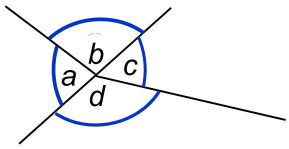
GCSE (9–1) MATHEMATICS

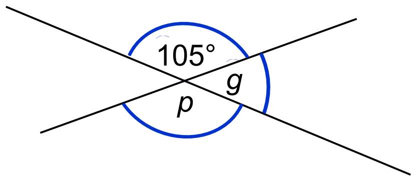
Topic Check In - 8.03 Angles

1. Complete the statement.

   $a + b + c + d =$ ....

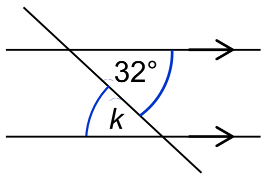


2. Find angle p.

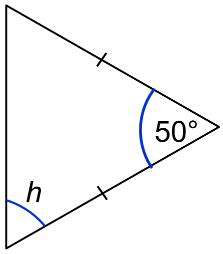


3. Find angle g.

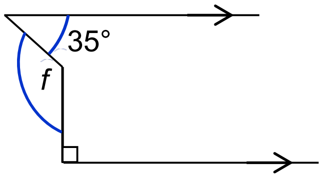
4. Find angle k.



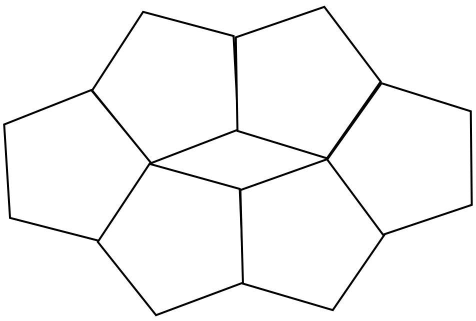
5. Work out angle h.



6. Show that angle $f = 125°$.



7. The diagram shows a pattern of identical regular pentagons and a rhombus.



One of the angles of the rhombus is 36°.

Use this information to work out the size of an interior angle of a regular pentagon.
Show your working.

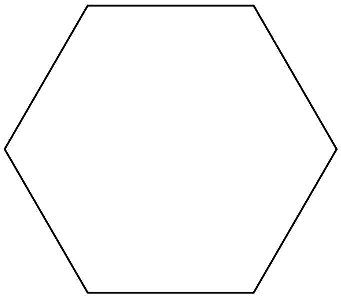
8. The shape opposite is a regular hexagon.

   Jan says,

   "The hexagon is regular so all the angles are the same.

   That makes each interior angle $\frac{360}{6} = 60°$."

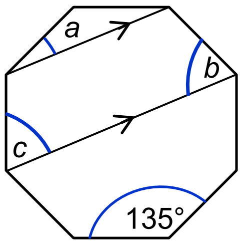
   What mistakes has Jan made?



9. Four of the exterior angles of a pentagon are the same. The fifth angle is 60°. Calculate the size of one of the other exterior angles.

10. The shape opposite is a regular octagon.

    Calculate the sizes of angles *a*, *b* and *c*.
    Give reasons for the steps in your working.



Extension

A robot moves forward 5 cm and then turns clockwise through a set angle.
It then moves forward another 5 cm and turns through the same angle.
After a number of turns it returns to the starting point, marking out a regular decagon (10-sided shape).

(a) Find the size of the angle turned.

(b) Find the number of sides drawn for angles of (i) 40°, (ii) 2°, (iii) p°.

(c) Does your answer to (b)(iii) work for all values of p? Explain your answer as fully as possible.

(d) Will any closed shape be a polygon?

Answers

1. 360°

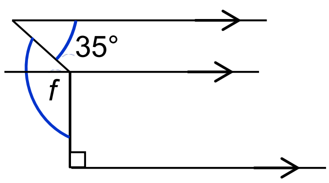
2. 105°

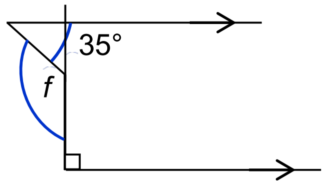
3. 75°

4. 32°

5. 65°

6. Using parallel lines 90 + 35 = 125° or Using right-angled triangle
   180 – (180 – (90 + 35)) = 125°





7. One angle of the pentagon = x.

$$3x + 36 = 360 \;\therefore\; x = \frac{360 - 36}{3} = 108^\circ$$

8. First statement is correct.

   Second statement refers to EXTERIOR angles, therefore each interior angle is 180 – 60 = 120°.

9. If x = the unknown exterior angle, the solution to 60 + 4x = 360 is x = 75°.

10. a = (180 – 135) ÷ 2 = 22.5° (base angle of an isosceles triangle).

    Line of symmetry so $b = c = \frac{135}{2}$ = 67.5°.

Extension

(a) 360 ÷ 10 = 36°

(b) (i) 360 ÷ 40 = 9 sides (ii) 360 ÷ 2 = 180 sides (iii) $\frac{360}{p}$

(c) No, if $\frac{360}{p}$ is not an integer then the polygon will be incomplete.

(d) Some values over 90° will mean that a star is created (e.g. an angle of 144° creates a 5 pointed star).
However, 120° creates an equilateral triangle.

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Sum of angles at a point is 360°.			
AO1	2	Vertically opposite angles are equal.			
AO1	3	Sum of angles at a point on a straight line is 180°.			
AO1	4	Alternate angles are equal.			
AO1	5	Angles in isosceles triangles.			
AO2	6	Deduce the size of angles between pairs of parallel lines.			
AO2	7	Interpret diagrams to deduce the size of angles.			
AO2	8	Understand the rules for interior and exterior angles of polygons.			
AO3	9	Form and solve equations using the angle properties of polygons.			
AO3	10	Interpret diagrams to solve angle problems.			

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