

- 1) A particle starts at $x=0$ with a 1m/s velocity. The velocity (y -axis) of the particle is plotted vs its position (x -axis). The acceleration of the particle can be found by taking the slope of this graph. True / False
 - 2) An excel spread sheet is used to analyze data from an experiment. The result of the experiment displayed is 246.977655 counts per second and the uncertainty displayed is $.00938456$ counts per second. Write the result of this experiment in scientific notation with the appropriate significant figures.
 - 3) A stationary roofer does not slide off a sloped roof. In this static situation, the force of static friction is (circle one: greater than / less than / same as) the component of the gravitational force down the slope.
 - 4) A story teller indicates that he saw a flash of light go past in the blink of an eye. Assuming a blink of an eye is 50 milliseconds find the distance light would travel in the blink of an eye.
 - 5)] Put the following vector, given in Cartesian coordinates, into polar form with angles measured in radians, MKS otherwise, as throughout this course. $(x,y)=(1325\text{ cm}, 0.00275\text{ km})$.
 - 6) A certain pickup truck has an advertised fuel use of 14 litres/ 100 km. Given there are about 4 litres per US gallon and 1 km is about 0.6 miles, how would the advertised fuel economy be given in the US custom of miles/gallon.
 - 7) A change in acceleration is called a jerk and the rate of this change is a vector quantity, given the symbol, j . The 1-D equation of motion for a particle moving under constant jerk is given. Using dimensional analysis, determine the units of j .

$$x_{\text{final}} = x_0 + v_0 t + \frac{1}{2} a_0 t^2 + \frac{1}{6} j t^3$$
 - 8) A--During the first 20 minutes of a hike I travel West 1km and I then stop for a 10 minute snack.
 B--Then I travel 30 degrees West of North at a speed of 5 km/hour for 25 minutes
 C--and then South East at the same speed for 35 minutes.
 In the space provided, starting at the origin given:
 - a) Draw and label (A – C) the 3 displacement vectors of the trip and
 - b) Estimate the resulting displacement of the whole trip graphically
 - c) Calculate algebraically the average velocity vector
 - d) Graphically indicate this average velocity vector on the figure.
 - 9) A 7kg mass is hung from a 1.5 m long massless string. It is released from rest with the string displaced by an angle of 18 degrees from vertical.
 - a) Make a free body diagram of the forces on the mass just after it is released.
 - b) Find the tension in the string.
 - c) Find the initial acceleration of the mass.
10. I wish to tow a 53 kg load (3 children plus a toboggan) up a snowy hill for a toboggan run, climbing the hill at a constant velocity of 0.73 m/s up the gentle 10 degree incline. I pull the toboggan with a length of rope at a 30 degree angle as shown. The coefficients of friction are given between the snow and the toboggan. ($\mu_k=0.09$, $\mu_s=0.11$).
- a) Draw a free body diagram of the forces acting on the load during the ascent.
 - b) Find the tension in the rope.
 - c) Once at the top we turn it around and do a run. I also get on the toboggan adding an additional 80 kg to the load. Find our velocity once we go 80 meters down the hill given an initial speed of 3 m/s from a push off at the top.
11. A disgruntled student in the back row of 1510 wishes to hit the professor standing at the front of the class in the back of the head with a spit ball. The professor stands 2 meters tall and the spit baller is sitting in an elevated seat, 5 meters above the floor the professor stands on. The horizontal distance from the spit baller to the professor is 12 meters. The time of flight of the spit ball is 0.8 . Find the velocity of the spit ball when it is fired.