GEOMETRY (SPACE / SHAPES / ANGLES / LINES)

ANGLES

This can be written as \( \angle ABC \) or \( \angle B \)

TYPES OF ANGLE:

- ACUTE
- OBTUSE
- REFLEX

RIGHT ANGLE = 90° = PERPENDICULAR

STRAIGHT LINE = 180°

ALL ANGLES WHICH MAKE UP A STRAIGHT LINE ADD UP TO 180°

\[ a + b + c = 180° \]

Q U E S T I O N S:

PLAY FIND THE STRAIGHT LINE

ALL ANGLES AT A POINT WHICH MAKE UP A FULL CIRCLE ADD UP TO 360°

\[ d + e + f + g = 360° \]
QUESTIONS WITH ANGLES

IF TWO LINES ARE PARALLEL:

\[ \angle 1 = \angle 2 \]

THIS LINE IS CALLED A "TRANSVERSAL"

THESE ANGLES ARE CORRESPONDING

LOOK FOR F SHAPE

THESE ANGLES ARE ALTERNATE

LOOK FOR Z SHAPE

VERTICALLY OPPOSITE

LOOK FOR \( \times \)

SOME "WORDS" / TERMS

AXIOM = "FACT" = WE ACCEPT WITHOUT PROOF

THEOREM = "FACT" THAT CAN BE PROVED
TRIANGLES

TYPES OF TRIANGLE

EQUILATERAL

ALL 3 SIDES ARE THE SAME

ALL 3 ANGLES ARE THE SAME (60°)

ISOSCELES

2 EQUAL SIDES

2 EQUAL ANGLES

A TRIANGLE WHICH IS NOT ANY OF THE OTHER 3 TRIANGLES IS CALLED A

SCALENE TRIANGLE

THE ONLY INTERESTING THING ABOUT A SCALENE TRIANGLE IS THAT THERE'S NOTHING INTERESTING ABOUT SCALENE TRIANGLES.

Pythagoras

\[ a^2 + b^2 = c^2 \]

HYPOTENUSE

REMEMBER

AN ISOSCELES TRIANGLE CAN BE DRAWN FACING ANY DIRECTION ... THEY MIGHT BE TRYING TO TRICK YOU.

IT IS THE TWO ANGLES WHICH ARE OPPOSITE THE TWO EQUAL SIDES WHICH ARE EQUAL

\[ \angle 1 + \angle 2 + \angle 3 = 180° \]
PARALLELOGRAMS

Has:
- Four Sides
  - Opposite Sides are Equal Length and Parallel.
  - Opposite Angles are Equal.

Diagonals across parallelograms are very interesting:

- Diagonals "Bisect" the Area
  
  \[
  \text{Area } A = \text{Area } B \quad \text{or} \quad \text{Area } C = \text{Area } D
  \]

- Diagonals also bisect each other.

Don't get confused by "tall" parallelograms! They work the same way.
### Congruent Triangles

**Congruent** = Identical

Triangles are congruent if:
- **S.S.S.** If all three sides are the same length
- **S.A.S.** If 2 sides and the angle in-between
- **A.S.A.** 2 angles and the side in-between
- **R.H.S.** If both triangles have a right-angle, the same hypotenuse length, and one other same side

### Examples

<table>
<thead>
<tr>
<th>Method</th>
<th>Condition</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.S.S.</td>
<td>If all three sides are the same length</td>
<td><img src="example1.png" alt="Example" /></td>
</tr>
<tr>
<td>S.A.S.</td>
<td>If 2 sides and the angle in-between</td>
<td><img src="example2.png" alt="Example" /></td>
</tr>
<tr>
<td>A.S.A.</td>
<td>2 angles and the side in-between</td>
<td><img src="example3.png" alt="Example" /></td>
</tr>
<tr>
<td>R.H.S.</td>
<td>If both triangles have a right-angle, the same hypotenuse length, and one other same side</td>
<td><img src="example4.png" alt="Example" /></td>
</tr>
</tbody>
</table>
**Similar Triangles**

*NOT THE SAME AS CONGRUENT*

**SAME ANGLES**

Similar triangles are like a larger/smaller version of each other.

These can be drawn one inside the other:

These are often treated differently, but actually they are just 2 similar triangles.

$\triangle ABC$ and $\triangle ADE$ have the same angles, so are similar triangles.

**Theorem**

The corresponding sides of similar triangles are in the same ratio. *

We use this to work out lengths of sides.

Write down an equation with "unknown" fraction = known fraction

eg $\frac{x}{5} = \frac{7}{10}$

These sides must be the ones that correspond to the "unknown" sides.

$10x = 35$

$x = 3.5$
Circles

- **Tangent**: Touches circle at one point.
- **Radius**: Length from center to any point of the circle.
- **Diameter**: Twice length of radius.
- **Chord**: Line that cuts/touches circle at two points.

- The angle in a semi-circle is a right angle.

Questions with Circles and Triangles

Look for:

- **Semi-circles**
  - Because the angle in a semi-circle is 90° (right angle).

- **Radii** (or radiiuses)
  - Because it will help us find isosceles triangles.

- **Isosceles triangles**
  - Because angles at the base are the same.

- **Right-angled triangle**
  - Because then I can work out the side-lengths using Pythagoras: $a^2 + b^2 = c^2$. 