

Angles: Lines, Triangles and Polygons

GCSE Mathematics • Foundation Tier • Grades 2-3 • Non-calculator

WORKED SOLUTIONS

Name: _____ *worked example* _____

Class: _____

Total: _____ *49* _____ / 49

Show all your working. Marks are given for correct method as well as the final answer.

1. Angles on a straight line add to 180° . Work out the missing angle when one angle is 115° . [1 mark]

$$180 - 115 = 65$$

Answer: _____ *65* _____

2. Angles at a point add to 360° . Three angles are 90° , 145° and x . Find x . [2 marks]

$$90 + 145 = 235$$

$$360 - 235 = 125$$

Answer: _____ *125* _____

3. Find x , giving a reason. [2 marks]



$$180 - 62 = 118$$

reason: angles on a straight line

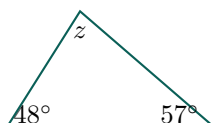
Answer: _____ *x = 118* _____

4. Two lines cross. One angle is 37° . Write down the vertically opposite angle and name the rule. [2 marks]

opposite angles are equal

Answer: _____ *37, vertically opposite* _____

5. Find z in the triangle. [2 marks]



$$48 + 57 = 105$$

$$180 - 105 = 75$$

angles in a triangle = 180

Answer: _____ *z = 75* _____

6. An isosceles triangle has an apex angle of 40° . Work out each base angle. [3 marks]

$$180 - 40 = 140$$

$$140 \div 2 = 70$$

the two base angles are equal

Answer: _____ *70 each* _____

7. A triangle has angles $3x$, $4x$ and $5x$. Find x . [3 marks]

$$3x + 4x + 5x = 180$$

$$12x = 180$$

$$x = 15$$

Answer: _____ $x = 15^\circ$ _____

8. Work out the missing angle in a quadrilateral with angles 85° , 100° and 73° . [2 marks]

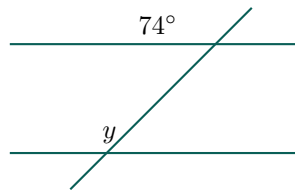
$$\text{angles in a quadrilateral} = 360$$

$$85 + 100 + 73 = 258$$

$$360 - 258 = 102$$

Answer: _____ 102° _____

9. Find y , giving a reason. [2 marks]



equal angles in a Z shape

reason: alternate angles

Answer: _____ $y = 74^\circ$ _____

10. Two parallel lines are crossed by a straight line. One angle is 118° . Work out the co-interior angle. [2 marks]

co-interior angles add to 180

$$180 - 118 = 62$$

C shape

Answer: _____ 62° _____

11. Explain the difference between corresponding and alternate angles. [2 marks]

corresponding: F shape, equal

alternate: Z shape, equal

both equal -- co-interior is the odd one out

Answer: ___ F shape vs Z shape ___

12. Work out the sum of the interior angles of a hexagon. [2 marks]

$$(n - 2) \times 180$$

$$(6 - 2) \times 180 = 720$$

Answer: _____ 720° _____

13. Work out one interior angle of a regular pentagon. [3 marks]

$$\text{sum} = (5 - 2) \times 180 = 540$$

$$540 \div 5 = 108$$

Answer: _____ 108° _____

14. Work out one exterior angle of a regular octagon. [2 marks]

exterior angles add to 360

$$360 \div 8 = 45$$

Answer: _____ 45° _____

15. A regular polygon has an exterior angle of 24° . How many sides does it have? [2 marks]

$$360 \div 24 = 15$$

Answer: _____ 15 sides _____

16. A regular polygon has an interior angle of 150° . How many sides does it have? [3 marks]

$$\text{exterior} = 180 - 150 = 30$$

$$360 \div 30 = 12$$

always go via the exterior angle

Answer: _____ 12 sides _____

17. The interior angles of a polygon add to 1080° . How many sides does it have? [3 marks]

$$(n - 2) \times 180 = 1080$$

$$n - 2 = 6$$

$$n = 8$$

Answer: _____ 8 sides _____

18. Explain why a regular polygon cannot have an exterior angle of 50° . [2 marks]

$$360 \div 50 = 7.2$$

you cannot have 7.2 sides

Answer: $360 \div 50$ is not a whole number

19. In triangle ABC , angle $A = 2x$, angle $B = 3x$ and angle $C = x + 20$.

- (a) Form an equation and solve it to find x . [3 marks]

$$2x + 3x + (x + 20) = 180$$

$$6x + 20 = 180$$

$$6x = 160$$

$$x = 26.67 \text{ (2 d.p.)}$$

- (b) Work out the largest angle. [2 marks]

$$3x = 80^\circ$$

$3x$ is the biggest

Answer: $x = 26.7^\circ$, largest 80°

20. A regular hexagon and a square share an edge.

- (a) Write down one interior angle of each shape. [2 marks]

$$\text{hexagon: } 720 \div 6 = 120^\circ$$

$$\text{square: } 90^\circ$$

- (b) Work out the angle between them at the shared vertex. [2 marks]

$$\text{angles at a point} = 360$$

$$360 - 120 - 90 = 150^\circ$$

Answer: 120° and 90° ; 150°