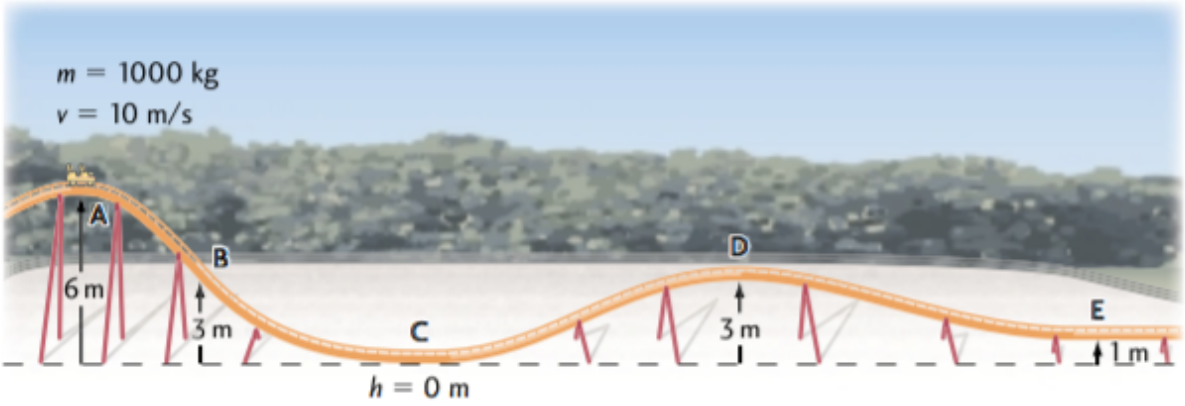
Calculations Review

1. What is the kinetic energy of a 1.25 kg softball that has been thrown at a velocity of 36.0 m/s?

2. How much potential energy does Projecto, a 2.5 kg circus duck, gain when he is shot 45 m up into the air from the ground?

3. How much gravitational potential energy does Projecto lose as he falls back down from a height of 45 m onto a net that is suspended 5.0 m above the ground?

4




| Fill in the table below. Assume that this is a SEGMENT of the coaster and it starts with kinetic energy (10 m/s =v) AND potential energy. Assume there is no energy lost to heat, sound, or friction. Energy is conserved. | | | | | |
|---|---|---|---|---|---|
| Time Interval | Height of coaster (m) | Speed of coaster (v) | Ek (J) | Eg (J) | Et (J) |
| A | | | | | |
| B | | | | | |
| C | | | | | |
| D | | | | | |
| E | | | | | |

5. Based on the information above, where on this roller coaster would you most like to be and why?

6. An inquisitive girl throws a 0.50 kg stone at 10.0 m/s straight towards the ground from the top of her roof, which is 3.2 m high.

(a) What is the gravitational potential energy and the kinetic energy of the stone at the beginning of the throw?

(b) What is the total energy of the stone at the beginning of its trip?

(c) What is the total energy as the stone hits the ground?

(d) What is the gravitational and potential energy of the stone right before it hits the ground?

(e) With what speed would the stone hit the ground?

(f) What is the stone's speed when it is 1 m from the ground?

7.What is the efficiency of a crane that uses $5.10 \times 10^5$ J of energy to lift 1000 kg a vertical height of 32.0 m?

8. If 200 kg of glitter and wind particles moving at 100 m/s hit your intergalactic turbine and are able to lift 500 kg of mass 38 m, how efficient was your turbine?

9. What is the power of a crane that uses $6.7 \times 10^4$ J of energy in 1.7 s?

10. How much power would the crane develop if it lifted a 1.25 t (1 t = 907 kg) bucket of concrete a vertical distance of 57.4 m in 3.5 s?

11. For a person of mass 70 kg moving up 30 steps, each 20 cm high (1 m = 100 cm), calculate the energy used and power developed if the process took 8.6 s at constant speed

12.In general terms, compare the efficiency of producing energy from waterfalls to that of burning wood or fossil fuels (remember the fuel must be obtained somehow). How does using a windmill or solar panels compare to burning wood or fossil fuels? What benefits are there to using methods other than burning materials?

13. In general, the greater the number of steps in transferring energy, the less efficient the process. Why is this true?

KNOW ALL YOUR PATTERNS (graphically and in words!). KNOW YOUR VOCAB. BE ABLE to APPLY the law of conservation of energy. UNDERSTAND the concept of efficiency and be able to apply it in calculations (you will NOT have this equation). Know your UNITS (Energy = Joules, Power = Watts, Efficiency = no units)