Practical trigonometry - Practice test 5: applications and reasoning

Name: _____ Date: _____

10 questions | 58 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. Similar signs have area ratio $\text{small} : \text{large} = 25 : 81$. The smaller sign has a side 7.5 cm and perimeter 22.5 cm. [5 marks]

(a) Find the length scale factor and matching large side. [3 marks]

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

2. A right triangle has perpendicular legs 20 cm and 21 cm. [4 marks]

(a) Find the hypotenuse. [2 marks]

(b) Find its two acute angles. [2 marks]

3. A cable runs from a roof point 12 m above level ground to an anchor 20 m horizontally from the building. [6 marks]

(a) Find its length and its angle above horizontal. [3 marks]

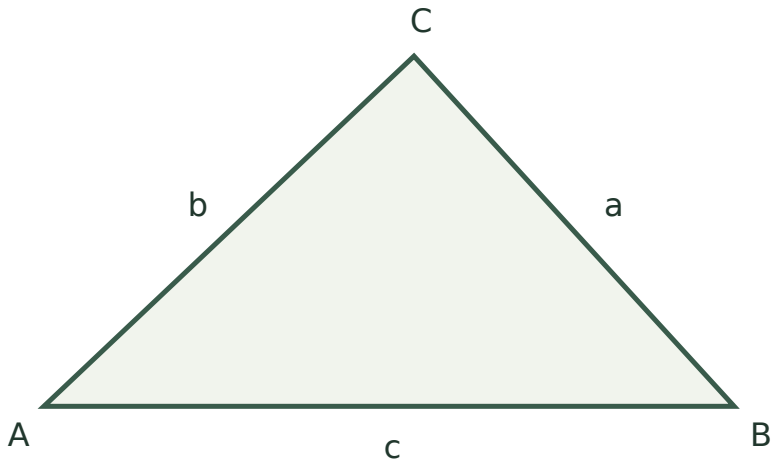
(b) The anchor moves 2 m farther away on the same straight ground line. How much longer must the cable become? [3 marks]

4. An acute angle θ satisfies $\sin\theta = \cos 38^\circ$. [4 marks]

(a) Find θ and explain without trial and error. [2 marks]

(b) Find $\tan\theta$ to three decimal places. [2 marks]

5. Triangle ABC has $A = 40^\circ$, $a = 9\,\text{cm}$ and $b = 12\,\text{cm}$. [7 marks]



Sketch not to scale

(a) Find all possible pairs B,C. [4 marks]

(b) Find c for each possible triangle. [3 marks]

6. A boat travels 10 km on bearing 060°, then 12 km on bearing 150°. [7 marks]

(a) Find its direct distance from the start. [3 marks]

(b) Find the direct return bearing. [4 marks]

7. A triangular panel has area $24\,\text{cm}^2$. Two sides are 8 cm and x cm, with included angle 30°. [4 marks]

(a) Find x. [2 marks]

(b) With those same two sides, find another included angle giving the same area. [2 marks]

8. A triangular frame has sides 9 cm, 10 cm and 15 cm. [6 marks]

(a) Find its largest angle and state whether it is acute or obtuse. [3 marks]

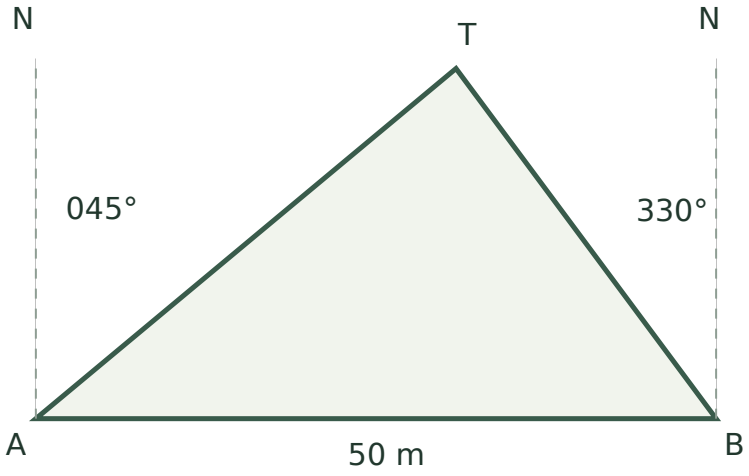
(b) Calculate its area. [3 marks]

9. An instrument records $A = 65^\circ$, $a = 9\,\text{m}$ and $b = 14\,\text{m}$ for a proposed triangle. [6 marks]

(a) Demonstrate why the readings cannot all be correct. [3 marks]

(b) If A and b are correct, find the smallest possible a. Describe the limiting triangle. [3 marks]

10. On level ground, B is 50 m due east of A. A marker T is seen from A on bearing 045° and from B on bearing 330°. [9 marks]



Sketch not to scale

(a) Find all three interior angles of triangle ABT. [3 marks]

(b) Find AT and BT. [3 marks]

(c) Find perpendicular distance from T to AB, then the area of ABT. [3 marks]