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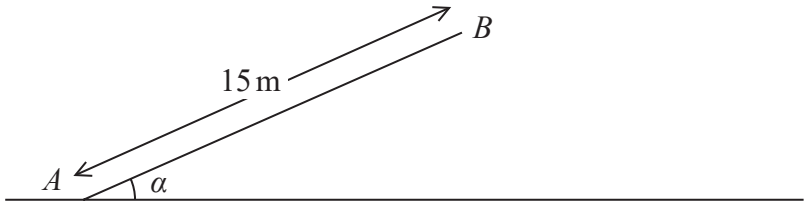


Figure 3

A rough straight ramp is fixed to horizontal ground. The ramp has length 15 m and is inclined at an angle α to the ground, where $\tan\alpha = \frac{5}{12}$. The line AB is a line of greatest slope of the ramp, where A is at the bottom of the ramp, and B is at the top of the ramp, as shown in Figure 3.

A particle P of mass 6 kg is projected up the ramp with speed 14 m s^{-1} from A in a straight line towards B. The coefficient of friction between P and the ramp is 0.25

(a) Find the work done against friction as P moves from A to B.

(3)

At the instant P reaches B, the speed of P is v m s^{-1}. After leaving the ramp at B, the particle P moves freely under gravity until it hits the horizontal ground at the point C. Immediately before hitting the ground at C, the speed of P is w m s^{-1}

(b) Use the work-energy principle to find

(i) the value of v,

(ii) the value of w.

(7)

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