Geometry and proof - Applications test

Name: _____ Date: _____

16 questions | 44 marks | 60 minutes

Use geometric reasoning to evaluate designs, constructions and claims.

A scientific calculator may be used.

1. A roof cross-section is isosceles with vertex angle 38°. Find each base angle. [2 marks]

2. A map uses similar triangles with corresponding bases 6 and 15 cm. The smaller height is 4 cm. Find larger height. [2 marks]

3. A design has two triangles with sides 6, 8, 10 each. Explain a congruence claim. [2 marks]

4. A circular window has radius 10 cm and a horizontal chord 16 cm long. Find the centre-to-chord distance. [3 marks]

5. A circular garden has centre O. From an exterior point P, a straight path PA touches the garden at A. $OA = 9$ m and $OP = 15$ m. Find PA. [3 marks]

6. Two tangents from a pole P to one circle have lengths $5x + 2$ and $3x + 14$. Find x. [2 marks]

7. A central minor angle AOB is 126°. C is on the major arc AB. Find $\angle ACB$. [2 marks]

8. A circular frame has diameter AB. A triangle ABC on the frame has $AB = 10$ and $AC = 6$. Find BC. [3 marks]

9. ABCD is a cyclic quadrilateral, with its vertices in that order. $\angle A = 75^\circ$ and $\angle B = 108^\circ$. Find $\angle C$ and $\angle D$. [2 marks]

10. A tangent-chord angle is 47°. The alternate-segment angle is $2x + 5$ degrees. Find x. [2 marks]

11. A simple quadrilateral has opposite angles 102° and 78°. Explain why it can be drawn on one circle. [3 marks]

12. A perpendicular-bisector algorithm changes compass radius between the two endpoints. Explain why its proof fails. [3 marks]

13. Construct the perpendicular bisector of AB using equal-radius arcs and label the midpoint. [4 marks]



14. A builder says two triangular braces are congruent because they have equal angles. Explain the missing information. [3 marks]

15. O is the centre of a circle. M is the midpoint of a chord AB that is not a diameter. Prove that OM bisects the smaller angle AOB. [4 marks]

16. A perpendicular-bisector construction appears correct for 20 examples. Explain what evidence would establish that it works for every segment AB with non-zero length. [4 marks]