

Power Problems 87-91

$$\textcircled{87} \text{ Power} = \frac{\text{Energy}}{\text{time}}, \text{ so time} = \frac{\text{Energy}}{\text{Power}}$$

$$\text{Work} = F \cdot d$$

$$F = m \cdot g = 2000 \text{ kg} \cdot 9.8 \frac{\text{m}}{\text{s}^2} = 19600 \text{ N}$$

$$\text{Work} = 19600 \text{ N} \cdot 28 \text{ m} = 548800 \text{ J}$$

$$\text{time} = \frac{548800 \text{ J}}{13000 \frac{\text{J}}{\text{s}}} = 42.25$$

$$\textcircled{88} \text{ Power} = \frac{\text{Energy}}{\text{time}}, \text{ Energy} = \text{Power} \cdot \text{time}$$

$$\text{Energy} = 50000 \frac{\text{J}}{\text{s}} \cdot 1.4 \text{ min} \cdot \frac{60 \text{ s}}{1 \text{ min}} = 4.2 \times 10^6 \text{ J}$$

$$\text{Energy} = \text{Force} \cdot \text{distance}, \text{ so}$$

$$\text{Force} = \frac{\text{Energy}}{\text{distance}} = \frac{4.2 \times 10^6 \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2}}{50 \text{ m}}$$

$$\text{Force} = 84000 \text{ N}$$

$$\text{mass} = \frac{F}{a} = \frac{84000 \text{ N} \cdot \frac{\text{kg} \cdot \text{m}}{\text{s}^2}}{9.8 \frac{\text{m}}{\text{s}^2}} = 8571.43 \text{ kg}$$

89

Power = Force x Velocity

So, Force = Power

Velocity

$\frac{150000 \text{ W} \left(\frac{\text{kgm}^2}{\text{s}^2} \right)}{7.77 \frac{\text{m}}{\text{s}}} =$

$\frac{150 \text{ kW} \left| \frac{1000 \text{ W}}{1 \text{ kW}} \right|}{1 \text{ kW}} = 150,000 \text{ W}$

$1.93 \times 10^4 \text{ N}$

The answer key was wrong, it said $1.93 \times 10^5 \text{ N}$

90

Power = Force x Velocity

$= 467000 \text{ N} \left(\frac{\text{kgm}}{\text{s}^2} \right) \times 6 \frac{\text{m}}{\text{s}} = 2802000 \text{ W}$

$2.8 \times 10^6 \text{ W}$

91

Power = Force x Velocity

Velocity = $\frac{\text{Power}}{\text{Force}} = \frac{7350 \frac{\text{kgm}^2}{\text{s}^2}}{5560 \frac{\text{kgm}}{\text{s}^2}}$

$1.32 \frac{\text{m}}{\text{s}}$