1 **Find the kinetic energy of a 5 kg chihuahua running at 5 m/s.**

2 **What is the potential energy of a 10 kg ball that falls from a height of 47 m?**

3 **A 1000 kg car is driving at 30 m/s, a constant force of -500 N is applied by the brakes. How far does the car go before it stops?**

4 **How much power is generated by a worker who lifts a 50 kg sack of sugar to a height of 5 m in 20 s?**

5 **A kid pulls a sled across the ice. She pulls with a force of 870 N at an angle of 25 degrees. How much work is done is she pulls for 50 m?**

6 **In Costa Rica, a person jumps on a rope swing and swings into the river below. They hit the water going 20 m/s. How high was the cliff?**

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Nov 10-10:41 AM

1) Chihuahua

$m = 5\,kg \quad v = 5\,m/s$

$K = \frac{1}{2}mv^2 = \frac{1}{2}(5\,kg)(5\,m/s)^2 = \boxed{62.5\,J}$

2) Ball - P.E.

$U_g = mgh = (10\,kg)(9.8\,m/s^2)(47\,m)$

$= \boxed{4606\,J}$

3) $W = \Delta K$

$Fd = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$(500\,N)\,d = \frac{1}{2}(1000\,kg)(0)^2 - \frac{1}{2}(1000\,kg)(30\,m/s)^2$

$d = \frac{450000\,J}{500\,N} = \boxed{900\,m}$

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4) $P = \frac{W}{t} = \frac{F \cdot d}{t}$

$= \frac{mgd}{t} = \frac{(50\,kg)(9.8\,m/s^2)(5\,m)}{20\,s}$

$P = 122.5\,W$

5)

$W = Fd\cos\theta = (870\,N)(50\,m)(\cos 25)$

$W = 39424\,J$

6) $U_i + K_i = U_f + K_f$

$mgh + 0 = 0 + \frac{1}{2}mv^2$

$h = \frac{\frac{1}{2}(20\,m/s)^2}{9.8\,m/s^2}$

$h = 20.4\,m$

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$$\text{Power} = \frac{\text{Work}}{\text{time}} = \frac{W}{t}$$

Rate at which we do work

$$P = \frac{W}{t} = \frac{F \cdot d}{t}$$

$$P = \frac{W}{t} = F \cdot v$$

Units -

$1 \frac{J}{s} = 1$ Watt (W)

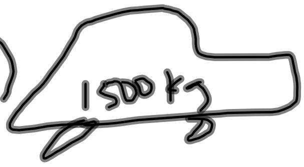
77) $P = \frac{W}{t}$

$= \frac{8.4 \times 10^6 \text{ J}}{1 \text{ day} \left(\frac{86400 \text{ s}}{1 \text{ day}}\right)}$

$= 97 \text{ W}$

Nov 10-12:01 PM

78)



$0 \rightarrow 90 \text{ km/hr}$ (25 m/s)

$t = 5\text{ s}$

$P = ?$

$$P = \frac{W}{t}$$

$$W = \Delta K \leftarrow$$

$$= \tfrac{1}{2}(1500\text{ kg})(25\text{ m/s})^2 - \tfrac{1}{2}m(0)^2 \rightarrow 0$$

$$= 468{,}750\text{ J}$$

$$P = \frac{468750\text{ J}}{5\text{ s}} = 93750\text{ W}$$

Nov 10-11:01 AM

79)

1.5 m $\quad t = 3\text{ days}$

$$U = mgh$$

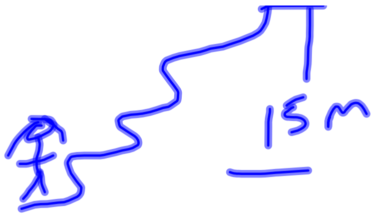
$$P = \frac{W}{t} = \frac{\Delta U}{t}$$

$$= \frac{mgh}{t} = \frac{(1.0\text{kg})(9.8)(1.5\text{ m})}{(3\text{ days})\left(\frac{86400\text{ s}}{1\text{ day}}\right)}$$

$$= 5.7 \times 10^{-5}\text{ W}$$

Nov 10-11:06 AM

80)



$t = 20\,s$

$m = 60\,kg$

a) $P = \frac{W}{t} = \frac{(60\,kg)(9.8\,m/s^2)(15\,m)}{20\,s}$

$= 441\,W$

b) $441\,W \cdot \frac{1\,hp}{746\,W} = 0.59\,hp$

81)

→ $P = 2.0\,hp\left(\frac{746\,W}{1\,hp}\right) = 1492\,W$

$\varepsilon = 0.45$

$P_o = (0.45)(1492\,W)$

$= 671\,W$

Energy per sec → 671 J

Work → $Fd\cos\theta$, ΔK

Kinetic Energy → $\frac{1}{2}mv^2$

Potential Energy → $U_g = mgh$

Cons. of Energy

$$U_i + K_i = U_f + K_f$$

Power → $\frac{W}{t}$, $F \cdot v$

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