

**Mathematics Questions by Topic**

Motion and Force

Answer 18

Source: K14SM2Q18

**Question 18**

A car is moving with constant acceleration has its speed reduced from  $3V \text{ ms}^{-1}$  to  $V \text{ ms}^{-1}$ , over a distance of  $D \text{ m}$  when the driver applies the brakes. The car travels a further distance of  $S \text{ m}$  until it comes to rest. The time  $T$  seconds represents the time when the driver applies the brakes until the car comes to rest. Then

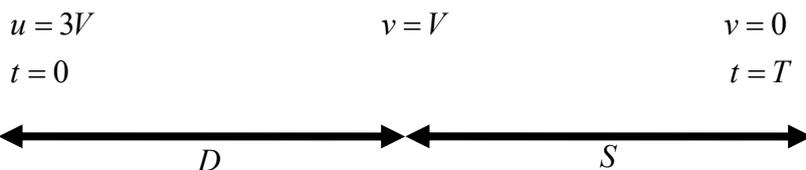
A.  $D = 8S$  and  $T = \frac{2(D+S)}{3V}$

B.  $D = 4S$  and  $T = \frac{2(D+S)}{3V}$

C.  $D = 8S$  and  $T = \frac{S}{V}$

D.  $D = 4S$  and  $T = \frac{S}{V}$

E.  $D = 2S$  and  $T = \frac{D}{2V}$

**ANSWER A**

use  $v^2 = u^2 + 2as$

with  $v = V$ ,  $u = 3V$   $s = D$

$$V^2 = 9V^2 + 2aD$$

$$a = -\frac{4V^2}{D}$$

use  $s = \left(\frac{u+v}{2}\right)t$

with  $v = 0$ ,  $u = 3V$   $s = D+S$  and  $t = T$

$$D+S = \frac{3V}{2} \times T \Rightarrow T = \frac{2(D+S)}{3V}$$

use  $v^2 = u^2 + 2as$

with  $v = 0$ ,  $u = V$   $s = S$  and  $a = -\frac{4V^2}{D}$

$$0 = V^2 - 2 \times \frac{4V^2}{D} \times S \Rightarrow D = 8S$$