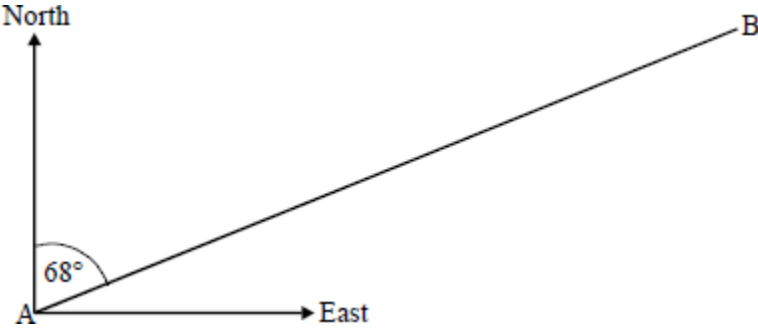


1

A microlight is a small aircraft powered by a petrol engine. The diagram represents the flight path, AB, of a microlight on a short horizontal training flight.



(a) On its outward journey, the wind velocity is 7.5 m s^{-1} due North and the resultant velocity of the microlight is 20 m s^{-1} in a direction 68° East of North, so that it travels along AB.

(i) Show that for the aircraft to travel along AB at 20 m s^{-1} it should be pointed due East.

(ii) The driving force of the aircraft engine is $2.0 \times 10^3 \text{ N}$. Calculate the work done by the engine if the aircraft travels 10 km on its outward journey.

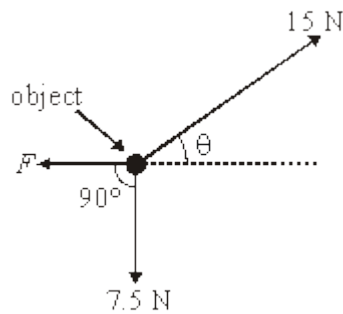
(iii) Calculate the output power of the aircraft engine for the outward journey.

(6)

- (b) After flying 10km, the aircraft turns round and returns along the same flight path at a resultant velocity of 14 m s^{-1} . Assuming that the turn-round time is negligible, calculate the average speed for the complete journey.

(2)
(Total 8 marks)

- 2** The object in the diagram below is in equilibrium.



By resolving forces, calculate:

- (a) the angle θ ;

Angle θ _____

(2)

- (b) the magnitude of the force F .

Magnitude of the force F _____

(1)

(Total 3 marks)

- 3** (a) State the difference between vector and scalar quantities.

(1)

- (b) State **one** example of a vector quantity (other than force) and **one** example of a scalar quantity.

Vector quantity _____

(1)

Scalar quantity _____

(1)

- (c) A 6.0 N force and a 4.0 N force act on a body of mass 7.0 kg at the same time. Calculate the maximum and minimum accelerations that can be experienced by the body.

Maximum acceleration _____ Minimum acceleration _____

(3)

(Total 6 marks)

- 4** Coplanar forces of 5 N, 4 N and 3 N act on an object. Which force, in N, **could not possibly** be the resultant of these forces?

- A 0
- B 4
- C 12
- D 16

(Total 1 mark)