

Applications 1.1 – Trig Rules and bearings

Section A - Revision

This section will help you revise previous learning which is required in this topic.

R1 I know the common exact values in the four quadrants.

1. Write down the exact value of:

(a) $\sin 30^\circ$

(f) $\tan 60^\circ$

(i) $\tan 45^\circ$

(k) $\cos 0^\circ$

(m) $\sin 90^\circ$

(n) $\cos 90^\circ$

2. Write down the exact value of:

(a) $\sin 150^\circ$

(e) $\cos 300^\circ$

(i) $\tan 225^\circ$

R2 I can solve simple linear equations and inequalities.

1. Solve the equations

(a) $4 \tan x^\circ - 6 = 2, \quad 0 \leq x < 360.$

(b) $4 \cos x^\circ - 3 = 0, \quad 0 \leq x \leq 360.$

(c) $7 \sin x^\circ - 1 = 0, \quad 0 \leq x \leq 360.$

2. Solve the equations

(a) $2 \tan x^\circ + 3 = 2, \quad 0 \leq x \leq 360.$

(b) $6 \cos x^\circ + 3 = 0, \quad 0 \leq x \leq 360.$

(c) $5 \sin x^\circ + 4 = 3, \quad 0 \leq x < 360.$

Trig Rules and bearings

Section B - Assessment Standard Section

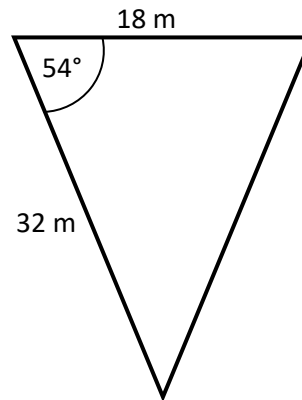
This section will help you practise for your Assessment Standard Test for Trig Rules and Bearings (Applications 1.1)

Practice Assessment Standard Questions

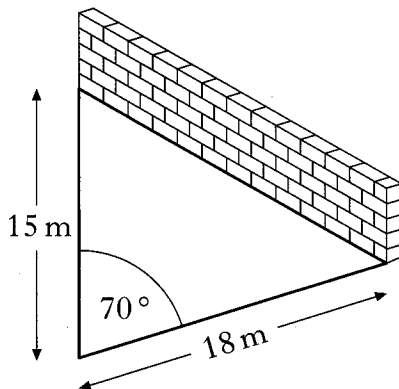
1. Chloe wishes to sow grass seed on a triangular plot of ground.

The diagram gives the dimensions of the plot.

Calculate the area of this plot to the nearest square metre.

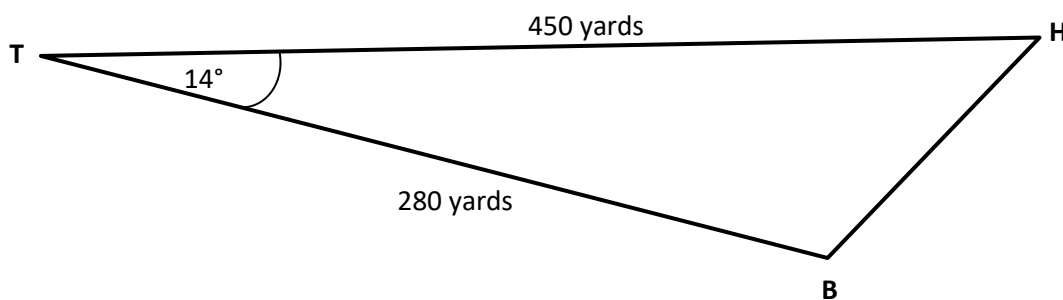


2. A farmer builds a sheep-pen using two lengths of fencing and a wall.



Calculate the area of the sheep-pen.

3. The diagram shows how a golf ball was hit from the tee (T) to position B, a distance of 280 yards. The hole (H) is 450 yards from the tee.

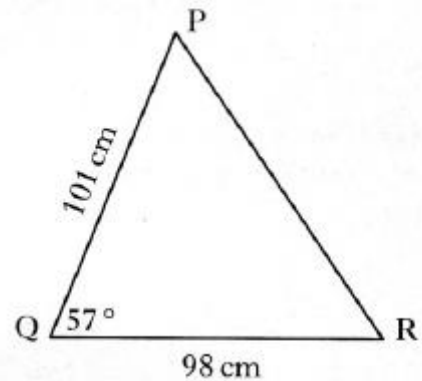


What is the shortest distance between the golf ball and the hole?

Trig Rules and bearings

4. The bonnet of a car is held open, at an angle of 57° , by a metal rod.

- In the diagram,
- PQ, 101cm, represents the bonnet
 - PR represents the metal rod
 - QR, 98cm, represents the distance from the base of the bonnet to the front of the car.



Calculate the length of the metal rod, PR.

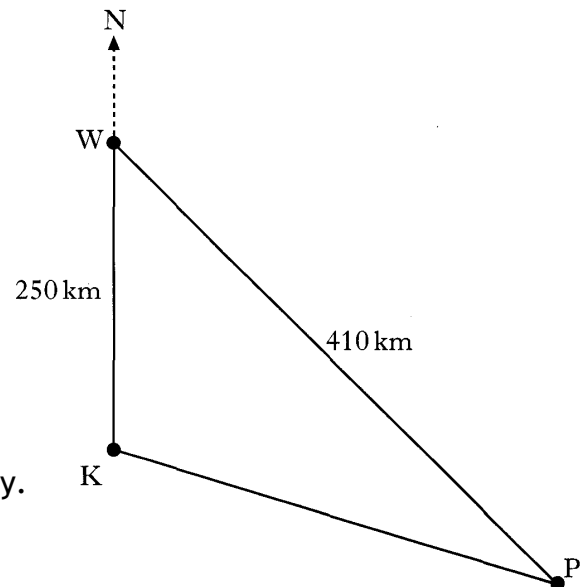
5. Three radio masts, Kangaroo (K), Wallaby (W) and Possum (P) are situated in the Australian outback.

Kangaroo is 250 kilometres due south of Wallaby.

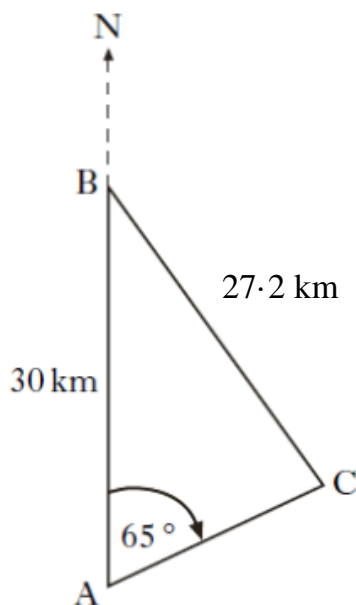
Wallaby is 410 kilometres from Possum.

Possum is on a bearing of 130° from Kangaroo.

Calculate the bearing of Possum from Wallaby.



- 6.



Brunton is 30 kilometres due North of Appleton.

From Appleton, the bearing of Carlton is 065° .

The distance between Brunton and Carlton is 27.2 kilometres.

Calculate the bearing of Carlton from Brunton.

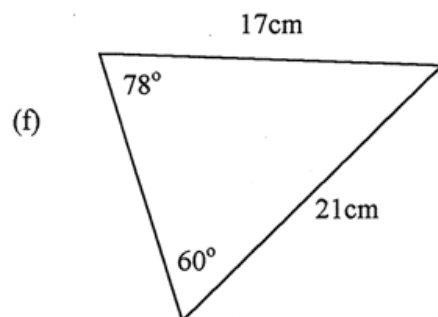
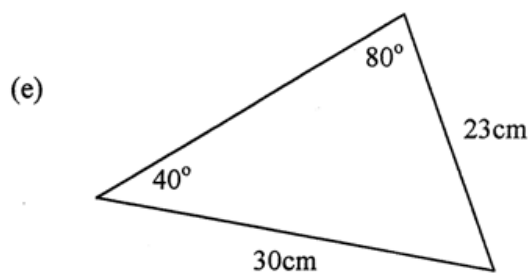
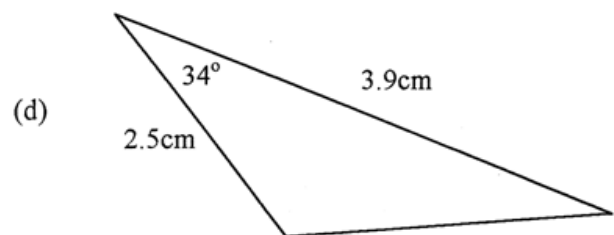
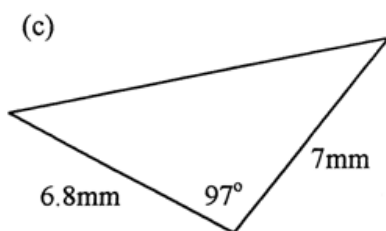
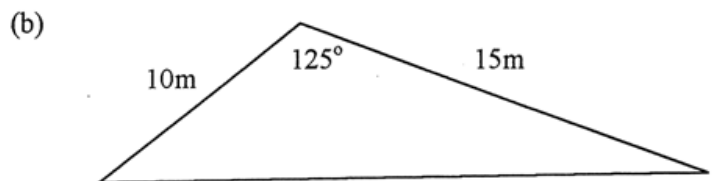
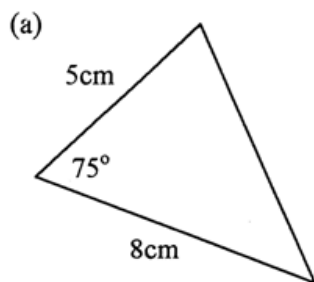
Trig Rules and bearings

Section C - Operational Skills Section

This section provides problems with the operational skills associated with Linear Relationships

O1 I can identify and calculate areas of non-right angled triangles using the formula $A = \frac{1}{2} ab \sin C$.

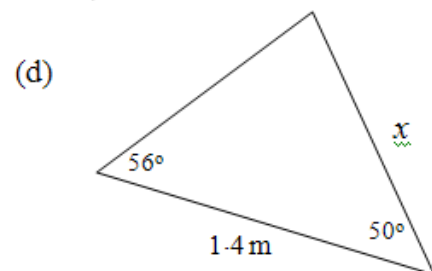
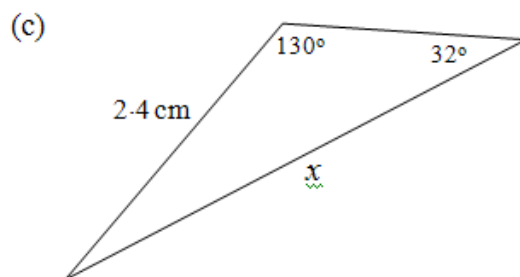
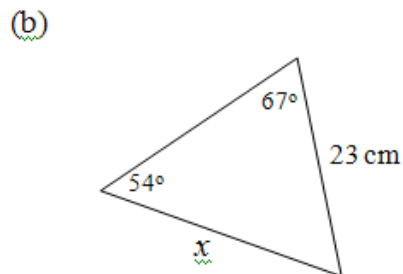
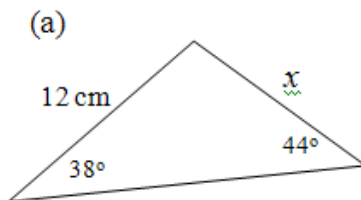
1. Find the area of each of these triangles.



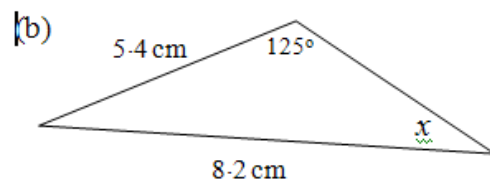
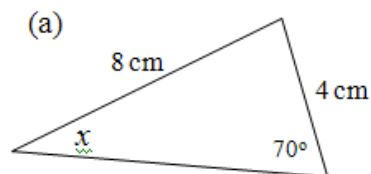
Trig Rules and bearings

02 I can apply the Sine Rule in context to solve problems.

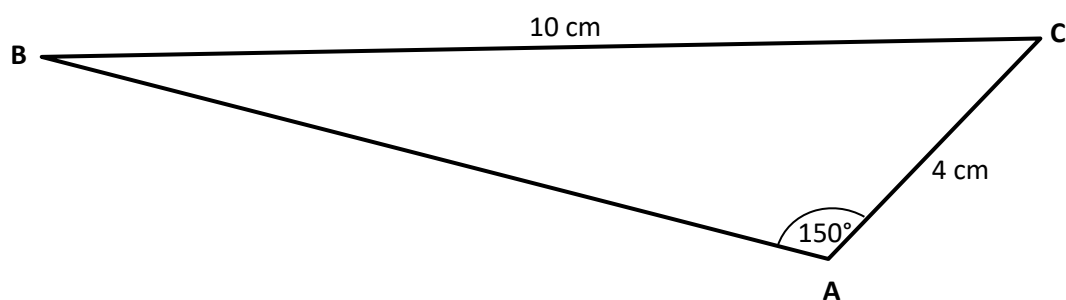
1. For each triangle below, find the size of the side marked x .



2. For each triangle below find the size of the angle marked x .



3. Given that $\sin 30^\circ = \frac{1}{2}$, show that $\sin B^\circ = \frac{1}{5}$ in the triangle below.

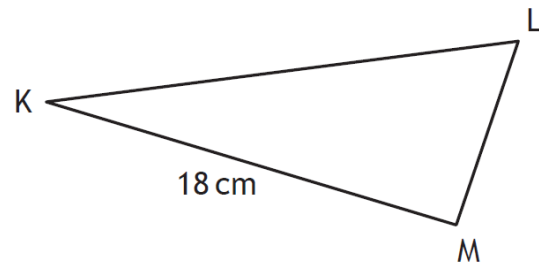


Trig Rules and bearings

4. In triangle KLM

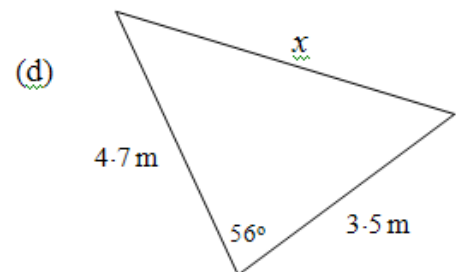
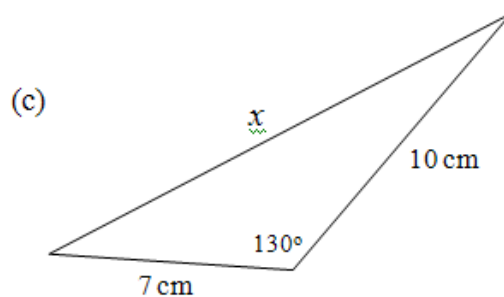
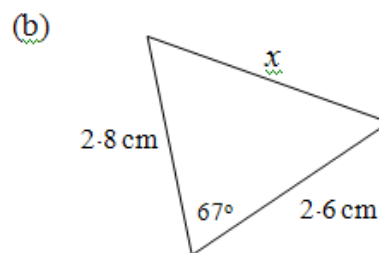
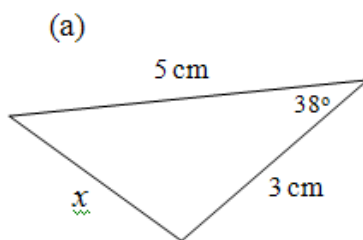
- $KM = 18$ centimetres
- $\sin K = 0.4$
- $\sin L = 0.9$

Calculate the length of LM.

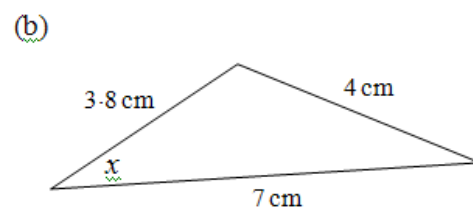
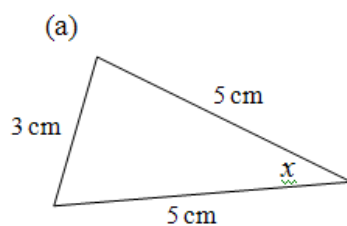


03 I can apply the Cosine Rule in context to solve problems.

1. For each triangle below, calculate the size of the side marked x .

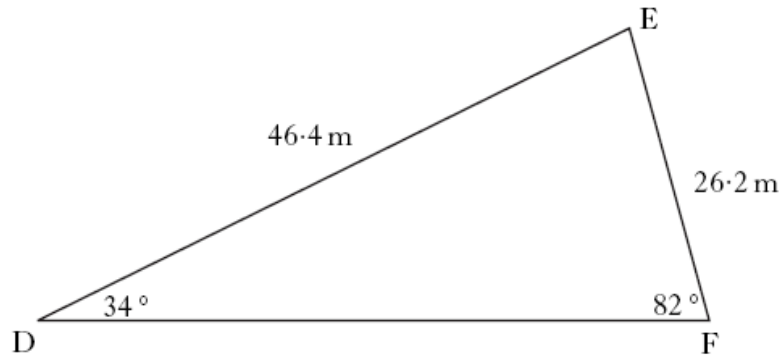


2. For each triangle below find the size of the angle marked x .



Trig Rules and bearings

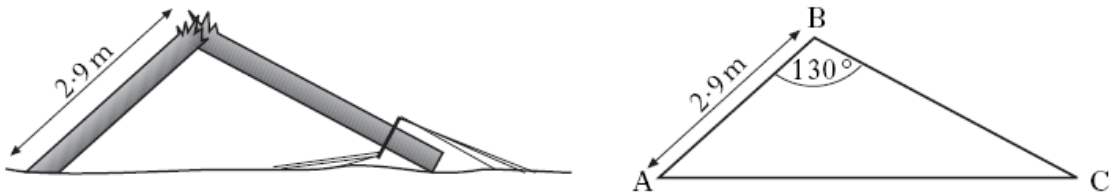
3. As part of their training, footballers run around a triangular circuit DEF.



How far do they run in one complete circuit?

4. A telegraph pole is 6.2 metres high.

The wind blows the pole over into the position as shown below.



AB is 2.9 metres and angle ABC is 130° .

Calculate the length of AC.

Trig Rules and bearings

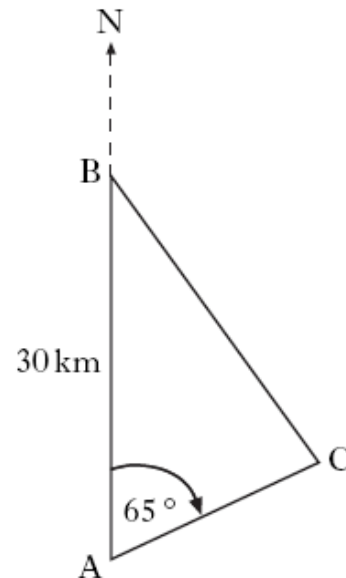
04 I can determine the type of question and choose an appropriate trigonometry rule in a context includes bearing.

1. Brunton is 30 kilometres due North of Appleton.

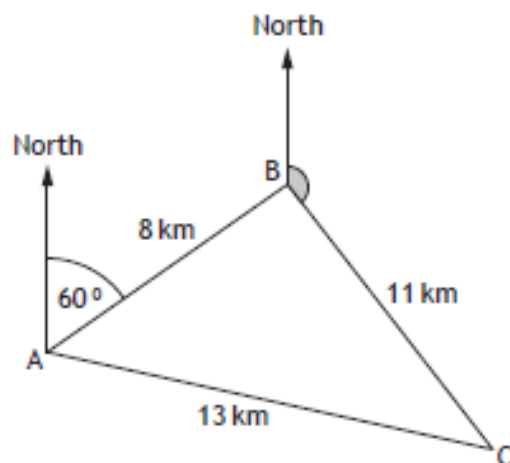
From Appleton, the bearing of Carlton is 065° .

From Brunton, the bearing of Carlton is 153° .

Calculate the distance between Brunton and Carlton.



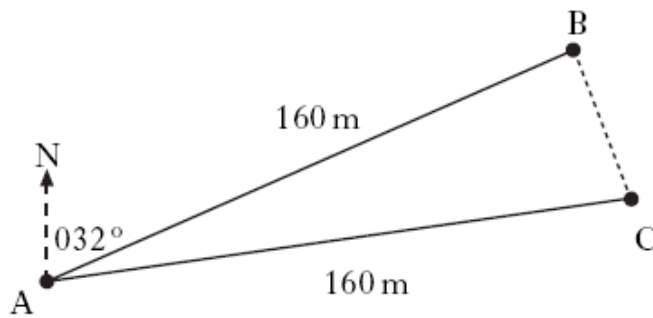
2. In a race, boats sail round three buoys represented by A, B and C in the diagram.



- (a) Calculate the size of angle ABC.
- (b) Hence find the size of the shaded angle.

Trig Rules and bearings

3. Jane is taking part in an orienteering competition.



She should have run 160 metres from A to B on a bearing of 032° .

However, she actually ran 160 metres from A to C on a bearing of 052° .

- Write down the size of angle BAC.
- Calculate the length of BC.
- What is the bearing of B from C?

Trig Rules and bearings

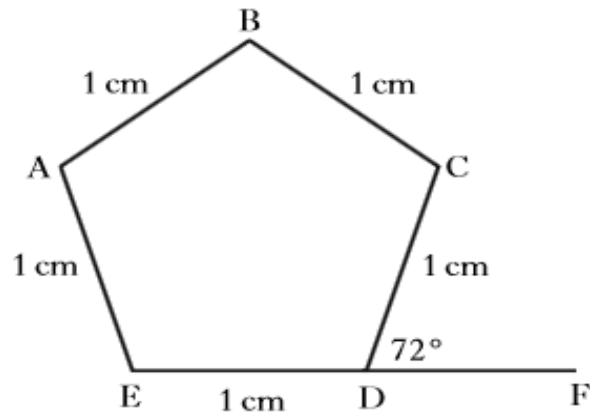
Section D - Reasoning Skills Section

This section provides problems with Reasoning Skills in the context of Trig Rules and bearings.

1. ABCDE is a regular pentagon with each side 1 centimetre.

Angle CDF is 72° .

EDF is a straight line.



- (a) Write down the size of angle ABC.
(b) Calculate the length of AC.

2. AD is a diameter of a circle, centre O.

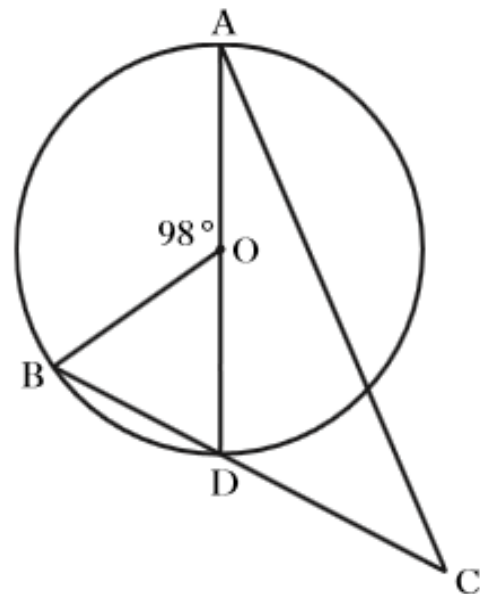
B is a point on the circumference of the circle.

The chord BD is extended to a point C, outside the circle.

Angle BOA = 98° .

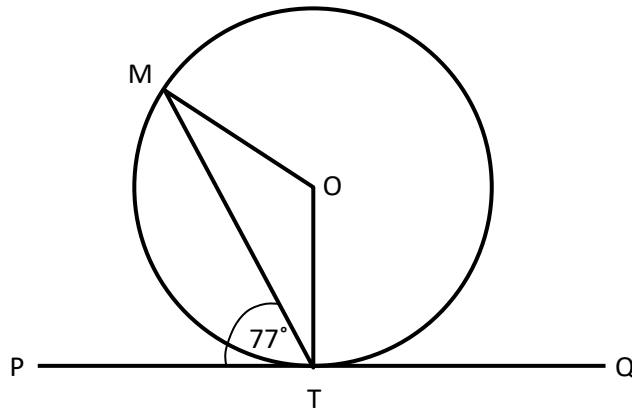
DC = 9 centimetres. The radius of the circle is 7 centimetres.

Calculate the length of AC.

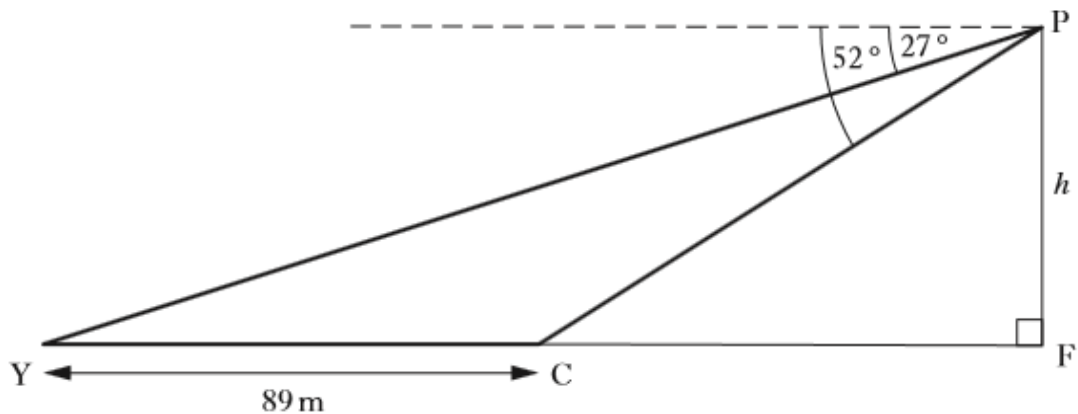


Trig Rules and bearings

3. The tangent PQ touches the circle, centre O, at T. Angle MTP is 77° .



- (a) Calculate the size of angle MOT.
- (b) The radius of the circle is 8 centimetres. Calculate the length of the chord MT.
4. In the diagram below, Y and C represent the points of a yacht and a canoe.



From the point P on top of a cliff

- The angle of depressions of the yacht is 27° .
- The angle of depressions of the canoe is 52° .

The distance between the canoe and the yacht is 89 metres.

Calculate the height, h metres, of the cliff.

Trig Rules and bearings

Answers

Section A - Revision

R1

Q1 (a) $\frac{1}{2}$ (b) $\sqrt{3}$ (c) 1 (d) 1 (e) 1
(f) 0

Q2 (a) $\frac{1}{2}$ (b) $\frac{1}{2}$ (c) 1

R2

Q1 (a) $63 \cdot 4^\circ, 243 \cdot 4^\circ$ (b) $41 \cdot 4^\circ, 318 \cdot 6^\circ$ (c) $8 \cdot 2^\circ, 171 \cdot 8^\circ$

Q2 (a) $153 \cdot 4^\circ, 333 \cdot 4^\circ$ (b) $120^\circ, 240^\circ$ (c) $191 \cdot 5^\circ, 348 \cdot 5^\circ$

Section B - Practice Assessment Standard Questions

Q1 233 m²

Q2 126.9m²

Q3 190.75 yards

Q4 94.99 cm

Q5 $K\hat{W}P = 22^\circ$ so required bearing = 158° .

Q6 $A\hat{B}C = 27^\circ$ so required bearing = 153° .

Section C - Operational Skills

O1

Q1 (a) $19 \cdot 3 \text{ cm}^2$ (b) $61 \cdot 4 \text{ m}^2$ (c) $23 \cdot 6 \text{ mm}^2$
(d) $2 \cdot 73 \text{ cm}^2$ (e) $298 \cdot 8 \text{ cm}^2$ (f) $119 \cdot 4 \text{ cm}^2$

O2

Q1 (a) $10 \cdot 6 \text{ cm}$ (b) $26 \cdot 2 \text{ cm}$ (c) $3 \cdot 47 \text{ cm}$ (d) $1 \cdot 21 \text{ m}$

(e) $m = 4$ $c = -3$ (f) $m = \frac{2}{3}$ $c = \frac{1}{3}$

Q2 (a) 28° (b) $32 \cdot 6^\circ$

Trig Rules and bearings

Q3 *Proof*

Q4 8 cm

O3

Q1 (a) 3.22 cm (b) 2.99 cm (c) 15.46 cm (d) 3.99 cm

Q2 (a) 34.9° (b) 26.9°

Q3 $DF = 42.11$ m so the Total Distance = 114.71 m.

Q4 $BC = 3.3$ m , $AC = 5.62$ m.

O4

Q1 $\hat{A}BC = 27^\circ$, $\hat{A}CB = 88^\circ$. Distance = 27.2 km.

Q2 (a) 84.8° (b) 155.2°

Q3 (a) 20° (b) 55.57 m (c) 312°

Section D - Reasoning Skills Section

Q1 (a) 108° (b) 1.62 cm

Q2 21.03 cm

Q3 (a) 154° (b) 15.59 cm

Q4 75.34 m