8. [*In this question* **i** *and* **j** *are unit vectors, with* **i** *horizontal and* **j** *vertical*.]

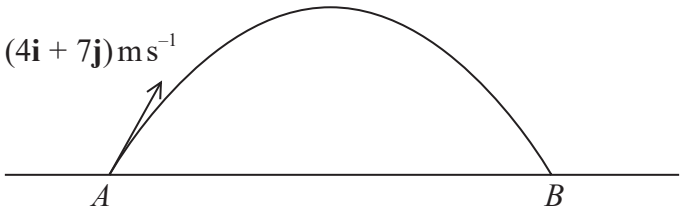


Figure 6

The fixed points A and B lie on horizontal ground.

At time $t = 0$, a particle P is projected from A with velocity $(4\mathbf{i} + 7\mathbf{j})\,\mathrm{m\,s^{-1}}$

Particle P moves freely under gravity and hits the ground at B, as shown in Figure 6.

(a) Find the distance AB.

(4)

The speed of P is less than $5\,\mathrm{m\,s^{-1}}$ for an interval of length T seconds.

(b) Find the value of T

(3)

At the instant when the direction of motion of P is perpendicular to the initial direction of motion of P, the particle is h metres above the ground.

(c) Find the value of h.

(4)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 8 continued

Question 8 continued

(Total for Question 8 is 11 marks)

TOTAL FOR PAPER IS 75 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA