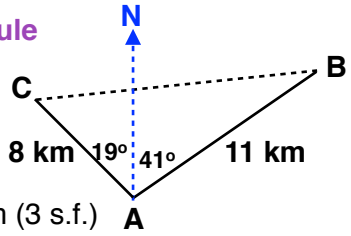
# Coordinates in 3-D Space

**Starter**

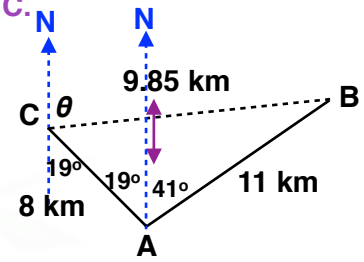
1. **(Review of last lesson)** From A, B lies 11 km away on a bearing of 041° and C lies 8 km away on a bearing of 341°. Find:
   (a) the distance between B and C to 3 s.f. and
   (b) the bearing of B from C, to the nearest degree.

***Working:*** (a) **Draw a diagram.**
**No arrow between knowns ⇒ cosine rule**




$a^2 = b^2 + c^2 - 2bc\cos A$
$BC^2 = 8^2 + 11^2 - 2\times 8\times 11\cos 60$
$x = 9.85$
The distance between B and C is 9.85 km (3 s.f.)

(b) **The bearing of B from C — start from C.**
**Draw a North line up from C.**
**The bearing required is angle $\theta$.**




By alternate angles, the angle between CA with the downward extension of the north line is $19^o$.

Therefore, with $\angle ACB$ we can find $\theta$.

Arrow between knowns ⇒ sine rule

Finding an angle: $\dfrac{\sin A}{a} = \dfrac{\sin B}{b}$

$\dfrac{\sin C}{11} = \dfrac{\sin 60}{9.85} \quad \Rightarrow \quad \sin C = \dfrac{11\sin 60}{9.85}$

$C = \sin^{-1}\left(\dfrac{11\sin 60}{9.85}\right) = 75.3^o$

$\theta = 180 - 19^o - 75.3 \approx 86^o$

The bearing of B from C is $086^o$ (1 d.p.)

**Notes**

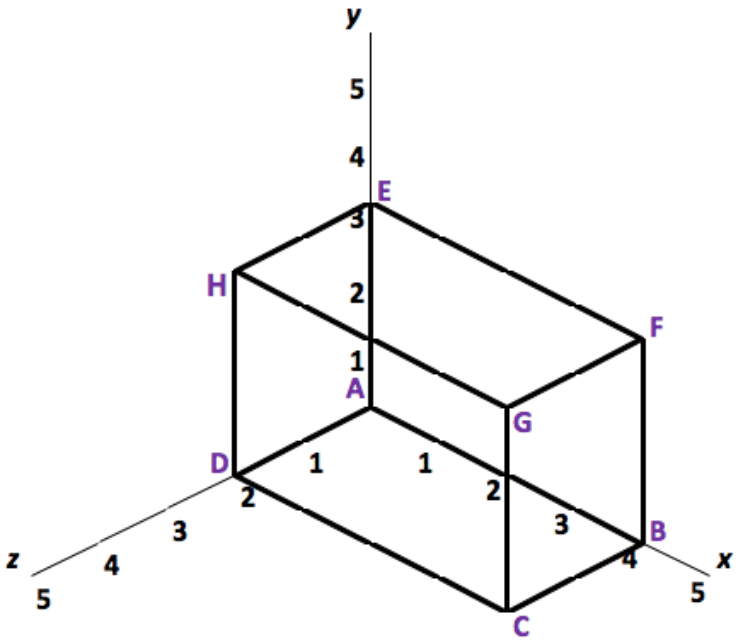
In 3-dimensions, the $z-$axis comes out of the page/whiteboard.

Coordinates are written $(x,\ y,\ z)$

To simulate this in a 2-D drawing, we draw the axes as if on isometric paper.

***E.g. 1*** Write down the coordinates of the vertices of the cuboid.

$A(0, 0, 0)$
$B(4, 0, 0)$
$C(4, 0, 2)$
$D(0, 0, 2)$
$E(0, 3, 0)$
$F(4, 3, 0)$
$G(4, 3, 2)$
$H(0, 3, 2)$




Solutions to Starter and E.g.s

**Exercise**

| | |
|---|---|
| 9-1 class textbook: | p574 M18.4 Qu 1-5 |
| A*-G class textbook: | p534 M18.4 Qu 1-5 |
| 9-1 homework book: | p193 M18.4 Qu 1-4 |
| A*-G homework book: | p148 M18.4 Qu 1-4 |

Homework book answers (only available during a lockdown)