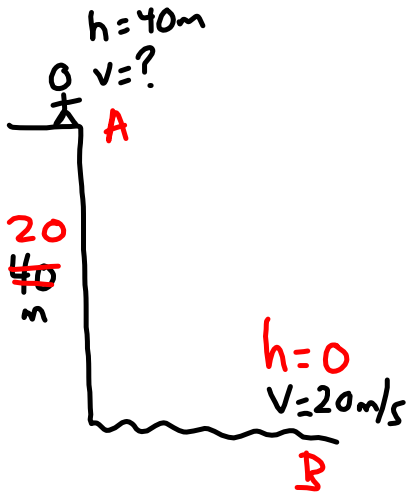
Review 3 Day 2

State the law of conservation of energy.

Energy can not be created or destroyed only transferred/transformed for form to another.

Bonnie jumps off a cliff that is ~~40~~ 20 m high and lands with a velocity of 20 m/s into the water. At what speed did Bonnie jump off the cliff?



$$E_A = E_B$$

$$E_p + E_K = E_K$$

$$\cancel{m}gh + \frac{\cancel{m}v_A^2}{2} = \frac{\cancel{m}v_B^2}{2}$$

$$9.8(20) + \frac{v_A^2}{2} = \frac{20^2}{2}$$

$$196 + \frac{v^2}{2} = 200$$

$$\frac{v^2}{2} = 4$$

$$v = \sqrt{2 \times 4} = 2.8\,m/s$$

Lieza mixes 400 g of 300 degree silver with 5 kg of 10 degree water. What is the final temperature of the system?

$$-E_{Lost} = E_{gain}$$

$$-mc\Delta T = mc\Delta T$$

$$-0.4(230)(T_f - 300) = 5(4200)(T_f - 10)$$

$$-92(T_f - 300) = 21000(T_f - 10)$$

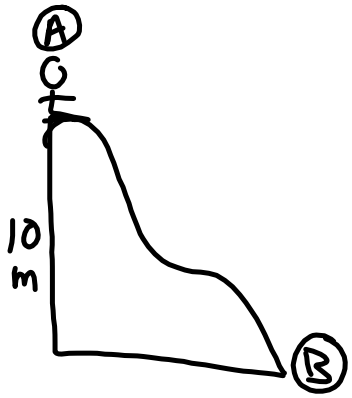
$$-92T_f + 27600 = 21000T_f - 210000$$

$$27600 + 210000 = 21000T_f + 92T_f$$

$$237600 = 21092T_f$$

$$T_f = 11.26°C$$

Jon slides down a 10 m slide from rest. If he keeps 80 % of the energy from top to bottom with which speed does he land?



$$0.8E_A = E_B$$

$$0.8E_p = E_K$$

$$0.8\,\cancel{m}gh = \frac{\cancel{m}v^2}{2}$$

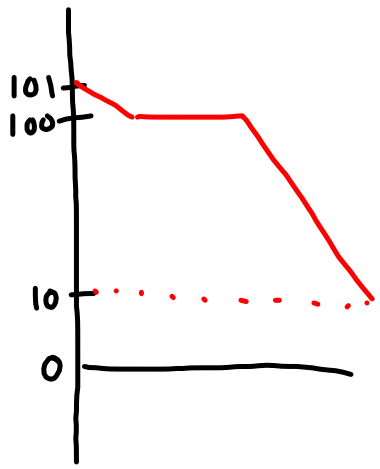
$$0.8(9.8)(10) = \frac{v^2}{2}$$

$$78.4 = \frac{v^2}{2}$$

$$v = \sqrt{2 \times 78.4}$$

$$= 12.5\ m/s$$

Find the amount of water you can take from 101 degrees down to 10 degrees if that releases 100000 J of energy?



$$\Delta E_H = mc\Delta T - mL_v + mc\Delta T$$

$$-100\,000 = m(2020)(100-101) - m(2.3\times10^6) + m(4200)(10-100)$$

$$-100\,000 = -2020m - 2.3\times10^6 m - 3.78\times10^5 m$$

$$-100\,000 = -2680020m$$

$$m = 0.037$$

$$= 37\,g$$

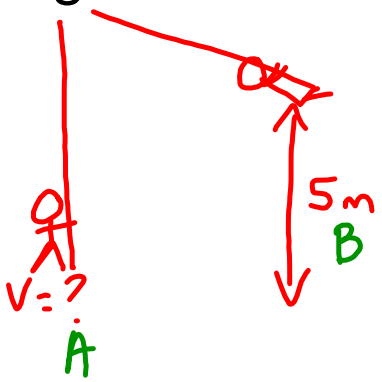
How can you do no work in the physical sense?

If d = 0 (you don't move) W = 0

If force and d are 90° to each other W = 0

If f = 0 then W = 0

A child is playing Tarzan. How fast do they have to run to reach a height of 5 m from level ground?



$E_A = E_B$

$E_K = E_P$

$\frac{\cancel{m}v^2}{2} = \cancel{m}gh$

$\frac{v^2}{2} = 9.8(5)$

$v = \sqrt{2 \times 49}$

$= 9.89 m/s$