



$a_{avg} = \Delta v / \Delta t$	$F_{net} = ma$	$p = mv$
$v = v_i + at$	$F_g = GMm/r^2$	$W = F \cdot \Delta s$
$\Delta s = v_i t + \frac{1}{2} at^2$	$F_c = mv^2/r$	$P_{avg} = \Delta W / \Delta t$
$V = IR$	$F_e = kq_1 q_2 / r^2$	$K = \frac{1}{2} mv^2$
$P = VI$	$F = qv \times B$	$U_g = mgh$
$R_{eq} = \Sigma R$	$\tau = r \times F$	$\Delta U = Q - W$
$1/R_{eq} = \Sigma 1/R$	$n = c/v$	$v = \lambda f$
$\mathcal{E}_{ind} = -N \frac{\Delta \Phi}{\Delta t}$	$n_1 \sin \theta_1 = n_2 \sin \theta_2$	$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$
$\Delta x = \Delta x' / \gamma$	$E = mc^2$	$\Delta t = \Delta t' \gamma$



Weekly Sheet for M\$2/ H\$1b PHYSICS
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Week #7, Week of Tues(10/11) to Mon (10/17)

Topics/Content/Skills: Kinematics (Linear and Circular), Intro Dynamics, Review

Skills:

- Know Rotational analogues for linear motion... Mass= Moment of inertia(I), Velocity- Angular velocity (ω), Acceleration-angular acceleration (α), Force- Rotational force(Aka Torque- τ); $F_{net} = ma \rightarrow \tau_{net} = I\alpha$
- More Practice with Projectile motion.
- More review with Free body diagrams.

Vocabulary/Key Terms/Formulas:

Constant Acceleration, Kinematics(d_f eqn), Projectile motion, Components of forces, Vectors, Circular motion ($F_c = mv^2 / r$; direction of A and V), Torque ($r \times F = \tau$; Review), Impulse ($F \Delta t = \Delta P$)

Homework/Classwork: (All homework is due the next class day unless indicated.)

	<u>In Class</u>	<u>Homework Due in this Class</u>
<u>Tuesday</u> <u>10/11</u>	<u>Finishing our practice sheets</u>	Hmwrk sheet #15&16
<u>Wednesday</u>	<u>Projectile Review</u>	PSAT Math Practice correct ad go over answers... (1 hour) Hmwrk sheet #17 (in class)
<u>Thursday</u>	<u>Test #1</u>	Get Quiz Signed... Hmwrk sheet #18
<u>Friday</u>	<u>No Class on Fridays</u>	<u>NA</u>
<u>Monday</u> <u>10/17</u>	<u>Prezi Practice</u> <u>Khan Academy</u>	Hmwrk Sheet #19 (Depends on PSAT Wed..)

Tests/Due Dates: There will be a 35 min quiz (#3) on Thursday Oct. 13

Quiz Topics: Vector Components, Circular motion, Kinematics, Projectile motion, Torque, Impulse, Atwood machines, 1-2 Step Algebra problems, STEM Review, Extra ordinary Review, Graphs of DVAJ, Basic Trigonometry.

Special Events/News:

6th -10th graders are expected to take the PSAT's and consequently we are having some extra help sessions during academic club time as well as Saturdays 10:00am to 12:30pm Lunch will be provided.

Name/ Grade: _____ / Date: _____

Homework Sheet #17Projectile Worksheet

1. A banana is dropped out of a 3rd floor building (by Flo) from a height of 8m.
 - a. **Draw a picture of what is happening:**

 - b. About how many feet is 8m? _____
 - c. How long does it take the banana to drop? _____
 - d. How fast is it going after 1 second? _____
 - e. About how fast is that in Miles per hour? _____ (remember U.Bolt can travel about 30 mph).
 - f. How fast is it going when it hits the ground? (neglect air resistance) _____

2. A different (non-squashed) Banana is now thrown horizontally with horizontal velocity of 25m/s, out of the same window, 8m above the ground.
 - a. **Draw a picture of what is happening:**

 - b. How long does it take to hit the ground? _____
 - c. What is it's final velocity in the vertical (y) direction? _____
 - d. How far away does the banana land (in the x direction)? _____

3. Eddie throws the banana back at Flo from where it landed in problem 2. His throw has a horizontal component of 25 m/s, and an upward vertical component of 12.6m/s.
 - a. **Draw a picture of the initial velocity components of the banana**

 - b. **Draw a picture of what you think will happen**

 - c. What is the magnitude of the total velocity he throws the banana? _____
 - d. Using trig, find the angle at which he throws the banana: _____
 - e. Now let's assume the velocity and angle are what you have listed above. Flo misses the banana, and the banana goes through a window across the hall (all doors are open for this to happen, and the banana reaches the ground again. **Draw a picture of what happens.**

 - f. **Give the time of flight of the trip:** _____
 - g. **Give the Range of the trip of the banana:** _____
 - h. **Check this with the PhET projectile program: Checks? Yes or no...**

4. Flo has moved up to the 6th floor and now she drops a banana from a height of 16m.
- Draw a picture of what is happening:**
 - About how many feet is 16m? _____
 - How long does it take the banana to drop? _____
 - How fast is it going after 1 second? _____
 - About how fast is that in Miles per hour? _____ (remember U.Bolt can travel about 30 mph).
 - How fast is it going when it hits the ground? (neglect air resistance) _____ in M/s and about _____ in Mph.
5. A different (non-squashed) Banana is now thrown horizontally with horizontal velocity of 30m/s, out of the same window, 16m above the ground.
- Draw a picture of what is happening:**
 - How long does it take to hit the ground? _____
 - What is it's final velocity in the vertical (y) direction? _____
 - How far away does the banana land (in the x direction)? _____
6. This time, Eddie throws the banana away from the building to a friend named Doc. He throws the banana with velocity of 30 m/s at an angle of 35° with respect to the horizontal.
- Draw a picture of what happens and give the initial velocity components of the banana**
 - What is the x- component of the total velocity he throws the banana? _____
 - What is the y-component of the total velocity he throws the banana? _____
 - Using the y- direction determine the time of flight of the banana: _____
 - Using the x-direction determine the range of the banana: _____
7. This time Doc throws the banana back to Eddie. He throws the banana with velocity of 40 m/s at an angle of 65° with respect to the horizontal.
- Draw a picture of what happens and give the initial velocity components of the banana**
 - What is the x- component of the total velocity he throws the banana? _____
 - What is the y-component of the total velocity he throws the banana? _____
 - Using the y- direction determine the time of flight of the banana: _____
 - Using the x-direction determine the range of the banana: _____

Name/ Grade: _____ / Date: _____

Homework Sheet #18 Statics Worksheet

1. A 30 kg uniform bar is held up by 2 wires. One wire on one end, and the other in the middle (2m from the other wire).

a. Draw an FBD of the bar (Mark the center of mass of the object)



b. The Torque in has to be equal to the torque out... so what is the equation for Torques around the end being held up by the wire? _____

c. What counter torque does the other wire create? _____

d. What Force does the center wire carry? _____

e. What force does the other wire carry? _____

2. The same 4 m/30kg bar in the first problem is held up by 2 wires, this time one wire is on the end, and the other wire is 1 meter from the other end of the bar.



a. The Torques in has to be equal to the torque out... so what equation do you use to determine the forces? _____

b. What Force does each wire carry? _____

3. A uniform 100 kg, 7m Diving board is supported by 2 supports, but not yet attached to either one. One support is 1m from the end, and the other support is 3m from the other end. The pool is empty so this is a dangerous situation.

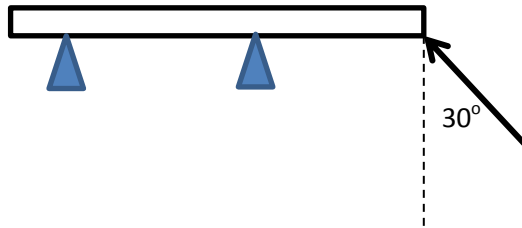
a. Draw an FBD of the board (Mark the center of mass of the object)



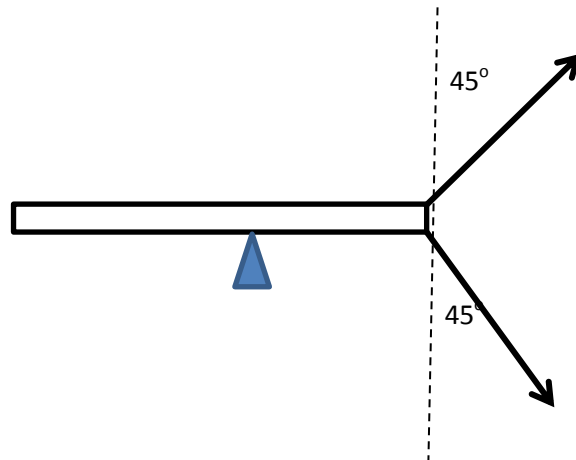
b. The Torque in has to be equal to the torque out... so what is the equation of the torque around the support 1m from the end? _____

c. What counter torque does the other support create? _____

- d. Eddie (a 50kg orangutan) jumps on the board, right where the support 3 m from the end is resting. He decided to see how far he can walk the plank just for fun. How far can he go before the board begins to rotate? _____
- e. **Bonus:** A Flo sees what is happening, jumps into the empty pool and grabs a plank and holds up the end at an angle of 30° from the vertical. Eddie makes it to the end, thanks to the help of the plank. What force does the plank have to exert to make sure the board doesn't rotate? _____

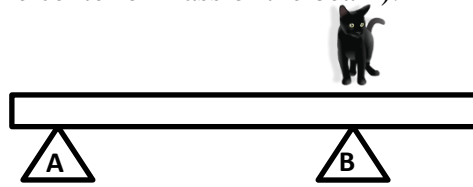


4. An off centered see saw (5m long) has an ocelot on one end, and is pivoted 3 meters from the end the ocelot is on. The uniform bar itself has a mass of 100kg, and Agent P is pulling a wire from one end at 45° with respect to the vertical.
- Is Agent P pulling down or pulling up? _____ Scratch out the force that is not being used in the picture below.
 - Why? _____
 - If Agent P pulls the wire with 200 Newtons of force, what is the mass of the ocelot? _____
 - Use this picture to help you....

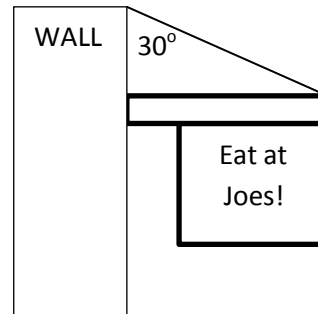


Bonus:

1. A uniform 20.0 kg, 10.0m long beam is supported by two posts. Post A is 1.00m from an end of the beam and post B is 4.00m from the other end. A 15.00 kg cat sits on the beam directly above post B.
 - a. Label the diagram below(include the center of mass of the beam).



- b. Calculate the force exerted by post A on the beam
 - c. Calculate force exerted by post B on the beam.
 - d. How far can the cat walk toward the end of the board before the board tips. The beam is not fastened to the posts.
2. A 50.0 kg uniform sign is hung from a 20.0 kg, 4.00m long uniform beam supported by a wall and a wire. The sign is a square 3.00m on a side and is hung so that the end of the sign is even with the end of the beam. The wire makes an angle of 30 degrees with the wall.
 - a. Find the tension in the wire.
 - b. Find the force exerted by the wall on the beam.



- b. What force is exerted by the wall on the ladder?
 - c. What force is exerted by the ground on the ladder?
 - d. What minimum coefficient of friction between ground and ladder is required to keep the system static.
3. A 5.00m long 20.0 kg uniform ladder leans against a wall so that the top of the ladder is 4.00 m above the ground. Assume no friction between wall and ladder.
 - a. Draw a picture of what is going on