4. [*In this question* **i** *and* **j** *are unit vectors, with* **i** *horizontal and* **j** *vertically upwards.*]

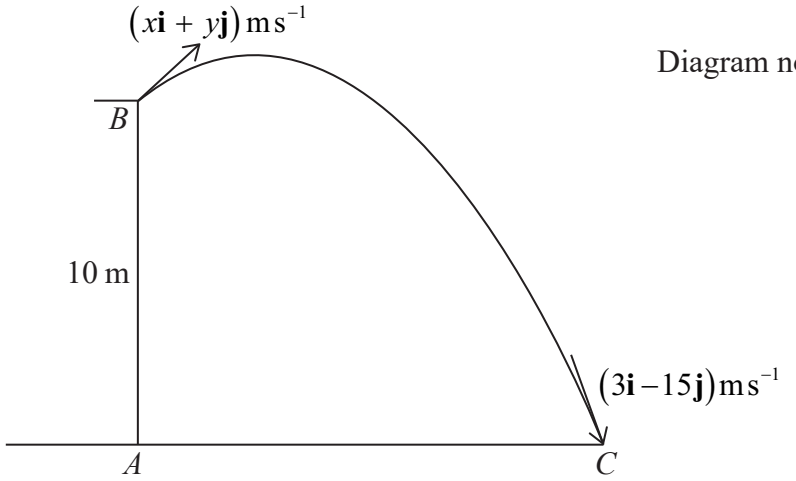


Figure 3

The fixed points A and C lie on horizontal ground.

The point B is vertically above A, with $AB = 10\,\mathrm{m}$.

At time $t = 0$, a particle P is projected from B with velocity $(x\mathbf{i} + y\mathbf{j})\,\mathrm{m\,s^{-1}}$, where x and y are positive.

Particle P moves freely under gravity and hits the ground at C.

At the instant before P hits the ground, the velocity of P is $(3\mathbf{i} - 15\mathbf{j})\,\mathrm{m\,s^{-1}}$, as shown in Figure 3.

(a) Find the value of x and the value of y.

(4)

(b) Find the distance AC.

(4)

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Question 4 continued

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