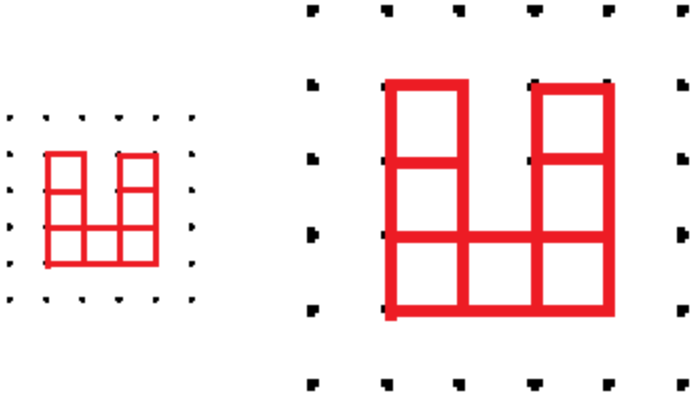
Grade 8 Math – Geometry – **Scale Drawings – Introduction**

Name: _____ Class: _____ Date: _____

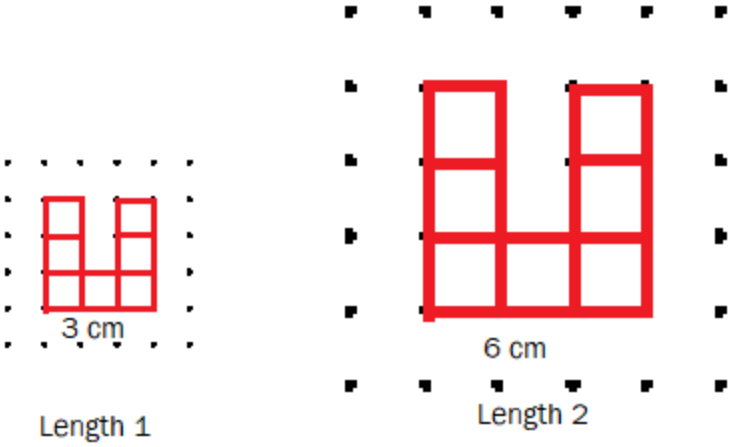
We intuitively know about scale – things can be made larger or smaller just by pinching or unpinching our screens now-a-days and when we look at a map of the world, we know that the distances are a lot bigger than they appear on the map. The reason that a map looks exactly like the area that it represents is that it has the same shape but different size this means that all the 'proportions' are the same. Consider the following two pictures of a group of 7 squares. The smaller one has the same shape as the larger one – down to the arrangements of the dots. In fact, if you measure the distances between any two points, you will see that it is exactly twice the distance on the bigger one.



We say that this always had the same 'proportion'. Since they have the same proportions, we call it a 'proportional figure'. In earlier grades, we called these figures 'similar figures' - because they have the same shape but different sizes. The figures can even point in different directions but be 'proportional' if the shape is exactly the same but proportionally bigger or smaller.

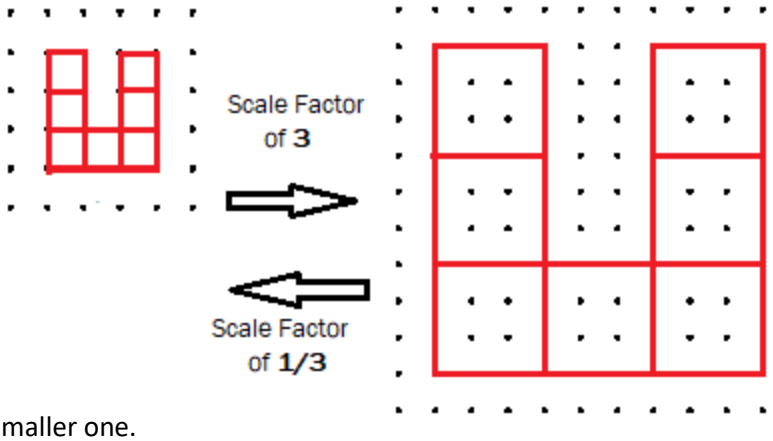
Now, other than the name, the new thing is that we can quantify the change – which means that we can calculate and give a number to the change in size. We call it the 'scale factor'. The way this is calculated is to take the same measurement from figures and divide them. Here is an example using the figures below.

The scale factor depends on which way you are going. Say you are going from the smaller figure to the larger figure – in this case, you take the larger length and divide by the shorter length. i.e., SF = 6cm ÷ 3cm As you should notice, the cm cancel out and you are left with a scale factor of 2. The bigger one is 2 times the size. This should make sense. If we go from the bigger to the smaller one, we see the scale factor (SF = 3cm ÷ 6 cm) is ½ or 0.5. This means that the smaller figure is half as big – which again makes sense.



We can use measurements on graph paper or just with a ruler to expand and contract the size of figures. If we take the same example we have been working on, if we wanted to redraw the smaller figure on dot paper, we can see that a scale factor of three would mean that for every one measure, you multiply it by your scale factor to get the larger image.

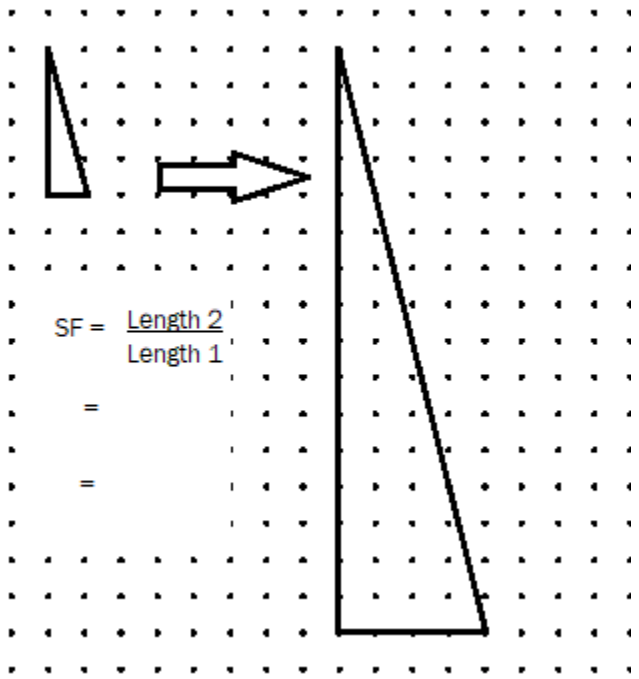
In this case, the columns are one length wide on the small figure and three wide on the larger figure. The base is three wide on the smaller figure and nine wide on the larger figure. Any distance must be multiplied by the scale factor to get the larger figure.



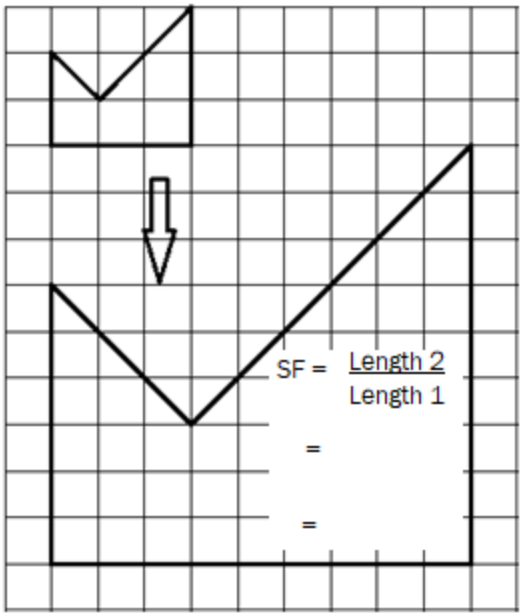
We can also see the scale factor of 1/3 when we go from the large drawing to the smaller one.

Let's try out the following examples:

1.



2.



3.