes, if sells 28 mugs he will make $\$ 616$

