O level Emath- Congruence and similarity

Congruence & Similarity

Congruent figures

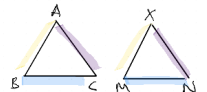
Properties
✓ exactly same size
✓ exactly same shape

Symbol "≡"

5 Congruency Test

① SSS

3 sides of △ are equal to 3 sides of other △



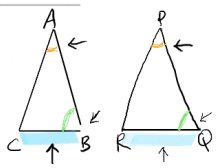
step 1 : consider △ABC and △XMN
step 2 : Tests
AB = XM
AC = XN
BC = MN
step 3 : concluding statement ∴ △ABC ≡ △XMN (SSS)

MUST STATE THE TEST USED!

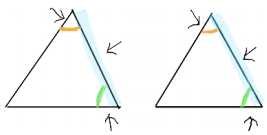
② SAS

2 ∠s + 1 side

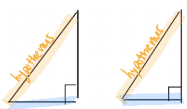
③ AAS



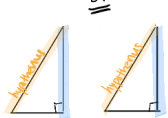
④ ASA



⑤ RHS → Right angle



OR

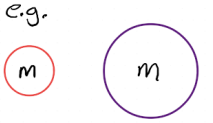


Hypotenuse and one side of the right-angled △.

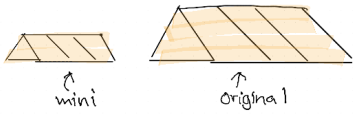
Similar figures

Properties
✓ Exactly the same shape
✓ Not necessarily the same size

e.g.



m&m chocolates



Toberlone chocolate

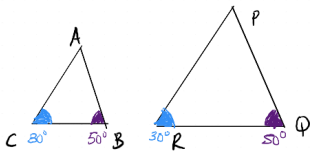
3 Similarity Test

For similar fig. test, you need not include Test name in final answer. Its solely for reasoning

① AAA

Even though this is AAA, we are only required to prove that 2 angles of one triangle are equal to 2 angles of the other triangle?

Why? Because all triangles have only 3 angles & the sum of an angles = 180°!



step 1 : consider △ABC and △PQR

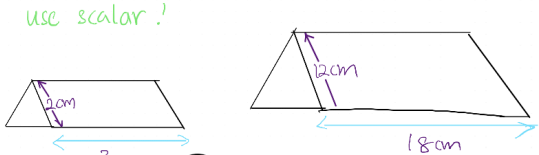
step 2 : ∠C = ∠R = 30°
∠B = ∠Q = 50°

∴ △ABC is similar to △PQR

② SSS

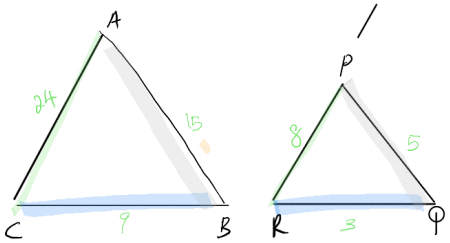
Three corresponding sides are equal

How do I prove that their sides are equal? use scalar!



The toberlone was magnified by 6 times!

$\frac{12}{2} = 6$ ✓
$\frac{18}{3} = 6$ ✓



consider △ABC and △PQR

Area of Similar Figures

The ratio of the areas of any two similar figures is equal to the square of the ratio of any two corresponding length.

$$\left(\frac{l_1}{l}\right)^2 = \frac{A_1}{A} \Leftrightarrow \sqrt{\frac{A_1}{A}} = \frac{l_1}{l}$$

opposite of square power is

square root

$\left(\frac{l_1}{l_2}\right)^2 = \frac{A_1}{A_2} \Leftrightarrow \sqrt{\frac{A_1}{A_2}} = \frac{l_1}{l_2}$

Volume of Similar Figures.

$\left(\frac{l_1}{l_2}\right)^3 = \frac{V_1}{V_2} \Leftrightarrow \sqrt[3]{\frac{V_1}{V_2}} = \frac{l_1}{l_2}$

The ratio of the vol of two similar solids is equal to the cube of the ratio of any two corresponding length of the two solids

$\frac{AB}{PQ} = K$

$\frac{BC}{QR} = K$

$\frac{AC}{PR} = K$

$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = K$

$\therefore \Delta ABC$ is similar to ΔPQR

③ SAS

side Angle side