Name: ....

1. The mass of the parasitic wasp *Caraphractus cintus* can be as small as 3×10^{-4} kg. What is this mass in micrograms?

   Answer: ....

2. A force vector F_1 points due west and has a magnitude of 100 N. A second force F_2 is added to F_1. The resultant of the two vectors has a magnitude of 300 N and points along the east/west line. Find the magnitude and directions of F_2. (Find both possible answers.)

   Answer: ....

3. A tourist being chased by an angry bear is running in a straight line toward his car at a speed of 4.0 m/s. The car is a distance d away. The bear is 26 m behind the tourist and running at 6.0 m/s. The tourist reaches the car safely. What is the maximum possible value for d?

   Answer: ....

4. A jetliner is moving at a speed of 215 m/s. The vertical component of the plane's velocity is 40.6 m/s. Determine the magnitude of the horizontal component of the plane's velocity.

   Answer: ....

5. A rock of mass 45 kg accidentally breaks loose from the edge of a cliff and falls down. The magnitude of air resistance is 250 N. What is the magnitude of the acceleration of the rock?

   Answer: ....

6. A stuntman is being pulled along a rough road at a constant velocity, by a cable attached to a moving truck. The cable is parallel to the ground. The mass of the stuntman is 89 kg, and the coefficient of kinetic friction between the road and him is 0.87. Find the tension in the cable.

   Answer: ....

7. A car travels at a constant speed around a circular track whose radius is 2.6 km. The car goes around the track in 360 s. What is the magnitude of the centripetal acceleration of the car?

   Answer: ....

8. At what angle should a curve of radius 250 m be banked, so cars can travel safely at 30 m/s without relying on friction?

Answer: ....

9. A cyclist approaches the bottom of a gradual hill at a speed of 11 m/s. The hill is 3 m high and the cyclist estimates that she is going fast enough to coast up and over it without pedaling. Ignoring air resistance and friction, find the speed at which the cyclist crests the hill.

Answer: ....

10. A clay vase on a potter's wheel experiences an angular acceleration of 8.00 rad/s^2 due to the application of a 10 Nm net torque, Find the total moment of inertia of the vase on the potter's wheel.

11. Answer: ....

12. A square, 0.8 m on a side, is mounted so that it can rotate about an axis that passes through the centre of the square. The axis is perpendicular to the plane of the square. A force of 15 N lies in this plane and is applied to the square. What is the magnitude of the maximum torque that such a force could produce?

Answer: ....

13. A 55 kg skier rides a 2830 m long lift to the top of the mountain. The lift makes an angle of 14.6 degrees with the horizontal. What is the change of the skier's gravitational potential energy?

Answer: ....

14. A basketball player makes a jump shot. The 0.6 kg ball is released at a height of 2 m above the floor with a speed of 7.2 m/s. The ball goes through the net 3.1 m above the floor at a speed of 4.2 m/s. What is the work done on the ball by air resistance?

Answer: ....

15. A ball is hanging at rest from a crane when suddenly the cable breaks. The time it takes for the ball to fall halfway to the ground is 1.2 s. Find the time it takes for the ball to fall from the rest of the way to the ground.

Answer: ....