**Lesson 5.6 Working with Formulas**

***Goal: Rearrange equations to rewrite the formula in terms of a different variable***

***Plan and organize solutions for real life problems***

A ***formula*** is a mathematical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that relates two or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* ***P* =25*T* –800** might give the profit from ticket sales, where ***P*** is the **profit** and ***T*** is the **# of** **tickets sold**
* ***E = mc2*** (Einstein’s theory of relativity) relates **Energy** to the **Mass** of an object and the **Speed of light**

***EXAMPLE 1*** The formula ***S = 0.6T + 331.5*** gives the approximate speed of sound in air, ***S*** metres per second, when the temperature is ***T*** degrees Celsius. Determine the speed of sound at -40 oC.

***[](javascript:edit(73540))***

Sometimes we need to solve for a variable that isn’t already by itself. To do this we rearrange the equations using an ***INVERSE OPERATIONS*** method. This means you “undo” or “reverse” what is in front of you. Order of operations (BEDMAS) are performed in **reverse** order.

***EXAMPLE 2***

For each example, isolate variable *P*.

   

For each example, isolate variable *B*.

   

***C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\QK3E7K61\MC900413624[1].wmfEXAMPLE 3*** To convert from Celsius (C) to Fahrenheit (F), the formula  is used.   
Determine a formula to convert from Fahrenheit to Celsius by isolating F.

***Solving Multi-Step Problems – Plan and organize your solution***

* ***PLAN*** your solution by working backward from what you are trying to find to what you are given
  + Determine what numerical info is given and what you need to find
  + Decide what formula(s) to use
* ***WRITE*** the solution by working forward from what you are given to what you are trying to find
  + Convert quantities to similar units (if necessary)
  + Substitute known values (given or calculated) to solve for the unknown

***EXAMPLE 4 – CHOOSING FORMULAS & CONVERTING MEASURES***

A landscaper uses a bucket with radius 18 cm and height 18 cm to pour soil into a rectangular planter measuring 1.2 m by 40 cm by 20 cm. How many buckets of soil are needed to fill the planter?

Convert measures 🡪

Planter Bucket

Decide on formulas to use 🡪

Substitute given values 🡪

Solve the problem 🡪

Write a final statement 🡪

***EXAMPLE 5*** The area, A, of a circle with radius r is given by A = πr2. Use the formula to determine the   
radius of a circular oil spill that covers an area of 5.0 km2.



***EXAMPLE 6 – MULTI-STEP PROBLEMS***

A landscaper wants to estimate the cost of fertilizing a triangular lawn with side lengths 150 m, 200 m, and 300 m. One bag of fertilizer costs $19.98 and covers an area of 900 m2. She uses Heron’s formula to determine the area of the lawn: The area A of a triangle with side lengths a, b, and c, is given by , where . Estimate the cost to fertilize the lawn.

**PLAN the solution: Work backwards**

To find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ I need to know the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To find the ***# of bags needed*** I need to know the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To find the ***area of the lawn*** I need to use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To use the ***formula for area*** I need to know the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To find the ***value of s*** I need to know the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**WRITE the solution: Work forwards**

Find s:

Find A:

Find # bags needed:

Find cost:

**Practice**: Page 346 #6 – 9; Page 354 #2, 4, 9, 11, 12, 14 – 16