

Name Key

Chapter 8 Review- Sections 8.1-8.8 pages 101-115

1. Billy lifts a box that weighs 575 N a height of 1.5 m. How much work does he do?

$$W = F \times D = (575\text{N})(1.5\text{m}) = 863\text{J}$$

2. Patrick does 800 J of work lifting his 35 kg sister. How high did he lift her?

$$h = \frac{PE}{m \cdot g} = \frac{800\text{J}}{(35\text{kg})(10\text{m/s}^2)} = 2.29\text{m}$$

3. A certain motor does 2000 J of work in a time of 4.5 seconds. How much power did the motor output?

$$P = \frac{W}{t} = \frac{2000\text{J}}{4.5\text{s}} = 444\text{W}$$

4. Using the information from above, how many horsepower is the engine?

$$HP = \frac{\text{Watts}}{746} = \frac{444\text{W}}{746} = .596\text{HP}$$

5. A student measures his power output to be 650 Watts running up the stairs. If the stairs are 4.2 meters high and he has a mass of 55 kg, how much time did it take the student?

$$t = \frac{W}{P} = \frac{F \times D}{P} = \frac{m \cdot g \cdot D}{P} = \frac{(55\text{kg})(10\text{m/s}^2)(4.2\text{m})}{650\text{W}} = 3.55\text{s}$$

6. A crate that has a mass of 18 kg is lifted 20 meters off the ground. How much potential energy does it have?

$$PE = m \cdot g \cdot h = (18\text{kg})(10\text{m/s}^2)(20\text{m}) = 3600\text{J}$$

7. A toy car of mass 2 kg is moving along at 5 m/s. What is the car's kinetic energy?

$$KE = \frac{1}{2} m v^2 = \frac{1}{2} (2\text{kg})(5\text{m/s})^2 = 25\text{J}$$

8. A 5 kg mass has is raised off the ground until it has 355 Joules of potential energy. How high was it lifted?

$$h = \frac{PE}{m \cdot g} = \frac{355\text{J}}{(5\text{kg})(10\text{m/s}^2)} = 7.1\text{m}$$

9. A mover uses an inclined plane to lift a 55 kg dresser into the back of his truck. How much force does the mover exert if the truck is .8 meters off the ground and the ramp is 5 meters long?

$$F_{in} = \frac{F_{out} D_{out}}{D_{in}} = \frac{(550\text{N})(.8\text{m})}{5\text{m}} = 88\text{N}$$

10. In the above example, what is the ramp's mechanical advantage?

$$MA = \frac{F_{out}}{F_{in}} = 6.25$$

11. A person using a pulley system pulls 15 meters of rope in order to lift an object 3 meters. If the object's mass is 25 kg, how much force does he exert?

$$F_{out} = \frac{F_{out} D_{out}}{D_{in}} = \frac{(250\text{N})(3\text{m})}{15\text{m}} = 50\text{N}$$

12. In the above example, what is the mechanical advantage?

$$MA = \frac{F_{out}}{F_{in}} = \frac{250\text{N}}{50\text{N}} = 5$$