

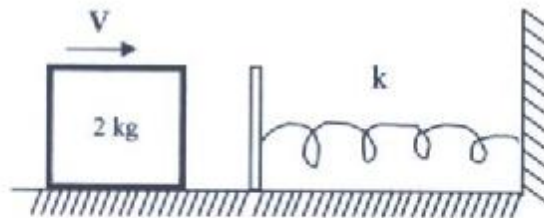
Name:

Key

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A block ($M = 2.0 \text{ kg}$) slides on a frictionless horizontal surface towards a spring with a spring constant $k = 2000 \text{ N/m}$. The speed of the block just before it hits the spring is 6.0 m/s . How fast is the block moving at the instant the spring has been compressed 15 cm ?



$$\Delta K + \Delta U_s = 0$$

$$\frac{1}{2} m (v_f^2 - v_i^2) + \frac{1}{2} k (x_f^2 - x_i^2) = 0$$

$$\frac{1}{2} (2) (v_f^2 - 6^2) + \frac{1}{2} (2000) (0.15^2 - 0^2) = 0$$

$$v_f = \sqrt{36 - 22.5} = \sqrt{13.5} \approx \boxed{3.7 \text{ m/s}}$$

2- A 10 kg object is dropped vertically from rest. After falling a distance of 50 m , it has a speed of 26 m/s . How much work is done by the air resistance on the object during this descent?

$$\Delta K + \Delta U_g = W_{ar}$$

$$\frac{1}{2} m (v_f^2 - v_i^2) + m g (y_f - y_i) = W_{ar}$$

$$\frac{1}{2} (10) (26)^2 - 10 (9.8) (50) = W_{ar}$$

$$\Rightarrow W_{ar} = \boxed{-1520 \text{ J}}$$