Name: _____ Date:_____

Mr. Croom's Physics Chapter 5: Work and Energy

Conservation of Energy 1

Solve the following problems

1. A 2kg ball is dropped from a height of 5 meters. How fast will the ball be going when it passes the 3 meter mark. What about the 2 meter mark?

E_{pg}			
E_k			
E_T			
h			
v			

2. A person throws a 1.5kg ball up in the air at 10m/s. If the ball is released from the throwers hand at 1.5m, how high above the ground will the ball go? What will its velocity be as it hits the ground? What about when it is 3m above the ground?

3. (Walker, p. 228, #13) At an amusement park, a swimmer uses a water slide to enter the main pool. If the swimmer starts at rest, slides without friction, and falls through a vertical height of 2.61 m, what is her speed at the bottom of the slide?

4. (Walker, p. 228, #14) In the previous problem, find the swimmer's speed at the bottom of the slide if she starts with an initial speed of 0.840 m/s.

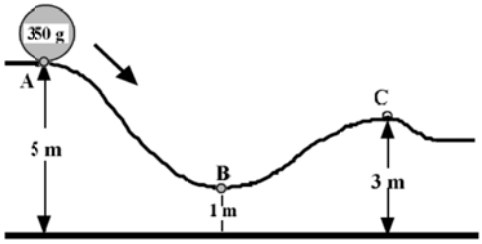
5. (Walker, p. 228, #16) In a tennis match, a player wins a point by hitting the ball sharply to the ground on the opponent's side of the net. **(a)** If the ball bounces upward from the ground with a speed of 16 m/s and is caught by a fan with a speed of 12 m/s, how high above the court is the fan? Ignore air resistance. **(b)** Explain why it is not necessary to know the mass of the tennis ball.

6. (Walker, p. 228, #15) A player passes a 0.600-kg basketball down court for a fast break. The ball is thrown at some angle upward. The ball leaves the player's hands with a speed of 8.30 m/s and slows down to 7.10 m/s at its highest point (Remember at the highest point, all of the velocity is in the x direction). What is the velocity of the ball when it is thrown in the y direction? Ignoring air resistance, how high above the release point is the ball when it is at its maximum height? How would doubling the ball's mass affect the results of the initial problem?

7. (Walker, p. 228, #17) A 0.21-kg apple falls from a tree to the ground, 4.0 m below. Ignoring air resistance, determine the apple's gravitational potential energy, *U*, kinetic energy, *K*, and total mechanical energy, *E*, when its height above the ground is each of the following: 4.0 m, 3.0 m, 2.0 m, 1.0 m, and 0 m. Take ground level to be $y = 0$.

8. (Walker, p. 228, #19) A 0.26-kg rock is thrown vertically upward from the top of a cliff that is 32 m high. When it hits the ground at the base of the cliff the rock has a speed of 29 m/s. Assuming that air resistance can be ignored, find **(a)** the initial speed of the rock and **(b)** the greatest height of the rock as measured from the base of the cliff.

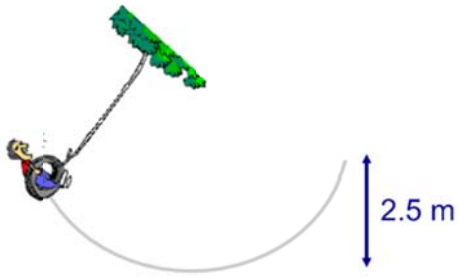
9. A 350-g ball starts from rest at position A at the top of the track. Find:
   a) the **total energy** at A,
   b) the **total energy** at B,
   c) the **velocity** of the ball at B,
   d) the **velocity** of the ball at C.



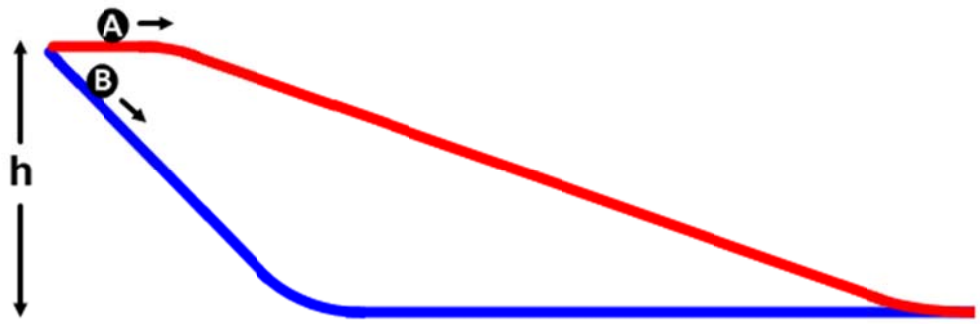
10. A 5.00-kg stone breaks loose from the side of a building and falls 7.00-m before smashing on the ground.
    a. How much potential energy does the stone possess before breaking loose?

    b. How fast is the stone traveling when it strikes the ground?

11. A 55-kg boy rides on tire swing. The distance from the highest point to the lowest point of his path is 2.5-m. What is the boy's maximum speed?



12. Two identical masses are released from rest at a height of **h** as shown below.



c. Compare the final speeds of the two masses.

d. Compare the time it takes each mass to reach the bottom.