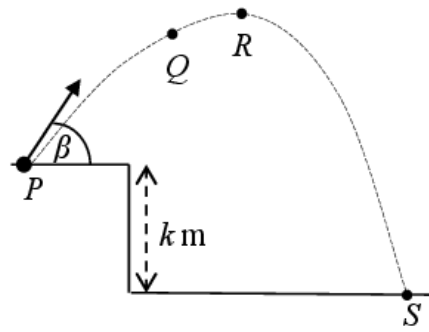


Question 1

3. A particle is projected from a point P , as shown in the diagram, with an initial speed of 74 m s^{-1} at an angle β to the horizontal, where $\tan \beta = \frac{35}{12}$.

The particle reaches point Q after 4 seconds of motion.
 R is the highest point reached by the particle.

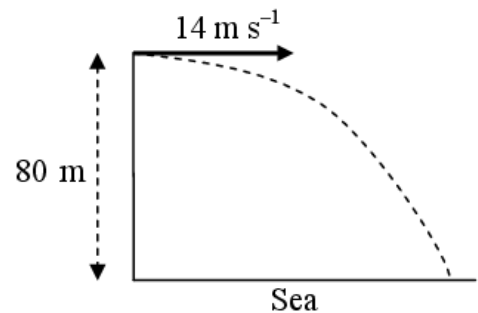


- Find
- the initial velocity of the particle in terms of \vec{i} and \vec{j}
 - the velocity of the particle at point Q in terms of \vec{i} and \vec{j}
 - the displacement of R from P in terms of \vec{i} and \vec{j}
 - the value of k , given that the particle reaches S after 16 seconds of motion.

Question 2

3. (a) A particle is projected horizontally with an initial speed of 14 m s^{-1} from the top of a straight vertical cliff of height 80 m .

How far from the foot of the cliff will it hit the sea?

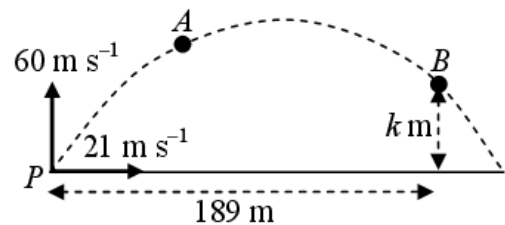


- (b) A particle is projected with initial velocity $21\vec{i} + 60\vec{j} \text{ m s}^{-1}$ from point P on a horizontal plane.

A and B are two points on the trajectory (path) of the particle.

The particle reaches point A after 4 seconds of motion.

The displacement of point B from P is $189\vec{i} + k\vec{j} \text{ m}$.



- Find
- the velocity of the particle at A in terms of \vec{i} and \vec{j}
 - the speed and direction of the particle at A
 - the value of k .

Question 3

3. A particle is projected from a point on horizontal ground with an initial speed of 82 m s^{-1} at an angle β to the horizontal, where $\tan \beta = \frac{40}{9}$.

- Find
- (i) the initial velocity of the particle in terms of \vec{i} and \vec{j}
 - (ii) the time taken to reach the maximum height
 - (iii) the maximum height of the particle above ground level
 - (iv) the range
 - (v) the two times at which the height of the particle is 275 m.

Question 4

3. (a) A ball is kicked from a point P on horizontal ground with a speed of 20 m s^{-1} at 45° to the horizontal.

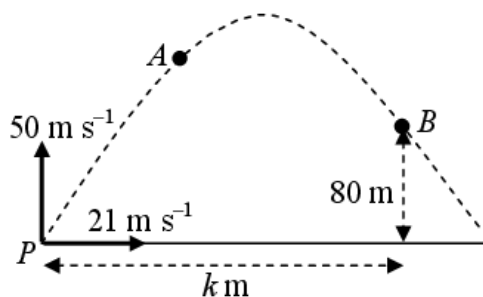
The ball strikes the ground at Q .

- Find
- (i) the time it takes the ball to travel from P to Q
 - (ii) $|PQ|$, the distance from P to Q .

- (b) A particle is projected with initial velocity $21\vec{i} + 50\vec{j} \text{ m s}^{-1}$ from point P on a horizontal plane.

A and B are two points on the trajectory (path) of the particle.

The particle reaches point A after 3 seconds of motion.



The displacement of point B from P is $k\vec{i} + 80\vec{j}$ metres.

- Find
- (i) the velocity of the particle at A in terms of \vec{i} and \vec{j}
 - (ii) the speed and direction of the particle at A
 - (iii) the value of k .