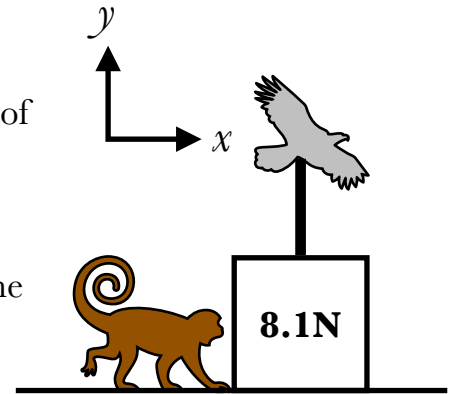


Alternate Homework Week 3

1. A box (weight 8.1N) is sitting on a table. A hawk is pulling upward on the box with a force of 2.3N, and a monkey to the left of the box is pushing on it, with a force of 4.5N. The box is not moving.



a) In the first column of the table, list all of the forces acting on the box, indicating the type of force and its source. I've listed one to begin.

<i>Force</i>	<i>x</i>	<i>y</i>
Normal, monkey	+4.5	—



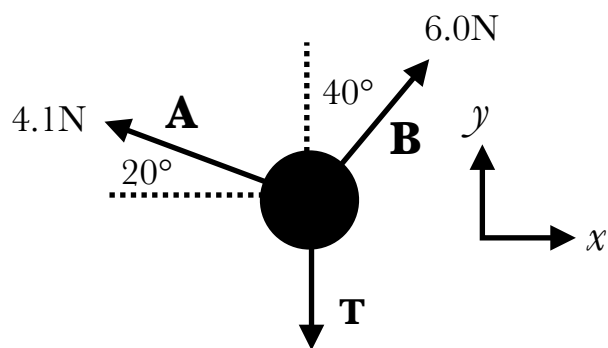
b) Next to the table draw a **force diagram** of the box, with an arrow for each force in your list. Label the arrows (with numbers, initials, or whatever) so that we can tell which is which.

c) Assuming that +x is to the right and +y is upwards, fill in the magnitudes of the forces in the table, with either a + or a - depending on the direction. If you don't know the magnitude of a force, give it a variable name corresponding to the type of force it is. I've filled in the first force as an example.

d) Solve for the two unknown variables.

2. A ball is held stationary by three horizontal ropes, exerting the forces shown. This is being seen from above, so weight isn't relevant here.

a. Fill in the table below with the correct values.



<i>Force</i>	<i>x</i>	<i>y</i>
A		
B		
T		

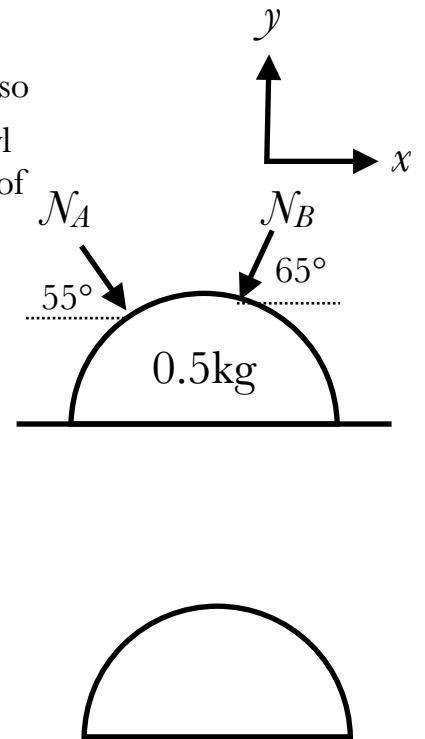
b. Solve for T.

Problems

1. A hemispherical bowl (mass 0.5kg) is sitting on a slippery table, so there is *no* friction between the bowl and the table, and yet the bowl is not moving. Two normal forces, A and B, are applied to the top of the bowl. Suppose $N_A = 20\text{N}$.

a) Draw a force diagram and fill out the force table below.

<i>Force</i>	<i>x</i>	<i>y</i>

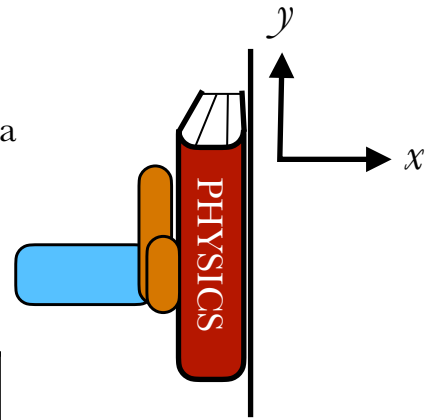


b) Solve for N_B .

c) Find the normal force of the table on the bowl.

2. A hand is pushing a 16N PHYSICS book against a wall; the coefficient of static friction between book and wall is $\mu_s = 0.4$.

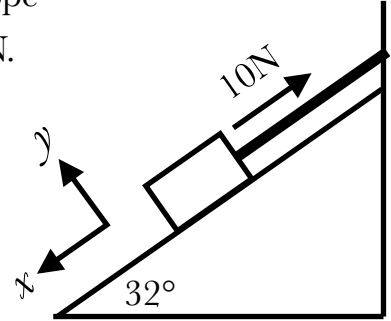
a) Analyze the forces on the book: fill in the force table and draw a force diagram.



<i>Force</i>	<i>x</i>	<i>y</i>

b) What is the minimum force the hand must apply to the book so that it doesn't slip along the wall?

- 3.** A 3kg block sits on a 32° ramp, as shown. It is attached by a rope to a wall at the top of the ramp, and the tension in the rope is 10N.
- a)** Using the tilted coordinate system, as shown, fill in the force table.

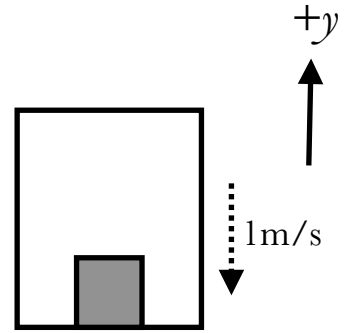


<i>Force</i>	<i>x</i>	<i>y</i>

- b)** Solve for the unknown values.

- c)** What values could μ_s have? (That is, solve the inequality for it.)

3. An elevator is moving downward at 1 m/s . It is speeding up, with an acceleration of 3 m/s^2 . A block with a weight of 40 N sits inside the elevator.



a) What direction does the acceleration point?

b) What is the mass of the block?

c) Draw a force diagram of the block, and fill out the force table for the block below.
(There are no horizontal forces so we don't need the x column.)

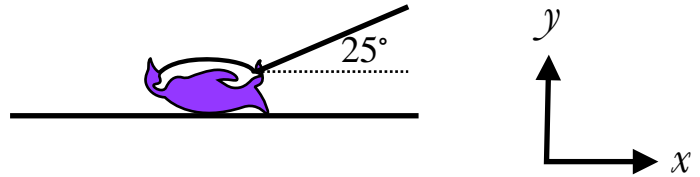
<i>Force</i>	<i>y</i>



d) Solve for any unknown forces on the block.

4. A purple penguin is being dragged along the ground by a rope which makes a 25° angle with the horizontal. If the tension in the rope is 8N , the weight of the penguin is 30N , and the coefficient of kinetic friction between penguin and ground is $\mu_K = 0.2$.

Find the acceleration of the penguin, and say whether the penguin is speeding up, slowing down, or moving at constant speed.



<i>Penguin</i>	<i>x</i>	<i>y</i>