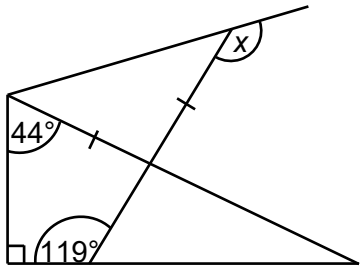
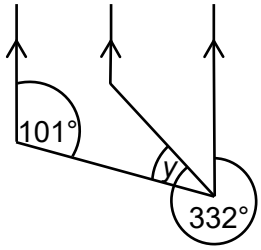
Higher Check In – 8.03 Angles

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

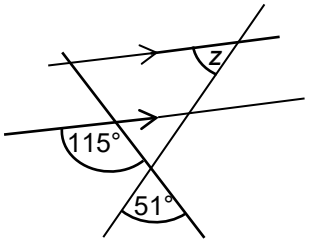
2. Find angle *x*.



3. Find angle *y*.

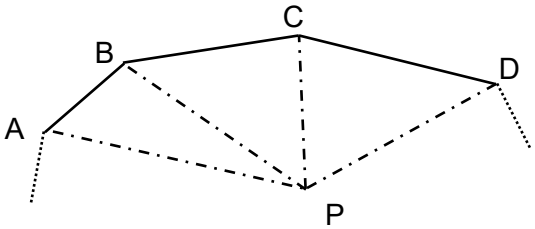


4. Find angle *z*.



5. The interior angles of a polygon sum to 1620°. How many sides does the polygon have?

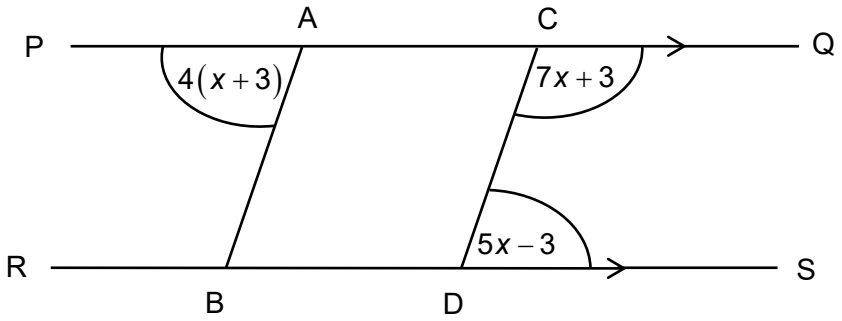
6. Point P is inside an *n*-sided polygon ABCD….



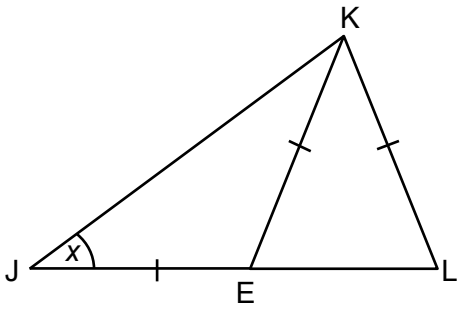
Use the diagram to show that the sum of the interior angles of a polygon can be given by this formula:

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

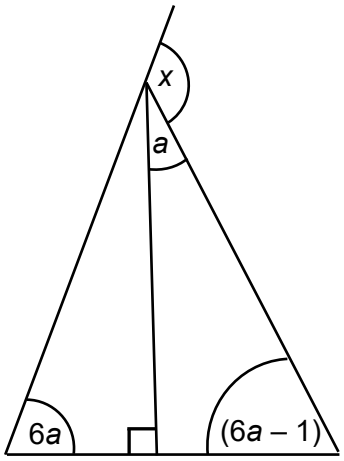
7. Prove that AB is parallel to CD.



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



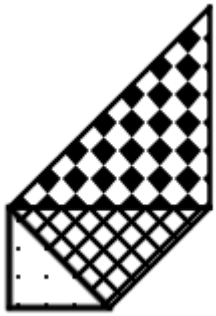
9. Find angle *x*.



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

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?

Answers

1. 15 sides

2. $x = 126.5^\circ$

3. $y = 51^\circ$

4. $z = 64^\circ$

5. 11 sides

6. 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 $180n - 360$

7. $(7x + 3) + (5x - 3) = 180^\circ$ (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 oe.

8. 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).

9. $x = 155^\circ$

10. 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	$8\sqrt{2}, 8\sqrt{2}, 16$

GCSE (9–1) MATHEMATICS

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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			
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