

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*

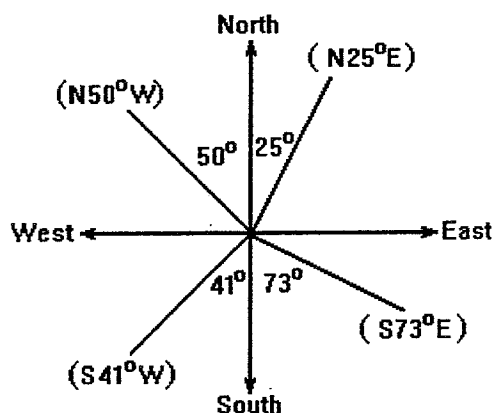


Figure 1

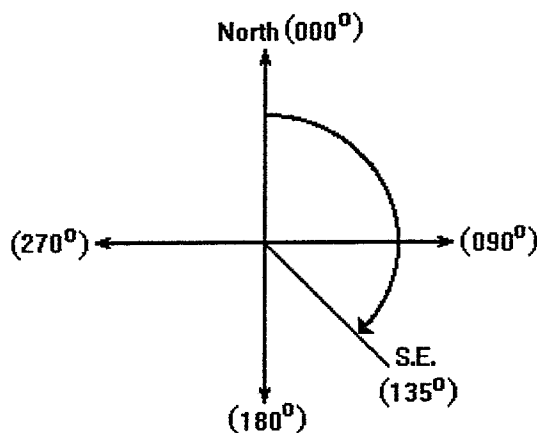
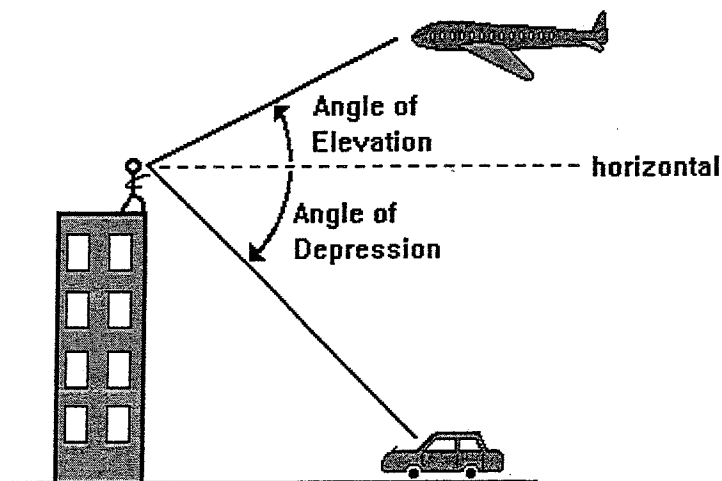


Figure 2

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?

ANSWERS

Exercise 40

1. 4.87 m
2. 49 m
3. 136 m
4. 146 m
5. 241°
6. 1.7 km, 062°

Homework Sheet (20)

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