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.

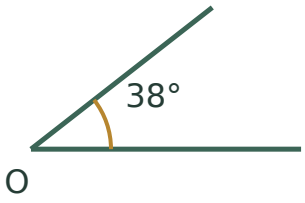
Equivalent correct methods earn the corresponding marks.

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: $x = 76^\circ$.

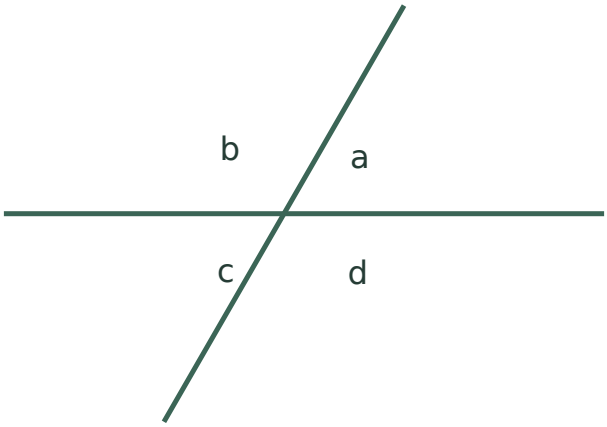
4. Four non-overlapping angles cover a full turn around a point. Three are 85, 97 and 74 degrees. Find the fourth. [2 marks]

$85 + 97 + 74 = 256$.

$360 - 256 = 104$ 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.

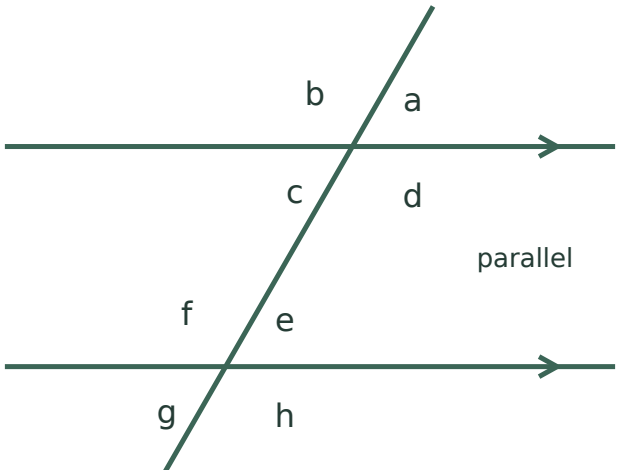
Answer: 48 degrees.

(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.

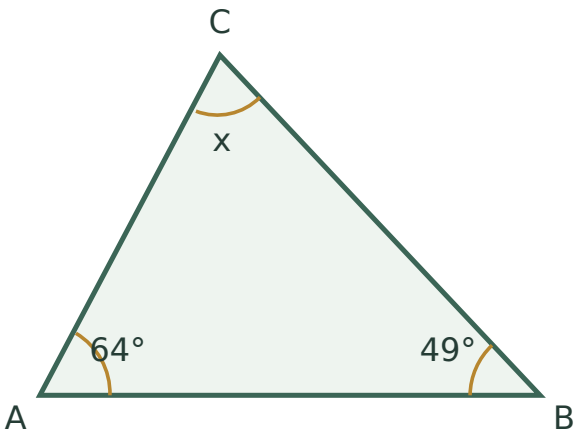
(b) Find e. [2 marks]

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]

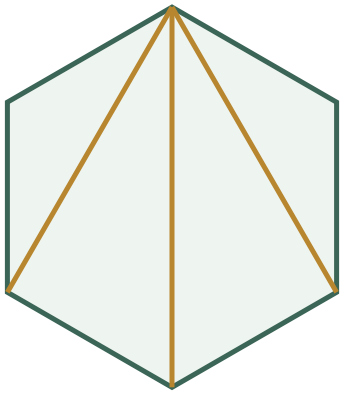
The two base angles total $180 - 44 = 136$ degrees.

They are equal because they are opposite equal sides.

$136 \div 2 = 68$ 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.

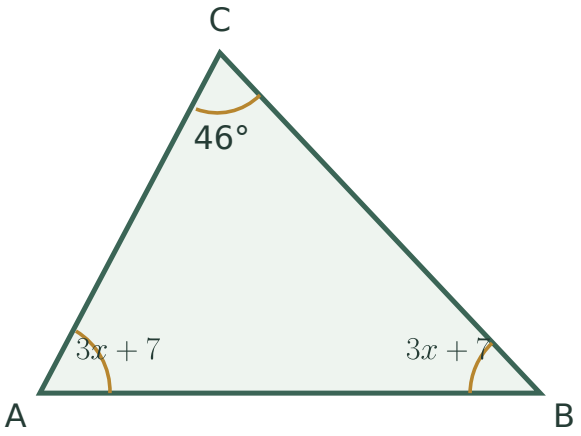
11. A quadrilateral has four equal sides, two acute angles and two obtuse angles. Give its most specific name and explain why it is not a square. [2 marks]

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.