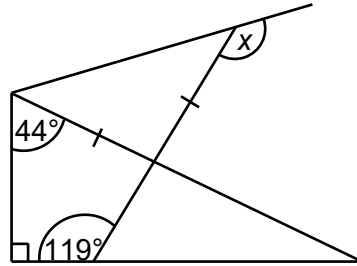
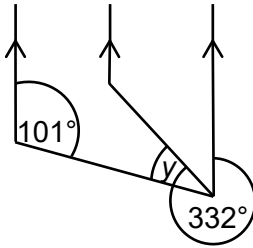


Higher Check In – 8.03 Angles

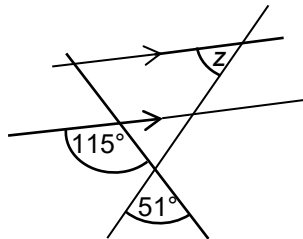
1. A regular polygon has an interior angle of 156° . How many sides does the polygon have?
2. Find angle x .



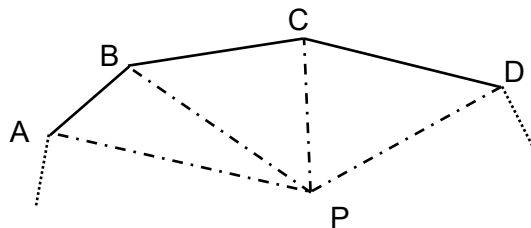
3. Find angle y .



4. Find angle z .



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



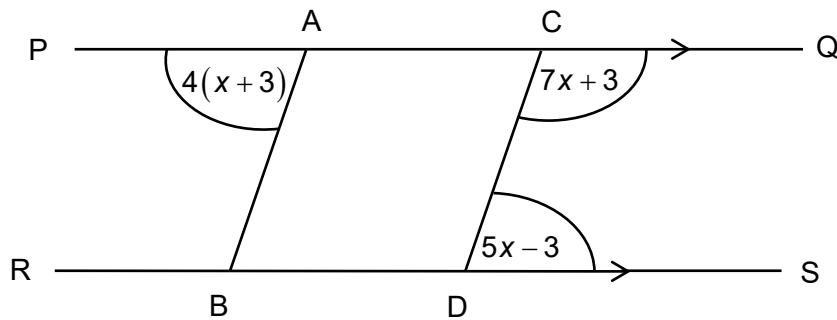
Use the diagram to show that the sum of the interior angles of a polygon can be given by this formula:

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

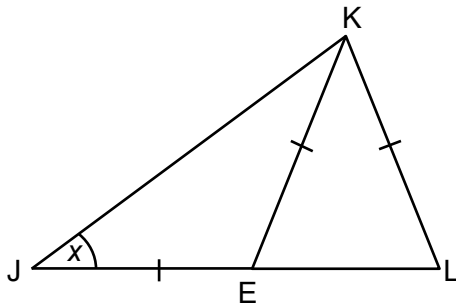


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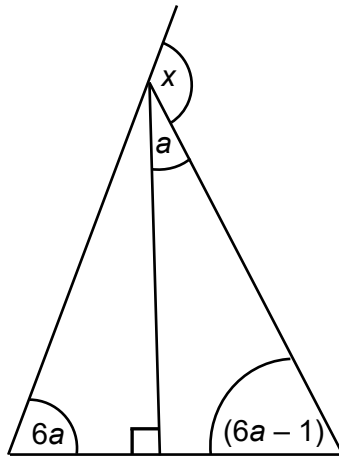
7. Prove that AB is parallel to CD.



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.



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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?



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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°
Therefore sum of interior angles is $180n - 360$
- $(7x + 3) + (5x - 3) = 180^\circ$ (interior angles add to 180°) 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°).
Angle LEK = $2x$ (angles on a straight line).
Angle JLK = LEK = $2x$ (base angles of an isosceles triangle are equal).
- $x = 155^\circ$
- 165°

Extension

Since the angles are 45° 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



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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use the sum of the exterior angles of a polygon is 360°			
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			

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