Conversion: Feet, Metres, Paces, Chains

Example: 1 inch = 2.54 cm

1. In our examples: 1 inch = 2.54 cm.

   To use algebra to find how many inches are in 140 cm:
   1. Write the equivalency ratio
   2. Write each side as a fraction (it is typically easier to put the equivalency ratios in the denominator)
   3. E.g. 140 cm Height in inches, place this number (140) in the numerator position of the side with the same units (cm). The variable, let us say x, fills in the numerator position of the other side (inches) and is the units of what we are trying to find.
   4. Solve for the value of x. Don't forget the units when you are finished!

Part 1: Conversions

Convert the following:

1) 4 ' to m.	2) 15.2m to ft	3) 15.7 gallons to L	4) 243L to gallons

Part 2: Outdoor Exploration of Conversions

Firefighters because of the nature of their job need to be able to quickly estimate to size of buildings, forests, fields, etc. So in the following activity you will be asked to measure certain outdoor objects and spaces in order to gain an understanding of the measuring units known as paces and chains (terms used within the firefighting profession).

Walk the area outlined by your teacher. Record the number of steps taken below: 66ft= _____ paces	Finding the unit ratio: To find the unit ratio you will need to divide both sides by the number of paces taken in the previous step. Simplify. 66ft = _____ paces	Converting to Chains: Since one chain equals 66ft write an equivalency ratio that converts chains to paces. ____ chains = ____ paces

Finding Perimeter:

a. Walk the perimeter of the portable and record the number of paces.
b. Use your conversions above to calculate the perimeter using chains, feet, and metres.
c. As a class use a tape measure to measure the perimeter of the portable.
d. Compare your answer from (c) to the answer calculated in (b). How close were the results?
e. What is the perimeter of the school?
f. Which measuring method do you believe would be most useful in an emergency situation? Why?

Fire Worksheet

Scale: 1mm=1ft

Example:

Flame Height: 2.5 cm = 25ft

Flame Length: 3 cm = 30ft

Horizontal distance: $30^2 - 25^2 = d^2$

$275 = d^2$

$16.6\text{ft} = d$

Flame slope:= $\frac{\text{rise}}{\text{run}}$

$= \frac{25}{16.6}$

$= 1.5$

Therefore the horizontal distance is 16.6 ft

1) Calculate the flames height, length, horizontal distance and slope of each fire.

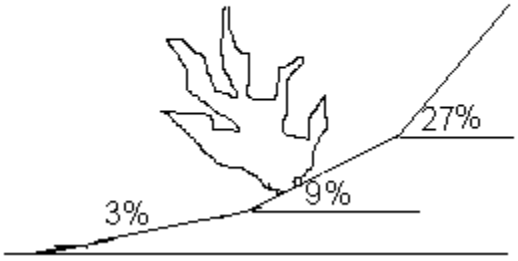
Scale: 1mm=0.5ft

Scale: 1cm = 5ft

Scale: 1cm= 1ft

Calculating the Effect of Slope on ROS of a Fire

a) Calculate the slope
b) Calculate the slope percent
c) If a fire would cover the entire area in 2h, what is its ROS?



ROS spread doubles when the slope percent triple.
If the ROS on a 9% slope is 4 Ch/h than…

a) What is the ROS on a 27% slope?
b) What is the ROS on a 3% slope?

For one of the following images complete the following…

a) Using a protractor find the angles of elevation for each change in slope.
b) Calculate the slope % of each terrain.
c) If the initial ROS is 3 ch/h in section 1. What would the ROS be section 2 and section 3?

Probability of Ignition

a. The ignition rate of a fire 43%. If 123 embers are released over 6 hrs. How many embers will start a fire?

b. The ignition rate of a fire 67%. If 1 456 embers are released over 24 hrs. How many embers will start a fire?

c. Calculate the ignition rate if 1546 number of embers start 124 number of fires.

d. Calculate the ignition rate if 1008 number of embers start 22 number of fires.

Putting Out the Flames - Using Quadratics to Fight Fire

Part 1: Label as many of the following features in each of the images below…

- Vertex
- Y-intercept
- X- intercept
- Direction of opening

Part 2: Sketch a graph for each of the following:

1. A fire fighter is standing at a top an 8 ft fire truck. He is aiming his hose at the top of a 30ft building that is 40 ft away.
2. A fire fighter is aiming his hose at the 12^{th} floor of an 18 floor, 180ft building that is 25 ft away.

Part 3: Word problems – Be sure to include a sketch of the picture in your solution.

1. A fire hydrant is leaking water that follows the path of $h = -\frac{1}{2}(d-4)^2 + 9$ in all directions from the origin, where h is the height of the water in metres and d is the distance from the hydrant in metres.
    a. How high does the water get?
    b. If you are standing 7 m away from the hydrant will you get wet?
2. A firefighter is using a hose to reach a fire at the top of a building. The spray of water follows a path of $h = -5d^2 + 20d + 2$, where h is the height of the water in feet and d is a horizontal distance from the nozzle's starting point in chains.
    a. How high is the nozzle off of the ground?
    b. How high is the fire if the water reaches the fire at its vertex?
    c. How far away is the building if the fire is 17 ft high. (Since there are two possible answers, sketch both possibilities and find the distance that is further away)
3. You are firefighter and have started your water hose but you notice that you are not hitting the fire. See the diagram below. List two things that you could do in order to bring the water level to the fire. How would each of these actions affect the equation of the water's path?