

5.

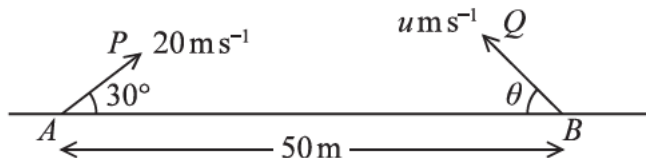


Figure 3

The points A and B lie 50 m apart on horizontal ground.

At time $t = 0$ two small balls, P and Q , are projected in the vertical plane containing AB .

Ball P is projected from A with speed 20 m s^{-1} at 30° to AB .

Ball Q is projected from B with speed $u \text{ m s}^{-1}$ at angle θ to BA , as shown in Figure 3.

At time $t = 2$ seconds, P and Q collide.

Until they collide, the balls are modelled as particles moving freely under gravity.

(a) Find the velocity of P at the instant before it collides with Q .

(6)

(b) Find

(i) the size of angle θ ,

(ii) the value of u .

(6)

(c) State one limitation of the model, other than air resistance, that could affect the accuracy of your answers.

(1)