

# FOUNDATIONS OF MATH 11

## Chapter 8 – Proportions, Scale Factors & Unit Conversions



### Lesson #8.4 – Scale Factors & Area 2D Shapes

In our last lesson we studied the concept of scale factor in relation to the length of an object and a model. In this lesson we will explore the relationship between scale factors of 2D shapes, specifically their perimeter and area.

$P = 2L + 2W$   
 $A = L \times W$

**Example 1:** Consider a collection of similar rectangles:

Rectangle	Length (cm)	Width (cm)	Perimeter (cm)	Area (cm <sup>2</sup> )
A	3	2	$2(3) + 2(2) = 10$	$3 \times 2 = 6$
B	6	4	$2(6) + 2(4) = 20$	$6 \times 4 = 24$
C	9	6	$2(9) + 2(6) = 30$	$9 \times 6 = 54$

Using the results from the table above complete the following table:

Rectangle	Scale Factor	Ratio of Perimeters (cm)	Ratio of Areas (cm <sup>2</sup> )
B to A	$\frac{6}{3} = 2$	$\frac{20}{10} = 2$	$\frac{24}{6} = 4$
C to A	$\frac{9}{3} = 3$	$\frac{30}{10} = 3$	$\frac{54}{6} = 9$
C to B	$\frac{9}{6} = 1.5$	$\frac{30}{20} = 1.5 = \frac{3}{2}$	$\frac{54}{24} = \frac{9}{4} \Rightarrow \frac{3^2}{2^2}$

What is the relationship between the scale factor and the ratios of the perimeters?

SF is equal to the ratio of Perimeters

Ratio of Perim. = SF

What is the relationship between the scale factor and the ratio of the areas?

Ratio of Area = (SF)<sup>2</sup>

**Example 2:** Jasmine is making a kite from a 1:20 scale diagram. The area of the scale diagram is 30 cm<sup>2</sup>. How much fabric will she need for her kite?

$$(SF)^2 = \frac{A_{\text{model}}}{A_{\text{actual}}} \Rightarrow \left(\frac{1}{20}\right)^2 = \frac{30 \text{ cm}^2}{x} \Rightarrow \frac{1}{400} \times \frac{30 \text{ cm}^2}{x}$$

$x = 400(30 \text{ cm}^2)$   
 $= 12000 \text{ cm}^2$   
 of fabric

**Practice Questions: Page 487 #:1 – 3, 4a, 5a, 8, 9, 10, 13**