GCSE Maths – Geometry and Measures

Properties of Triangles and Quadrilaterals
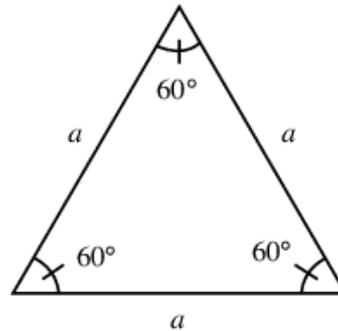
Notes

WORKSHEET

Properties of Triangles

A triangle is a **3-sided** shape, with the sum of interior angles totalling **180°**. There are three types of triangles: **equilateral, isosceles** and **scalene.**
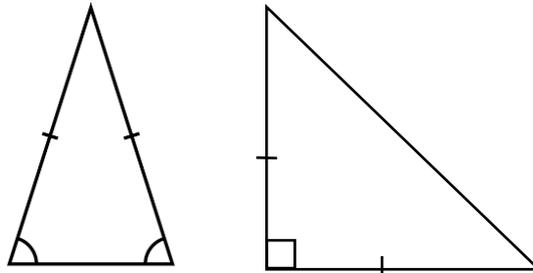
Equilateral triangle:

- All sides are equal in length

- All angles are equal in size (60°)

Isosceles triangle:

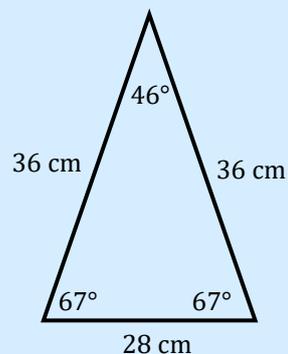- Two sides are equal in length

- Two angles are equal in size

Scalene triangle:

- No sides are equal in length

- No angles are equal in size

Example: Which type of triangle is drawn below?

Two sides are equal in length, both measuring 36 cm.
Two angles are equal in size, both measuring 67°.

Using the properties defined above, we see that this triangle is an isosceles triangle.
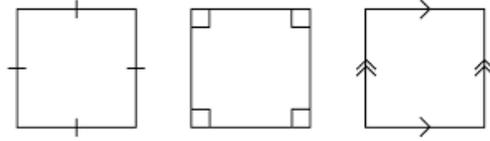
Properties of Quadrilaterals

A quadrilateral is a **4-sided** shape, with the sum of interior angles totalling **360°**.
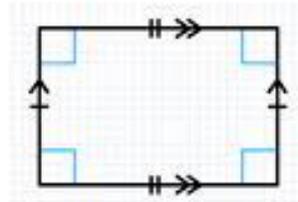Quadrilaterals can be classified based on **parallel sides, interior angles** and **side lengths**.

Square
- 2 pairs of parallel sides
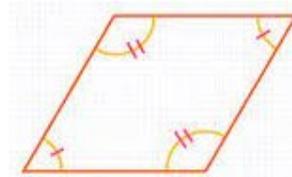- 4 equal side lengths
- 4 equal angles (90°)

Rectangle
- 2 pairs of parallel sides
- 2 pairs of equal side lengths
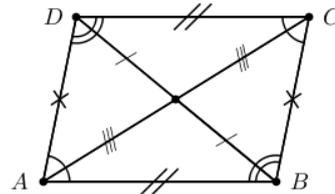- 4 equal angles (90°)

Rhombus
- 2 pairs of parallel sides
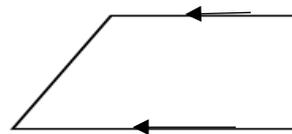- 4 equal side lengths
- Opposite angles are equal

Parallelogram
- 2 pairs of parallel sides
- 2 pairs of equal side lengths
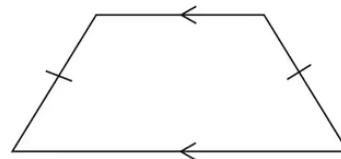- Opposite angles are equal
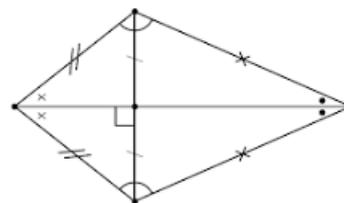
Trapezium
- 1 pair of parallel sides

Isosceles Trapezium
- 1 pair of parallel sides
- 1 pair of opposite sides with equal length
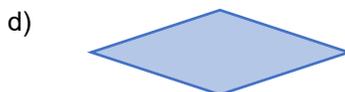- 2 pairs of adjacent equal angles

Kite
- 0 pairs of parallel sides
- 2 equal and adjacent side lengths
- 1 pair of opposite equal angles

Example: Which of the shapes below is a parallelogram?

a)

c)

b)

d)

A parallelogram has 4 sides so we can eliminate c).
A parallelogram has two sets of parallel sides, so we can eliminate a) and d).

B must be the parallelogram. Indeed, it is a parallelogram since it has two pairs of parallel sides, where the pairs are of equal length, and its opposite angles are equal.

Example: Identify the quadrilateral below and then use the properties of the shape to find the unknown angles.

$64°$

$158°$

x

y
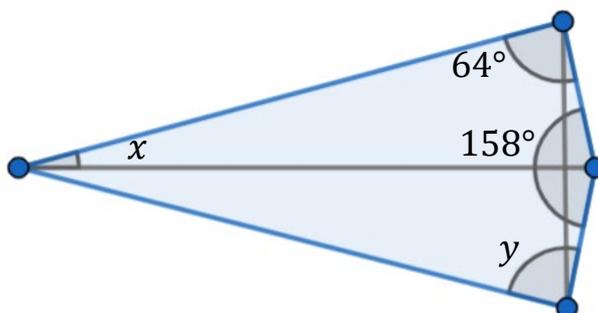
1. Calculate angle y.

    Using the property that opposite angles across the line of symmetry in a kite are equal, we find:
    $$y = 64°$$

2. Calculate angle x.

    Angles in a quadrilateral add up to $360°$:

    $$x + x + 64° + 64° + 158° = 360°$$
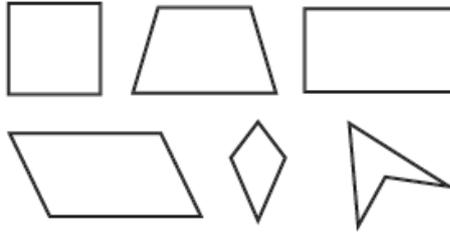 $$2x + 286° = 360°$$
    $$2x = 74°$$
    $$x = 37°$$

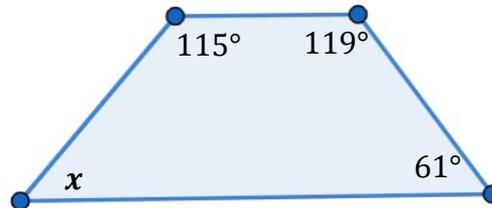Therefore angle $x = \mathbf{37°}$.

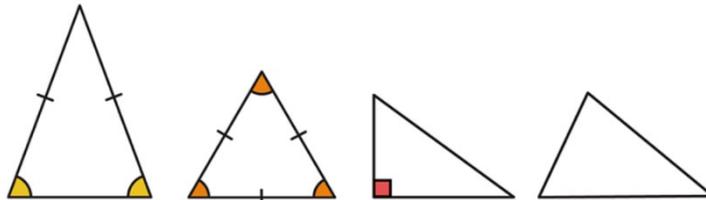# Properties of Quadrilaterals and Triangles – Practice Questions

1. Circle the trapezium
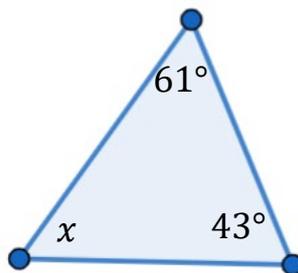
2. Give two properties of a rhombus.

3. Calculate angle x.

115°   119°

x 61°

4. Circle the isosceles triangle and give a reason for your identification

5. Calculate angle x.

61°

x 43°

Worked solutions for the practice questions can be found amongst the worked solutions for the corresponding worksheet file.