Geometry and proof - Practice test 2

16 questions | 38 marks | 55 minutes

Build angle, triangle and circle reasoning with justified steps.

Equivalent correct methods earn the corresponding marks.

1. Angles around a point total 360°. Three are $75^\circ, 90^\circ$ and 110°. Find the fourth. [1 mark]

$360 - 75 - 90 - 110 = 85.$

Answer: 85°

2. An isosceles triangle has vertex angle 44°. Find each base angle. [1 mark]

$\frac{180 - 44}{2} = 68.$

Answer: 68°

3. Two equal alternate angles are formed by a transversal. What does the converse theorem show? [2 marks]

Equal alternate angles imply parallel lines.

Answer: The lines are parallel.

4. Triangles have side lengths 4, 5, 6 and 8, 10, 12. Are they similar? [2 marks]

All corresponding ratios are $1:2$.

Answer: Yes, by SSS similarity.

5. Triangles each have angles $50^\circ, 60^\circ, 70^\circ$. Must they be congruent? Explain. [2 marks]

AAA gives similarity only; scale may differ.

Answer: No.

6. A circle radius 13 cm has chord 24 cm. Find perpendicular centre distance. [2 marks]

Half-chord 12; $\sqrt{169-144}=5$.

Answer: 5 cm

7. A tangent length is 24 cm and the contact radius is 7 cm. Find centre-to-exterior-point distance. [2 marks]

$\sqrt{24^2+7^2}=25$.

Answer: 25 cm

8. Two tangents from P have lengths $4x-1$ and $2x+7$. Find x and the common length. [3 marks]

$4x-1=2x+7$.

$x=4$ and length 15.

Answer: $x=4$; length 15

9. An inscribed angle intercepting a minor arc is 43°. Find its central angle. [2 marks]

Double 43.

Answer: 86°

10. A circle has centre O and minor central angle $AOB=80^\circ$. D is on the minor arc AB. Find $\angle ADB$. [3 marks]

The intercepted major arc is 280°.

Half gives 140.

Answer: 140°

11. Opposite cyclic angles are $2x+20$ and $4x-8$ degrees. Find x. [3 marks]

$6x+12=180$.

$x=28$.

Answer: 28

12. A tangent-chord angle is 64°. Find the angle in the alternate segment. [2 marks]

Alternate-segment theorem.

Answer: 64°

13. A circle has a chord that is not a diameter. A line joins the circle centre to the chord midpoint. Explain why the line is perpendicular to the chord. [4 marks]

Radii are equal, half-chords equal, and the centre-to-midpoint side shared.

The equal adjacent angles sum to 180°.

Answer: SSS congruence gives equal adjacent right angles.

14. Find the perpendicular bisector of $A = (1, -2), B = (7, -2)$. [3 marks]

Midpoint $(4, -2)$; AB is horizontal.

Answer: $x = 4$

15. A student claims every rhombus is cyclic. Give a counterexample with angles. [3 marks]

Opposite angles sum 120° or 240°, not 180°.

Answer: A rhombus with angles $60^\circ, 120^\circ, 60^\circ, 120^\circ$.

16. A student uses SSA as a congruence test: two corresponding sides are 5 cm and 8 cm, and one corresponding non-included angle is equal. Explain why this information does not guarantee congruence in every case. [3 marks]

The angle must be included for SAS.

Different allowed triangles may fit SSA.

Answer: SSA is insufficient in general.