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Geometry

What triangle is it?

Scalene, isosceles or equilateral? Acute, right or obtuse? For sides, count how many are equal; for angles, just look at the biggest angle.

In this video we see the rules with an animation and solve 3 exercises step by step: two calculations and one reasoning question about the equilateral triangle.

The method

$$\text{largest angle} < 90^\circ \;\Rightarrow\; \text{acute}$$

$$\text{largest angle} = 90^\circ \;\Rightarrow\; \text{right}$$

$$\text{largest angle} > 90^\circ \;\Rightarrow\; \text{obtuse}$$

Worked examples

Exercise 1

In triangle ABC angle A is 53° and angle B is 37°. How big is angle C? What kind of triangle is it?

Data: $\hat{A} = 53^\circ \;\cdot\; \hat{B} = 37^\circ$

1. **Third angle: 180° minus the sum of the other two**

$$\hat{C} = 180^\circ - (53^\circ + 37^\circ) = 90^\circ$$

Result: $\hat{C} = 90^\circ$

2. **There is a 90° angle: it is a RIGHT triangle**

$$\hat{C} = 90^\circ \Rightarrow \text{right}$$

$$\text{different angles} \Rightarrow \text{scalene}$$

💡 All angles different → all sides different too: it is scalene

Result: right scalene

✓ Check

$$53^\circ + 37^\circ + 90^\circ = 180^\circ \checkmark$$

Exercise 2

A triangle has two angles of 34° and 48°. How big is the third angle? What kind of triangle is it?

Data: $\hat{A} = 34^\circ \cdot \hat{B} = 48^\circ$

1. **Third angle: 180° minus the sum of the other two**

$$\hat{C} = 180^\circ - (34^\circ + 48^\circ) = 98^\circ$$

Result: $\hat{C} = 98^\circ$

2. **98° is more than 90°: it is OBTUSE**

$$\hat{C} = 98^\circ > 90^\circ \Rightarrow \text{obtuse}$$

$$\text{different angles} \Rightarrow \text{scalene}$$

Result: obtuse scalene

✓ Check

$$34^\circ + 48^\circ + 98^\circ = 180^\circ \checkmark$$

Exercise 3

A triangle has a 60° angle and two equal sides. Must it be equilateral?

Data: one angle $= 60^\circ$ · 2 equal sides

1. **Two equal sides → isosceles. Case 1: 60° is the vertex angle**

$$(180^\circ - 60^\circ) : 2 = 60^\circ$$

Result: $\hat{A} = \hat{B} = 60^\circ$

2. **Case 2: 60° is a base angle**

$$180^\circ - 60^\circ - 60^\circ = 60^\circ$$

3. **In both cases: three 60° angles!**

$$3 \times 60^\circ \Rightarrow \text{equilateral}$$

Result: equilateral

✓ Check

$$60^\circ + 60^\circ + 60^\circ = 180^\circ \checkmark$$

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