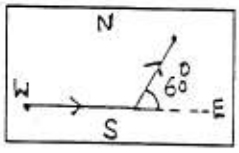
Sample Midterm Examination
Physics 204

Time Allowed: 1 hr. **Maximum marks: 100**

1. A car makes a 200-km trip at an average speed of 40 km/hr. A second car 1 hour later arrives at their mutual destination at the same time. What was the average speed of the second car for the period that it was in motion? 7

2. The minimum distance required to stop a car moving at 60 km/hr is 40 meters. What is the minimum stopping distance for the car moving at 100 km/hr, assuming the same rate of acceleration. 7

3. A car travels 10 km due east and then 20 km in a direction 60° north of east as shown in the figure. Find the magnitude and direction of the car's resultant displacement. 6



4. Vector A has x and y components of -8.7 cm and 15 cm, respectively; vector B has x and y components of 13.2 cm and -6.6 cm, respectively. If $\vec{A} - \vec{B} + 3\vec{C} = 0$. What are the components of $\vec{C}$? 7

5. A boat crosses a wide river with a speed of 10 km/hr relative to water. The river has a uniform speed of 5 km/hr due east relative to earth. Determine the speed of the boat relative to the stationary ground observer. In what direction should the boat be heading to reach a point across the river? 12

6. A ball is thrown horizontally from the top of a building 40 m high. The ball strikes the ground at a point 100 m from the base of the building. Find (a) the time the ball is in flight, (b) the initial velocity. 12

7. If a man weighs 980 N on earth. What would he weigh on Jupiter, where the free fall acceleration is 25.9 m/s^2? 10

8. A block is placed on a plane inclined 30° relative to the horizontal. If the block slides down the plane with an acceleration of magnitude g/3, determine the coefficient of kinetic friction between block and the plane. 12

9. A person weighs a fish of mass 1.5 kg on a spring scale attached to the ceiling of an elevator. What would be the reading on the scale if the elevator accelerates downward with an acceleration of 3 m/s^2? What would be the reading if the elevator was going upward with an acceleration of 1 m/s^2. 12

10. A ball at the end of a string is whirled around in a horizontal circle of radius 0.30 m. The plane of the circle is 1.5 m above the ground. The string breaks and the ball lands 2.0 m away from the point on the ground directly beneath the balls location when the string breaks. Find the centripetal acceleration of the ball during its circular motion. 15