

Angles of elevation and depression

Starter

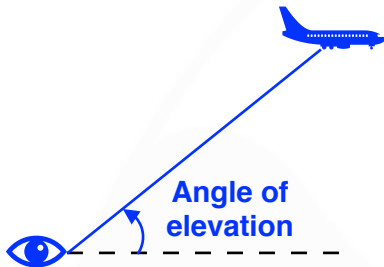
1. **(Review of last lesson)** A ship sails 250 km on a bearing of 238° . How far has it travelled (a) west (b) south? Give your answers to the nearest kilometre.

Notes

Angles of elevation and depression are always measured from the horizontal.

Angle of elevation

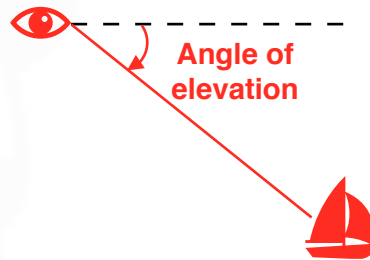
Measured **upwards** from the horizontal



E.g. Looking up at an aeroplane in the sky.

Angle of depression

Measured **downwards** from the horizontal



E.g. Looking down at a boat on the sea from the top of a cliff

- E.g. 1** A man stands on top of a cliff and spies a sailing boat on the sea. The direct distance from the man to the boat is 2.1 km. The angle of depression is 40° . Find the distance of the boat from the foot of the cliff.

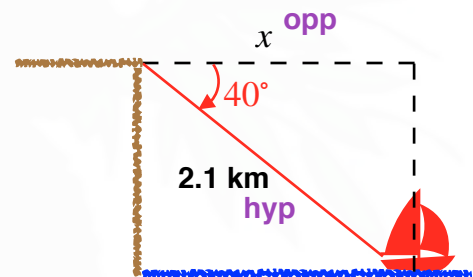
Working: adj and hyp \Rightarrow cos

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}: \quad \cos 40 = \frac{x}{2.1}$$

$$2.1 \cos 40 = x$$

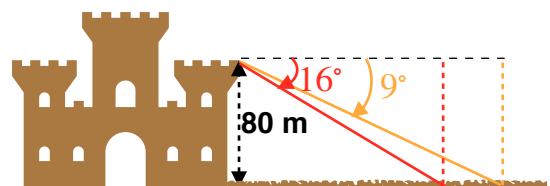
$$x \approx 1.609$$

The distance of the boat from the foot of the cliff is 1.61 km (3 s.f.).



- E.g. 2** A woman looks up towards the top of a building. The angle of elevation is 28° . Her distance from the base of the building is 70 m. If her eye is 1.7 m above the ground, find the height of the building.

- E.g. 3** From the top of a tower of height 80 m, a guard sees two prisoners both due east of him. If the angles of depression of the two prisoners are 9° and 16° , calculate the distance between them.



Video 1:

[Angles of elevation and depression](#)

Video 2:

[Angles of elevation and depression](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook:

p572 M18.3 Qu 1-8 Draw a diagram for each question

A*-G class textbook:

p532 M18.3 Qu 1-9 Draw a diagram for each question

9-1 homework book:

p192 M18.3 Qu 1-8 Draw a diagram for each question

A*-G homework book:

p147 M18.3 Qu 1-7 Draw a diagram for each question

Summary

Angles of *elevation* — angle measured *upwards* from the horizontal.

Angles of *depression* — angle measured *downwards* from the horizontal.