Unit 14 · Plane Figures

HARDER PRACTICE QUESTIONS

Full marks 35

Write your answers on separate paper. Show your working. Sketch every figure first, with its measurements on it. For a construction, use a ruler and a compass, keep the arcs, and measure the parts that were not given. The measurements on this sheet are made up for the problems.

1 Spot the errors [4]

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

i. A triangle with sides of 3 cm, 4 cm and 8 cm can be constructed with two arcs.

ii. A right-angled triangle whose shorter sides are 20 cm and 21 cm has a hypotenuse of 41 cm.

iii. The diagonals of every rectangle bisect each other at right angles.

iv. A triangle ABC with $BC = 6$ cm, $\angle B = 70^\circ$ and $\angle C = 115^\circ$ can be constructed.

2 One, many or none? [4]

For each set of measurements, say whether it gives exactly one triangle, many different triangles, or none. Give a reason.

a. $AB = 5$ cm, $BC = 7$ cm and $\angle B = 50^\circ$

b. $\angle A = 50^\circ$, $\angle B = 60^\circ$ and $\angle C = 70^\circ$

c. $PQ = 4$ cm, $QR = 5$ cm and $PR = 10$ cm

d. $XY = 6$ cm, $\angle X = 40^\circ$ and $\angle Z = 75^\circ$

3 A triangle with a 105° corner [4]

i. Construct $\triangle ABC$ with $AB = 5$ cm, $\angle BAC = 105^\circ$ and $\angle ABC = 45^\circ$, using a compass for both angles.

ii. Find $\angle ACB$ without measuring.

iii. Measure BC and AC.

iv. Which side is the longest? Which angle is it opposite?

4 Build a parallelogram [4]

i. Construct a parallelogram $PQRS$ with $PQ = 5$ cm, $PS = 3.5$ cm and $\angle P = 60^\circ$. Explain how you find R with a compass.

ii. Find $\angle Q$, $\angle R$ and $\angle S$ without measuring.

iii. Draw the diagonals PR and QS, crossing at O. Measure them. Are they equal?

iv. Measure PO, OR, QO and OS. What do you find?

5 The ladder [4]

A ladder 5 m long leans against a wall. The ground is level and the wall is upright.

i. Its foot is 1.4 m from the wall. How high up the wall does it reach?

ii. The foot is pulled out to 3 m from the wall. How high does it reach now?

iii. How far did the top slide down?

iv. Bibisha says, “The foot moved 1.6 m, so the top slid down 1.6 m too.” Is she right?

6 Short cuts [4]

i. A school ground is a rectangle 80 m long and 60 m broad. How long is its diagonal?
ii. How much shorter is it to walk across the diagonal than along two sides?
iii. A door is 2 m high and 1.5 m wide. Can a flat board 2.4 m long be carried through it, upright or tilted? Give a reason.
iv. A phone's screen is a rectangle 15 cm by 8 cm. Phone sizes are given by the diagonal. What size is this phone?

7 Name it from its diagonals [4]

A four-sided shape is a parallelogram. Name it as exactly as you can, and give a reason.

a. Its diagonals are equal, but don't cross at a right angle.
b. Its diagonals are equal and cross at a right angle.
c. Its diagonals are not equal.
d. One of its angles is 90°.

8 Think: right triangles with whole sides [4]

3, 4, 5 and 5, 12, 13 are the sides of right-angled triangles.

i. Show that 7 cm, 24 cm and 25 cm make a right-angled triangle too.
ii. Look at 3, 4, 5; 5, 12, 13; 7, 24, 25. How are the two bigger numbers related? And how is their sum related to the smallest number?
iii. Use the pattern to find the next one, starting with 9.
iv. Check your answer to iii.

9 Make your own [3]

i. Write three lengths that make no triangle, and three that make an isosceles triangle.
ii. Find a right-angled triangle with whole-number sides that is not 3, 4, 5 made bigger.
iii. The diagonals of a parallelogram are 6 cm and 8 cm, and they cross at a right angle. Find the length of each side.