2. What is the work done by gravity when a mass \( m \) is thrown to a height \( h \) near the Earth's surface?

A) \(-mg\)  
B) \(mgh\)  
C) \((\frac{1}{2})mg^2\)  
D) \(2gh\)  
E) \(-mgh\)

3. A block of mass \( m \) is at rest on a ramp inclined at angle \( \theta \). The force of friction on the block is

A) \(mg \sin \theta\)  
B) \(mg \cos \theta\)  
C) \(mg \tan \theta\)  
D) \(mg\)  
E) 0N

4. The SI unit for power is the Watt. What is this equal to in terms of kilograms (kg), meters (m), and seconds (s)?

A) \(kg \cdot m/s\)  
B) \(kg \cdot m/s^2\)  
C) \(kg \cdot m^2/s\)  
D) \(kg \cdot m^2/s^3\)  
E) \(kg \cdot m^3/s^2\)

5. A rubber ball of mass \( m \) bounces of a wall with equal incoming and outgoing speed \( v \). What is the total work done by the wall on the ball during the entire collision?

A) \(2mv^2\)  
B) \(mv^2\)  
C) \(\frac{1}{2} mv^2\)  
D) \(\frac{1}{4} mv^2\)  
E) zero

6. As a block slides down an incline at constant speed, the total mechanical energy of the block is

A) increasing at a constant rate  
B) decreasing at a constant rate  
C) decreasing at an increasing rate  
D) constant greater than zero  
E) zero

7. A cart of mass \( m \) has speed \( v \) and collides inelastically with a cart of mass \( m/3 \) at rest. The final speed of both carts is

A) 0  
B) \(\frac{1}{4} v\)  
C) \(\frac{1}{2} v\)  
D) \(\frac{3}{4} v\)  
E) \(v\)

8. Four forces act on a 2 kg mass: a 6 N force north, 8 N force west, weight down, and normal force up. The normal force balances the weight. What is the mass' acceleration?

A) 0  
B) 5 m/s^2  
C) 7 m/s^2  
D) 9.8 m/s^2  
E) 14 m/s^2

9. A car initially traveling northwest makes a quarter circular turn at constant speed so that it then travels northeast. The car’s average acceleration during the turn is directed

A) west.  
B) east.  
C) in the direction of the car's motion.  
D) opposite the direction of motion.  
E) north.

10. A cart initially with speed \( v \) hits and compresses a spring a distance \( x \) before stopping. If the cart had been moving twice as fast, it would have compressed the spring? (Assume the spring is long enough to be compressed as much as needed.)

A) 4 times farther.  
B) twice as far.  
C) 1.4 times farther.  
D) half as far.  
E) There is not enough information.

11. A mass is attached to a spring and oscillates with a period \( T \). If the mass is doubled, what is the new period?

A) \(2T\)  
B) \(\sqrt{2}T\)  
C) \(T\)  
D) \(T/\sqrt{2}\)  
E) \(T/2\)
220 retakes Exams 1, 2 and 3 MC Practice Questions
(These questions are not comprehensive, refer to Practice Exams 1, 2, and 3)

Exam 1 material

1. Which pizza is the best deal (in terms of price per area)?
   A) 8 in diameter for $8
   B) 10 in diameter for $10
   C) 12 in diameter for $12
   D) 14 in diameter for $14
   E) all pizzas have equal price per area

2. How many kilometers are in one meter?
   A) 10^{-3}
   B) 10^{-2}
   C) 10^2
   D) 10^3
   E) 10^6

3. A ball is thrown straight up with initial speed 10 m/s. What is its speed 3 seconds later? Use $g = 10 \text{m/s}^2$.
   A) 5 m/s
   B) 10 m/s
   C) 20 m/s
   D) 30 m/s
   E) 40 m/s

4. A car with initial speed 10 m/s accelerates at a constant rate of 2 m/s$^2$. How far has the car moved once its speed is 20 m/s?
   A) 2.5 m
   B) 5.0 m
   C) 10 m
   D) 25 m
   E) 50 m

5. A ball is thrown horizontally with initial speed 60 m/s off a tall cliff. What is the ball’s total speed 4 s later? Use $g = 10 \text{m/s}^2$.
   A) 40 m/s
   B) 60 m/s
   C) 80 m/s
   D) 100 m/s
   E) 120 m/s

6. A ball is thrown horizontally with initial speed 40 m/s off a 20 m tall cliff. What is the ball’s horizontal displacement once it hits the ground? Use $g = 10 \text{m/s}^2$.
   A) 40 m
   B) 60 m
   C) 80 m
   D) 100 m
   E) 120 m

7. A car travels 80 mph for 3 hours and then stops for 1 hour. What is the average speed of the car during these 4 hours?
   A) 40 mph
   B) 50 mph
   C) 60 mph
   D) 70 mph
   E) 80 mph

8. A car accelerates from rest at a constant positive rate. The slope of the car’s velocity versus time graph is
   A) zero and constant
   B) positive and constant
   C) negative and constant
   D) positive and increasing
   E) negative and increasing

9. What is the height of a cylinder with radius $R$ and volume $V$?
   A) $2\pi R V$
   B) $\pi R^2 V$
   C) $V/(2\pi R)$
   D) $V/(\pi R^2)$
   E) 0

10. Train car 1 moves east at 8 m/s, while train car 2 moves north at 6 m/s. What is the speed of car 2 relative to car 1?
   A) 5 m/s
   B) 8 m/s
   C) 10 m/s
   D) 12 m/s
   E) 20 m/s