Practical trigonometry - Practice test 1

10 questions | 42 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. Triangles ABC and DEF are similar in that order. AB=5 cm, BC=7 cm, AC=9 cm and DE=10 cm. [4 marks]

(a) Find the scale factor ABC to DEF, then EF. [2 marks]

k=10/5=2.

EF=7×2=14 cm.

Answer: 2; EF=14 cm.

(b) Find DF and the larger-to-smaller area ratio. [2 marks]

DF=9×2=18 cm.

Area factor=2^2=4.

Answer: 18 cm; 4:1.

2. Triangle PQR is right-angled at Q and P=32°. [4 marks]

(a) Name the hypotenuse and find R. [2 marks]

PR is opposite Q=90°.

R=90°−32°=58°.

Answer: PR; 58°.

(b) Relative to P, identify the opposite and adjacent legs. [2 marks]

QR does not touch P; PQ is the leg touching P.

Answer: Opposite QR; adjacent PQ.

3. A rectangular garden is 15 m by 20 m. [4 marks]

(a) Find its diagonal. [2 marks]

$d^2=15^2+20^2=625$.

$d=25$ m.

Answer: 25 m

(b) A student suggests 18 m. Reject this without repeating the calculation. [2 marks]

It is the hypotenuse; $18<20$.

Answer: The diagonal must exceed the 20 m side.

4. A 7 m ladder makes angle 67° with level ground and touches a vertical wall. [4 marks]

(a) Find the height reached. [2 marks]

$h=7\sin 67°$.

Answer: 6.4 m

(b) Find the horizontal distance of its foot from the wall. [2 marks]

$x=7\cos 67°$.

Answer: 2.7 m

5. An instrument is 1.5 m above level ground, 24 m horizontally from a tower. Elevation to its top is 38°. [4 marks]

(a) Find the rise above instrument level. [2 marks]

$\text{rise}=24\tan 38°$.

Answer: 18.8 m

(b) Find the tower height and explain the instrument correction. [2 marks]

$H=1.5+24\tan 38°$.

The rise starts 1.5 m above ground.

Answer: 20.3 m

6. A campsite is 18 km east and 24 km north of a station. [4 marks]

(a) Find the direct distance. [2 marks]

$d=\sqrt{(18^2+24^2)}=30$.

Answer: 30 km

(b) Find its bearing from the station. [2 marks]

$\beta=\tan^{-1}(18/24)=36.87\ldots°$ from north.

Answer: 037°

7. Two sides of a triangular banner are 8 m and 11 m, enclosing 50°. [4 marks]

(a) Find its area. [2 marks]

$K=\frac{1}{2}\times 8\times 11\sin 50°$.

Answer: 33.7 m²

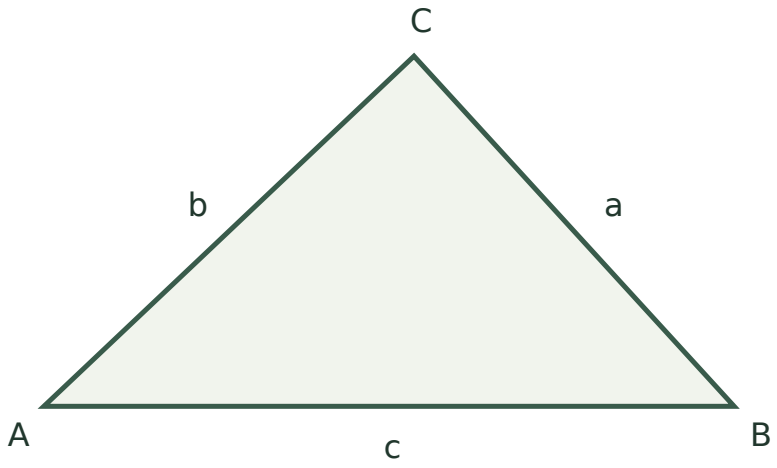
(b) Find the maximum possible area with these two sides and state when it occurs. [2 marks]

$K=44\sin C\leq 44$.

$\sin C=1$ at 90°.

Answer: 44 m², at included angle 90°.

8. Triangle ABC has A=42°, B=68° and a=9 cm. [4 marks]



Sketch not to scale

(a) Find C. [2 marks]

C=180°−42°−68°=70°.

Answer: 70°

(b) Find b. [2 marks]

b=9sin68°/sin42°.

Answer: 12.5 cm

9. Two triangle sides are 7 cm and 9 cm, with included angle 110°. [4 marks]

(a) Find the third side. [2 marks]

$c^2=7^2+9^2-2\times7\times9\cos110°$.

Take the positive root.

Answer: 13.2 cm

(b) Explain why it is the longest side. [2 marks]

The other two angles together total 70°.

Answer: It faces the largest angle, 110°.

10. Survey stations A and B are 25 m apart on a straight level line. A marker T lies to one side, with TAB=40° and TBA=65°. [6 marks]

(a) Find ATB and AT. [3 marks]

$T=180°-40°-65°=75°$.

$AT=25\sin65°/\sin75°$.

Answer: 75°; 23.5 m

(b) Find the perpendicular distance from T to line AB. [3 marks]

$h=AT\sin40°$, using unrounded AT.

Answer: 15.1 m