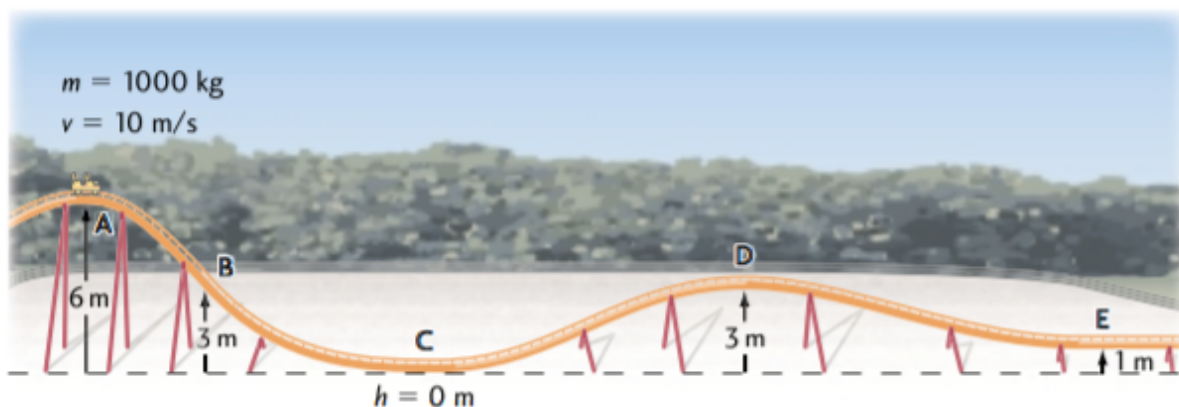


Calculations Review - KEY

1. What is the kinetic energy of a 1.00 kg softball that has been thrown at a velocity of 30.0 m/s? **450 J**
2. How much potential energy does Projecto, a 3 kg circus duck, gain when he is shot 40 m up into the air from the ground? **1200 J**
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? (Solve for potential energy at both heights, find the difference) **1200 J**

4



Fill in the table below. Assume there is no friction.					
Time Interval	Height of coaster (m)	Speed of coaster (v)	E_k (J)	E_g (J)	E_t (J)
A	6	10 m/s	50,000	60,000	110,000
B	3	x	80,000	30,000	110,000
C	0	x	110,000	0	110,000
D	3	x	80,000	30,000	110,000
E	1	x	100,000	10,000	110,000

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

C because it's going the fastest

6. An inquisitive girl throws a 1 kg stone at 10 m/s towards the ground from the top of her roof, which is 4 m high.

(a) What is the gravitational potential energy and the kinetic energy of the stone at the beginning of the throw? (show 2 4-step calculations)

PE = 40 J KE= 50 J

(b) What is the total energy of the stone at the beginning of its trip? 90J

(c) What is the kinetic and potential energy of the stone at the end of the throw? KE= 90 J, PE= 0J

d) What is the total energy of the stone at the end of the trip? 90 J

7. What is the efficiency of a wind turbine that can transform 100 J of kinetic energy into 60 J of potential energy? (4 step) 60%

7. What is the efficiency of a crane that uses 500 J of energy to lift 10 kg a vertical height of 3 m? (2 4-step calculations) 60%

8. If 20 kg of glitter and wind particles moving at 10 m/s hit your intergalactic turbine and are able to lift 5 kg of mass 1 m, how efficient was your turbine? (3 4 step calculations) (solve for kinetic energy, solve for potential energy, use these values to solve for efficiency)

KE= 1,000 J PE = 50 J E= 5%

9. What is the power of a crane that uses 6000 J of energy in 2 s? (4 step) = 3000 W

10. How much power would the crane develop if it lifted a 1000 kg bucket of concrete a vertical distance of 20 m in 3 s? (2 4 step calculations) (solve for potential energy, then use joules to solve for power) PE = 200,000 Power = 66,667 W

11. For a person of mass 70 kg moving up 30 steps, each 0.2 m high, calculate the energy used and power developed if the process took 8.6 s at constant speed. (4 step) (Find out how high the stairs are, find total potential energy, use that value (in Joules) to solve for power) PE = 4200 J Power= 488 W

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?

While fuels are more concentrated and thus produce a greater amount of energy in a shorter amount of time. Wind turbines and solar panels are not as efficient at producing energy because their source is more dispersed BUT they are renewable so wasted sun/wind is easily replenished without cost.

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

Because energy is lost through many sources, especially HEAT. Thus, the amount of usable energy decreases in relation to the total energy put into the system.

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)