**Review: Chapter 7 – Energy and Work** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_

Integrated Science: Physics/Design

1. Define energy

Energy is the ability to do work.

1. Define potential energy

Potential energy is energy due to position.

1. What is the equation for gravitational potential energy?

GPE = (mass)(acceleration due to gravity)(height)

GPE = mgh

1. Define kinetic energy

Kinetic energy is the energy of motion.

1. What is the equation for kinetic energy?

KE = ½mv2

1. What is the equation for work?

Work = force x distance

1. What is the law of conservation of energy?

Energy can be transferred or transformed but it cannot be created or destroyed.

1. A bicyclist moves 3 times as fast as another identical bicyclist. Compared to the slower bicyclist, the faster bicyclist has \_\_\_\_\_\_9\_\_\_\_ times the KE.
2. A skateboarder moves 4 times as fast as another identical skateboarder. Compared to the slower skateboarder, the faster skateboarder has \_\_\_\_\_16\_\_\_\_ times the KE.
3. If you push for 20 minutes on a stationary wall, how much work did you do on the wall? How do you know?

You don’t do any work on the wall. You know this because the wall did not move.

1. Which requires more work: lifting a 50 kg sack 4 m, or lifting a 100 kg sack 2 m?

Work = force x distance

50kg x 4m = 200J

100kg x 2m = 200J The same amount of work was done (200J).

1. What is the gravitational potential energy of a 10 kg sack of groceries on a shelf 2 m above the floor?

GPE = mgh

(10kg)((9.8m/s2)(2m) = 196J

1. What is the gravitational potential energy of a 35 kg sack of rice on a shelf that is 3 m above the floor?

GPE=mgh

(35kg)(9.8m/s2)(3)= 1029J

1. A cheetah can run briefly with a speed of 31 m/s. Suppose a cheetah with a mass of 47 kg runs at this speed. What is the cheetah’s KE?

KE=1/2mv2

(0.5)(47kg)(961 m/s) = 22,583.5 J

1. What is the KE of a 4 kg rock that is falling with a velocity of 3 m/s?

KE = (0.5)(4)(32)

KE = (0.5)(4)(9)

KE = 18J

1. If a bow is drawn so that it has 35 J of PE, how much KE will the arrow have the instant after the bow is released. How do you know? (Ignore friction)

It will have 35 J of KE. You know this because all of the potential energy was converted into kinetic energy.

1. If an object has KE it must be \_\_\_\_\_\_\_\_\_\_moving\_\_\_\_\_\_\_\_\_\_\_\_.
2. What has more gravitation potential energy: a book on a tall table or the same book on a short table? How do you know?

The book on the tall table has more GPE. You know this because the book has more height and therefore more GPE.

1. Which would have more KE when it hit the ground: a book that fell off of a tall table or the same book that fell off of a short table? How do you know?

The book that fell off the tall table would have more KE when it hit the ground. You know this because the book on the tall table had more GPE and therefore more speed and KE when it hit the ground.

1. It takes 25 Newtons of force to move a large rock 6 m. How much work was done on the rock?

W = (f)(d)

W = (25N)(6m)

W = 150J

1. A big brick and a small brick are traveling through the air. They have the same amount of KE. Which brick is going faster? How do you know?

The small brick is going faster. You know this because if the KE is the same, the thing with less mass must have a greater velocity.

1. Complete the following diagram. Ignore friction.

PE=6000J

PE=\_\_\_\_\_

PE=\_\_\_\_\_

PE=\_\_\_\_\_

PE=\_\_\_\_\_

KE=\_\_\_\_\_

KE=\_\_\_\_\_

KE=\_\_\_\_\_

KE=\_\_\_\_\_

KE=\_\_\_\_\_

Use the drawing of the roller coaster to answer the following:

1. location of greatest potential energy \_\_\_\_\_A\_\_\_
2. location of greatest kinetic energy \_\_\_\_\_C\_\_\_
3. location of greatest speed \_\_\_\_\_C\_\_\_
4. location of least potential energy \_\_\_C\_\_\_\_\_

D

B

A

C

1. A squirrel is carrying a nut into a tree. Is work being done on the nut? Yes
2. A car is crashing into a guardrail and the guardrail bends. Is work being done on the guardrail? Yes
3. A hockey puck is sliding along the ice at 3m/s. Is work being done on the hockey puck? No – because no force is being applied to cause the movement.
4. A bike crashes into a wall. The wall does not move. Was work done on the wall? No – because the distance is zero.
5. How much work would you do if you lifted a 300 N box up 2 meters high?

W = (f)(d)

W = (300N)(2m) = 600 J

1. A purple box and a yellow box are the exact same weight and were raised the exact same distance. The purple box was raised more quickly. Which box had more work done on it? How do you know?

They both had the same amount of work done. You know this because work **onl**y depends on force and distance.

1. It takes of force of 25 Newtons to move a large rock 3 meters. How much work was done?

W = (f)(d)

W = (25N)(3m)

W= 75J

1. A force of 5 Newtons was necessary to lift a weight. A total of 100 J of work was done. How far was the weight lifted?

D = w/f

D = 100J/5 N

D = 20 m

1. A dog pulled a sled 6 m. It did 6J of work. How much force did the dog use?

F = w/d

F = 6J/6m

F= 1N