Year 9 Angles and Pythagoras – Mixed Practice

ANSWER KEY HappyKids.fit

Answers and worked solutions · 30 questions

A. Mixed practice (mixed order)

1. x = 12.5 cm

Shorter side: $x^2 = 16^2 - 10^2 = 256 - 100 = 156$

$x = \sqrt{156} = 12.5$ (1 d.p.) cm

2. 170°

Each exterior angle = 360 ÷ 36 = 10°

Interior = 180 − 10 = 170°

3. x = 10.7 cm

Shorter side: $x^2 = 14^2 - 9^2 = 196 - 81 = 115$

$x = \sqrt{115} = 10.7$ (1 d.p.) cm

4. 2340°

Sum = (n − 2) × 180°, with n = 15

(15 − 2) × 180 = 13 × 180 = 2340°

5. 17 km

East and north are at right angles: $d^2 = 15^2 + 8^2 = 289$

d = 17 km

6. y = 100°

Exterior angles add up to 360°: 31 + 60 + 27 + 84 + 58 = 260°

y = 360 − 260 = 100°

7. x = 4.8 cm

Shorter side: $x^2 = 12^2 - 11^2 = 144 - 121 = 23$

$x = \sqrt{23} = 4.8$ (1 d.p.) cm

8. 60 m shorter

$\text{Diagonal}^2 = 90^2 + 120^2 = 22500$

Diagonal = 150 m

Saving = 210 − 150 = 60 m

9. Construct a right angle (90°), for example with a perpendicular bisector, then bisect it: 90 ÷ 2 = 45°.

Construct a perpendicular (90°) first

Bisect the right angle

90 ÷ 2 = 45°

10. 1080°

Sum = (n − 2) × 180°, with n = 8

(8 − 2) × 180 = 6 × 180 = 1080°

11. 24 sides

The exterior angles add up to 360°

n = 360 ÷ 15 = 24

12. For a shorter side, subtract: $\sqrt{(17^2 - 15^2)} = \sqrt{64} = 8$ cm.

Error: the squares were added, but the hypotenuse is already known

$x^2 = 289 - 225 = 64$

x = 8 cm

13. x = 130°

Angle sum: (6 – 2) × 180 = 720°; known angles 105 + 110 + 102 + 138 + 135 = 590°

x = 720 – 590 = 130°

14. x = 114°

At the upper crossing, the angle in the same position as x is 114° (angles on a straight line add up to 180°)

Corresponding angles are equal, so x = 114°

15. B = 58°, D = 123°

AB is parallel to DC, so co-interior angles add up to 180°

D = 180 – 57 = 123° (with A)

B = 180 – 122 = 58° (with C)

16. 60°

Exterior angles add up to 360°

360 ÷ 6 = 60°

17. Yes: $12^2 + 16^2 = 144 + 256 = 400$, which equals $20^2 = 400$.

Test Pythagoras' theorem with the longest side as the hypotenuse

$12^2 + 16^2 = 400$ and $20^2 = 400$

Equal means right-angled

18. 3 cm; 60°

Each side joins two points the compass width apart

Side = 3 cm

Angle at the centre = 360 ÷ 6 = 60° (six equilateral triangles)

19. 7 sides

(n – 2) × 180 = 900, so n – 2 = 900 ÷ 180 = 5

n = 7

20. x = 131°

At the upper crossing, the angle in the same position as x is 131° (angles on a straight line add up to 180°)

Corresponding angles are equal, so x = 131°

21. B = 78°, C = 102°, D = 78°

Co-interior angles between parallel sides add up to 180°

B = D = 180 – 102 = 78°

Opposite angles are equal: C = 102°

22. 360 ÷ 15 gives the exterior angle. The interior angle is 180 – 24 = 156°.

Error: that is the exterior angle
Interior + exterior = 180°
180 – 24 = 156°

23. 900°

Sum = (n – 2) × 180°, with n = 7
(7 – 2) × 180 = 5 × 180 = 900°

24. x = 139°

Angle sum: (6 – 2) × 180 = 720°; known angles 96 + 108 + 159 + 113 + 105 = 581°
x = 720 – 581 = 139°

25. (n – 2) × 180 ÷ n = 1080 ÷ 8 = 135°; or 180 – 360 ÷ 8 = 180 – 45 = 135°

Way 1: sum (8 – 2) × 180 = 1080°, shared by 8 equal angles
Way 2: exterior angle 360 ÷ 8 = 45°
Both give 135°

26. Yes. (6 – 2) × 180 = 720°, whatever the shape of the hexagon.

Test an example
(6 – 2) × 180 = 720°, whatever the shape of the hexagon.
Decide

27. y = 36°

Exterior angles add up to 360°: 77 + 78 + 81 + 88 = 324°
y = 360 – 324 = 36°

28. 20°

Exterior angles add up to 360°
360 ÷ 18 = 20°

29. x = 7.6 cm

Hypotenuse: $x^2 = 7^2 + 3^2 = 49 + 9 = 58$
x = √58 = 7.6 (1 d.p.) cm

30. 4.9 m

The ramp is the hypotenuse: $g^2 = 5^2 - 1^2 = 24$
g = 4.9 m