1. Nov/2021/Paper_23/No.3a

    (a) Define *velocity*.

    ....

    .... [1]

    (b) A remote-controlled toy aircraft is flying horizontally in a wind. Fig. 3.1 shows the velocity vectors, to scale, of the wind and of the aircraft in still air.
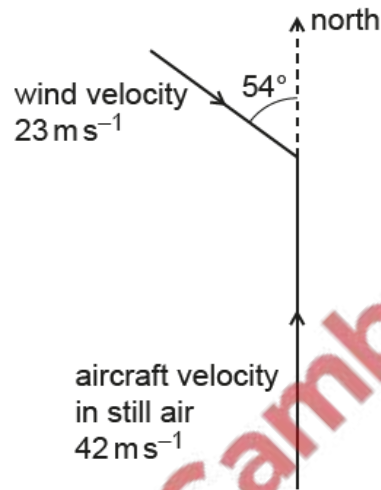
Fig. 3.1

The velocity of the aircraft in still air is $42\,\text{m}\,\text{s}^{-1}$ to the north. The velocity of the wind is $23\,\text{m}\,\text{s}^{-1}$ in a direction of 54° east of south.

Determine the magnitude of the resultant velocity of the aircraft.

magnitude of velocity = ... $\text{m}\,\text{s}^{-1}$ [2]

2. June/2021/Paper_23/No.1

(a) A property of a vector quantity, that is not a property of a scalar quantity, is direction. For example, velocity has direction but speed does not.

   (i) State **two** other scalar quantities and **two** other vector quantities.

     scalar quantities: .... and ....

     vector quantities: .... and ....
              [2]

   (ii) State **two** properties that are possessed by both scalar and vector physical quantities.

     1. ....

     2. ....
              [2]

(b) A ship at sea is travelling with a velocity of $13\,m\,s^{-1}$ in a direction $35°$ east of north in still water, as shown in Fig. 1.1.

Fig. 1.1

   (i) Determine the magnitudes of the components of the velocity of the ship in the north and the east directions.

     north component of velocity = ... $m\,s^{-1}$

     east component of velocity = ... $m\,s^{-1}$
              [2]

(ii) The ship now experiences a tidal current. The water in the sea moves with a velocity of $2.7\,\text{m s}^{-1}$ to the west.

Calculate the resultant velocity component of the ship in the east direction.

resultant east component of velocity = ... m s^{-1} [1]

(iii) Use your answers in **(b)(i)** and **(b)(ii)** to determine the magnitude of the resultant velocity of the ship.

magnitude of resultant velocity = ... m s^{-1} [2]

(iv) Use your answers in **(b)(i)** and **(b)(ii)** to determine the angle between north and the resultant velocity of the ship.

angle = ...° [2]

[Total: 11]

3. March/2021/Paper_22/No.1b

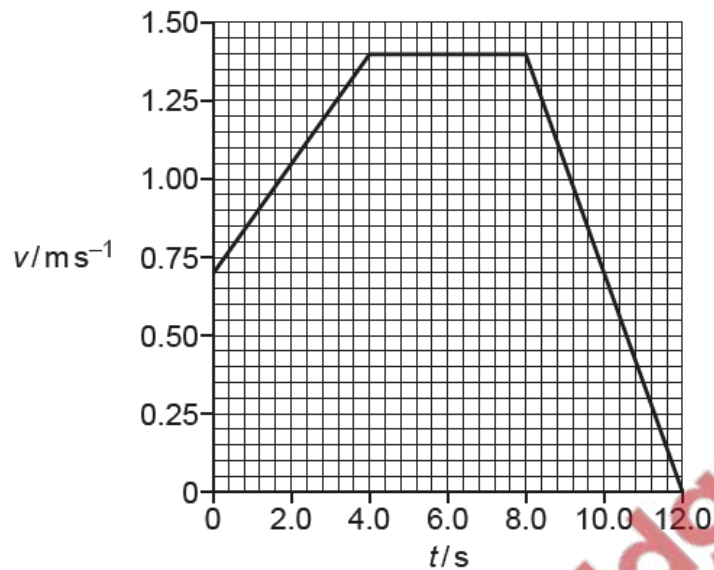   **(b)** The variation with time t of the velocity v of an object is shown in Fig. 1.1.

Fig. 1.1

   (i) Determine the acceleration of the object from time $t = 0$ to time $t = 4.0\,\text{s}$.

acceleration = ... ms^{-2} [2]

   (ii) Determine the distance moved by the object from time $t = 0$ to time $t = 4.0\,\text{s}$.

distance = ... m [2]