



KS3.M-G10 Angles in Polygons

AQA KS3.M-G10 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A regular hexagon has all sides and angles equal. Write down the size of one interior angle of a regular hexagon.

(1)

- 2** Find the exterior angle of a regular pentagon.

(1)

- 3** Work out the sum of the interior angles for each polygon.

(a) Triangle

(1)

(b) Quadrilateral

(1)

(c) Heptagon

(1)

- 4** A regular octagon has interior angles all equal. Calculate the size of one interior angle.

(2)

5 Calculate the exterior angle of a regular decagon.

(2)

6 An irregular pentagon has interior angles 90 degrees, 110 degrees, 95 degrees and 85 degrees. Work out the missing interior angle.

(2)

7 A regular polygon has each interior angle equal to 150 degrees. Find the number of sides of the polygon.

(3)

8 The interior angles of a quadrilateral add to 360 degrees. Two of the angles are equal and the other two are 95 degrees and 85 degrees. Find the size of each of the equal angles.

(2)

9 Each exterior angle of a regular polygon is 24 degrees. How many sides does the polygon have?

(2)

- 10** A regular polygon has 14 sides. Calculate both the sum of its interior angles and the measure of one interior angle.

(3)

- 11** A regular triangle is equilateral. A student says one exterior angle is 100 degrees. Explain why this statement is incorrect and give the correct exterior angle size.

(2)

- 12** A regular polygon has interior angle 162 degrees. Work out n , the number of sides.

(2)

- 13** The angles in a quadrilateral are in the ratio 3:4:5:6. Find the size, in degrees, of the largest angle.

(3)

- 14** A regular polygon and a regular star-shaped polygon both have the same exterior angle of 40 degrees at a certain vertex. For the regular polygon, find the number of sides.

(2)

- 15** A teacher draws a regular polygon on the board. The sum of its interior angles is 2340 degrees. How many sides does the polygon have?

(3)

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- 16** In a regular polygon, three exterior angles are removed and their total is 108 degrees. If the remaining exterior angles are all equal and there are 12 exterior angles in total, find the measure of each of the remaining exterior angles.

(3)

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- 17** Stretch question. The interior angles of a convex polygon are in arithmetic progression. The smallest angle is 100 degrees and the largest is 170 degrees. There are 8 sides. Find the common difference of the progression and write down all eight interior angles.

(3)

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- 18** Stretch question. A regular polygon is joined to its centre to form isosceles triangles. If each triangle has a vertex angle of 20 degrees at the centre, how many sides does the polygon have and what is each base angle of the isosceles triangle?

(3)

Mark scheme · KS3.M-G10 Angles in Polygons

Question 1

- **B1** 120 degrees cao
- Answer: **120 degrees**

Question 2

- **B1** 72 degrees cao
- Answer: **72 degrees**

Question 3

- (a) **B1** 180 degrees cao
- (a) Answer: **180 degrees**
- (b) **B1** 360 degrees cao
- (b) Answer: **360 degrees**
- (c) **B1** 900 degrees cao
- (c) Answer: **900 degrees**

Question 4

- **M1** use sum formula: $(8-2) \times 180 = 1080$ or divide by 8
- **A1** 135 degrees cao
- Answer: **135 degrees**

Question 5

- **M1** use $360/n = 360/10$ or compute interior then $180 - \text{interior}$
- **A1** 36 degrees cao
- Answer: **36 degrees**

Question 6

- **M1** use sum for pentagon: $(5-2) \times 180 = 540$ and subtract given angles
- **A1** 160 degrees cao
- Answer: **160 degrees**

Question 7

- **M1** use relation interior = $180 - 360/n$ leading to $150 = 180 - 360/n$ or $360/n = 30$
- **M1** rearrange to $n = 360/30$
- **A1** $n = 12$ cao
- Answer: **12**

Question 8

- **M1** compute remaining sum: $360 - (95 + 85) = 180$
- **A1** each equal angle = 90 degrees cao
- Answer: **90 degrees**

Question 9

- **M1** use $n = 360/\text{exterior} = 360/24$
- **A1** $n = 15$ cao
- Answer: **15**

Question 10

- **M1** $\text{sum} = (14-2) \times 180 = 12 \times 180 = 2160$
- **M1** $\text{interior} = \text{sum}/14 = 2160/14$ or use $180 - 360/14$
- **A1** 2160 degrees and 154.285... $\rightarrow$ 154 $\frac{2}{7}$ degrees (or 154.2857 degrees) cao
- **Answer: 2160 degrees; 154.285714 degrees**

Question 11

- **M1** explain that interior of equilateral is 60 so exterior = $180 - 60 = 120$, not 100: identification of error using exterior = $180 - \text{interior}$
- **A1** correct exterior angle is 120 degrees cao (award for clear correction)
- **Answer: Exterior angle = 120 degrees**

Question 12

- **M1** use exterior = $180 - \text{interior} = 18$ then $n = 360/18$
- **A1** $n = 20$ cao
- **Answer: 20**

Question 13

- **M1** let common multiplier = k , $\text{sum} = (3+4+5+6)k = 18k$ and set = 360
- **M1** find $k = 360/18 = 20$
- **A1** largest angle = $6k = 120$ degrees cao
- **Answer: 120 degrees**

Question 14

- **M1** use $n = 360/\text{exterior} = 360/40$
- **A1** $n = 9$ (since $360/40 = 9$) cao
- **Answer: 9**

Question 15

- **M1** use sum formula $(n-2) \times 180 = 2340$
- **M1** rearrange: $n-2 = 2340/180 = 13$
- **A1** $n = 15$ cao
- **Answer: 15**

Question 16

- **M1** total of all exterior angles = 360 so remaining sum = $360 - 108 = 252$
- **M1** number of remaining angles = $12 - 3 = 9$ so each = $252/9$
- **A1** each remaining exterior angle = 28 degrees cao
- **Answer: 28 degrees**

Question 17

- **M1** recognise arithmetic progression with first $a = 100$, last $a + 7d = 170$ so $7d = 70$
- **M1** compute $d = 70/7 = 10$ degrees
- **A1** angles: 100, 110, 120, 130, 140, 150, 160, 170 cao
- **Answer: common difference = 10 degrees; angles = 100, 110, 120, 130, 140, 150, 160, 170**

Question 18

- **M1** use central angle = $360/n$ so $n = 360/20$
- **M1** compute $n = 18$
- **A1** base angles = $(180 - 20)/2 = 80$ degrees each cao
- **Answer: 18; 80 degrees**