Angles in Polygons - Worksheet

Skill

Group A - Finding the sum of interior angles

Find the sum of interior angles for a:

1) $Triangle$ **2)** $Rectangle$ **3)** $Square$

4) $Regular\ Pentagon$ **5)** $Irregular\ Pentagon$ **6)** $Regular\ Hexagon$

7) $Irregular\ Decagon$ **8)** $Regular\ Nonagon$ **9)** $15\ Sided\ Polygon$

10) $25\ Sided\ Polygon$ **11)** $100\ Sided\ Polygon$ **12)** $Polygon\ with\ 'n'\ Sides$

Group B - Finding a single interior or exterior angle

All polygons in these questions are regular. Calculate the size of a single interior angle for a:

1) $Triangle$ **2)** $Quadrilateral$ **3)** $Pentagon$

4) $Decagon$ **5)** $18\ Sided\ Shape$ **6)** $Polygon\ with\ 'n'\ Sides$

All polygons in these questions are regular. Calculate the size of a single exterior angle for a:

7) $Triangle$ **8)** $Quadrilateral$ **9)** $Pentagon$

10) $Decagon$ **11)** $18\ Sided\ Shape$ **12)** $Polygon\ with\ 'n'\ Sides$

Group C - Finding the number of sides given an exterior or interior angles

Assuming the polygons are regular. Find the number of sides given the information below.

1) $Sum\ of\ interior\ angles\ = 720^\circ$ **2)** $Sum\ of\ interior\ angles\ = 1800^\circ$

3) $One\ Exterior\ angle\ = 72^\circ$ **4)** $One\ Exterior\ angle\ = 30^\circ$

5) $One\ Interior\ angle\ = 140^\circ$ **6)** $One\ Interior\ angle\ = 162^\circ$

7) $One\ Interior\ angle\ = 168^\circ$ **8)** $One\ Interior\ angle\ = 176.4^\circ$

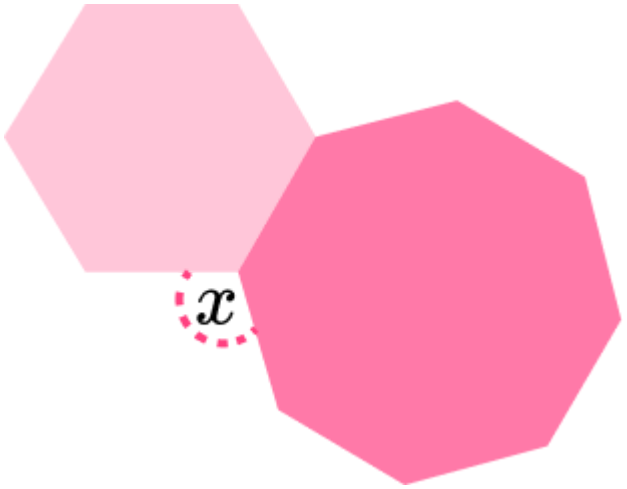
Angles in Polygons - Worksheet

Applied

1) Each exterior angle of a regular polygon is 24°. Work out the number of sides of the polygon.

2) The size of each interior angle of a regular polygon is 156°. Work out the number of sides of the polygon.

3) The two polygons shown below are both regular shapes. Find angle x.



Angles in Polygons - Exam Questions

1) **(a)** Each exterior angle of a regular polygon is 15°. Work out the number of sides the polygon has.

..... **(2)**

(b) In a different regular polygon each interior angle is 140°. Show that this polygon has 9 sides.

..... **(2)**

(c) In a different regular polygon each exterior angle is 18°. Find the sum of interior angles for this polygon.

..... **(3)**

(7 marks)

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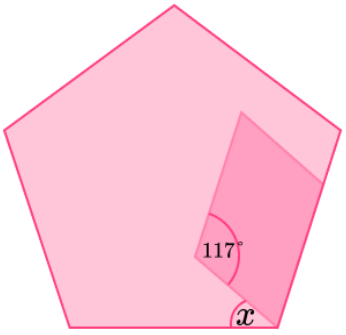
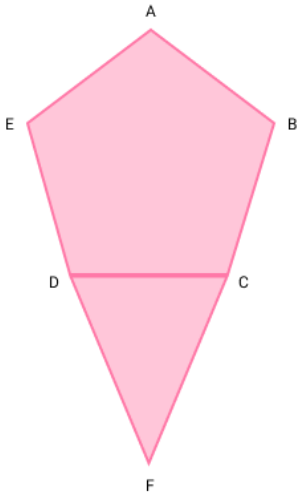
2) The diagram shows a regular pentagon and a parallelogram. Work out the size of the angle marked x. You must show all your working.



..... **(4 marks)**

Angles in Polygons - Exam Questions

3) $ABCDE$ is a regular pentagon where BCF and EDF are straight lines. Work out the size of the acute angle CFD.



..... **(3 marks)**

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4) An exterior angle of regular polygon A is 30° bigger than an exterior angle of regular polygon B. Polygon A has 9 sides. Find the number of sides of polygon B.

..... **(2 marks)**

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5) There are two regular polygons M and N.
M has an exterior angle of $3x$.
N has an exterior angle of $2x$.
M had 10 sides.
Find the number of sides N has.

..... **(4 marks)**

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6) A regular polygon has interior angles that are 5 times larger than each of its exterior angles. Calculate how many sides it has.

..... **(5 marks)**

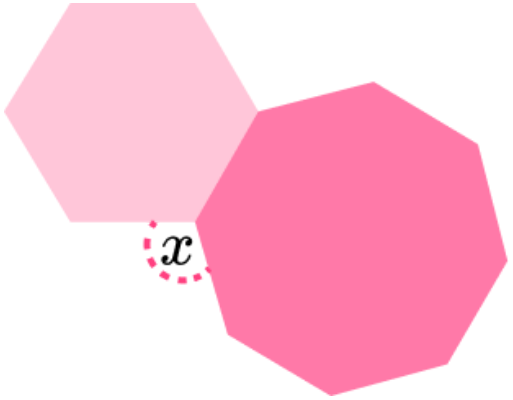
Angles in Polygons - Answers

	Question	Answer
	Skill Questions	
Group A	Find the sum of interior angles for a: **1)** $Triangle$ **2)** $Rectangle$ **3)** $Square$ **4)** $Regular\ Pentagon$ **5)** $Irregular\ Pentagon$ **6)** $Regular\ Hexagon$ **7)** $Irregular\ Decagon$ **8)** $Regular\ Nonagon$ **9)** $15\ Sided\ Polygon$ **10)** $25\ Sided\ Polygon$ **11)** $100\ Sided\ Polygon$ **12)** $Polygon\ with\ 'n'\ Sides$	**1)** 180° **2)** 360° **3)** 360° **4)** 540° **5)** 540° **6)** 720° **7)** 1440° **8)** 1260° **9)** 2340° **10)** 4140° **11)** 17640° **12)** $180(n-2)$ or $180n-360$
Group B	All polygons in these questions are regular. Calculate the size of a single interior angle for a: **1)** $Triangle$ **2)** $Quadrilateral$ **3)** $Pentagon$ **4)** $Decagon$ **5)** $18\ Sided\ Shape$ **6)** $Polygon\ with\ 'n'\ Sides$ All polygons in these questions are regular. Calculate the size of a single exterior angle for a: **7)** $Triangle$ **8)** $Quadrilateral$ **9)** $Pentagon$ **10)** $Decagon$ **11)** $18\ Sided\ Shape$ **12)** $Polygon\ with\ 'n'\ Sides$	**1)** 60° **2)** 90° **3)** 108° **4)** 144° **5)** 160° **6)** $\frac{180\times(n-2)}{n}$ **7)** 120° **8)** 90° **9)** 72° **10)** 36° **11)** 20° **12)** $180^\circ-\frac{180^\circ(n-2)}{n}$ or $\frac{360^\circ}{n}$

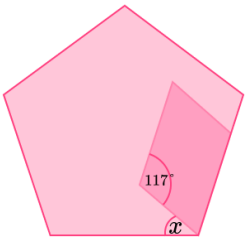
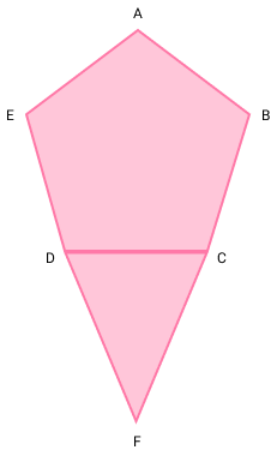
Angles in Polygons - Answers

Group C	Assuming the polygons are regular. Find the number of sides given the information below. **1)** $Sum\ of\ interior\ angles\ = 720^{\circ}$ **2)** $Sum\ of\ interior\ angles\ = 1800^{\circ}$ **3)** $One\ Exterior\ angle\ = 72^{\circ}$ **4)** $One\ Exterior\ angle\ = 30^{\circ}$ **5)** $One\ Interior\ angle\ = 140^{\circ}$ **6)** $One\ Interior\ angle\ = 162^{\circ}$ **7)** $One\ Interior\ angle\ = 168^{\circ}$ **8)** $One\ Interior\ angle\ = 176.4^{\circ}$	**1)** $6\ sides\ (hexagon)$ **2)** $12\ sides\ (dodecagon)$ **3)** $5\ sides\ (pentagon)$ **4)** $12\ sides\ (dodecagon)$ **5)** $9\ sides\ (nonagon)$ **6)** $20\ sides$ **7)** $30\ sides$ **8)** $100\ sides$

Angles in Polygons - Answers

	Question	Answer
	Applied Questions	
1)	Each exterior angle of a regular polygon is 24°. Work out the number of sides of the polygon.	15 sides
2)	The size of each interior angle of a regular polygon is 156°. Work out the number of sides of the polygon.	15 sides
3)	The two polygons shown below are both regular shapes. Find angle x. 	105°

Angles in Polygons - Mark Scheme

	Question	Answer	
	Exam Questions		
1) (a)	Each exterior angle of a regular polygon is 15°. Work out the number of sides the polygon has.	**(a)** $360 \div 15$ 24	**(2)**
(b)	In a different regular polygon each interior angle is 140°. Show that this polygon has 9 sides.	**(b)** Exterior angle $=$ 40 seen or implied $360 \div 40 = 9$	**(2)**
(c)	In a different regular polygon each exterior angle is 18°. Find the sum of interior angles for this polygon.	**(c)** $360 \div 18$ or implied by "20" 180×18 3240	**(3)**
2)	The diagram shows a regular pentagon and a parallelogram. Work out the size of the angle marked x. You must show all your working. 	Finding correctly angle in parallelogram "$180 - 117 = 63$" Finding single interior angle "$\frac{3 \times 180}{5} = 108$" For their "108" $-$ their "63" 45	**(4)**
3)	$ABCDE$ is a regular pentagon where BCF and EDF are straight lines. Work out the size of the acute angle CFD. 	Finding single interior angle in pentagon "$\frac{3 \times 180}{5} = 108$" Finding DCF or CDF, could be implied by "180" $-$ their "108" or "72" seen (could be on diagram) $180 - 144$ 36	**(3)**

Angles in Polygons - Mark Scheme

4)	An exterior angle of regular polygon A is 30° bigger than an exterior angle of regular polygon B. Polygon A has 9 sides. Find the number of sides of polygon B.	$360 \div 9 = 40$ $360 \div 10 = 36$	**(2)**
5)	There are two regular polygons M and N. M has an exterior angle of $3x$. N has an exterior angle of $2x$. M had 10 sides. Find the number of sides N has.	"180 × 8" or "1440" or implied by "144" seen $180 -$ "144" $= 36$ or implied by $3x = 36$ or implied by $x = 12$ $360 \div$ "24" 15 sides	**(4)**
6)	A regular polygon has interior angles that are 5 times larger than each of its exterior angles. Calculate how many sides it has.	Interior angles × 5 = Exterior Angle seen or implied by working out or Interior + exterior angle = 180 6 angles = 180 or implied e.g. $6x = 180$ "One angle = 30" or implied e.g. $x = 30$ 360 ÷ "their 30" 12 sides	**(5)**