Practical trigonometry - Practice test 4: design and survey

Name: _____ Date: _____

10 questions | 50 marks | 75 minutes

Use degree mode. Give calculated lengths and angles to one decimal place unless stated otherwise; bearings use three digits to the nearest degree. In triangle ABC, a is opposite A, b opposite B and c opposite C. Show working, units and reasons for rejected solutions.

A scientific calculator may be used.

1. Two similar triangular panels have corresponding length ratio 3:7. The smaller panel has a side of 21 cm and area $45\,\text{cm}^2$. [4 marks]

(a) Find the corresponding larger side. [2 marks]

(b) Find the larger area. [2 marks]

2. A symmetrical roof section has horizontal span 10 m and vertical rise 3 m. A vertical line through the centre divides it into equal right triangles. [5 marks]

(a) Find each sloping roof length. [2 marks]

(b) Find the roof angle above horizontal and the triangular cross-sectional area. [3 marks]

3. A rectangular floor is 18 m by 24 m. A post 7 m high stands vertically at one corner. A cable runs from its top to the opposite floor corner. [5 marks]

(a) Find the floor diagonal. [2 marks]

(b) Find the cable length. [3 marks]

4. A ramp rises 0.75 m. Its design limit is a rise of 1 m for every 12 m horizontally. Use the limiting slope. [5 marks]

(a) Find the required horizontal run and the sloping length. [3 marks]

(b) Find the ramp angle above horizontal. [2 marks]

5. An observer’s eyes are 1.65 m above level ground. A building is 25 m horizontally away. Elevation to its roof is 22°. [4 marks]

(a) Find building height. [2 marks]

(b) If the observer steps 5 m farther away along the same level line, does the elevation increase or decrease? Explain. [2 marks]

6. A vessel travels 12 km on bearing 350°, then 9 km on bearing 080°. [6 marks]

(a) Show the two travel directions are perpendicular, then find direct distance from the start. [3 marks]

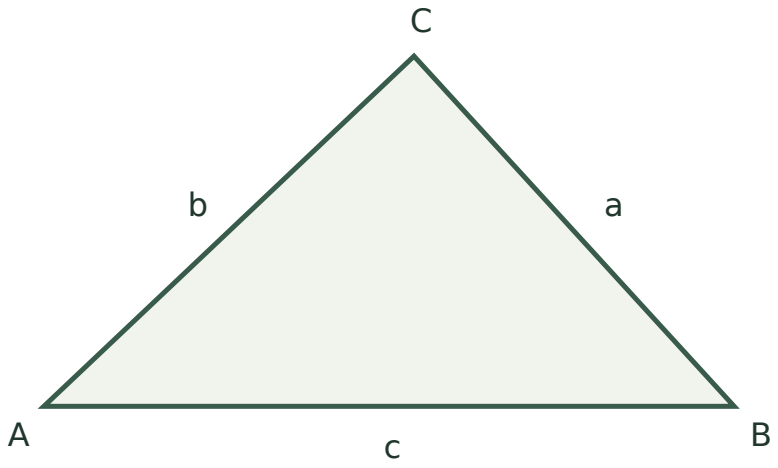
(b) Find the final bearing from the start. [3 marks]

7. A triangular solar plot has sides 40 m and 55 m enclosing 70°. [5 marks]

(a) Calculate the area. [2 marks]

(b) Fencing is required on the third side only. Find that side and its cost at 18 dollars per metre. [3 marks]

8. Triangle ABC has $A = 37^\circ$, $B = 83^\circ$ and $b = 18\,\text{m}$. [5 marks]



Sketch not to scale

(a) Find C and a. [3 marks]

(b) Find c and check which side should be longest. [2 marks]

9. A triangle has sides 6 cm, 11 cm and 14 cm. [5 marks]

(a) Find its largest angle. [2 marks]

(b) Find its area without treating any two sides as perpendicular. [3 marks]

10. A 45 m straight baseline AB and marker P form a triangle, with $PAB = 48^\circ$ and $PBA = 72^\circ$. All measurements are horizontal. [6 marks]

(a) Find angle P and AP. [3 marks]

(b) Find perpendicular distance from P to AB, and state one practical assumption. [3 marks]