

During a short interval of time the speed  $v$  in  $\text{m/s}$  of an automobile is given by  $v = at^2 + bt^3$ , where the time  $t$  is in seconds. The units of  $a$  and  $b$  are respectively:

- A.  $\text{m} \cdot \text{s}^2$  ;  $\text{m} \cdot \text{s}^4$
- B.  $\text{s}^3/\text{m}$  ;  $\text{s}^4/\text{m}$
- C.  $\text{m}/\text{s}^2$  ;  $\text{m}/\text{s}^3$
- D.  $\text{m}/\text{s}^3$  ;  $\text{m}/\text{s}^4$
- E.  $\text{m}/\text{s}^4$  ;  $\text{m}/\text{s}^5$

Ans: D

$$T^{-1} = T^m \cdot T^2$$

$$-1 = m + 2$$

$$m = -3$$

$$a = \frac{L}{T^{-1}} = \frac{L}{T^{-4}} = L T^4 = \text{m/s}^4$$

$$b = \frac{L}{T^{-1}} = \frac{L}{T^{-4}} = L T^4 = \text{m/s}^4$$

$$L^{-1} = L^n \Rightarrow n = 1$$

$$T^{-1} = T^y \cdot T^3$$

$$-1 = y + 3$$

$$y = -4$$

$$V = at^2 + bt^3$$

$$a = L^n \cdot T^m = L T^{-3} = \text{m/s}^3$$

$$b = L^x \cdot T^y = L T^{-4} = \text{m/s}^4$$

$$L^{-1} = L^n T^m T^2$$

$$L^{-1} = L^n T^m T^2$$

$$-1 = m + 2$$

$$-3 = m$$

$$L^{-1} = L^x T^y T^3$$

$$L^{-1} = L^x T^y T^3$$

$$-1 = y + 3$$

$$-4 = y$$



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Suppose  $A = BC$ , where  $A$  has the dimension  $\underline{L/M}$  and  $C$  has the dimension  $\underline{L/T}$ . Then  $B$  has the dimension:

- A.  $T/M$
- B.  $L^2/TM$
- C.  $TM/L^2$
- D.  $L^2 T/M$
- E.  $M/L^2 T$

Ans: A

$$A = BC$$

$$C = \frac{A}{B} = \frac{\underline{L/M}}{\underline{L/T}} = \underline{\frac{T}{M}}$$

Suppose  $A = B^n C^m$ , where  $A$  has dimensions  $\underline{LT}$ ,  $B$  has dimensions  $\underline{L^2 T^{-1}}$ , and  $C$  has dimensions  $\underline{LT^2}$ . Then the exponents  $n$  and  $m$  have the values:

- A.  $2/3; 1/3$
- B.  $2; 3$
- C.  $4/5; -1/5$
- D.  $1/5; 3/5$
- E.  $1/2; 1/2$

Ans: D

$$\underline{LT} = \underline{L^{2n} T^{-n}} \cdot \underline{L^m T^{2m}}$$

$$L = L^{2n+m}$$

$$T = T^{-n+2m}$$

$$1 = 2n + m$$

$$1 = -n + 2m$$

$$n = \frac{1}{5}$$

$$m = \frac{3}{5}$$



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