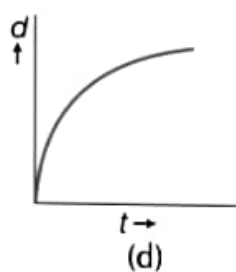
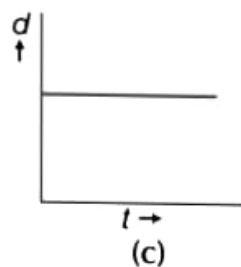
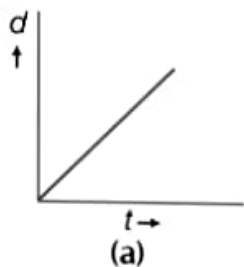


Q.

A body is moving unidirectionally under the influence of a source of constant power supplying energy. Which of the diagrams shown in figure correctly shown the displacement-time curve for its motion?



Ans. (b) Given, power = constant

We know that power (P)

$$P = \frac{dW}{dt} = \frac{\mathbf{F} \cdot d\mathbf{s}}{dt} = \frac{F ds}{dt} \quad (\because \text{body is moving unidirectionally})$$

Hence,

$$F \cdot ds = F ds \cos 0^\circ$$

$$P = \frac{F ds}{dt} = \text{constant} \quad (\because P = \text{constant by question})$$

Now, writing dimensions

$$\Rightarrow [F] [v] = \text{constant}$$

$$\Rightarrow [MLT^{-2}] [LT^{-1}] = \text{constant}$$

$$\Rightarrow L^2 T^{-3} = \text{constant}$$

$$\Rightarrow L \propto T^{3/2} \Rightarrow \text{Displacement (d)} \propto t^{3/2} \quad (\because \text{mass is constant})$$