Mechanics I – Quiz 1 - A

2019-2020

KEY

Full Name:...

1- The speed v in m/s of an automobile is given by $v = at^2 + bt^4$ where the time t is in seconds. Determine the dimensions of a and b.

$$V = at^2 + bt^4 \qquad\qquad V = \frac{L}{T}$$

$$\frac{L}{T} = aT^2 + bT^4$$

$$\underbrace{aT^2}_{\frac{L}{T}} \qquad \underbrace{bT^4}_{\frac{L}{T}}$$

$$aT^2 = \frac{L}{T} \qquad\qquad bT^4 = \frac{L}{T}$$

$$\boxed{a = \frac{L}{T^3}} \qquad\qquad \boxed{b = \frac{L}{T^5}}$$

2- The density of iron is 7.90×10^3 kg/m^3. What is the mass of a spherical iron ball having a volume of 122 in^3 (1 in = 2.54 cm).

$$d = \frac{m}{V} \implies m = d \cdot V$$

$$V = 122 \ in^3$$

$$= 122 \cdot (2.54 \ cm)^3$$

$$= 2001 \ cm^3$$

$$= 2001 \cdot 10^{-6} \ m^3$$

$$= 2,001 \cdot 10^{-3} \ m^3$$

$$m = 7.9 \times 10^3 \times 2.001 \times 10^{-3}$$

$$m = 15.8 \ kg$$