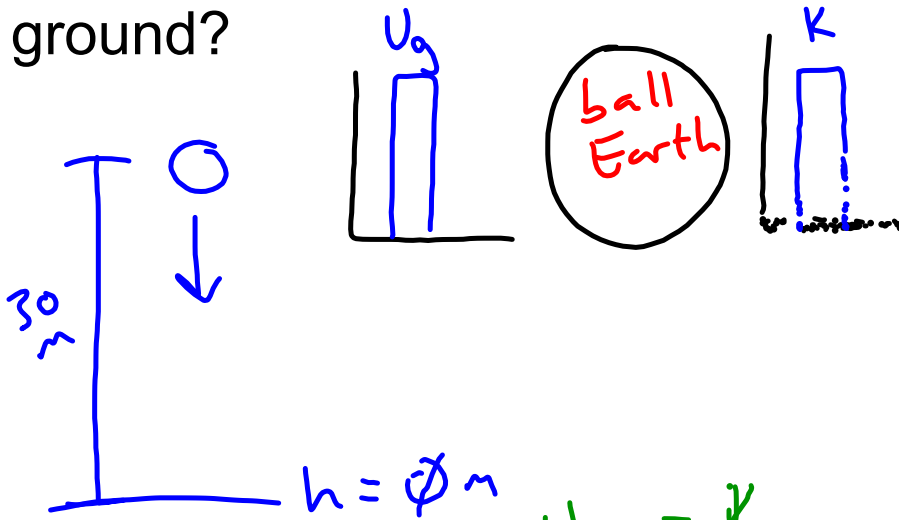


A ball is dropped from a height of 30 m. What is the velocity of the ball just before it hits the ground?



$$U_{g_i} = K_f$$

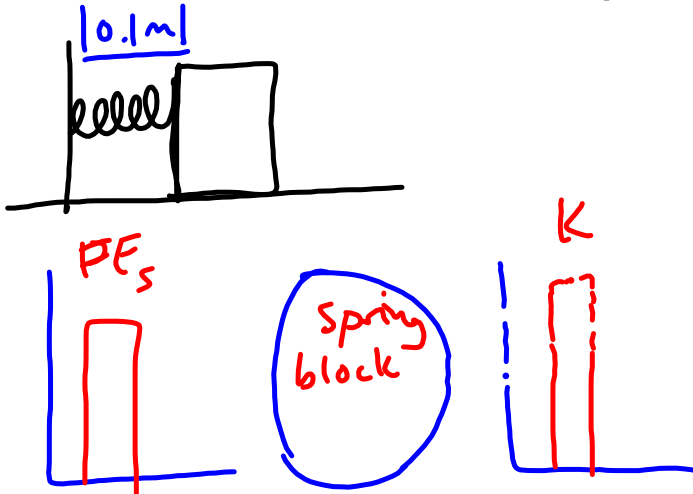
$$\cancel{m} a_g h_i = \frac{1}{2} \cancel{m} v_f^2$$

$$v_f = \sqrt{2 a_g h}$$

$$= \sqrt{2 (9.8 \text{ m/s}^2) (30 \text{ m})}$$

$$= 24.2 \text{ m/s}$$

A 0.5 kg block is attached to a spring on a frictionless surface, and the spring is compressed by 10 cm. If the spring constant of the spring is 50 N/m, what is the velocity of the block as it leaves the spring?



$$PE_{s_i} = K_{f_i}$$

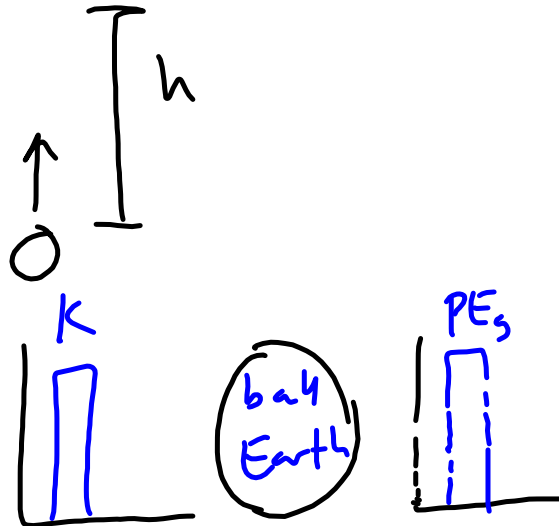
$$\frac{1}{2}k(\Delta x)^2 = \frac{1}{2}mv_f^2$$

$$v_f = \sqrt{\frac{k}{m}(\Delta x)^2}$$

$$= \sqrt{\frac{50 \frac{\text{N}}{\text{m}}}{0.5 \text{ kg}} (0.1 \text{ m})^2}$$

$$= 1 \text{ m/s}$$

A ball is launched vertically upward with an initial velocity of 20 m/s. How high is the ball at the top of the flight?



$$K_i = PE_{gf}$$

$$\frac{1}{2}mv_i^2 = mgh_f$$

$$h = \frac{v_i^2}{2a_g}$$

$$= 20.2 \text{ m}$$