COLLECTING LIKE TERMS

A **term** is a number, variable, or a combination of both.
eg. 2, $3x^2y^3z$, -6x, a

ONLY like terms may be combined!

Example:

$$7x^2 + 2xy^2 + 2x^2y$$
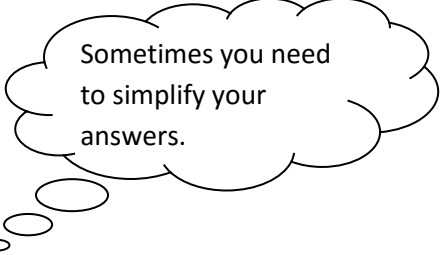
$$=$$

$$-2a^3b + a^3b$$

$$=$$

THE DISTRIBUTIVE LAW

Multiply the term outside the bracket with **each** term inside the bracket.

Example:

$$-4(x-2) + 2(x+2)$$

$$=$$

$$=$$

$$6\left(\frac{x}{2} - \frac{4}{3}\right)$$

$$=$$

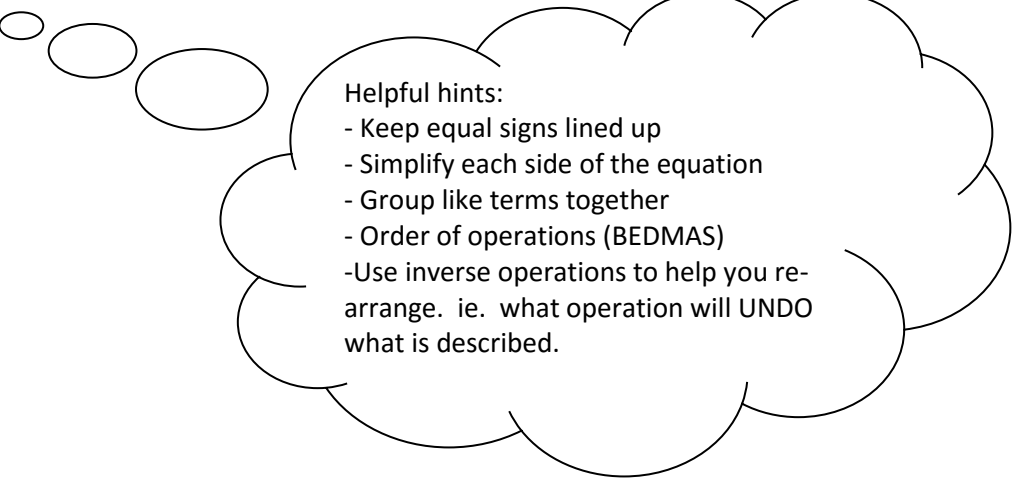$$=$$

Sometimes you need to simplify your answers.

SOLVING LINEAR EQUATIONS

To **solve** means to find a value for the unknown variable that would make the LS = RS of a given equation.

Example:

$$5x + 3 - 2 = 3x - 4 + x$$

$$=$$

$$=$$

$$=$$

$$3y - 2(y-7) = 3(y-4) + 8$$

$$=$$

$$=$$

$$=$$

$$=$$

Helpful hints:
- Keep equal signs lined up
- Simplify each side of the equation
- Group like terms together
- Order of operations (BEDMAS)
-Use inverse operations to help you re-arrange. ie. what operation will UNDO what is described.

Sometimes we can take shortcuts (especially when working with fractions) to solve for an unknown. If you are solving an equation with a fraction, you can **CROSS MULTIPLY** to shorten your work. Note that using inverse operations will lead us to the same answer.

Example:

$$\frac{5}{45} \diagup\diagdown \frac{m}{3}$$

$$\frac{5}{45} = \frac{m}{3}$$
$$=$$
$$=$$

WORKING WITH FRACTIONS

1 - REDUCING FRACTIONS

   Divide both the numerator and denominator by a common factor.

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

2 - CONVERT TO IMPROPER FROM MIXED

$$-3\frac{3}{4}$$
$$=$$

3 - MULTIPLICATION and DIVISION
   - Reduce all fractions, make sure you convert if in mixed form.
   - If dividing, invert second fraction and multiply.
   - Multiply numerators together, multiply denominators together.
   - You CAN cross cancel.

$$\frac{1}{2} \times \frac{4}{6}$$ $$\frac{3}{4} \div \frac{15}{16}$$

$$=$$ $$=$$

Also known as multiplying by the reciprocal.

4 - ADDING and SUBTRACTING

      You can only +/- fractions with the same denominator. Find the lowest common denominator if necessary and re-write fraction. Then you can +/- the numerators, keeping the common denominator.

$$\frac{1}{2} - \frac{7}{10}$$
$$=$$

$$1\frac{1}{4} + \left(-3\frac{5}{6}\right)$$
$$=$$

UNIT CONVERSIONS

The metric system is based on powers of 10. The imperial system is used in many fields of work including land surveying, construction, drafting and design, and the air industry. It is important to be able to convert within and to and from each system of measurement.

Metric System	**Imperial System**	**Conversions**
10 mm = 1 cm	12 inch = 1 foot	1 inch = 25.4 mm
100 cm = 1 m	3 feet = 1 yard	1 foot = 30.48 cm
1000 m = 1 km	1760 yards = 1 mile	1 yard = 0.9144 m
		1 mile = 1.609 km

Example - Convert the following

a) 154 m = _____ km

b) 36 yards = _____ ft

Sometimes depending on the units you are working with, it is difficult to know whether you need to multiply or divide. Instead of guessing, you can setup a linear equation and solve using algebraic skills.

Example: 14.6 km to _____ miles

Step 1 - Write given information as a fraction (known value over unknown value)

Step 2 - Look up the needed unit conversion, express it as a fraction and set it equal to your given information that you converted to a fraction.
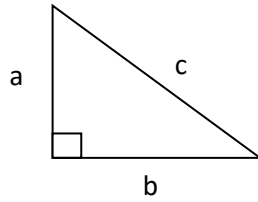
Step 3 - Solve by cross multiplying!

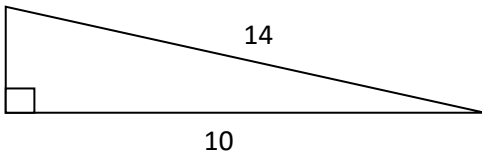**Hint: Ensure that your units line up!**

THE PYTHAGOREAN THEOREM

In right ΔABC with hypotenuse c:

$$c^2 = a^2 + b^2$$

Remember that the hypotenuse is always opposite the right angle.

Note how the formula is re-arranged if you are trying to find a side other than the hypotenuse.

Example: Find the missing side in the following triangle.

14

10

SLOPE AND EQUATION OF A LINE

Slope of a Line $m = \dfrac{rise}{run} = \dfrac{y_2 - y_1}{x_2 - x_1}$
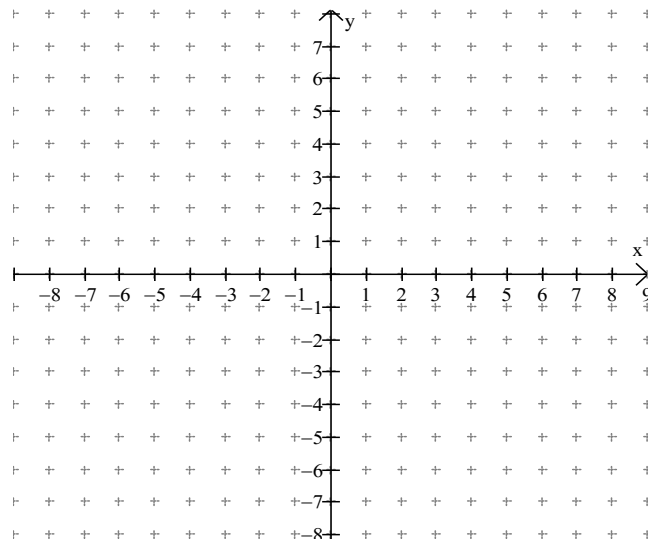
Equation of a Line $y = mx + b$

slope

y-intercept (where the line crosses the y-axis)

Instructions:

1. Plot the point (-3,2) and (1,-2) on the graph.
2. Connect these points to create a line segment.
3. Find the slope of this line by counting and algebraically.
4. Find the equation of this line.
5. Graph the line x=-8   y=7 and y=2x+1 on the grid.

1. Solve.

a) $6 = 7 - 3x$

b) $5 = \frac{4}{3}m$

c) $-\frac{1}{2}y - 3 = -7$

d) $2x - 8 - 4x + 5 = 5x + 7 - 3x - 10$

e) $5(3x - 2) - 4x + 7 = 4(x - 6) - 2(8 - 3x) - 5$

f) $\frac{x}{2} = \frac{5}{8}$

g) $\frac{3}{y} = \frac{7}{4}$

h) $\frac{d}{5.3} = \frac{2.1}{9.4}$

2. Reduce the following:

a) $\frac{8}{10}$

b) $\frac{45}{20}$

c) $\frac{-24}{16}$

d) $\frac{2x}{x}$

3. Evaluate the following:

a) $\frac{2}{7} \times \frac{1}{4}$

b) $\frac{4}{3} \div \frac{5}{11}$

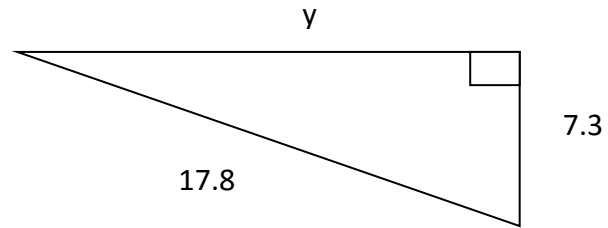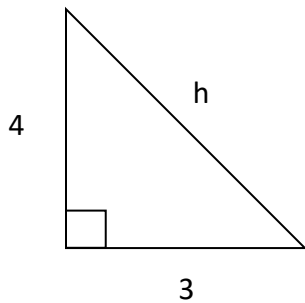c) $-\frac{3}{8} + \frac{5}{6}$

d) $-\frac{3}{7} \div \left(-\frac{9}{28}\right)$

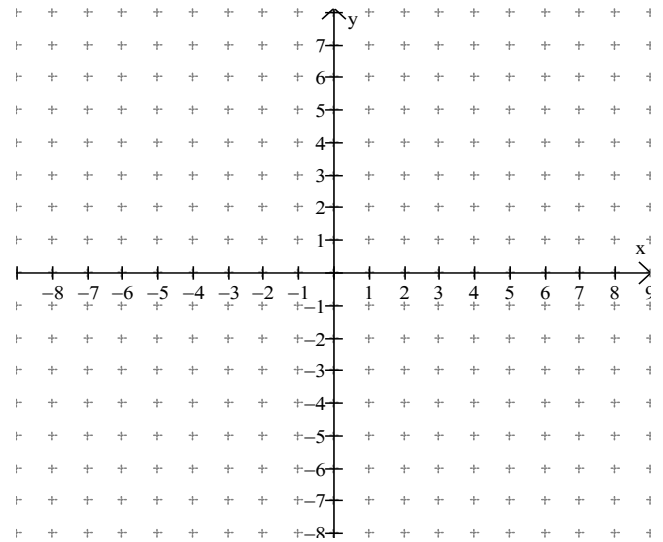4. Convert the following units.

a) 13 feet 10 inches = _____ inches   b)   26.8 feet = _____ m   (2 steps needed)

5. Solve for the missing side of the triangle using the Pythagorean Theorem.

6. Find the slope and equation of the line passing through the points D (-3,5) and E (2,-5) and graph this line.
Ensure that you can find the slope algebraically.