



$a_{avg} = \Delta v / \Delta t$	$F_{net} = ma$	$p = mv$
$v = v_i + at$	$F_g = GMm/r^2$	$W = F \cdot \Delta s$
$\Delta s = v_i t + \frac{1}{2} at^2$	$F_c = mv^2/r$	$P_{avg} = \Delta W / \Delta t$
$V = IR$	$F_e = kq_1q_2/r^2$	$K = \frac{1}{2} mv^2$
$P = VI$	$F = qv \times B$	$U_g = mgh$
$R_{eq} = \Sigma R$	$\tau = r \times F$	$\Delta U = Q - W$
$1/R_{eq} = \Sigma 1/R$	$n = c/v$	$v = \lambda f$
$\epsilon_{ind} = -N \frac{\Delta \Phi}{\Delta t}$	$n \sin \theta_i = n \sin \theta_r$	$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$
$\Delta x = \Delta x / \gamma$	$E = mc^2$	$\Delta t = \Delta t \gamma$



**Weekly Sheet for MS2/ HS1b PHYSICS**  
**Michael Dixon (MD<sup>2</sup>) mdixon@parksideca.org**

**Week #6, Week of Mon(10/3) to Tues (10/11)**

**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 ( $\omega$ ), Acceleration-angular acceleration ( $\alpha$ ), Force- Rotational force(Aka Torque-  $\tau$ );  $F_{net} = ma \rightarrow \tau_{net} = I\alpha$
- 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>Monday</u> <u>10/3</u>	<u>PhET Labs Projectile motion lab</u> <u>Khan Academy Practice( if time)</u>	Sheet #12
<u>Tuesday</u>	<u>Finishing our lab, Graphs</u>	Get Quiz Signed...
<u>Wednesday</u>	<u>Projectile Review</u> <u>Online Physics lab- Constant Velocity</u>	Hmwrk sheet #13
<u>Thursday</u>	<u>Test #1</u>	Hmwrk sheet #14
<u>Friday</u>	<u>No Class on Fridays</u>	<u>NA</u>
<u>Tuesday</u> <u>10/11</u>	<u>Prezi Practice</u> <u>Khan Academy</u>	Hmwrk sheet #15&16

**Tests/Due Dates: There will be a 35 min quiz (#3) on Thursday Oct. 6**

**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:**

6<sup>th</sup> -10<sup>th</sup> 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.

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### Homework Sheet #13

1. A car with an oil leak is moving left to right. Match the oil drop pattern with the motion word that most closely describes it.

I. Rest	a.	
II. Deceleration	b.	
III. constant velocity	c.	
IV. acceleration, then deceleration	d.	
V. acceleration	e.	

7. A force  $F_1$  pushes on an object of mass 10 kg with a force of 500 N to the right. A force  $F_2$  pushes on the same object with a force of 400 N to the left.

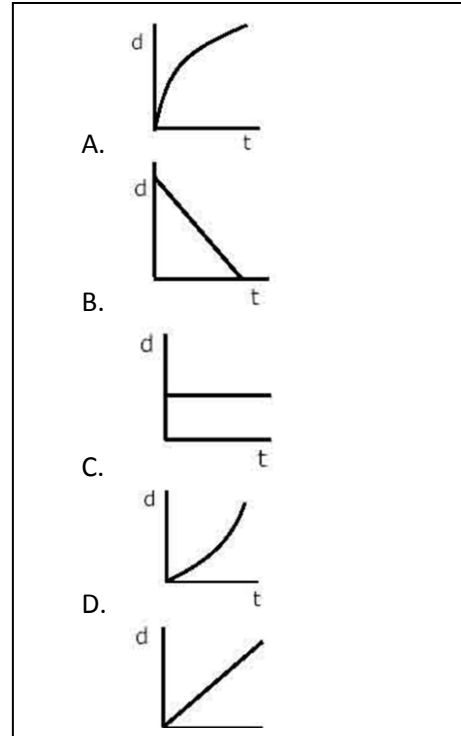
a. What is the net force on the object? \_\_\_\_\_

b. What is the acceleration of the object? (Choose from below)

- (A) 0.3 m/s<sup>2</sup> to the right
- (B) 0.5 m/s<sup>2</sup> to the left
- (C) 1 m/s<sup>2</sup> to the right
- (D) 1.5 m/s<sup>2</sup> to the left
- (E) 10 m/s<sup>2</sup> to the right

8. Match the distance vs time graph with the motion phrase that most closely

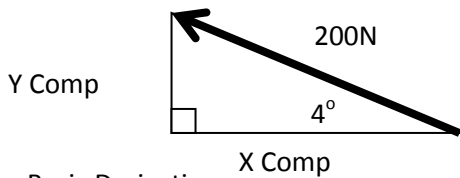
- I. An object at rest
- II. constant positive velocity
- III. increasing velocity
- IV. decreasing velocity
- V. constant negative velocity



5. Fermi: Estimate how many times have you exhaled in the last 30 days? Show work for Credit and give answer to the nearest order of magnitude (power of 10).

Physics Review Questions of the Week

6.

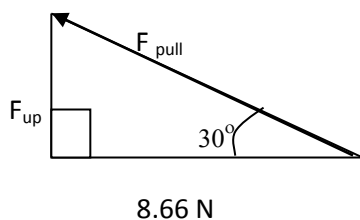


- a. What is the x component of the 200 N vector ? \_\_\_\_\_
- b. What is the y component of the 200 N vector ? \_\_\_\_\_

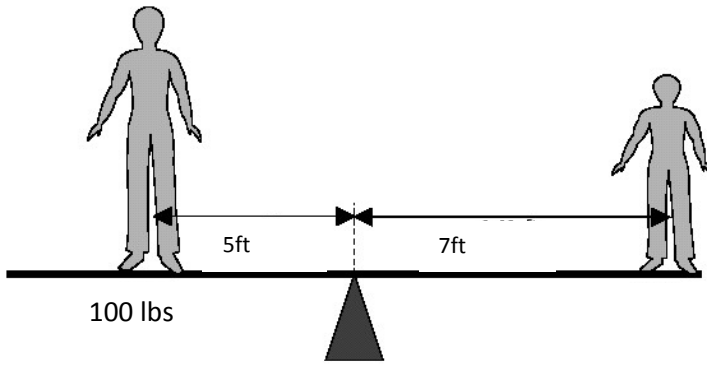
Basic Derivatives:

- 1.  $D = -4t^3$
- a.  $V =$  \_\_\_\_\_
- b.  $A =$  \_\_\_\_\_
- c. What is D if  $t = 2$  seconds? \_\_\_\_\_

Trigonometry: Bonus



- a. What trig function would you use to solve for  $F_{up}$ ?
- Cos  $\theta$    Sin  $\theta$    Tan  $\theta$**
- ( Circle one )
- b. What is  $F_{up}$ ?
  - c. What is  $F_{pull}$ ?
  - d. If the box does not move off of the ground, What is the weight of the box?
  - e. What is the normal?



1. Flo a ~ 100lb, orangutan is on a see saw with a George a large teddy bear. Flo is 5 feet from the pivot and the George is 7 feet from the pivot.
  - a. Label the Forces of the “animals”.

- b. Label the direction of the torque for each animal.

- c. Solve for the weight of George:

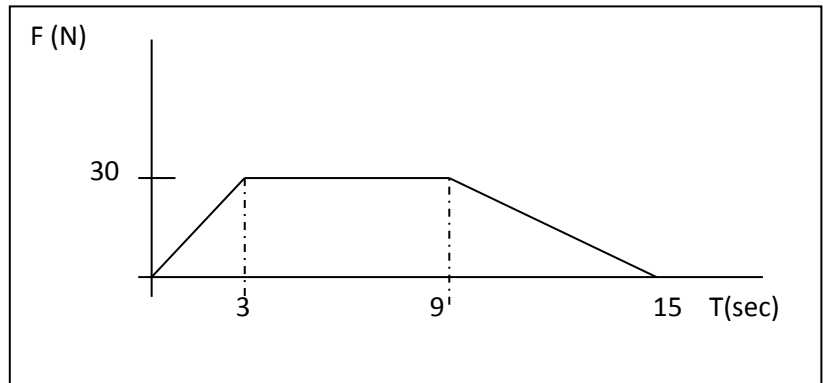
\_\_\_\_\_

2.

a. What is the Impulse from 0-3 seconds?

b. What is the Impulse from 3-9 seconds?

c. What is the Impulse from 9-15 seconds?



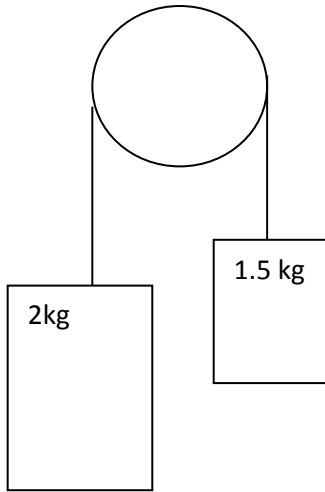
d. What is the total Impulse from 0-15 seconds?

e. A road runner(10 kg) had this impulse and she started from rest how fast would she be moving after 15 seconds? \_\_\_\_\_

f. How fast would she be running after 20 seconds?

g. How far would she have travelled from 15 seconds to 20 seconds? \_\_\_\_\_

3.



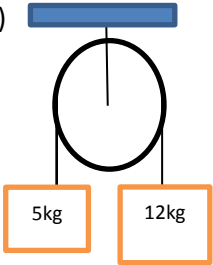


A. What is the magnitude of Acceleration of the blocks? \_\_\_\_\_

B. What is the Tension on the String? \_\_\_\_\_

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### Homework Sheet #14

<p>1) Do these as fast as you can</p> <p>a. <math>D = \cos 2x</math></p> <p style="margin-left: 20px;"><math>V =</math> _____</p> <p>b. <math>f(x) = 3x + \pi</math>  <math>g(x) = \cos x</math> (in radians)  <math>g(f(\pi)) =</math> _____</p> <p>c. <math>i^{24} =</math> _____ Bonus</p> <p>Math</p>	<p>2)</p> <p>a. 1 mi ~ _____ km</p> <p>b. 1 km ~ _____ mi</p> <p>c. 10 m/s ~ _____ mi/hr</p> <p>Conversions</p>	<p>3) What is an engineer?</p> <p>_____</p> <p>_____</p> <p>Give 3 types of Engineers you didn't know about 3 weeks ago</p> <p>a. _____</p> <p>b. _____</p> <p>c. _____</p> <p>Definitions</p>
<p>4) An ant is moving forward starting from rest with <math>a = 0.1 \text{ cm/sec}^2</math>.</p> <p>a. What is the linear speed after 3 seconds? _____</p> <p>b. How far has it travelled in 3 seconds? _____</p> <p>c. How long does it take to get 5m? _____</p> <p>Linear Kinematics</p>	<p>5) An ant is on a record player starting from rest with <math>\alpha = 0.4 \text{ rad/sec}^2</math>.</p> <p>a. What is the angular speed after 2 seconds? _____</p> <p>b. How far around has it travelled in 2 seconds? _____</p> <p>c. How long does it take to get around once? _____</p> <p>Rotational Kinematics</p>	<p>6) A bar has <b>moment of inertia</b> around a pivot of <math>= 10 \text{ Kg-m}^2</math></p> <p>a. This is like rotational _____</p> <p>b. If this bar has a force of 3 N, 2 m from the pivot, What is the net torque? _____</p> <p>c. What is the <math>\alpha</math> of the bar due to that net torque? _____</p> <p>Rotational Dynamics (Torques)</p>

<p>7)</p> <p>a. What is the next palindrome number after 2787? _____</p> <p>b. What is the next palindrome number after 27972? _____</p> <p>c. How fast is 90m/s in Mi/hr? _____</p> <p>Algebra/ Number Sense</p>	<p>8)</p>  <p>a. Acceleration= _____</p> <p>b. Tension= _____</p> <p>Atwood Machines</p>	<p>9)</p> <p><u>Estimate how many finger and toe nails there are at Pca/CFA.</u></p> <p>Estimations</p>
<p>10)</p> <p>a. Draw the FBD of a 3kg box at rest on a table.</p>  <p>b. Draw the FBD of a 4kg box being held up by a string</p>  <p>FBD's</p>	<p>11) A. The equation for Impulse is _____</p> <p>b. The Unit for impulse is _____</p> <p>c. Impulse is equal to the area under the _____ vs _____ graph.</p> <p>d. What is impulse in your own words: _____</p> <p>_____</p> <p>_____</p> <p>Impulse</p>	<p>12) How big is two <math>\pi</math> baker's dozen? _____</p> <p>_____ How big is a half a mole times _____ a _____ picometer?</p> <p>Weekly Topics</p>

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**Homework Sheet #15**

1. A ball is Thrown straight off a 20 m building at 30 m/s .

- Draw a picture of what is happening:

- How long does it take to hit the ground? \_\_\_\_\_

- How far away from the base of the building is the ball when it lands? \_\_\_\_\_

2. A ball is shot at  $40^\circ$  from the horizontal at 20 m/s on a flat surface.

- Draw a picture of what is happening

- What is the initial Vel. Comp up ? \_\_\_\_\_
  - What is the initial Vel. Comp Forward ? \_\_\_\_\_
  - What is the time of flight? \_\_\_\_\_
  - What is the range ? \_\_\_\_\_
2. Flo accidentally bumps a flowerpot with her arm from the 3<sup>rd</sup> floor window 25 feet off of the ground towards Eddie who is lying down on the ground under her window.
- a. How long would it take for the flowerpot to hit the Eddie?
  - b. She notices the falling flowerpot and Eddie underneath it after 0.2 seconds. She screams, how long does it take for her voice to reach eddie? \_\_\_\_\_ (speed of sound is about  $3 \times 10^2$  m/s)
  - c. Eddie is just waking up and is groggy, it takes him 1.8 seconds to move... Does he get hit? \_\_\_\_\_

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**Homework Sheet #16**

**SAT SUBJECT TEST PRACTICE--- To be handed out...**