4.10 Angles in Polygons: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out the size of one interior angle of a regular decagon.

(3)

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2 Three angles of a quadrilateral are 89°, 59° and 81°. Work out the fourth angle and say whether the quadrilateral could be a parallelogram.

(3)

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3 Each exterior angle of a regular polygon is 20°. How many sides does the polygon have?

(2)

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4 Three angles of a quadrilateral are 113°, 89° and 83°. Work out the fourth angle.

(2)

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5 Two angles on a straight line are (2x + 10)° and (3x - 20)°. Work out the value of x.

(3)

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6 Each interior angle of a regular polygon is 108°. Work out the number of sides of the polygon.

(3)

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7 Three angles of a quadrilateral are 81°, 74° and 44°. Work out the fourth angle.

(2)

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8 5 of the interior angles of a hexagon are 147°, 133°, 141°, 95°, 121°. Work out the size of the last interior angle.

(3)

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9 Work out the sum of the interior angles of a decagon.

(2)

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10 Three angles of a quadrilateral are 64°, 107° and 66°. Work out the fourth angle.

(2)

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11 Each exterior angle of a regular polygon is 12°. How many sides does the polygon have?

(2)

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12 5 of the interior angles of a hexagon are 125°, 124°, 98°, 116°, 105°. Work out the size of the last interior angle.

(3)

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13 Work out the sum of the interior angles of a hexagon.

(2)

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14 6 of the interior angles of a heptagon are 98°, 105°, 142°, 100°, 138°, 158°. Work out the size of the last interior angle.

(3)

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15 A regular hexagon has 6 equal exterior angles. Work out the size of one exterior angle.

(2)

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16 Each interior angle of a regular polygon is 140°. Work out the number of sides of the polygon.

(3)

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17 A regular heptagon has 7 equal exterior angles. Work out the size of one exterior angle.

(2)

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18 Each exterior angle of a regular polygon is 72°. How many sides does the polygon have?

(2)

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

(2)

---

20 Work out the sum of the interior angles of a octagon.

(2)

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21 7 of the interior angles of a octagon are 154°, 144°, 159°, 156°, 94°, 110°, 134°. Work out the size of the last interior angle.

(3)

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22 5 of the interior angles of a hexagon are 100°, 125°, 133°, 154°, 119°. Is it possible for the last angle to be 109°? Give a reason.

(3)

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23 Each interior angle of a regular polygon is 150°. Work out the number of sides of the polygon.

(3)

---

24 5 of the interior angles of a hexagon are 139°, 130°, 153°, 105°, 93°. Work out the size of the last interior angle.

(3)

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25 Each interior angle of a regular polygon is 162°. Work out the number of sides of the polygon.

(3)

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26 Each interior angle of a regular polygon is 135°. Work out the number of sides of the polygon.

(3)

---

27 Three angles of a quadrilateral are 105°, 62° and 77°. Work out the fourth angle and say whether the quadrilateral could be a parallelogram.

(3)

---

28 5 of the interior angles of a hexagon are 124°, 102°, 110°, 154°, 126°. Work out the size of the last interior angle.

(3)

---

29 Each exterior angle of a regular polygon is 15 degrees. How many sides does the polygon have?

(2)

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30 The interior angles of a quadrilateral add to 360 degrees. Two of the angles are equal (each y) and the other two are 100 degrees and 90 degrees. Find the size of y.

(2)

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31 A regular polygon has interior angle 156 degrees. Work out n, the number of sides.

(2)

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32 A regular polygon has n sides. The sum of its interior angles is 3060 degrees. Work out n.

(3)

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33 In a regular polygon, four exterior angles are removed and their total is 100 degrees. The remaining exterior angles are all equal and there are 14 exterior angles in total. Work out the size of one of the remaining exterior angles.

(3)

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34 The interior angles of a convex hexagon are in arithmetic progression. The smallest angle is 80 degrees and the largest is 160 degrees. Work out the common difference between consecutive angles.

(3)

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35 A polygon has 9 sides. Eight of its interior angles are equal, each measuring 142 degrees. The ninth angle is r degrees.

(a) Work out the sum of the interior angles of a 9-sided polygon. **(1)**

.....

(b) Hence work out r. **(2)**

.....

(c) A different, regular nonagon has all 9 angles equal. Work out the size of one interior angle of this regular nonagon, and state whether it is bigger or smaller than r found in part (b). **(2)**

.....

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Mark scheme · 4.10 Angles in Polygons: 2-hour Pack

Question 1

360 ÷ 10 = 36 (exterior) or 1440 ÷ 10	M1
180 - 36 or 1440 ÷ 10	M1
144° cao	A1

Answer: **144°**

Question 2

360 - 229	M1
131°	A1
parallelogram needs opposite angles equal; check pairs	B1

Answer: **131°; it cannot be a parallelogram**

Question 3

360 ÷ 20	M1
18 cao	A1

Answer: **18**

Question 4

360 - 113 - 89 - 83 or 360 - 285	M1
75° cao	A1

Answer: **75°**

Question 5

2x + 10 + 3x - 20 = 180	M1
5x = 190 or equivalent	M1
x = 38 cao	A1

Answer: **x = 38**

Question 6

exterior angle 180 - 108 = 72	M1
360 ÷ 72	M1
5 cao	A1

Answer: **5**

Question 7

360 - 81 - 74 - 44 or 360 - 199	M1
161° cao	A1

Answer: **161°**

Question 8

(6 - 2) x 180 = 720	M1
720 - 637	M1
83° cao	A1

Answer: **83°**

Question 9

(10 - 2) x 180 or 8 triangles	M1
1440° cao	A1

Answer: **1440°**

Question 10

360 - 64 - 107 - 66 or 360 - 237	M1
123° cao	A1

Answer: **123°**

Question 11

360 ÷ 12	M1
30 cao	A1

Answer: **30**

Question 12

(6 - 2) x 180 = 720	M1
720 - 568	M1
152° cao	A1

Answer: **152°**

Question 13

(6 - 2) x 180 or 4 triangles	M1
720° cao	A1

Answer: **720°**

Question 14

(7 - 2) x 180 = 900	M1
900 - 741	M1
159° cao	A1

Answer: **159°**

Question 15

360 ÷ 6	M1
60° cao	A1

Answer: **60°**

Question 16

exterior angle 180 - 140 = 40	M1
360 ÷ 40	M1
9 cao	A1

Answer: **9**

Question 17

360 ÷ 7	M1
360/7° cao	A1

Answer: **360/7°**

Question 18

360 ÷ 72	M1
5 cao	A1

Answer: **5**

Question 19

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

Answer: **160 degrees**

Question 20

(8 - 2) x 180 or 6 triangles	M1
1080° cao	A1

Answer: **1080°**

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Question 21

(8 - 2) x 180 = 1080	M1
1080 - 951	M1
129° cao	A1

Answer: **129°**

Question 22

(6 - 2) x 180 = 720	M1
720 - 631 = 89	M1
No, as the last angle must be 89°	B1

Answer: **No**

Question 23

exterior angle 180 - 150 = 30	M1
360 ÷ 30	M1
12 cao	A1

Answer: **12**

Question 24

(6 - 2) x 180 = 720	M1
720 - 620	M1
100° cao	A1

Answer: **100°**

Question 25

exterior angle 180 - 162 = 18	M1
360 ÷ 18	M1
20 cao	A1

Answer: **20**

Question 26

exterior angle 180 - 135 = 45	M1
360 ÷ 45	M1
8 cao	A1

Answer: **8**

Question 27

360 - 244	M1
116°	A1
parallelogram needs opposite angles equal; check pairs	B1

Answer: **116°; it cannot be a parallelogram**

Question 28

(6 - 2) x 180 = 720	M1
720 - 616	M1
104° cao	A1

Answer: **104°**

Question 29

360 / 15 or equivalent method	M1
24 cao	A1

Answer: **24**

Question 30

form the equation 2y + 100 + 90 = 360	M1
85 cao	A1

Answer: **85 degrees**

Question 31

find exterior angle 180 - 156 = 24	M1
15 cao	A1

Answer: **15**

Question 32

use (n-2) x 180 = 3060	M1
solve n - 2 = 3060 / 180 = 17	M1
19 cao	A1

Answer: **19**

Question 33

subtract the removed total from 360: 360 - 100 = 260	M1
find the number of remaining angles: 14 - 4 = 10	M1
26 cao	A1

Answer: **26 degrees**

Question 34

hexagon angle sum is 720, giving an average angle of 720/6 = 120, matching (80+160)/2	M1
there are 5 equal gaps between the smallest and largest of the 6 terms	M1
16 cao	A1

Answer: **16 degrees**

Question 35

(a) 1260 cao	B1

(a) Answer: **1260 degrees**

(b) 8 x 142 = 1136, then 1260 - 1136	M1
(b) 124 cao	A1

(b) Answer: **124 degrees**

(c) 1260 / 9 = 140	M1
(c) 140 degrees, which is bigger than r = 124, cao	A1

(c) Answer: **140 degrees; bigger than r (124 degrees)**

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