Physics Study Guide, Unit 3: Energy

Note: Use your notes and handouts to complete this study guide, and review your quizzes while you study!

$W=Fd$ $Power=\frac{W}{t}$

$KE=\frac{1}{2}mv^{2}$ $PE=mgh$ $TME=KE+PE$

1. How can you tell when work is being done?
	1. A \_\_\_\_\_\_\_\_\_\_\_\_\_ is acting on an object
	2. It is causing the object to \_\_\_\_\_\_\_\_\_\_\_\_\_
2. When a pitcher throws a ball, he is doing \_\_\_\_\_\_\_\_\_\_\_\_\_ work. (positive/negative)
3. The work-energy theorem states that when work is done on an object, its \_\_\_\_\_\_\_\_\_\_\_\_\_ changes.
4. What is the kinetic energy of a 4 kg ball rolling at 6 m/s?
5. What is the gravitational potential energy of a 1.5 kg box sitting on top of a car at a height of 2 m?
6. What is the total mechanical energy of a 2 kg cat that is running at 8 m/s on a fence at a height of 3 m?
7. When an apple is falling from a tree, what is happening to its:

KE? TME?

PE?

1. Joe pushes a 25 N box and moves it 5 meters across the floor. How much work has he done?
2. Monica carries a 25 N box for a distance of 5 meters. How much work has she done?
3. What is a closed system?
4. A 6 kg book is lifted to a height of 8 meters. How much work was done on the book?
5. A 6 kg book is at rest on a shelf 4 meters above the ground. What is its kinetic energy?
6. What is the potential energy of the book in question 12?
7. In the image to the right, a roller coaster has 900 J of potential energy at the highest point, and it is not moving at this point. The cart goes through a loop and over a hill.
	1. What is the cart’s TME?
	2. If the cart has 200 J of PE at the top of the second hill, how much KE does it have?
8. A ball is rolling with 150 J of kinetic energy, and it slows down due to friction. After slowing down, it only has 110 J of kinetic energy. How much work did the friction force do on the ball?
9. Ezekiel pushes a wagon with a force of 50 N for a distance of 50 meters in 10 seconds. Lauren pushes a wagon with a force of 25 N for 50 meters in 5 seconds.
	1. Who performed more work?
	2. Who used more power?
10. A 4 kg block is released from rest at point (A). The block slides down a frictionless curved ramp past point (B) where it has 60 J of PE. It then slides along a flat, rough surface, where it begins to slow down.
	1. What is the potential energy at point A?
	2. What is the TME at point A?
	3. What is the kinetic energy at point B?
	4. What type of force did work to move the object from A to B?
	5. How much work did friction do while the block was sliding across the rough surface up to point C?
	6. If the distance is 5 m from the start of the rough surface to point C, how much friction did the box encounter over that distance?
	7. How fast is the block moving at point C?
	8. What type of energy was produced when the block slid over the rough surface and how much of this energy was produced?