Angles and polygons - topic test

15 questions | 42 marks | 45 minutes

A by-hand review of measuring, angle relationships, polygons and shape-sorting reasoning. Start with short facts, then explain multi-step solutions.

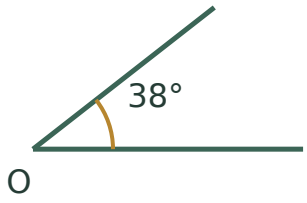
Equivalent correct methods earn the corresponding marks.

1. Classify an angle of 154 degrees. [1 mark]

154 is between 90 and 180 degrees.

Answer: Obtuse.

2. Use a ruler and protractor to draw an angle of 38 degrees. Mark the vertex and label the angle. [2 marks]



Angle size is the turn between the arms.

Draw a baseline and place the protractor centre on the vertex.

Read from the zero on the baseline, mark 38 degrees and draw the second arm.

Answer: A labelled acute angle of 38 degrees.

3. Two adjacent angles on a straight line are 104 degrees and x. Find x and state the angle rule. [2 marks]

Angles on a straight line total 180 degrees.

180 − 104 = 76 degrees.

Answer: $x = 76^\circ$.

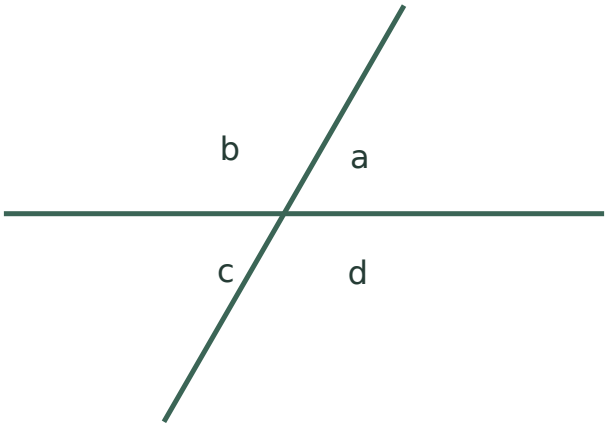
4. Four non-overlapping angles cover a full turn around a point. Three are 85, 97 and 74 degrees. Find the fourth. [2 marks]

85 + 97 + 74 = 256.

360 − 256 = 104 degrees.

Answer: 104 degrees.

5. Two straight lines cross as shown. Given a = 48 degrees, find the following. [3 marks]



Two straight lines intersect. Sketch not to scale.

(a) Find b. [1 mark]

180 − 48 = 132.

Answer: 132 degrees.

(b) Find c. [1 mark]

c is vertically opposite a.

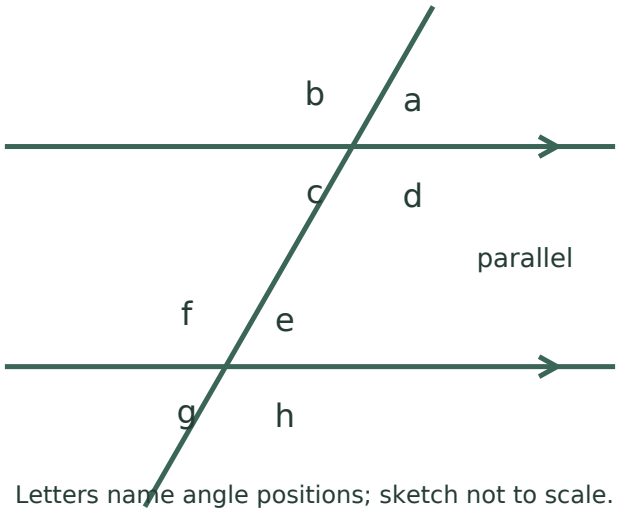
Answer: 48 degrees.

(c) Find d. [1 mark]

d is vertically opposite b.

Answer: 132 degrees.

6. The two horizontal lines in the diagram are parallel. Given d = 126 degrees, answer each part with an angle reason. [4 marks]



Letters name angle positions; sketch not to scale.

(a) Find f. [2 marks]

d and f are alternate interior angles.

Parallel lines make them equal.

Answer: 126 degrees.

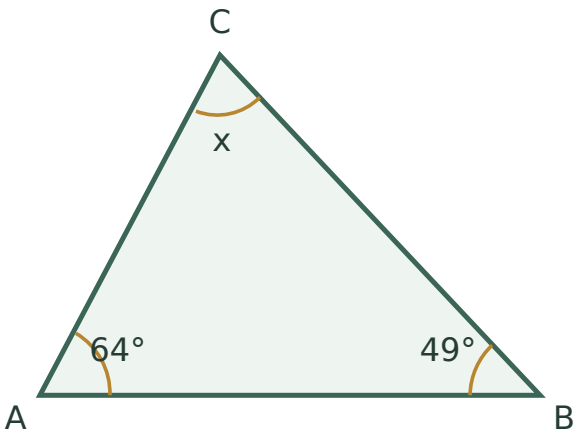
(b) Find e. [2 marks]

e and f are adjacent on a straight line.

e = 180 − 126 = 54 degrees.

Answer: 54 degrees.

7. A triangle has two interior angles of 64 degrees and 49 degrees. Find the third. [2 marks]



Sketch not to scale

64 + 49 = 113.

180 − 113 = 67 degrees.

Answer: 67 degrees.

8. An isosceles triangle has vertex angle 44 degrees. Find each base angle and explain why division is needed. [3 marks]

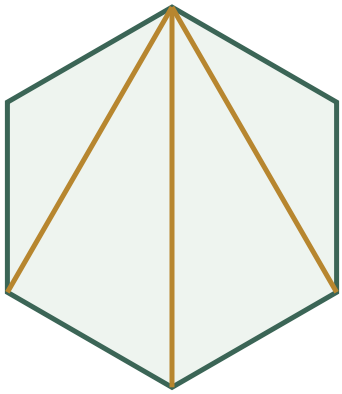
The two base angles total 180 − 44 = 136 degrees.

They are equal because they are opposite equal sides.

136 ÷ 2 = 68 degrees.

Answer: 68 degrees each.

9. Consider a regular hexagon. [4 marks]



6 sides split into 4 triangles

(a) Find its interior-angle sum. [2 marks]

$(6 - 2) \times 180 = 720$ degrees.

Answer: 720 degrees.

(b) Find each interior angle. [2 marks]

$720 \div 6 = 120$ degrees.

Answer: 120 degrees.

10. Each interior angle of a regular polygon is 140 degrees. Find its number of sides. [3 marks]

Each exterior angle is $180 - 140 = 40$ degrees.

The exterior angles total 360 degrees.

$360 \div 40 = 9$.

Answer: 9 sides.

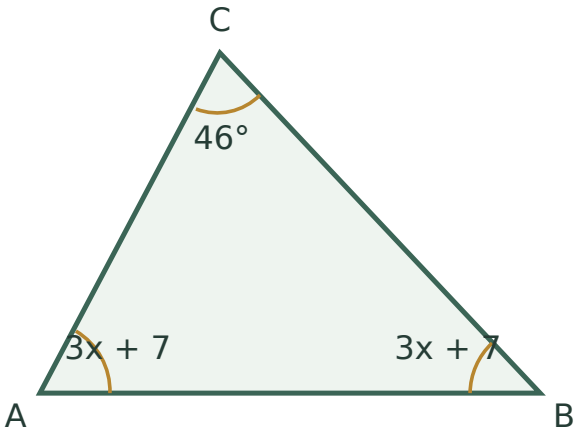
11. A quadrilateral has four equal sides, two acute angles and two obtuse angles. Give its most specific name and explain why it is not a square. [2 marks]

Four equal sides define a rhombus.

The angle information rules out a square.

Answer: Rhombus; it does not have four right angles.

12. The two equal base angles of an isosceles triangle are each $(3x + 7)^\circ$. The vertex angle is 46 degrees. Find x and the base angle size. [3 marks]



Sketch not to scale

2(3x + 7) + 46 = 180.

6x + 60 = 180, so x = 20.

3(20) + 7 = 67 degrees. Check: 67 + 67 + 46 = 180.

Answer: x = 20; each base angle is 67 degrees.

13. Two co-interior angles on parallel lines are $(3x + 15)^\circ$ and $(2x + 20)^\circ$. Find x and both angle sizes. [4 marks]

Co-interior angles sum to 180 degrees.

3x + 15 + 2x + 20 = 180, so 5x = 145 and x = 29.

3(29) + 15 = 102; 2(29) + 20 = 78. Their total is 180.

Answer: x = 29; the angles are 102 degrees and 78 degrees.

14. A five-sided garden border has interior angles of 92, 107, 119 and 125 degrees at four corners. A paving plan needs the angle at the last corner. Calculate it. [3 marks]

The five interior angles total $(5 - 2) \times 180 = 540$ degrees.

The four measured angles total $92 + 107 + 119 + 125 = 443$ degrees.

$540 - 443 = 97$ degrees.

Answer: 97 degrees.

15. A sorting program is used on quadrilaterals. Rule 1: if there are four right angles, output Rectangle and stop. Rule 2: otherwise, if all four sides are equal, output Rhombus and stop. Rule 3: otherwise output Other. The table gives two inputs. [4 marks]

Properties of the input quadrilaterals

Shape	Four right angles?	Four equal sides?
A	Yes	Yes
B	No	Yes

(a) What does the current program output for A? [1 mark]

A satisfies Rule 1.

Answer: Rectangle.

(b) Repair the program so that it gives the most specific name for A. [2 marks]

A square also satisfies the rectangle test.

Putting the more specific test first prevents early misclassification.

Answer: Before Rule 1, test for four right angles AND four equal sides; if true output Square and stop.

(c) What does the repaired program output for B? [1 mark]

B fails the square and rectangle tests but has four equal sides.

Answer: Rhombus.