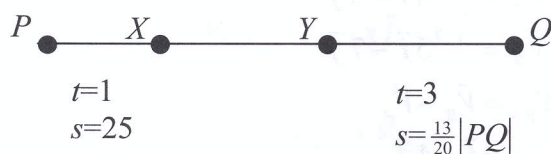


1. (b) A particle passes P with speed 20 m s^{-1} and moves in a straight line to Q with uniform acceleration.

In the first second of its motion after passing P it travels 25 m.

In the last 3 seconds of its motion before reaching Q it travels $\frac{13}{20}$ of $|PQ|$.

Find the distance from P to Q .



PX

$$s = ut + \frac{1}{2}ft^2$$

$$25 = 20(1) + \frac{1}{2}f(1)^2$$

$$5 = \frac{1}{2}f$$

$$\Rightarrow f = 10$$

5

PY

$$s = ut + \frac{1}{2}ft^2$$

$$\frac{7}{20}|PQ| = 20(t+1) + 5(t+1)^2$$

$$= 5t^2 + 30t + 25$$

5

PQ

$$s = ut + \frac{1}{2}ft^2$$

$$|PQ| = 20(t+4) + 5(t+4)^2$$

$$= 5t^2 + 60t + 160$$

5

$$\frac{7}{20}|PQ| = 5t^2 + 30t + 25$$

$$\frac{7}{20}(5t^2 + 60t + 160) = 5t^2 + 30t + 25$$

5

$$65t^2 + 180t - 620 = 0$$

$$\Rightarrow t = 2$$

5

$$|PQ| = 20(6) + 5(6)^2$$

$$= 300 \text{ m}$$

5

30