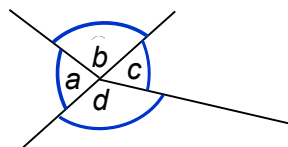


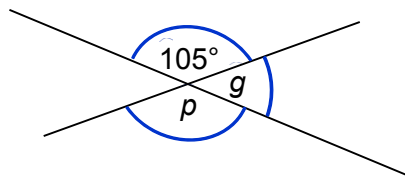
## Topic Check In - 8.03 Angles

1. Complete the statement.

$$a + b + c + d = \dots\dots\dots$$

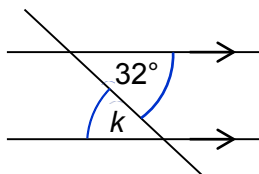


2. Find angle  $p$ .

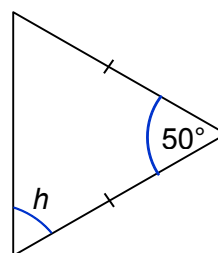


3. Find angle  $g$ .

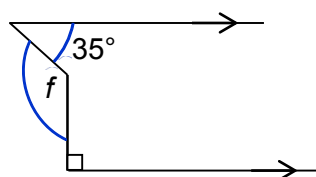
4. Find angle  $k$ .



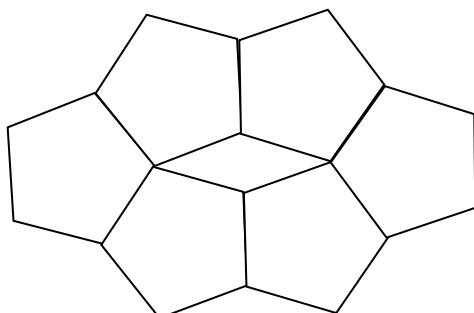
5. Work out angle  $h$ .



6. Show that angle  $f = 125^\circ$ .



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



One of the angles of the rhombus is  $36^\circ$ .

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



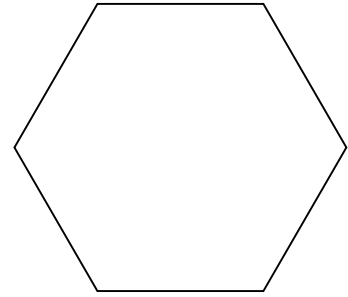
8. The shape opposite is a regular hexagon.

Jan says,

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

That makes each interior angle  $\frac{360}{6} = 60^\circ$ .”

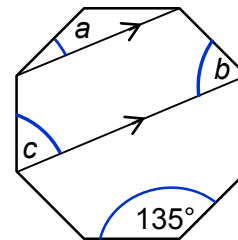
What mistakes has Jan made?



9. Four of the exterior angles of a pentagon are the same. The fifth angle is  $60^\circ$ . 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

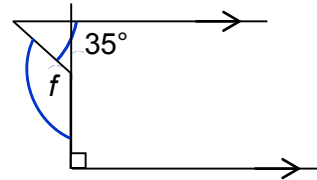
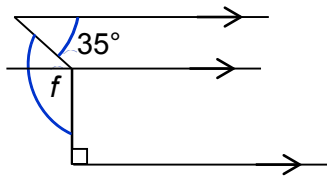
A robot moves forward 5 cm and then turns clockwise through a set angle. It then moves forward another 5 cm and turns through the same angle. After a number of turns it returns to the starting point, marking out a regular decagon (10-sided shape).

- Find the size of the angle turned.
- Find the number of sides drawn for angles of (i)  $40^\circ$ , (ii)  $2^\circ$ , (iii)  $p^\circ$ .
- Does your answer to (b)(iii) work for all values of  $p$ ? Explain your answer as fully as possible.
- Will any closed shape be a polygon?



## Answers

1.  $360^\circ$
2.  $105^\circ$
3.  $75^\circ$
4.  $32^\circ$
5.  $65^\circ$
6. Using parallel lines  $90 + 35 = 125^\circ$  or Using right-angled triangle  
 $180 - (180 - (90 + 35)) = 125^\circ$



7. One angle of the pentagon =  $x$ .

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

8. First statement is correct.

Second statement refers to EXTERIOR angles, therefore each interior angle is  $180 - 60 = 120^\circ$ .

9. If  $x$  = the unknown exterior angle, the solution to  $60 + 4x = 360$  is  $x = 75^\circ$ .
10.  $a = (180 - 135) \div 2 = 22.5^\circ$  (base angle of an isosceles triangle).

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

## Extension

- (a)  $360 \div 10 = 36^\circ$
- (b) (i)  $360 \div 40 = 9$  sides (ii)  $360 \div 2 = 180$  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  $90^\circ$  will mean that a star is created (e.g. an angle of  $144^\circ$  creates a 5 pointed star).  
However,  $120^\circ$  creates an equilateral triangle.



# GCSE (9–1) MATHEMATICS



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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Sum of angles at a point is $360^\circ$ .			
AO1	2	Vertically opposite angles are equal.			
AO1	3	Sum of angles at a point on a straight line is $180^\circ$ .			
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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