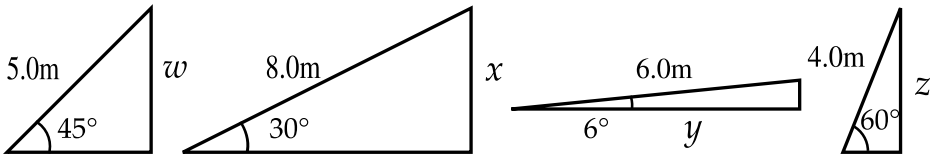
Chapter B

Mechanics

B1 Components of a Vector

$^{8}/_{10}$

Where bearings are given, they are in degrees East of North (so North is $000°$, East is $090°$, South is $180°$ and West $270°$). For the purposes of this exercise, assume that the Earth is flat.
Give the length of the following sides.



B1.1 w. B1.2 x. B1.3 y. B1.4 z.

B1.5 Eric the Explorer walks 35 km on a bearing of $075°$. How far East is he compared to his original position?

B1.6 A trolley has a weight of 11 N and sits on a ramp inclined at $33°$ to the horizontal. How big is the component of the weight which is trying to pull the trolley along the ramp?

B1.7 A ladder needs to be inclined at $10°$ to the vertical. It is 6.0 m long, and is propped against a wall. How far will the base of the ladder be from the base of the wall?

B1.8 When walking up Amersham Hill, you walk at an angle of about $6.0°$ to the horizontal. How far up do you go when walking 500 m along the road?

B1.9 A plumb bob has a weight of 1.0 N. It is swinging on the end of a piece of string and, at one particular instant, the string is inclined at $28°$ to the vertical. What is the component of the weight perpendicular to the line of the string?

B1.10 A fly in a room is flying on a bearing of $204°$ at a speed of 0.36 m s^{-1}. Sunlight streams horizontally westward across a room, forming a shadow of the fly on the west wall. How fast does the shadow move?