

Verifying Properties of Two-Dimensional Shapes

We can apply slope and length to verify properties of two-dimensional shapes and:

- classify triangles (right angled, equilateral, isosceles, scalene)
- classify quadrilaterals (square, rectangle, parallelogram, trapezoid)

Example – Verify that M (7.5, -1.3) is the centre of the circle that passes through the points G (18, 6), H (4, 11) and I (-5, -4).

Example – A triangle has vertices at A (6, -2), B (-13, 7) and C (-4, -8).

- a) Verify that this is a right angle triangle.
- b) Explain how you could determine the area of this triangle.

Example – A triangle has vertices at D (14, -1), E (3, 12) and F (4, -5).

- a) Determine whether this triangle is equilateral, isosceles or scalene.
- b) Explain how you could determine the area of this triangle.

Example – The vertices of a quadrilateral are at W (14, -2), X (8, 10), Y (-7, 16) and Z (-11, 8).

- a) Determine whether or not this is a parallelogram.
- b) Sketch this shape to illustrate your answer.

Example – A quadrilateral has vertices located at P (18, -6), Q (14, 8), R (-7, 2) and S (-3, -12).

- a) Determine whether this quadrilateral is a trapezoid, parallelogram, rhombus, rectangle or square.
- b) Explain how you could calculate the area of this shape.

Homework – Solve the following problems and answer question C3 on page 142.

1. A triangle has vertices at A (2, -5), B (16, 3) and C (-6, 9).

- a) Verify that this is a right angle triangle.
- b) Determine the area of this triangle.

2. Determine whether a triangle is equilateral, isosceles or scalene if it has:

a) vertices at D $(-8, 15)$, E $(3, -2)$ and F $(11, 8)$

b) vertices at G $(-9, 2)$, H $(7, -2)$ and I $(-1, 8)$

3. Classify the quadrilateral with vertices located at J (11, 9), L (2, 12), N (−16, 6) and P (11, −3). Explain how you could determine its area. Sketch this shape to illustrate your answer.

4. A trapezoid has vertices at Q $(-8, -5)$, R $(8, 7)$, S $(2, 22)$ and T $(-14, 10)$. Given that the slope of QR is $\frac{3}{4}$, slope of RS is $-\frac{5}{2}$ and slope of ST is $\frac{3}{4}$ determine whether or not this trapezoid is a parallelogram.

5. Verify that C $(-8.5, 5.7)$ is the centre of the circle that passes through the points U $(-3, -11)$, V $(9, 4)$ and W $(7, 14)$. Sketch the circle to illustrate your answer.