BEARINGS & ANGLES OF ELEVATION

We use *bearings* to give "*directions*" that are used at sea, on land and in the air. There are 2 types:

(i) We start by declaring our direction as north or south, then say how many degrees to go east or west of the vertical – see *Figure 1*

(ii) We give *true bearings* – a 3 digit angle starting from North and going in the "*clock-wise*" direction – see *Figure 2*

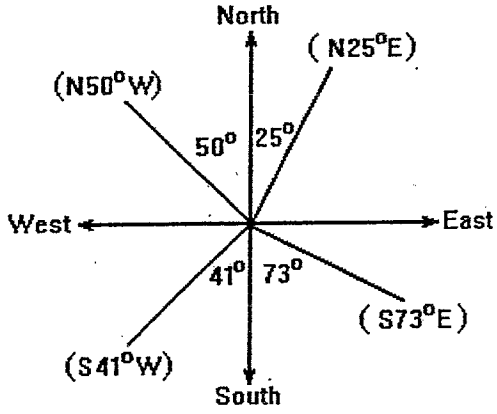


Figure 1

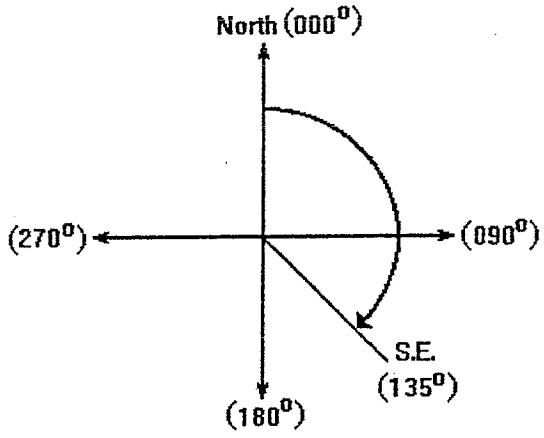


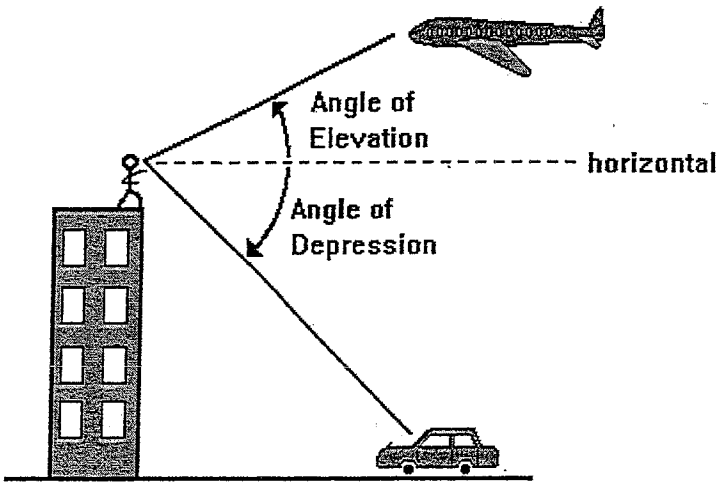
Figure 2

What are the "*true bearings*" of all the directions given in *Figure 1*?

(i) North = ... (ii) N25°E = ... (iii) East = ... (iv) S73°E = ...

(v) South = ... (vi) S41°W = ... (vii) West = ... (viii) N50°W = ...

Both the *Angle of Elevation* and the *Angle of Depression* are the angles measured from the '*horizontal*' to the '*line of sight*' (to the object we look at).



EXERCISE 40 - Trigonometric Problems

1. A ladder has length 5·2 metres. When it is resting against a wall, the base of the ladder makes an angle of $69^{\circ}25'$ with the ground. Draw a diagram to represent this information. Find the height of the other end of the ladder (against the wall) above the ground. (Answer to the nearest centimetre)

2. A boat has an anchor rope of length 55 metres. Due to the ocean current, the boat drifts so that the anchor rope is tight making an angle of 63° with the surface of the water. Draw a diagram to represent this information. Find the depth of the water above the anchor.

3. A man is standing on top of a 55 metre high cliff. The angle of depression from there to a boat out at sea is 22°.
   (i) Draw a diagram to represent this information.
   (ii) Find the distance of the boat from the base of the cliff.

4. A rally car driver heads in a direction with bearing 145° at a speed of 85 kph for 3 hours! Draw a diagram to represent this information. How far east of his starting position would the rally car driver be at the end of the 3 hours?

5 A ship sails from a port A. It travels 55 km west, then 30 km south, to a buoy at point B. Draw a diagram to represent this information. Find the bearing of B *from A* (answer to the nearest degree).

6 A canoeist paddles (rows) due west for 1·5 km. He then turns due south and covers a further 800 metres. Draw a diagram to represent this information. How far and in what direction must he travel to return to his starting point?

HOMEWORK SHEET (20)

1) The *diagonal* of a rectangle is 12 cm in length, and the longer side of the rectangle is 9 cm. Draw a diagram to represent this information.
Find the measure (size) of the angle between the diagonal and the shorter side. (Answer to the nearest minute)

2) A young boy, with eyes one metre above ground level, stands 25 metres from the base of a tall building. If he looks up to the top of the building at an *angle of elevation* of 72°, find the height of the building. First draw a diagram to represent this information.

3) Point A is 40 km due north of point B. Point C is 100 km due east of point B. Draw a diagram to represent this information, then . . .
Find (i) the distance of C from A (to the nearest km), and . . . .
(ii) the bearing of point C from A (to nearest minute).

4) A kite string is tied to the ground. The string, 80 metres long, makes an angle of 55°43' with the ground. Draw a diagram to represent this information. How high is the kite above the ground level.

ANSWERS

Exercise 40

1. 4·87 m
2. 49 m
3. 136 m
4. 146 m
5. 241°
6. 1·7km , 062°

Homework Sheet(20)

1. $\sin\theta = \frac{3}{4} \therefore \theta = 48°35'$
2. $\frac{x-1}{25} = \tan 72° \rightarrow x = 77.94m$
3. (i) AC = 107.7m (ii) 111°48'
4. $\sin 55°43' = \frac{x}{80} \rightarrow x = 66.1m.$