**Day 1:**

**Review: Calculating Area of 2D Shapes**

This unit teaches about surface area and volume. In order to be able to calculate the surface area of a 3-dimensional object, you need to first know how to calculate the area of a 2-dimensional shape. The shapes you are required to know how to calculate the area for include: rectangle, square, parallelogram, trapezoid, triangle, and circle. These calculations are explained on the following pages.

**AREA**

In geometry, **area** refers to the measure of a region. It is ***ALWAYS*** in square units – cm2, in2, m2, etc. The area of a geometric figure is the number of square units needed to cover the interior of that figure. The following formulas are used to find area. These formulas are also provided for you on a single sheet as a handout.

In equations, the symbol for area is a capital a 🡪 **A**.

Rectangle: A **rectangle** has 4 right angles, with opposite sides equal in length. Area for a rectangle is the length (or base) times the width (or height). Both terms are used depending on author.

**A = *l* × *w* or A= b × h**

Example:

 **A = *l* × *w***

 6 m

 15 m

Square: In a **square**, all the sides have the same length. The 4 angles are all right angles. The area is the side times side, or side squared.

**A = *s* × *s* or A= *s2***

Example:

 **A= *s2***

 7 cm

 7 cm

Parallelogram: A **parallelogram** is a 4 sided figure that has opposite sides equal in length. The 4 angles are NOT right angles. It looks like a rectangle that has been pushed over. The area is base times the height. The height is always perpendicular (at right angles or 900) to the base.

**A= b × h**

Example:

 **A = b × h** 9 mm

 14 mm

Trapezoid: A **trapezoid** is a 4 sided figure that has one pair of opposite sides parallel and the other pair of opposite sides not parallel. The area is the average of the parallel sides (often the top and base, usually called ***a*** and ***b*)**, times the height.

**A= (a + b) × h which means (a + b) ÷ 2 × h**

 **2**

Example: 5 cm

**A= (a + b) × h**

**2** 8 cm

 9 cm

Triangle: A **triangle** is any 3 sided figure. It can have any other combination of angles. The area is base times the height divided by 2. The height is always perpendicular (at right angles or 900) to the base.

**A= (b × h) which means A= b × h ÷ 2**

Example:

**A= b × h ÷ 2**

 9 cm

 6 cm

These are other shapes of triangles that still follow this formula.

 5 cm 5 in

 4 cm 9 in

Circle: In a **circle**, there are no “sides”. So the area is calculated using the length of the radius in the following formula. Remember, the radius goes from the centre of the circle to touch the circle at any place. Use the **π** button on your calculator.

**A = π*r2* which means A = π × *r* × *r***

Example:

 **A = π*r2***

 r = 6 cm

If given the diameter, divide that number by 2 before calculating the area because the radius is half the length of the diameter.

 ***r = d ÷* 2**

 d = 18 in

 **A = π*r2***

This page summarizes the formulas for the 2-D shapes discussed previously.

 ***l s***

 ***A = l × w* *w A = s2 s***

 Rectangle Square

 ***b a***

 ***h*** ***A = b × h A = (a + b) × h***

 ***h*** ***2***

 ***b***

 Parallelogram Trapezoid

 ***A= (b × h)*** ***A = πr2***

 ***2***

  ***h r***

  ***b***

 Circle

 Triangle

**ASSIGNMENT 1 – Calculating Area of 2D Shapes**

For each of the following, name the shape and calculate its area. Write the formula for your calculations as part of your answer. DON’T FORGET THE UNITS!

1)

 6.2 cm

 5.7 cm

2)

 67 m

3) 25 mm

 15 mm

 35 mm

4) 17 in

 11 in

5)

 7.9 m

 9.6 m

6) 5.3 ft

7)

 8.1 cm

 4.9 cm

8)

 3.5 mm

 7.7 mm

**Calculating THE Area of 2D COMPOSITE FIGURES**

A composite figure is an irregular shape that can be broken into two or more smaller, regular shapes. In order to find the area of a composite 2-D shape, you need to find the areas of regularly shaped parts that make it up, and then add those areas together. There are often different ways to break up an irregular shape. These solutions present just one way to solve the problems.

Example: Calculate the area of the figure below.

 2.5 mm

 2.2 mm

 9.9 mm

 4.9 mm

 3.7 mm

Solution: The figure above can be broken into a triangle and two rectangles. The individual areas of these shapes are calculated and added together.

**ASSIGNMENT 2 – CALCULATING AREA OF COMPOSITE 2D FIGURES**

1) In the irregular figures below, draw lines to show one way to separate the figures into smaller regular shapes. You do not need to calculate the area of these figures.

2) Show four possible ways to divide the irregular figure below into regular shapes to be able to calculate its area. Then choose one method, show all your measurements, and calculate the total area.

 4.7 m

 4.5 m

 2.9 m 2.3 m

 5.9 m

 5.3 m

 10.5 m

3) Calculate the area of the following figures.

a)

 8 ft

 7 ft

 6.5 ft

 5 ft

b) 6.8 cm

 3.4 cm

 8.6 cm

c)

 25 cm

 16 cm

Assignment: Area worksheet