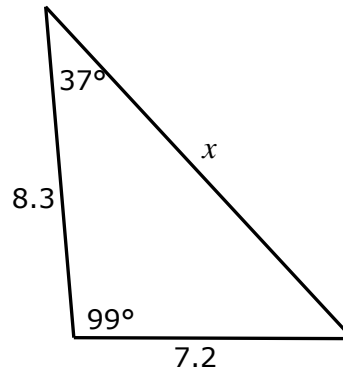# Merit+ Trigonometry Practice #1

1.   Find x

8.3

37°

x

99°

7.2

2.   A rescue helicopter has to fly to a concert to treat someone in acute distress from too much of something undesirable.

Air control steer the helicopter to avoid the town centre, so get them to fly 4 kilometres at bearing 045, then 6 kilometres at bearing 300.

How far from the helicopter's starting point is the concert?
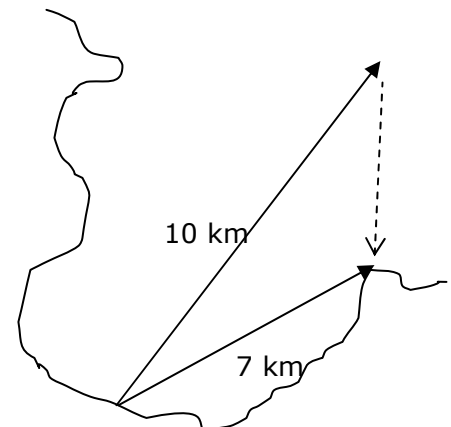
N

W — E

S

3.   Bill sails 10 kilometres out from home on a bearing of 040.

He then gets into trouble, and decides to make for the nearest shore.

There is a headland which is 7 kilometres from his home on a bearing of 060.

What bearing must he take from his current position to head directly towards the headland (dotted line)?
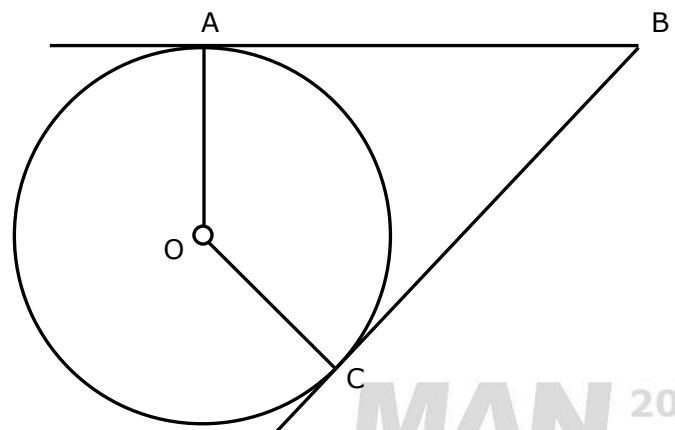
10 km

7 km

4.   Find ∠AOC

The circle has a radius of 5 cm.

AB is 8 cm.

AB and AC are tangents to the circle

A   B

O

C

Answers: Merit+ Trigonometry Practice #1

1. Find x
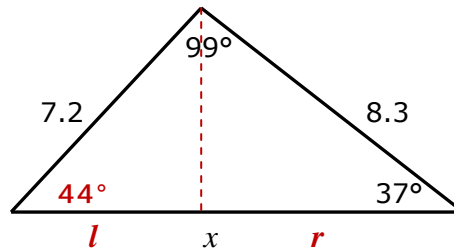
   $r = \cos 37° \times 8.3 = 6.6287$

   The bottom angle is 44°

   (Δ interior angles add to 180°)

   $l = \cos 44° \times 7.2 = 5.1792$

   $x = l + r$ $x = 11.8$

2. Air control steer the helicopter to avoid the town centre, so get them to fly 4 kilometres at bearing 045, then 6 kilometres at bearing 300.

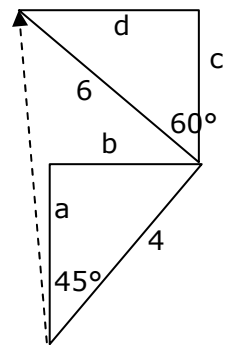   How far from the helicopter's starting point is the concert?

   The two sections must be divided into N/S and E/W components

   The triangles are shown: bearing 300 is 60° from N anti-clockwise

   Total North = a + c = $\cos 45° \times 4 + \cos 60° \times 6 = 5.8284$

   Total East = d − b = $\sin 60° \times 6 - \sin 45° \times 4 = 2.3677$

   Distance overall is dotted line = $\sqrt{5.8284^2 - 2.3677^2} = 6.29$ km

3. Bill sails 10 kilometres out from home on a bearing of 040.
   A headland is 7 kilometres from his home on a bearing of 060.
   What bearing must he take from his current position to head directly towards the headland (dotted line)?

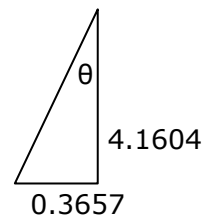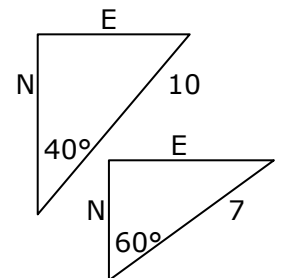   10 kms at bearing 040 can be made into a triangle with a N component and a E component – shown to right.

   N part = $\cos 40° \times 10 = 7.6604$, E part = $\sin 40° \times 10 = 6.4279$

   Doing the same with the 7 km at 060

   N part = $\cos 60° \times 7 = 3.5$, E part = $\sin 60° \times 7 = 6.0622$

   So needs to sail 7.6604 − 3.5 = 4.1604 S and 6.4279 − 6.0622 = 0.3657 W

   $\theta = \tan^{-1}(^{0.3657}/_{4.1604}) = 5.023°$. **Bearing = 180° + θ = 185.0**

4. Find ∠AOC

   The circle has a radius of 5 cm. B is 8 cm.

   AB and AC are tangents to the circle

   ∠OAB is 90° (tangent to radius)

   So we can use right angle trig

   $z = \tan^{-1}(^8/_5) = 57.99°$

   ∠AOC = 2z (by symmetry)   **∠AOC = 115.99**