Practical trigonometry - Practice test 2

10 questions | 43 marks | 70 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 and units.

Equivalent correct methods earn the corresponding marks.

1. A courtyard is drawn as an 8 cm by 5 cm rectangle at scale 1:250. [4 marks]

(a) Find the real dimensions in metres. [2 marks]

$8 \times 250 = 2000\,\text{cm} = 20\,\text{m}$.

$5 \times 250 = 1250\,\text{cm} = 12.5\,\text{m}$.

Answer: 20 m by 12.5 m.

(b) Find its area and explain why multiplying the drawing area by 250 is wrong. [2 marks]

$20 \times 12.5 = 250\,\text{m}^2$.

The area factor is 250^2 before unit conversion.

Answer: $250\,\text{m}^2$

2. Triangle ABC has $B = 90^\circ$ and $C = 36^\circ$. [4 marks]

(a) Find A and the side opposite C. [2 marks]

$A = 90^\circ - 36^\circ = 54^\circ$; AB is opposite C.

Answer: 54°; AB.

(b) Relative to C, name the adjacent leg and hypotenuse. [2 marks]

AC lies opposite the right angle; BC touches C.

Answer: BC and AC respectively.

3. A rectangular reserve is 12 m by 35 m. [4 marks]

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

$d = \sqrt{12^2 + 35^2} = 37.$

Answer: 37 m

(b) How much shorter is it than walking along two adjacent sides? [2 marks]

$\text{Boundary route} = 12 + 35 = 47\,\text{m}.$

$47 - 37 = 10\,\text{m}.$

Answer: 10 m

4. A straight ramp rises 2.4 m over a horizontal distance of 9 m. [4 marks]

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

$\theta = \tan^{-1}\left(\frac{2.4}{9}\right).$

Answer: 14.9°

(b) Find its sloping length. [2 marks]

$L = \sqrt{2.4^2 + 9^2}.$

Answer: 9.3 m

5. A cable car is 70 m from a ground station along a line of sight at elevation 38°. [4 marks]

(a) Find its vertical rise. [2 marks]

The 70 m line is the hypotenuse.

$h = 70\sin 38^\circ$.

Answer: 43.1 m

(b) Find horizontal distance and explain why $70\tan 38^\circ$ is not the rise. [2 marks]

$x = 70\cos 38^\circ$.

Tangent would require a horizontal known side, not the sloping 70 m.

Answer: 55.2 m

6. A boat travels 14 km on bearing 225°. [5 marks]

(a) Find its westward and southward distances. [3 marks]

The direction is 45° west of south.

Each component magnitude is $\frac{14}{\sqrt{2}}$.

Answer: 9.9 km in each direction.

(b) Give its direct return bearing. [2 marks]

$225^\circ - 180^\circ = 45^\circ$, written 045°.

Answer: 045°

7. Triangle sides 7 cm and 12 cm enclose 40°. [4 marks]

(a) Calculate the area. [2 marks]

$K = \frac{1}{2} \times 7 \times 12 \sin 40^\circ$.

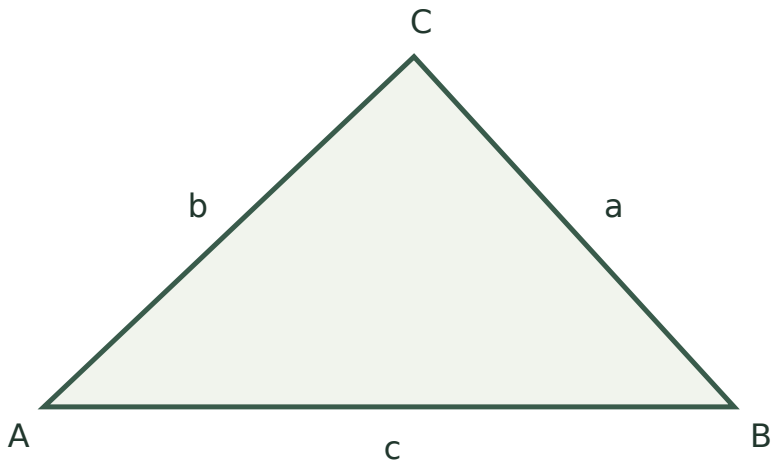
Answer: $27.0\,\text{cm}^2$

(b) Give a different included angle that produces the same area with these sides. Explain. [2 marks]

$\sin 140^\circ = \sin 40^\circ$; supplementary angles have equal sine.

Answer: 140°

8. A triangle has $A = 35^\circ$, $a = 12\,\text{cm}$ and $b = 8\,\text{cm}$. [4 marks]



Sketch not to scale

(a) Find the acute candidate B. [2 marks]

$\sin B = \frac{8 \sin 35^\circ}{12}$.

Answer: 22.5°

(b) Decide whether the supplementary candidate fits. [2 marks]

The supplementary candidate plus 35° exceeds 180°.

Answer: No; only one triangle fits.

9. A triangular frame has sides 9 cm, 10 cm and 13 cm. [4 marks]

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

It faces side 13.

$\cos C = \frac{81 + 100 - 169}{2 \times 9 \times 10}$.

Answer: 86.2°

(b) Classify the triangle as acute, right or obtuse. Justify. [2 marks]

The largest angle is below 90°, so all are acute.

Answer: Acute.

10. A triangular field has $AB = 80\,\text{m}$, $AC = 60\,\text{m}$ and $BAC = 65^\circ$. [6 marks]

(a) Find BC. [3 marks]

$BC^2 = 80^2 + 60^2 - 2 \times 80 \times 60 \cos 65^\circ$.

Answer: 77.1 m

(b) Find the area and mowing charge at 0.04 dollars per square metre. [3 marks]

$K = \frac{1}{2} \times 80 \times 60 \sin 65^\circ$.

Multiply the unrounded area by 0.04; round charge to cents.

Answer: Area $2175.1\,\text{m}^2$; charge 87.01 dollars.