Unit 15 · Congruent Figures

HARDER PRACTICE QUESTIONS

Full marks 35

Write your answers on separate paper. Give a reason for each answer. When you write $\triangle ABC \cong \triangle XYZ$, write the matching corners in matching order. Draw on squared paper where a question asks for it.

1 Spot the errors [4]

Rabina wrote these four. Each one is wrong. Correct it, and say what went wrong.

i. Two rectangles each have an area of 12 cm^2, so they are congruent.

ii. Two triangles each have angles of 30°, 60° and 90°, so they are congruent.

iii. $\triangle ABC \cong \triangle PQR$, so $AB = QR$.

iv. A paper shape and its mirror image are never congruent, because one must be turned over to fit the other.

2 Matching parts [4]

$\triangle DEF \cong \triangle KLM$. $DE = 6$ cm, $EF = 10$ cm, $DF = 8$ cm, $\angle D = 90°$ and $\angle E = 53°$.

i. Find KL and LM.

ii. Find $\angle K$ and $\angle L$.

iii. Find $\angle M$.

iv. Find the perimeter of $\triangle KLM$.

3 Find the unknowns [4]

In each part, $\triangle ABC \cong \triangle XYZ$; each part is about a different pair of triangles.

i. $AB = (2x + 1)$ cm and $XY = 9$ cm. Find x.

ii. $\angle C = 3y°$ and $\angle Z = 51°$. Find y.

iii. $BC = (3p - 2)$ cm and $YZ = (p + 6)$ cm. Find p and the length of BC.

iv. $\angle A = 2k°$, $\angle Y = (k + 9)°$ and $\angle Z = 51°$. Find k.

4 Cutting a tile [4]

A mason has square tiles with sides of 40 cm. Say whether each cut gives congruent pieces, and give a reason.

i. One cut along a diagonal.

ii. Two cuts, along both diagonals.

iii. One cut from the middle of one side to the middle of the opposite side.

iv. One cut from a corner to the middle of a side that doesn't meet that corner.

5 Triangles in a rectangle [4]

$ABCD$ is a rectangle, not a square. Its diagonals AC and BD cross at O.

i. Name the four small triangles that meet at O.

ii. Which of them are congruent to each other? Give a reason.

iii. Name the four big triangles each made by one diagonal. Are they all congruent?

iv. If $ABCD$ were a square, how many of the four small triangles would be congruent?

6 Built from the same parts [4]

i. Construct $\triangle ABC$ with $AB = 5$ cm, $BC = 6$ cm and $\angle ABC = 60°$.

ii. Construct $\triangle PQR$ with $PQ = 6$ cm, $QR = 5$ cm and $\angle PQR = 60°$.

iii. Cut one out and lay it on the other. Are they congruent? Did you have to turn or flip it?

iv. Write the congruence with the corners in matching order.

7 Same area, same perimeter [4]

i. Two figures are congruent. Explain why they must have the same area and the same perimeter.
ii. On squared paper, draw a row of 5 squares, and an L made of a row of 4 squares with one more square on top of the end one. Find the area and the perimeter of each, counting sides of squares.
iii. Are the row and the L congruent? What does this show?
iv. Two rectangles both have an area of 12 cm^2 and a perimeter of 14 cm. Are they congruent? Find their sides.

8 Think: four Ls make an L [4]

On squared paper, draw a square 4 squares by 4 squares, and cut away the 2 by 2 square at its top right corner. What is left is a big L of 12 squares.

i. A small L is made of 3 squares: a 2 by 2 square with one corner square taken away. Cut the big L into 4 small Ls, all congruent. Draw your answer.
ii. Is the big L the same shape as the small L? How many times as long are its sides?
iii. Does a 2 by 2 square cut into 4 congruent squares the same way? What about a 3 by 3 square cut into 9?
iv. Sagar says, “The big L has 4 times the area of the small L, so its perimeter is 4 times too.” Check.

9 Make your own [3]

i. On squared paper, draw two congruent figures, neither a rectangle, where one must be flipped over to fit on the other.
ii. Name two everyday things that have the same shape but are not congruent.
iii. Name the corners of your two figures in i, and write the congruence with the corners in matching order.