Unit 1 · Lines and Angles

HARDER PRACTICE QUESTIONS

Full marks 35

Write your answers on separate paper. Show your working, and give a reason for each answer. Use a ruler, a protractor, a set square and squared paper where they help.

1 Spot the error [3]

Sujan measured $\angle PQR$. He put the protractor's center on Q and its base line along QR, which points to the **right**. The arm QP crossed the edge where the two rows read 52 and 128. He wrote $\angle PQR = 128°$. But the angle looks narrower than a square corner.

i. Which row of numbers should he have read?
ii. What is the right size of the angle?
iii. Give a quick check that would have caught his mistake.

2 Angles on a clock [4]

The 12 numbers on a clock face are spaced equally round a whole turn of 360°. At each hour, take the smaller angle between the two hands.

i. What is the angle between two numbers next to each other, such as 12 and 1?
ii. What is the angle between the hands at 4 o'clock? What kind of angle is it?
iii. At which two hours is the angle a right angle?
iv. At which hours, from 1 o'clock to 12 o'clock, is the angle acute?

3 On a straight line [4]

O is a point on the straight line AB. A line OC starts from O, and $\angle AOC = 35°$.

i. Find $\angle BOC$ without measuring.
ii. What kind of angle is $\angle BOC$?
iii. Now OC is turned so that $\angle AOC$ is obtuse. What kind of angle is $\angle BOC$ now?
iv. Can $\angle AOC$ and $\angle BOC$ both be acute? Why or why not?

4 Corners of the set squares [5]

A geometry box has a 45° set square (angles 90°, 45°, 45°) and a 30°–60° set square (angles 90°, 30°, 60°). You may put one corner of each **side by side**, so that their angles add up. Or you may put one corner **on top of** the other, so that you see the difference.

Which of these angles can you make this way? For each, say how, or say why not.

i. 75°
ii. 105°
iii. 120°
iv. 15°
v. 100°

5 Fold it [3]

Tashi makes a right-angle tester by folding a scrap of paper twice, as in the unit. Then she folds the tester exactly in half once more, so that its two edges lie on each other.

i. What is the angle of the new corner? Which set square has a corner of the same size?
ii. She puts the new corner side by side with a second right-angle tester. What angle do they make together?
iii. What kind of angle is your answer to ii?

6 Letters on squared paper [3]

Draw these capital letters with straight lines on squared paper: **L, H, T, V, Z** and **N**. Draw L, H and T along the grid lines.
For each letter, say whether it has **parallel** lines, **perpendicular** lines, **both** or **neither**.

7 Slanting lines [3]

On squared paper, draw three lines, each starting at a corner of a square. PQ goes 3 squares right and 2 squares up from P. RS starts 4 squares below P, and goes 3 squares right and 2 squares up. TU starts 2 squares to the right of P, and goes 2 squares right and 3 squares up.

i. Which two lines are parallel? How can you tell without measuring?
ii. Do the other pairs meet if you make the lines longer?

8 Is it possible? [4]

Give a reason for each.

i. A triangle with two right angles.
ii. A triangle with three acute angles.
iii. A quadrilateral with four right angles.
iv. Two lines, each perpendicular to the same line AB, that meet each other.

9 Make your own [3]

On squared paper, draw a quadrilateral ABCD, its corners on the corners of squares, that has exactly **two** right angles and exactly **one** pair of parallel sides.
Measure its other two angles with a protractor, and say what kind each one is.

10 Think [3]

Diksha's protractor is broken. A piece is missing from its left end, so the outer row has no 0, 10 or 20 any more. The center and the rest of the edge are fine.
She must draw an angle of 50°. Give **two** different ways she can still do it with this protractor.