

1. Breaking down the bill...

Write an equation that represents the total cost:

$$\begin{aligned}
 \text{Total Cost} &= \text{Monthly Charge} + \text{Smartphone Access} + \text{Extra Data:} \\
 & \quad \text{500MB} \qquad \qquad \qquad \text{per 500MB} \\
 & = \$30 + \$80 + \text{per 500MB, } \$15 \\
 & = \$110 + 15x
 \end{aligned}$$

per 500MB

ADDITIONAL 500 MB OVER CHARGE

2. The bill says that \$30 covers "500 monthly MB allowance": what does that mean?

a. Let y stand for the amount of MB I am allowed to use every month.
Write a numerical representation using y that stands for the amount of MB I am allowed to use every month.

b. Am I allowed to use more or less of the allotted MB?

allowed to use $y \leq 500$ MB ↳ IF I USE MORE, THIS COSTS AN EXTRA \$15

c. Is this an equation?

Why/why not?

NOPE - AN EQUATION HAS AN EQUAL SIGN.
AN EQUATION HAS A LIMITED # OF SOLUTIONS. AN INEQUALITY HAS TONS.

INEQUALITY: A STATEMENT THAT COMPARES

SOLUTION:

$x <$

x is less than

$x \leq$

x is less than or equal to

$x \geq$

x is greater than or equal to

$x >$

x is greater than

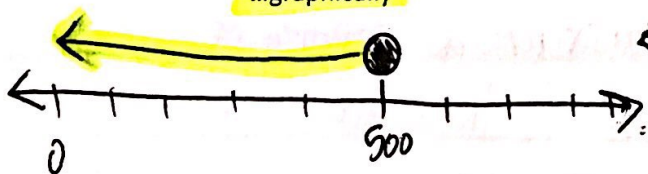
Write an amount of data usage in MB that my plan would cover without an additional charge.

$x \leq 500$

Write an amount of data usage in MB that would NOT be considered a solution.

The solution set can be expressed ...

...graphically



...in set notation

$\{ x \mid x \leq 500 \}$

THE SET OF all numbers such that THE NUMBERS ARE LESS THAN OR EQUAL TO 500

Ex1: Is the value of the variable a solution to the inequality?

$$4p < 64$$

• $p = 60$
 $4(60) < 64$
 Not True $240 < 64$

Not A Solution

• $p = 5$
 $4(5) < 64$
 $20 < 64$
 True

Yes

$$3h + 20 \leq -13$$

• $h = 11$

$3(11) + 20 \leq -13$
 $33 + 20$
 $53 \leq -13$

NOT TRUE - NOT A SOLUTION

• $h = -11$

$3(-11) + 20 \leq -13$
 $-13 \leq -13$

TRUE: Yes, its a Solution

Ex2: Write each as an expression to represent the situation.

Define a variable.

Graph on a number line.

a. The water temperature of a pool must be no less than 76°F.

$$\geq$$

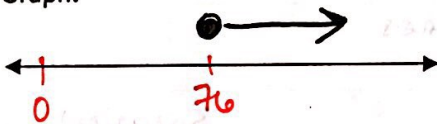
Defined Variable:

$t =$ temperature of water

Expression:

$t \geq 76 \rightarrow \{t | t \geq 76\}$

Graph:



b. The water temperature is less than 76°F.

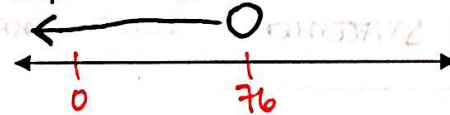
Defined Variable:

$t =$ temp of water

Expression:

$t < 76 \rightarrow \{t | t < 76\}$

Graph:



c. Approximately 30% of the land on Earth is deforested, but this percent is decreasing due to construction.

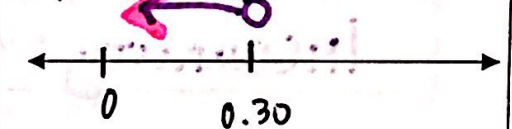
Defined Variable:

$L =$ LAND ON EARTH THAT IS DEFORESTED

Expression:

$L < 0.30 \rightarrow \{L | L < 0.30\}$

Graph:



Linear inequalities can be solved just like linear equations: using properties of inequality.

$$4 \leq x - 5$$

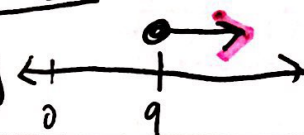
$$+5 \quad +5$$

$$9 \leq x$$

Rewrite!

$$\{x | x \geq 9\}$$

$$x \geq 9$$

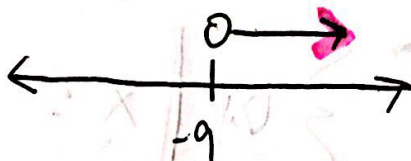


ADDITION PROPERTY OF INEQUALITY

Linear inequalities can be solved just like linear equations: using properties of inequality.

$$3 \cdot \frac{x}{3} > -3 \cdot 3$$

$$x > -9$$



MULTIPLICATION PROPERTY OF INEQUALITY

in set notation:

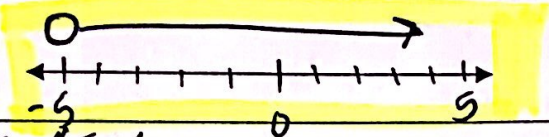
$$\{x | x > -9\}$$

3. Solve the linear inequality. Graph the solution set, and express in set notation.

a. $x - 14 > -19$

$+14 \quad +14$

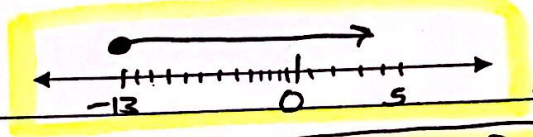
$\{x \mid x > -5\}$ or



b. $x + 9 \geq -4$

$-9 \quad -9$

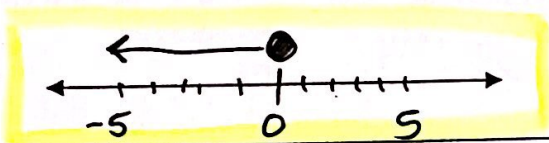
$\{x \mid x \geq -13\}$



c. $x - 4 \leq -4$

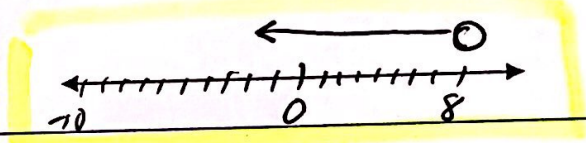
$+4 \quad +4$

$\{x \mid x \leq 0\}$



d. $\frac{4x}{4} < \frac{32}{4}$

$\{x \mid x < 8\}$



e. $-\frac{4x}{3} < -4 \cdot 3$

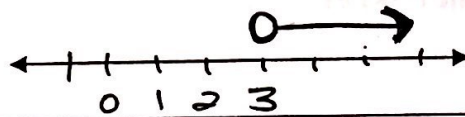
$-4x < -12$

$\frac{-4x}{-4} < \frac{-12}{-4}$

$x > 3$

WHEN MULTIPLYING OR DIVIDING BOTH SIDES OF AN INEQUALITY BY A NEGATIVE

$\{x \mid x > 3\}$



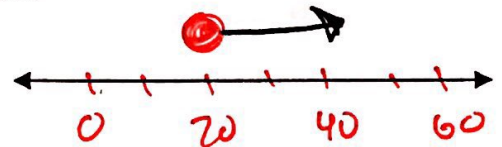
f. Felix wants to get at least one hour of exercise each day. Today he has run 40 minutes. Write, solve, and graph an inequality that shows how much longer he needs to exercise to reach his goal.

$x + 40 \geq 60$

$-40 \quad -40$

$x \geq 20$

$\{x \mid x \geq 20\}$



Exit ticket: Describe the differences between equations and inequalities. Are they alike? Elaborate.