

1. What is the kinetic energy of a car of 1500 kg mass moving at 50 km/h?
2. What is the kinetic energy of a car of 1000 kg mass moving at a rate of 20 m/s?
3. A force of 20 N is exerted over a distance of 75 m. How much work is done?
4. If 10,000 J of work is done by Big Sweaty Guy using a force of 500 N, how far did the Big Sweaty Guy push?
5. How much work is done by Big Sweaty Guy to lift a mass of 500 g a distance of 2000 cm?
6. An engine of 5.0 HP (1.0 HP = 750 W) works for 10 minutes. How much work does it do?
7. A bullet has a kinetic energy of E joules and a speed of v m/s. What would the kinetic energy be if the speed was increased to $1.5 v$?
8. An elevator motor lifts a load of 10 000 kg a height of 40 m in 5.0 s. What power in watts does the motor develop?

9. A Big force of 100 N is applied to a Sweaty object of mass 5.0 kg and causes an acceleration of 15.0 m/s^2 over a distance of 20 m. What is the work which is turned into heat by friction?

10. A car engine is rated at 30% efficiency. If the car was given 1.0 MJ of energy in the form of gasoline how much useful work could it do?

11. Mr. Carmichael's Big Sweaty Guy Action Figure of mass 200 g is thrown up at an angle to the ground with a speed of 20 m/s. A short while later it has reached a height of 12.0 m above the point from which it was released. How fast is it going at that time ?

12. A roller coaster moving at 5.0 m/s rolls over a steep dip in the track and descends a vertical distance of 10 m. If friction is ignored, what speed does the roller coaster reach?

13. 1.0 kg of water is being heated with a 250 W heater. How many minutes will it take to heat the water from 20°C to 95°C ? ($C_{\text{water}} = 4200 \text{ J/kg}\cdot^\circ\text{C}$)

14. 3.5 kg of copper, $C_{\text{Cu}} = 390 \text{ J/kg}\cdot^\circ\text{C}$, is heated to 90°C , then dropped into an insulated container containing 4.0 kg of alcohol at 20°C , $C_{\text{alcohol}} = 2300 \text{ J/kg}\cdot^\circ\text{C}$. What equilibrium temperature will the two materials reach?

15. Big Sweaty Guy's scooter engine of 2.5 HP works for 35 minutes. How much work does it do?
16. Big Sweaty Guy's big, sweaty left foot has a kinetic energy of 50 J at a certain speed. What would the kinetic energy be if the speed of his foot was increased by a factor of 3?
17. Mr. Lock's Big Sweaty Station Wagon accelerates from rest to 72 km/h (in a tail wind). This takes 25.0 s. The mass of the Wagon is 2000 kg. Friction exerts a force of 800 N on the car during the acceleration.
- a) What is the net work done on the car?
- b) How far does the car move during the acceleration?
- c) What is the net force exerted on the car during the acceleration?
18. A 250 kg big, sweaty roller coaster car on the Moisture Monster roller coaster, initially moving at 4.0 m/s, rolls over a steep dip in the track and descends a vertical distance of 12 m. If friction generates 7500 J of big, sweaty heat energy, what speed does the roller coaster reach?
19. 2.0 kg of Big Sweaty Guy's sweat is being heated with a Big Sweaty Heater. If it takes 6.5 minutes to heat the sweat from 10°C to 85°C, what is the power of the heater? ($C_{\text{sweat}}=4200 \text{ J/kg}^\circ\text{C}$)

