Module 3 Review

EF 151, Class 3-7

The area under a force-displacement graph is _____.

- A. momentum
- B. kinetic energy
- C. impulse
- D. work

- A scooter that is 67% efficient is designed to consume 640 J of energy. How much energy is available for the scooter to do work?
 - A. 429 J
 - B. 640 J
 - C. 955 J
 - D. 1280 J

Conservation of momentum applies if _____.

- A. we only look at the initial and final position of the system
- B. the sum of the internal forces on the system is zero
- C. the sum of the external forces on the system is zero
- D. we do not care about the time required to move between the two points

Mabel drops her toy ball straight down on the ground. Before the collision, the ball has a speed of 7 m/s. After the collision, the ball has a speed of 3 m/s. What is the coefficient of restitution between the ball and the ground?

A. 0

- B. 0.429
- C. 1
- D. 2.33

Where does the datum <u>have to be</u> set for gravitational potential energy?

- A. Lowest point
- B. Undeformed position
- C. Initial position
- D. Anywhere

Which of the following is <u>not</u> a unit of energy?

- A. N-m
- B. kW-h
- C. J
- D. J/s

- A ball is dropped from a height of 100 ft. When it hits the ground, it does not bounce back into the air. What type of collision best explains this situation?
 - A. Perfectly inelastic
 - B. Inelastic
 - C. Perfectly elastic
 - D. Explosion

The same ball is thrown on a trajectory path as shown. What can you say about the xcomponent of the velocity of the ball <u>after</u> the collision with the ground?

A.
$$v'_{x} = 0$$

B.
$$v'_x = v_x$$

C.
$$v'_x = v_y$$

D. Cannot determine



Rock Subjected to a Variable Force

A 12.0 kg rock is subject to a variable force given by the equation

$$F(x) = 6.0 N + (2.0 \frac{N}{m}) x$$



where x is the position in meters. If the rock initially is at rest at the origin, find its speed when it has moved 9.0 m.

Dr. Bennett Throwing a Brick

Dr. Bennett throws a 2.7 kg brick directly upward at 15.0 m/s from ground level. How high will the brick be when its speed has been reduced to half of its initial value? Assume the brick loses 15 J of energy to air resistance.



Block Hitting a Spring

A 5.0-kg block is moving at 7.0 m/s along a horizontal frictionless surface toward a spring that is attached to a wall. After the block collides with the spring, the spring is compressed a maximum distance of 0.68 m. What is the speed of the block when the spring is compressed to only one-half of the maximum distance?



Crane Lifting a Weight

A crane is used to raise an 89-kg crate vertically upward. The engine consumes 2500 W of power and is 65% efficient. **How long does it take the engine to lift the crate a vertical distance of 18.7 m?**



Roller Coaster

A 1000 kg roller coaster starts from rest and ascends a 35 meter hill. The theoretical speed at the top of the hill is 9 m/s while the actual measured speed is 2 m/s. **Determine W_{in} and E_{loss} as the coaster climbs the hill.**



Truck Crashing into a Slow Car

A 2200 kg truck traveling at 22 m/s rear crashes into a slow car in front of it that is traveling in the same direction at 8 m/s. After the crash, the car and truck move together at 17 m/s. **Determine the mass of the car.**



Shane's Sliding Disc

Shane slides a 14 kg disc down the ice at a speed of 6 m/s. The disc directly collides with an 8 kg disc that is initially at rest. The collision is a perfectly elastic collision. **Determine the speed of the 8 kg disc after the collision**.



Abby Throwing a Ball

Abby throws a 0.80 lb ball such that it strikes the floor with a speed of 22 ft/s at an angle of 40°. If the coefficient of restitution between the ball and the floor is 0.64, what is the angle θ with which the ball leaves the floor?

