1) An 80kg anchor is dropped in the water and plummets to the ocean floor with an observed acceleration of 3.0 m/s^2.

a) Draw a free-body diagram for the anchor.

b) What is the magnitude of the water resistance acting on the anchor?

c) How long does it take the anchor to drop 100m?

2) Draw free body diagrams for the following:

a) a soda can tossed into the air

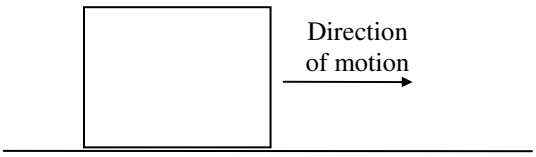
b) a sea turtle floating in the ocean

c) a possum standing by the side of the road

d) a possum jumping vertically (prior to its feet leaving the ground)

3) A 50 kg box is pulled horizontally along a frictionless floor by a 100N force.

a) Draw a free-body diagram for the box.



b) What is the magnitude and direction of the net force (ΣF) acting on the box?

c) What is the magnitude and direction of the acceleration for the box?

d) Express the net force and acceleration vectors in component form.

e) How far does the box travel in 2.5 seconds?

4) A 50 kg box is pulled up a 30^o incline along a frictionless floor by a 500 N force.

a) Draw a free-body diagram for the box.

b) What is the magnitude and direction of the net force ($\vec{F}_{net}$) acting on the box?

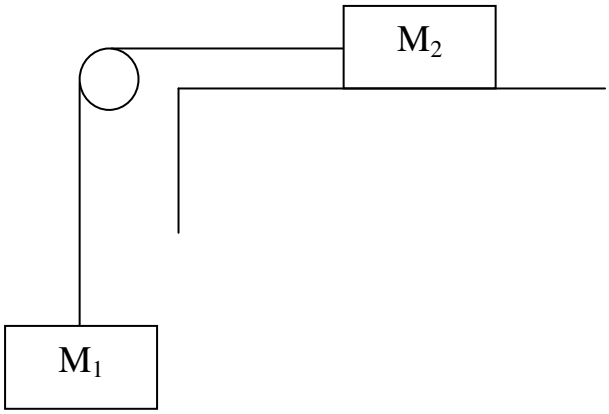
c) What is the magnitude and direction of the acceleration of the box?

e) Express the $\vec{F}_{net}$ and $\vec{a}$ vectors in component form.

f) How long does it take to pull the box 2.0m up the incline?

5. Consider the 2 mass pulley system (see diagram). *Assume the pulley has no mass and there is no friction between (i) M_2 and the surface supporting it and (ii) the pulley.*

a. Draw free body diagrams for each mass.



b. Apply Newton's 2nd law to each mass.

c. Determine an equation for the acceleration of the 2 mass system in terms of only the masses and g.

d. What are the tension forces acting on each mass? Express the tension vectors in component form.

e. If M_1 = 10 kg and M_2 = 20 kg, what is the acceleration of the system? Express the acceleration vectors for M_1 and M_2 in component form.

f. Identify as many "Action-Reaction" Force Pairs as you can in this example.

6. How would the same pulley system above behave if the surface supporting M_2 were at an angle ($\theta=20^o$), pointing upward to the left? Assume there is no friction between M_2 and the incline.

a. Draw a diagram of the pulley system described in this problem

b. Draw a free body diagram for each mass.

c. Apply Newton's 2nd law to each mass.

d. Determine an equation for the acceleration of the 2 mass system in terms of only the masses and g.

e. What are the tension forces acting on each mass? Express the tension vectors in component form.

f. Express the normal force vector acting on the mass, in component form.

g. What is the angle of incline that will keep the system from moving?