Grade 8 Math, Explained

Unit 15 · Congruency and Similarity

HARDER PRACTICE QUESTIONS

Full marks 27

Write your answers on separate paper. Show your working. In a proof, list the three pairs of equal parts, each with its reason, then name the test. Draw a figure for every proof.

1 A proof with a shared side [3]

In quadrilateral $ABCD$, $AB = AD$ and $CB = CD$. Prove that $\triangle ABC \cong \triangle ADC$, and so that $\angle ABC = \angle ADC$.

2 Why the height cuts the base in half [3]

In $\triangle ABC$, $AB = AC$, and AD is perpendicular to BC, with D on BC. Prove that $BD = DC$. Which test do you use, and why not another?

3 Not enough [3]

Give an example or a reason for each.

i. Two triangles have all three angles equal. Must they be congruent?

ii. Two triangles have all three angles equal, and their perimeters are equal too. Must they be congruent?

iii. Two triangles have two pairs of equal sides and one pair of equal angles. Must they be congruent?

4 Find the unknowns [3]

$\triangle ABC \cong \triangle DEF$, with $AB = (2x + 1)$ cm, $DE = (3x - 4)$ cm, $BC = (y + 2)$ cm and $EF = (2y - 3)$ cm. Find x and y, and the lengths of AB and BC.

5 Spot the error [3]

Find the mistake and correct it.

In two triangles, $AB = PR$, $BC = PQ$ and $AC = QR$. Aayusha wrote: "$\triangle ABC \cong \triangle PQR$ by SSS." The test is right, but the statement is wrong. Why? Write it correctly, and say which angle equals $\angle B$.

6 A line across a triangle [4]

In $\triangle ABC$, D is on AB and E is on AC, with $DE \parallel BC$. $AD = 4$ cm, $DB = 6$ cm and $DE = 5$ cm.

i. Show that $\triangle ADE$ and $\triangle ABC$ have equal angles.

ii. Write the ratio of their corresponding sides.

iii. Find BC.

iv. If $AE = 6$ cm, find EC.

7 In a real setting [3]

At the same moment, Sushant, who is 1.6 m tall, casts a shadow 1.2 m long, and the school's flagpole casts a shadow 6 m long. (The numbers are made up for the problem.)

i. Why are the two triangles made by the sun's rays similar?

ii. Find the height of the flagpole.

8 Think [3]

i. Are all equilateral triangles similar? All squares? All rectangles? Give a reason for each.

ii. A triangle with sides 3, 4 and 5 cm is right-angled, and so is a similar triangle with sides 6, 8 and 10 cm. The sides have doubled. How many times has the area grown? Why?

9 Make your own [2]

A triangle has sides of 3, 5 and 7 cm. Find the sides of a similar triangle whose perimeter is 45 cm. Then make up another pair of similar triangles with a ratio of your own, and give their sides.