Q1 Key Concepts to Remember

Solving Equations

★ SHOW ALL STEPS

ex) $2x + 7 = 15$ get x alone

$-7 \quad -7$ always add/subtract first

$2x = 8$ then mult or divide

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

ex) $\frac{3x+1}{2} = 10$ (2) in this case you must "free" up the numbers first by getting rid of the 2 (since it is being divided do inverse - MULT)

$3x + 1 = 20$

$-1 \quad -1$

$3x = 19$ Now do as above

$\frac{3x}{3} = \frac{19}{3}$

$x = \frac{19}{3}$ It is okay to leave your answer as a fraction

DO NOT change to a decimal

What if there is a fraction?

ex) $\frac{3}{4}x + 1 = 6$ add/subtract

$-1 \quad -1$

$\left(\frac{4}{3}\right)\frac{3}{4}x = \frac{5}{1}\left(\frac{4}{3}\right)$ Multiply by the reciprocal

$x = \frac{20}{3}$

Variables on both sides

Collect all the variables to one side, usually on the left.

★ $5x + 7 = -9x - 8 + 2x$

combine like terms on same side first

$5x + 7 = -7x - 8$

$+7x \qquad +7x$

move variable to other side

$12x + 7 = -8$

$-7 \qquad -7$

get x alone

$\frac{12x}{12} = \frac{-15}{12}$

$x = \frac{-15}{12}$ reduce by 3

$x = \frac{-5}{4}$

Literal Equations

SAME as solving equations

ex) $ax + by = c$ solve for x

$-by \quad -by$ Move over #'s furthest from x (you can add or subtract the whole thing, don't split)

$\frac{ax}{a} = \frac{c - by}{a}$ divide by the # next to x

$x = \frac{c-by}{a}$ or $x = \frac{c}{a} - \frac{by}{a}$ There are 2 ways You can write it. Either one is correct

ex $2x + 3y = 9$ Solve for y

$-2x \qquad -2x$

$\frac{3y}{3} = \frac{9}{3} - \frac{2x}{3}$ ← divide

$y = 3 - \frac{2}{3}x$ usually x is first You can re-order it

$y = -\frac{2}{3}x + 3$

Distributing if there is a # outside of a parentheses multiply it to everything inside.

★) $3(x + 2y)$

$3x + 6y$

★) $\frac{1}{3}(x - 7y)$ → $\left[\frac{1}{3} \cdot \frac{7}{1} = \frac{7}{3}\right]$

$\frac{1}{3}x - \frac{7}{3}y$

Word Problems

1) Make a let statement, it looks like Let x = _____
This answers the question: What am I looking for?

2) create an equation w/ a variable

3) Solve the equation

4) Answer your question w/ a phrase or sentence

example: Equation example

Jane bought 6 dresses for x dollars each and a pair of pants that cost twice as much. She spent a total of $90
How much was the pair of pants?

Let x: cost of a dress

equation: $6x + 2x = 90$

Work:

$6x + 2x = 90$

$\frac{8x}{8} = \frac{90}{8}$

$x = 11.25$

divide because you are talking about money

$$8\overline{)90.00}\quad 11.25$$
8
10
8
20
16
40

Answer: Pants cost $22.50

Since My question is how much are pants I need to double the cost bc pants are twice as much

Word problems continued

Inequality Example

A cell phone company charges $24.99 a month plus $0.15 per text message. You can spend at most $45. How many text messages can you send or receive?

(what am I looking for?)

Let x: # of text messages

↳ this is a key word that my inequality has to be less than or equal to 45

Inequality: $24.99 + 0.15x \leq 45$

Work:

$24.99 + .15x \leq 45.00$

$-24.99 \quad -24.99$

$.15x \leq 20.01$

$\frac{.15x}{.15} \leq \frac{20.01}{.15}$

$x \leq 133.4$

→ divide

$$\begin{array}{r} 133.4 \\ .15\overline{)20.00} \\ 15 \\ \hline 50 \\ 45 \\ \hline 50 \\ 45 \\ \hline 5 \end{array}$$

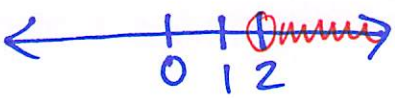
Answer: So you can send or receive at most 133 messages

Graphing Inequalities

> or < open circle

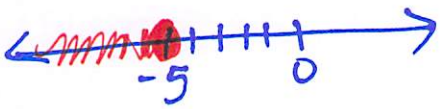
≥ or ≤ closed circle

★) $x > 2$



To solve: Do like a regular equation. Just remember if you multiply or divide by a negative flip the sign.

★) $x \leq -5$



★) $-3x + 1 \leq 10$

$-1 \quad -1$

$-3x \leq 9$

$\frac{-3x}{-3} \leq \frac{9}{-3}$ ← flip

$x \geq -3$

★) $\frac{1}{2}x - 7 > 8$

$+7 \quad +7$

$\frac{1}{2}x > 15$ (2)

$x > 30$

Compound Inequalities

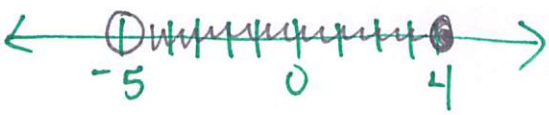
And (should graph towards eachother)

$-3 < 2x + 7 \leq 15$

$-7 \quad -7 \quad -7$ do it to all sides

$\frac{-10}{2} < \frac{2x}{2} \leq \frac{8}{2}$

$-5 < x \leq 4$



★ A special case if it ends up going away from eachother that is a no solution

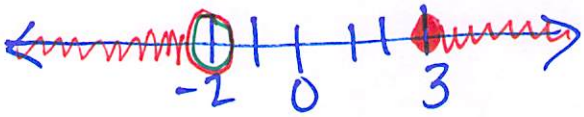
OR (should graph away from eachother)

$2x - 6 < -10$ or $-3x \leq -9$ Solve separately

$+6 \quad +6 \qquad \frac{-3}{-3} \quad \frac{-9}{-3}$ ↑ flip sign

$\frac{2x}{2} < \frac{-4}{2}$ $\qquad x \geq 3$

$x < -2$ or $x \geq 3$



★ A special case is if it goes towards each other that is an all real #'s solution

Some Things to remember:

★ You can ONLY combine like terms. So numbers with the same variable and exponent.

like terms

★) $2a + 3a$

$5a$

Not like terms

★) $2x + y$

★) $3x^2 - x^2$

$2x^2$

↑ remember there is a 1 here

★) $2x^2 + x^3$

★ When writing #'s and variables, the number is always first

correct way

$4x$ (:)

incorrect way

~~$x4$~~ (:

★ To get rid of fractions, Multiply by the reciprocal.

★ Dividing fractions without variables: Keep, Change, Reciprocal

Some things to Remember Continued

Coefficient: # in front of a variable

Inequalities: if you multiply or divide by a negative, FLIP the SIGN