**STRAND 5: GEOMETRY**

SUB STRAND: Enlargement

LESSON OBJECTIVE: Students should be able to:

- Describe properties of enlargement

- Workout the scale factor of an enlargement

- Calculate lengths of unknown sides by using the scale factor

Note:

- ✓ Invariant – does not change.
- ✓ Enlargement creates an image <u>larger or smaller</u> than the object.
- ✓ <u>Scale factor</u> is the ratio of the sizes of image to object.
- ✓ Distances under enlargement change according to scale factor.
- ✓ Angles and orientation are invariant.
- ✓ Enlargement changes the distance from the centre.
- ✓ To find the centre of enlargement. Join any two corresponding points on the object and image. The place where they meet is the centre of enlargement.
  - ▪ **Length Scale factor (LSF) = <u>Image length</u>**
    - o **Object length**

  - ▪ **Area Scale Factor (ASF) = (Length Scale Factor)^2**

<u>Example 1</u>
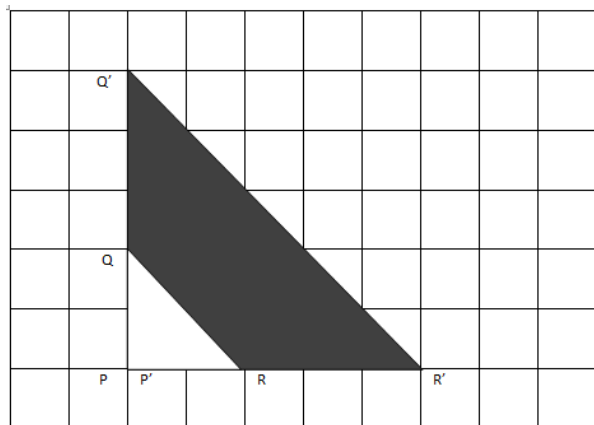
$$\text{LSF} = \frac{image\ length}{object\ length} = \frac{5}{2}$$
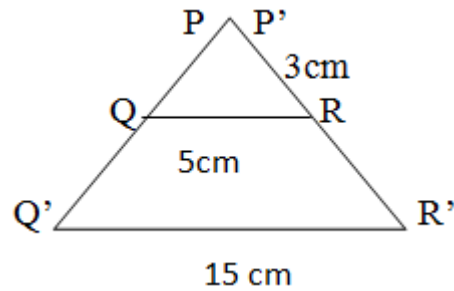$$= 2.5$$

$$\text{ASF} = (\text{LSF})^2$$
$$= (2.5)^2$$
$$= 6.25$$

Or

ASF = <u>Area (Image)</u> = <u>12.5</u> = 6.25
　　　　Area (Object)　　2

Example 2

Triangle PQR is enlarged to triangle P'Q'R' as shown below.

a. What is the scale factor of enlargement?

LSF = $\frac{15}{5}$= **3**

b. Is there any <u>invariant point?</u> If so, what is it?

Yes, P

c. Find the length of side P'R'.

Length = 3cm x 3 = 9cm

d. If the area of triangle P'Q'R' is 52cm^2, what is the area of triangle PQR?

ASF = (LSF)^2   **ASF = <u>Image Area</u>**

          = **(3)^2**   **Object Area**

          = **9**   **9 = <u>52cm^2</u>**

                        Object Area

          Object Area = $\frac{52}{9}$ = 5.78cm^2

Example 3

Enlarge shape ABCD below by scale factor about the origin. The **center of enlargement** is the origin (0,0). The **scale factor** is 2.
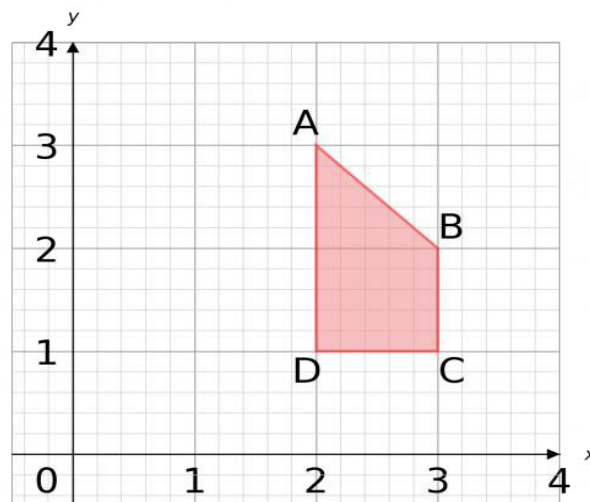
First draw lines from the (0,0) through all the corners of the shape. Since the scale factor is 2, we want to extend all of those lines to be 2 times as long (scale factor 3 would mean 3 times as long, and so on)

2. The lines are now drawn from the corners of the new shape, which is 2 times as big as the original.

AD =2 Squares on the original, so AD = 4 squares on the enlarged shape.

3. Finally, join up the corners of the new shape.

As these shapes are mathematically similar, they should be the same shape.

Note: the scale factor tells you how big the shape will be, the center of enlargement tells you where it will be.
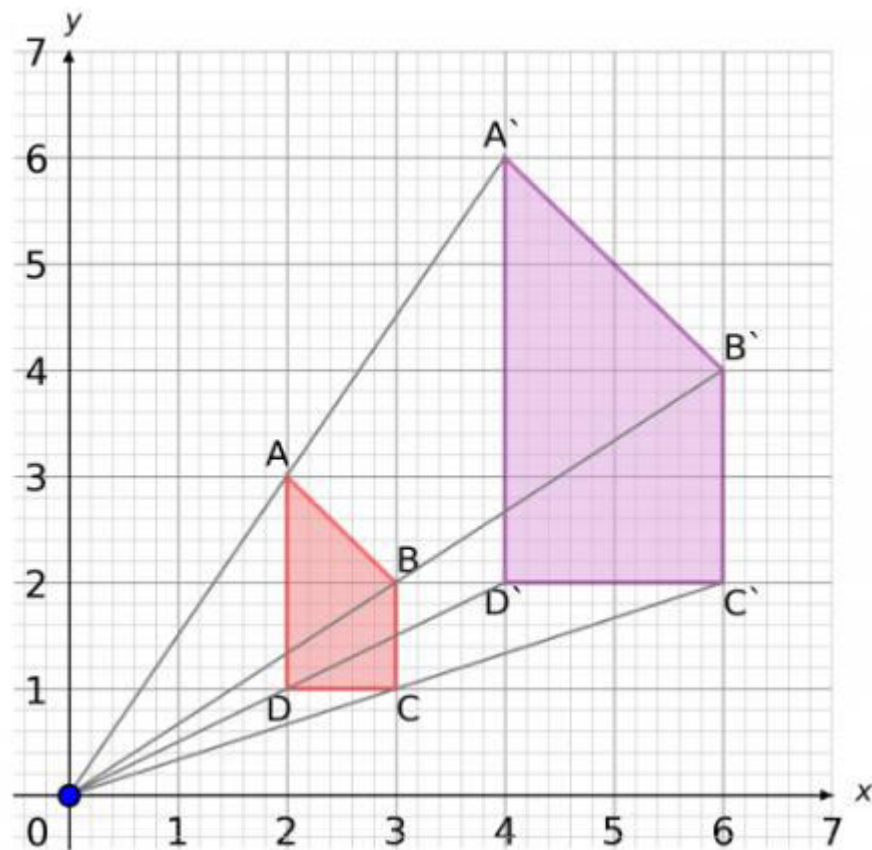
Congruent Triangles (Identical)

- Congruent triangles are identical in size and shape. It is not necessary for the triangle to be in same orientation or position.
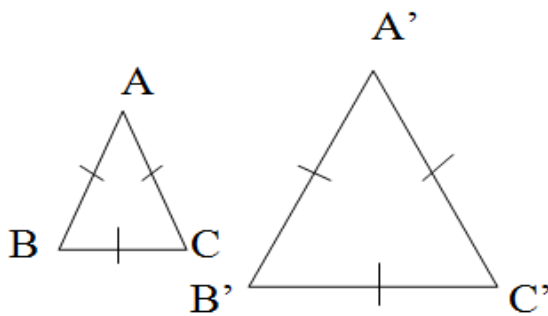

The Green Triangle on the right, is an upside down version of the Pink Triangle. They are both the same size and shape.
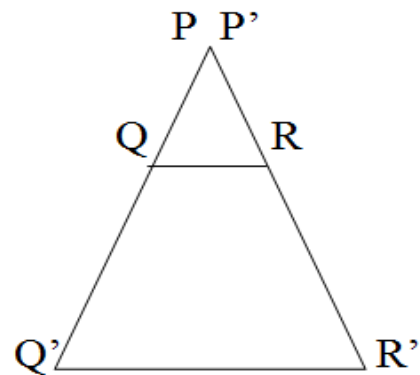
Similar Figures

- All corresponding angles in similar figures are equal.
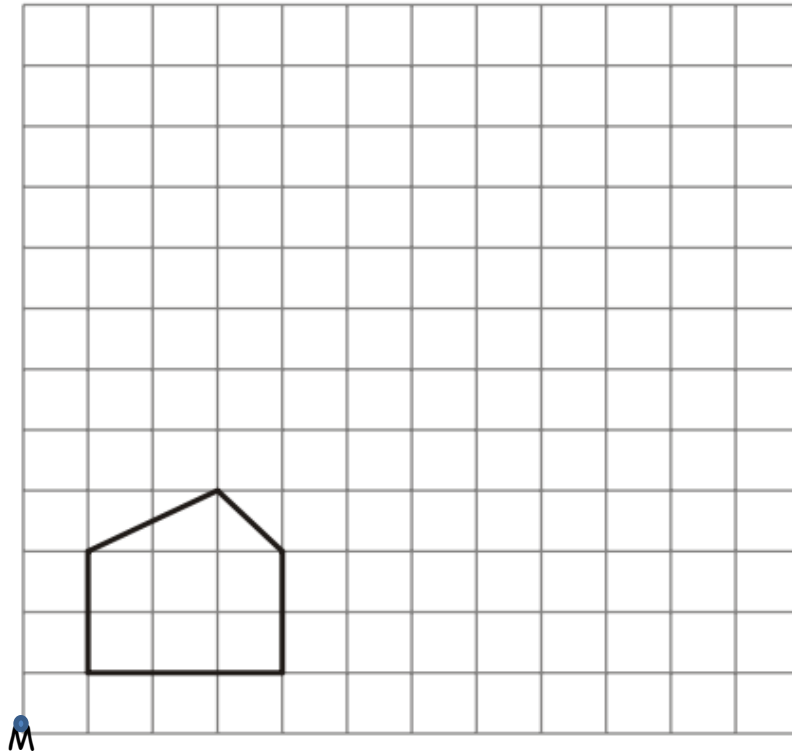- The figures will differ only by a scale factor.

Example

Triangle ABC is similar to triangle A'B'C'

Triangle PQR is similar to P'Q'R'

Exercise

1. On the grid, enlarge the shape with a scale factor of 2. Center is Point M.

2. On the grid, enlarge the shaded triangle by a scale factor of 2, center C.