Pythagoras and Trigonometry - Applications paper

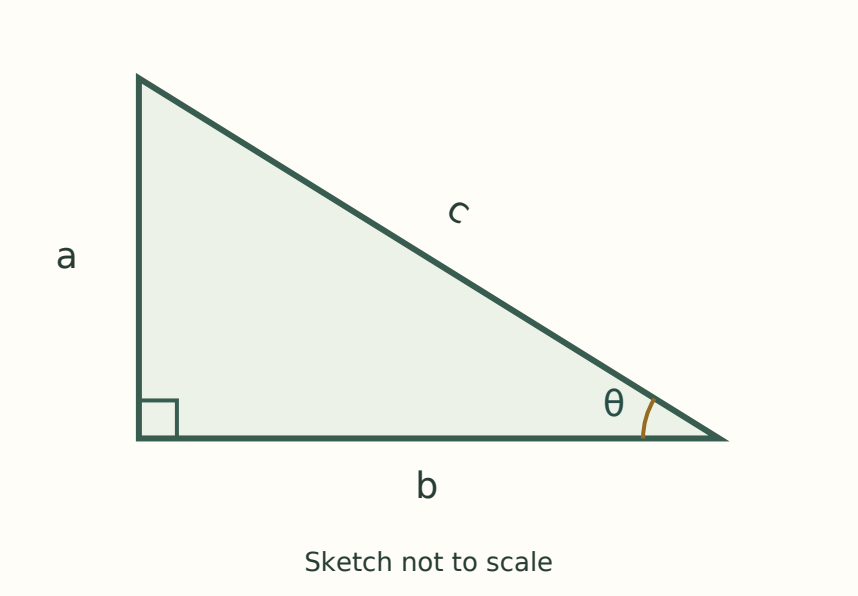
Name: _____ Date: _____

16 questions | 59 marks | 60 minutes

Apply right-triangle geometry to diagrams, lengths, angles and contextual decisions.

A scientific calculator may be used.

1. In the sight-line model, state what each side represents. [3 marks]



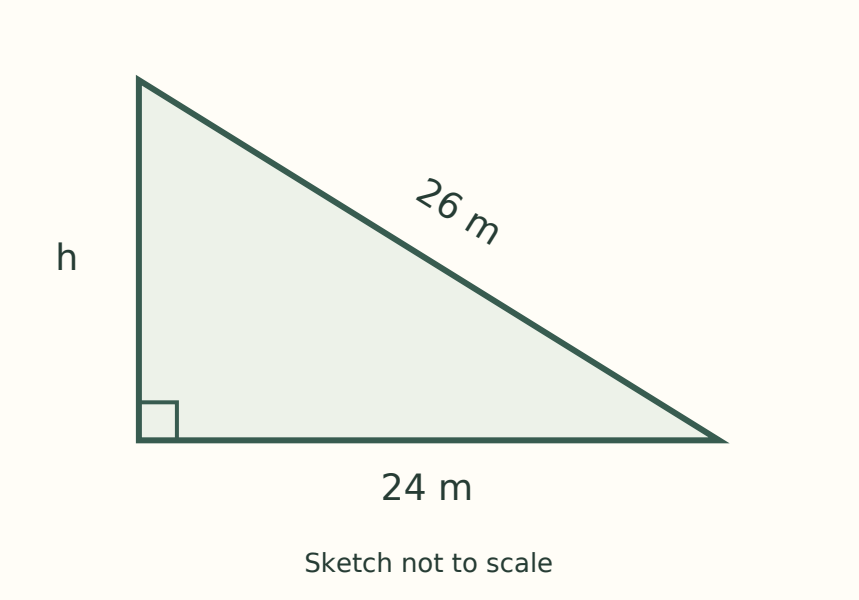
Sketch not to scale

2. A garden drawing is a 3 cm by 4 cm rectangle at scale $1:200$. Find the actual diagonal in metres. [3 marks]

3. A square has diagonal 12 cm. Find its side as an exact square root, then to two decimal places. [3 marks]

4. A rectangular frame is 0.9 m high and 1.2 m wide. Find one diagonal brace length. [3 marks]

5. A taut 26 m cable runs from level ground to the top of a vertical mast. Its anchor is 24 m horizontally from the base. Find the height. [3 marks]



Sketch not to scale

6. A straight hill rises 9 m over 15 m horizontally. Find its inclination to two decimal places. [3 marks]

7. A 20 m ladder slides from having its foot 12 m from the wall to 16 m from it. How far does the top drop? [4 marks]

8. A vertical tree casts an 8 m shadow on level ground. The Sun’s elevation is 35°. Find the height to two decimal places. [3 marks]

9. A kite is 45 m vertically above its ground-level anchor and has a taut 60 m string. Find its angle to horizontal to two decimal places. [3 marks]

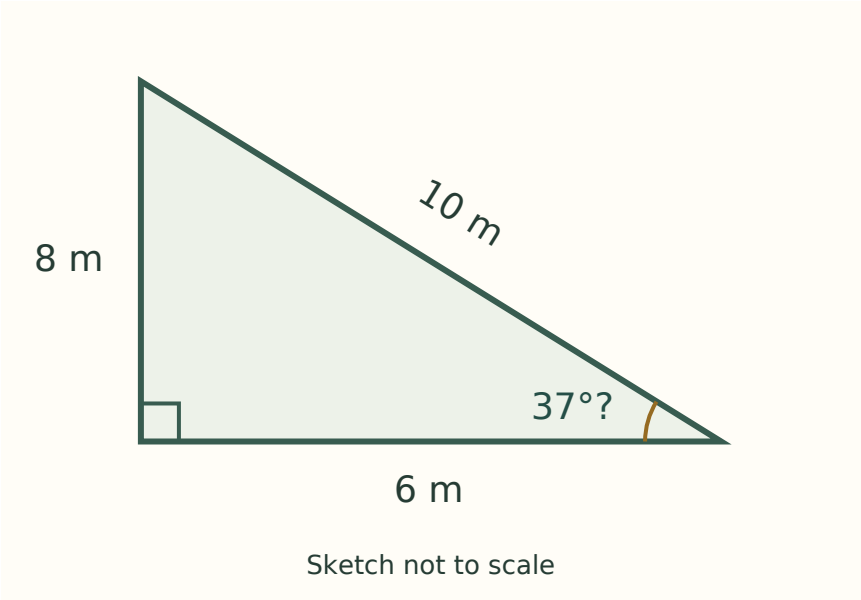
10. An observer is 24 m above a level beach. A boat is seen at 18° below horizontal. Find the horizontal distance to two decimal places. [4 marks]

11. An observer's eyes are 1.4 m above level ground, 10 m horizontally from a wall. The top is at 35° above horizontal. Find wall height to two decimal places. [4 marks]

12. A tree top is seen from ground level at 27°, 20 m from the base. A nearer point on the same line sees it at 45°. How much closer is the nearer point? Give two decimal places. [5 marks]

13. A park is an 84 m by 112 m rectangle. How much shorter is its diagonal than walking along two adjacent sides? [4 marks]

14. A survey sketch labels opposite 8 m, adjacent 6 m and $\theta = 37^\circ$. Is the angle consistent? Explain. [4 marks]



Sketch not to scale

15. Similar triangles have $\theta = 25^\circ$ and hypotenuses 10 cm and 20 cm. Answer each part. [5 marks]

(a) Find both opposite lengths to two decimal places. [3 marks]

(b) Why is $\frac{\text{opposite}}{\text{hypotenuse}}$ unchanged? [2 marks]

16. A window is 18 m above level ground. An observer's eyes are 1.5 m above the same ground and see it at 40° above horizontal. Find horizontal distance to two decimal places. [5 marks]