# Foundation Check In – 8.03 Angles

1. Calculate the exterior angle of a regular 20-sided polygon.

**Not to scale**

*P*

*T*

Circle the correct word to complete the statement below.

 Alternate Corresponding Parallel Intersecting Opposite

 Angles *P* and *T a*re \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angles.

1. Calculate the size of angle *a*.

71°

*a*

**Not to scale**

1. Work out the size of an interior angle of a regular 12-sided polygon.
2. Calculate the size of angle *x*.

72°

**Not to scale**

*x*

1. Prove that the angles in triangle ABC sum to 180°.

A

*x*

*y*

*z*

**Not to scale**

B

C

1. Jane says, “The lines VW and XY are parallel”.

Is she right? Explain how you decide.

**Not to scale**

X

V

W

Y

50°

130°

50°

1. Explain why angle *x* is 36°.

**Not to scale**

60°

*x*

84°

1. A computer programme is being used to draw regular polygons. The initial instruction for the first shape is ‘forward 3 cm then right 20°’. How many times does this instruction have to be repeated to complete the polygon and what is the sum of its interior angles?
2. Terri has started making a tessellation using regular polygons. Work out what other shape will need to be used in the tessellation and state the size of its angles.

**Extension**

a) How many regular polygons have interior angles which are a whole number of degrees?

b) This is a tessellation of regular hexagons. Investigate which regular polygons tessellate, and which do not, giving reasons.

## Answers

1. 18°
2. Corresponding
3. 109°
4. 150°
5. 144°
6. Angle C  *x*° (alternate angles)

Angle B  *y*° (alternate angles)

So the angles in triangle ABC sum to  (angles on a straight line)

1. Yes, with any correct argument. Angles may be marked on diagram but there must be some explanation given.
2. Angle opposite *x* is 36° (angles on a straight line). Angle *x* is 36° (opposite angles).
3. 18 times and 2880°
4. Rhombus, opposite angles 36° and 144°

**Extension**

a) There are 22: 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 45, 60, 72, 90, 120, 180, 360.

For integer interior angles to exist, the number of sides must be a factor of 360 (so that the exterior angles are integer). Factors can be found by listing factor pairs or by prime factorisation. Ignore 1 and 2 since a polygon has 3 or more sides.

b) Equilateral triangles (60°), squares (90°) and hexagons (120°) tessellate, all others don’t. The interior angle must be a factor of 360° to fit together. So, for example, pentagons (108°) and octagons (135°) do not tessellate as neither 108 nor 135 are factors of 360.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Know and use the sum of the exterior angles of a polygon is 360° |  |  |  |  | AO1 | 1 | Know and use the sum of the exterior angles of a polygon is 360° |  |  |  |
| AO1 | 2 | Know that corresponding angles on parallel lines are equal |  |  |  |  | AO1 | 2 | Know that corresponding angles on parallel lines are equal |  |  |  |
| AO1 | 3 | Apply angle properties to find angles in a rectilinear figure |  |  |  |  | AO1 | 3 | Apply angle properties to find angles in a rectilinear figure |  |  |  |
| AO1 | 4 | Find the interior angle of a regular polygon |  |  |  |  | AO1 | 4 | Find the interior angle of a regular polygon |  |  |  |
| AO1 | 5 | Apply angle properties to find angles in a rectilinear figure |  |  |  |  | AO1 | 5 | Apply angle properties to find angles in a rectilinear figure |  |  |  |
| AO2 | 6 | Justify results in a simple proof using angle properties |  |  |  |  | AO2 | 6 | Justify results in a simple proof using angle properties |  |  |  |
| AO2 | 7 | Apply angle properties for intersecting and parallel lines |  |  |  |  | AO2 | 7 | Apply angle properties for intersecting and parallel lines |  |  |  |
| AO2 | 8 | Apply angle properties about a point |  |  |  |  | AO2 | 8 | Apply angle properties about a point |  |  |  |
| AO3 | 9 | Solve a polygon problem using angle properties |  |  |  |  | AO3 | 9 | Solve a polygon problem using angle properties |  |  |  |
| AO3 | 10 | Solve a polygon problem using angle properties |  |  |  |  | AO3 | 10 | Solve a polygon problem using angle properties |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| AO1 | 1 | Know and use the sum of the exterior angles of a polygon is 360° |  |  |  |  | AO1 | 1 | Know and use the sum of the exterior angles of a polygon is 360° |  |  |  |
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| AO2 | 6 | Justify results in a simple proof using angle properties |  |  |  |  | AO2 | 6 | Justify results in a simple proof using angle properties |  |  |  |
| AO2 | 7 | Apply angle properties for intersecting and parallel lines |  |  |  |  | AO2 | 7 | Apply angle properties for intersecting and parallel lines |  |  |  |
| AO2 | 8 | Apply angle properties about a point |  |  |  |  | AO2 | 8 | Apply angle properties about a point |  |  |  |
| AO3 | 9 | Solve a polygon problem using angle properties |  |  |  |  | AO3 | 9 | Solve a polygon problem using angle properties |  |  |  |
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