EDUCATION
MADE SIMPLE

Geometry

Equal parts and fractions

"Three times", "2/3 of", "half": when a problem uses these words, think equal parts! One part = sum : number of parts, then each measure = number of parts × one part.

In this video we see the method with animated bars and solve 3 triangle exercises step by step: with a multiple, with a fraction and with angles.

The method

$$1 \text{ part} = \text{sum} : \text{no. of parts}$$

$$\text{measure} = \text{no. of parts} \times 1 \text{ part}$$

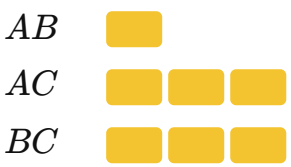
Worked examples

Exercise 1

In an isosceles triangle, each leg is three times the base. The perimeter is 133 cm. How long are the sides?

Data: $AC = BC = 3 \times AB \ \cdot \ p = 133 \text{ cm}$

1. **Base = 1 part, each leg = 3 parts**



$$1 + 3 + 3 = 7 \text{ parts}$$

Result: $p = 7 \text{ parts}$

2. **One part = perimeter : number of parts**

$$1 \text{ part} = 133 : 7 = 19 \text{ cm}$$

Result: $1 \text{ part} = 19 \text{ cm}$

3. **Each side = number of parts × one part**

$$AB = 1 \times 19 = 19 \text{ cm}$$

$$AC = BC = 3 \times 19 = 57 \text{ cm}$$

Result: $AB = 19 \text{ cm} \quad AC = BC = 57 \text{ cm}$

✓ Check

$$19 + 57 + 57 = 133 \text{ cm} \checkmark$$

Exercise 2

A triangle has a perimeter of 76 cm. One side is 16 cm. Of the other two sides, one is 2/3 of the other. How long are they?

Data: $p = 76 \text{ cm} \cdot BC = 16 \text{ cm} \cdot AC = \frac{2}{3} AB$

1. **Sum of the two unknown sides: perimeter − known side**

$$AB + AC = 76 - 16 = 60 \text{ cm}$$

Result: $AB + AC = 60 \text{ cm}$

2. **"AC is 2/3 of AB": AB = 3 parts, AC = 2 parts**



$$3 + 2 = 5 \text{ parts}$$

💡 The denominator (3) splits AB into 3 parts, the numerator (2) gives 2 to AC

3. **One part = sum : number of parts**

$$1 \text{ part} = 60 : 5 = 12 \text{ cm}$$

Result: $1 \text{ part} = 12 \text{ cm}$

4. **Each side = number of parts × one part**

$$AB = 3 \times 12 = 36 \text{ cm}$$

$$AC = 2 \times 12 = 24 \text{ cm}$$

Result: $AB = 36 \text{ cm} \quad AC = 24 \text{ cm}$

✓ Check

$$36 + 24 + 16 = 76 \text{ cm} \checkmark$$

$$\tfrac{2}{3} \times 36 = 24 \checkmark$$

Exercise 3

In a right triangle, one acute angle is 2/3 of the other. How big are the two acute angles?

Data: $\hat{C} = 90° \cdot \hat{A} = \tfrac{2}{3}\,\hat{B}$

1. **In a right triangle the acute angles add up to 90°**

$$\hat{A} + \hat{B} = 180° - 90° = 90°$$

Result: $\hat{A} + \hat{B} = 90°$

2. **"A is 2/3 of B": B = 3 parts, A = 2 parts**

$\hat{B}$ 

$\hat{A}$ 

$$3 + 2 = 5 \text{ parts}$$

3. **One part = 90° : 5**

$$1 \text{ part} = 90^\circ : 5 = 18^\circ$$

Result: $1 \text{ part} = 18^\circ$

4. **Each angle = number of parts × one part**

$$\hat{B} = 3 \times 18^\circ = 54^\circ$$

$$\hat{A} = 2 \times 18^\circ = 36^\circ$$

Result: $\hat{B} = 54^\circ \quad \hat{A} = 36^\circ$

✓ Check

$$36^\circ + 54^\circ = 90^\circ \checkmark$$

$$\frac{2}{3} \times 54^\circ = 36^\circ \checkmark$$

. .

© Education Made Simple