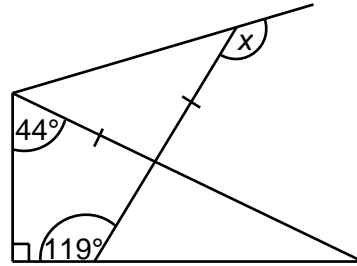
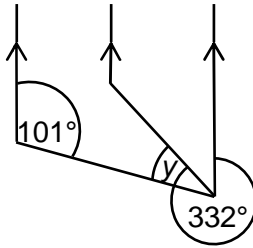


## Higher Check In – 8.03 Angles

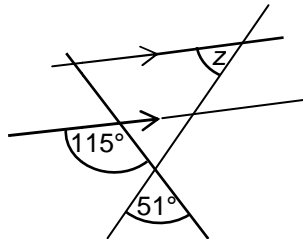
1. A regular polygon has an interior angle of  $156^\circ$ . How many sides does the polygon have?
2. Find angle  $x$ .



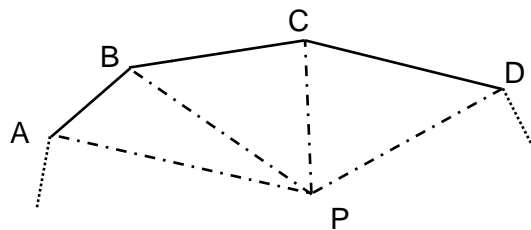
3. Find angle  $y$ .



4. Find angle  $z$ .



5. The interior angles of a polygon sum to  $1620^\circ$ . How many sides does the polygon have?
6. Point  $P$  is inside an  $n$ -sided polygon  $ABCD\dots$



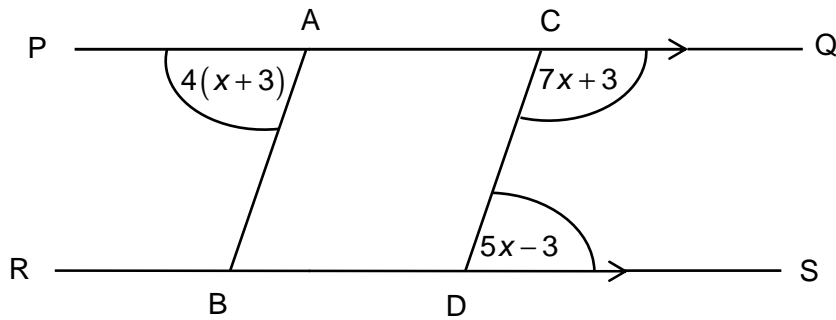
Use the diagram to show that the sum of the interior angles of a polygon can be given by this formula:

$$\text{Sum of the interior angles} = 180n - 360$$

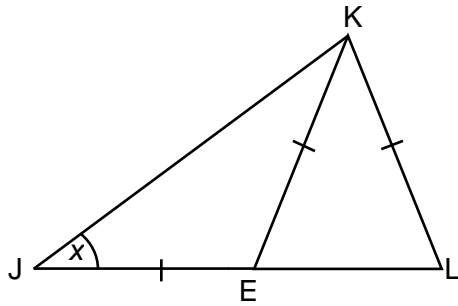


# GCSE (9-1) MATHEMATICS

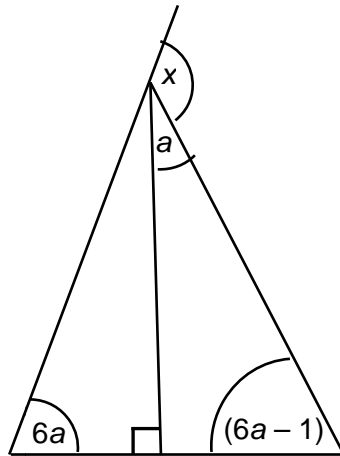
7. Prove that AB is parallel to CD.



8. Prove that angle  $JLK = 2x$ .



9. Find angle  $x$ .



10. The size of an exterior angle of a regular polygon is  $5x^\circ$  and the number of sides of this polygon is  $8x$ . Find the size of the interior angle.



# GCSE (9-1) MATHEMATICS

## Extension

A spiral pattern is made using right-angled isosceles triangles as shown in the diagram below. The lengths of the sides of the first triangle are 1, 1,  $\sqrt{2}$ .



How many triangles are needed to complete a full rotation, and what are the sizes of each triangle in the pattern?



# GCSE (9-1) MATHEMATICS

## Answers

- 15 sides
- $x = 126.5^\circ$
- $y = 51^\circ$
- $z = 64^\circ$
- 11 sides
- $n$  triangles each with sum of interior angles  $180^\circ = 180n$   
Sum of angles at point P =  $360^\circ$   
Therefore sum of interior angles is  $180n - 360$
- $(7x + 3) + (5x - 3) = 180^\circ$  (interior angles add to  $180^\circ$ ) which gives  $x = 15^\circ$ .  
Angle PAB =  $4(15 + 3) = 72^\circ$  and angle ACD =  $180 - 7 \times 15 + 3 = 72^\circ$ .  
AB is parallel to CD because corresponding angles are equal.
- Angle JKE =  $x$  (base angles of an isosceles triangle are equal).  
Angle JEK =  $180 - 2x$  (angle sum of a triangle is  $180^\circ$ ).  
Angle LEK =  $2x$  (angles on a straight line).  
Angle JLK = LEK =  $2x$  (base angles of an isosceles triangle are equal).
- $x = 155^\circ$
- $165^\circ$

## Extension

Since the angles are  $45^\circ$  there will be  $\frac{360}{45} = 8$  triangles to complete the spiral.

Triangle	Side Lengths
1	1, 1, $\sqrt{2}$
2	$\sqrt{2}$ , $\sqrt{2}$ , 2
3	2, 2, $2\sqrt{2}$
4	$2\sqrt{2}$ , $2\sqrt{2}$ , 4
5	4, 4, $4\sqrt{2}$
6	$4\sqrt{2}$ , $4\sqrt{2}$ , 8
7	8, 8, $8\sqrt{2}$
8	$8\sqrt{2}$ , $8\sqrt{2}$ , 16



# GCSE (9–1) MATHEMATICS

We'd like to know your view on the resources we produce. By clicking on '[Like](#)' or '[Dislike](#)' you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

If you do not currently offer this OCR qualification but would like to do so, please complete the Expression of Interest Form which can be found here: [www.ocr.org.uk/expression-of-interest](http://www.ocr.org.uk/expression-of-interest)

#### **OCR Resources: the small print**

OCR's **resources** are provided to support the teaching of OCR specifications, but in no way constitute an endorsed teaching method that is required by the Board, and the decision to use them lies with the individual teacher. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources.

© OCR 2016 - This resource may be freely copied and distributed, as long as the OCR logo and this message remain intact and OCR is acknowledged as the originator of this work.

OCR acknowledges the use of the following content: n/a

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications: [resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk)



Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use the sum of the exterior angles of a polygon is $360^\circ$			
AO1	2	Apply angle properties to find angles in a rectilinear figure			
AO1	3	Apply angle properties about parallel lines			
AO1	4	Apply angle properties to find angles in a rectilinear figure			
AO1	5	Use the sum of the interior angles of a polygon, $180(n-2)$			
AO2	6	Use angle properties to justify the sum of the interior angles of a polygon			
AO2	7	Apply angle properties in a more formal proof of geometrical results			
AO2	8	Apply angle properties in a more formal proof of geometrical results			
AO3	9	Use angle properties to solve a triangle problem			
AO3	10	Use angle properties to solve a polygon problem			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use the sum of the exterior angles of a polygon is $360^\circ$			
AO1	2	Apply angle properties to find angles in a rectilinear figure			
AO1	3	Apply angle properties about parallel lines			
AO1	4	Apply angle properties to find angles in a rectilinear figure			
AO1	5	Use the sum of the interior angles of a polygon, $180(n-2)$			
AO2	6	Use angle properties to justify the sum of the interior angles of a polygon			
AO2	7	Apply angle properties in a more formal proof of geometrical results			
AO2	8	Apply angle properties in a more formal proof of geometrical results			
AO3	9	Use angle properties to solve a triangle problem			
AO3	10	Use angle properties to solve a polygon problem			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use the sum of the exterior angles of a polygon is $360^\circ$			
AO1	2	Apply angle properties to find angles in a rectilinear figure			
AO1	3	Apply angle properties about parallel lines			
AO1	4	Apply angle properties to find angles in a rectilinear figure			
AO1	5	Use the sum of the interior angles of a polygon, $180(n-2)$			
AO2	6	Use angle properties to justify the sum of the interior angles of a polygon			
AO2	7	Apply angle properties in a more formal proof of geometrical results			
AO2	8	Apply angle properties in a more formal proof of geometrical results			
AO3	9	Use angle properties to solve a triangle problem			
AO3	10	Use angle properties to solve a polygon problem			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use the sum of the exterior angles of a polygon is $360^\circ$			
AO1	2	Apply angle properties to find angles in a rectilinear figure			
AO1	3	Apply angle properties about parallel lines			
AO1	4	Apply angle properties to find angles in a rectilinear figure			
AO1	5	Use the sum of the interior angles of a polygon, $180(n-2)$			
AO2	6	Use angle properties to justify the sum of the interior angles of a polygon			
AO2	7	Apply angle properties in a more formal proof of geometrical results			
AO2	8	Apply angle properties in a more formal proof of geometrical results			
AO3	9	Use angle properties to solve a triangle problem			
AO3	10	Use angle properties to solve a polygon problem			

