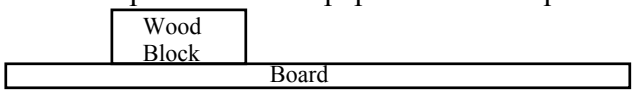
AP Physics 2 Preparation Assignment Name: _____

*Due First Full Day of Class
*Attach additional sheets if necessary.
*Contact Mr. Babich at ababich@mchs.net with any questions.
*Additional, potentially useful information can be found at the following websites:
http://www.physicsclassroom.com/Class
http://ocw.mit.edu/OcwWeb/hs/physics/physics/index.htm
http://www.animations.physics.unsw.edu.au/mechanics/index.html

Part 1: Know Your AP Physics 2 Exam

- Go to: the AP Physics 2 student site: https://apstudent.collegeboard.org/apcourse/ap-physics-2 and download the 5 pdf files.
- In the AP Physics 1 and 2 Course and Exam Description pdf:
  - Read pg 5-7, 13-14 on the description of the course and the course objectives
  - Read pg 117-123 on the 7 scientific practices. **After reading, write a paragraph or more on the specific expectations of each scientific practice that you feel you need to work on throughout this course and how you plan to address those expectations.**
  - Read pg 147-151 on the exam format. Pay attention to the meaning of specific words.
- Print out the AP Physics 2 Equation Tables pdf (to use and discuss in class)
- Read the Paragraph Length Response pdf. **Comment on the differences from AP Physics 1.**
- If you have any questions about the test and/or its format, make a list to bring to class.

Part 2: Experimental Design – You may need a separate sheet of paper to answer questions #1 and #2 in detail



1. Design an experiment to determine the coefficient of friction between a wood block and a board. You have access to common lab equipment. Describe your experimental procedure in enough detail so that another student could duplicate your process. Include what measurements you will take and how you will take them.

2. Describe one assumption you made about the design of the experiment and explain how it might affect the value obtained for the coefficient of friction.

Part 3: Variable Manipulation

Solve the following equations for the selected variable.

1. $PV = nRT$ solve for T T = _____
2. $F_g = Gm_1m_2 / r^2$ solve for r r = _____
3. $\tau = rF \sin\theta$ solve for θ θ = _____
4. $F_e = kq_1q_2/r^2$ solve for r r = _____
5. $F_c = mv_t^2/r$ solve for v_t v_t = _____
6. $KE = \frac{1}{2} mv^2$ solve for m m = _____

Part 4: Physics in Our World

1. Physics is happening around us all the time, even on YouTube.
   a. Find a school appropriate video clip on YouTube related to one or more physics concepts.
   b. Type a paragraph-length response, following AP Physics 2 guidelines, describing how the video is related to concepts in physics. Be specific and accurate in your explanation. Include diagrams and equations if necessary.
   c. Email ababich@mchs.net with the paragraph and the link to the YouTube video no later than the first day of school.
   d. Prepare a presentation of the physics concepts in the video.

Part 5: Preparation for Unit 1 – Fluid Statics/Dynamics

- Research definitions, equations and the importance of each the following topics on fluid statics.
  - What is a 'fluid'?
  - Density
  - Pressure (including atmospheric pressure, gauge pressure, absolute pressure)
  - Depth of a fluid
  - Pascal's Principle and Hydraulics
  - Buoyancy / Buoyant Force
  - Archimedes' Principle

- Type 2-3 paragraphs including definitions, units of measure and the relationship. Include a works cited.

Part 6: Fluid Pressure and Flow Simulation**: http://phet.colorado.edu/en/simulation/fluid-pressure-and-flow**

Learning Goals: Students will be able to qualitatively discover which variables affect pressure.
Directions:

1. Download, open and explore the simulation to find out how pressure changes in air and water. Describe your findings below and include specific data from your explorations to support your ideas.

2. Lower the pressure gauge from the top of the screen down to just above the water (about 3 meters). Record your observations. Explain why this happens.

3. Fill the tank. Now lower the pressure gauge from the top of the water to the bottom of the screen (about 3 meters). Record your observations. Explain why this result differs from your previous answer:

4. Calculate the pressure 3 m underwater if the pressure at sea level is 101325 Pa.

5. Using the triangular tank, (2^{nd} window, upper-left) slide the pressure gauge along the bottom of the tank.
   a. What happens as the gauge moves across the bottom? Explain:

   b. How does the shape of the pool affect the values?

Hydraulics and Pascal's Principle

6. Using the 3^{rd} window, put a pressure gauge at the bottom of each tank. What happens to the pressures as the weights are added on the left tank? What conclusion can you make?

7. Remove the weights. This is a hydraulic system like the brake system on your car. The left piston is small like your brake pedal piston and the right piston is large like the piston at your brake pads. Get a ruler and measure the heights of the fluid in each tank. Now add 1000 kg to the left and re-measure the heights. Describe you observations and explain:

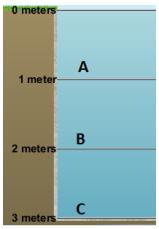
8. How much work is done on the left piston? (Hint: the change in height is important)

9. Ideally, all the work is transmitted from the left piston to the right piston. What force does this piston exert?

10. Explain, using the hydraulic principle (Pascal's Principle), how a small force can be applied on a brake pedal to bring a car to a stop.

11. Test a variety of situations to help answer the ppt questions. List your answers below each question.

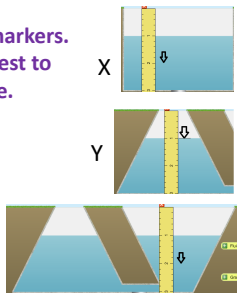
1. Order from lowest to highest pressure.



A. A<B<C
B. C<B<A
C. all are equal

Question 1: _____

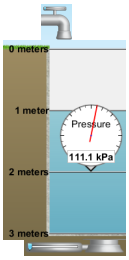
2. Look at the markers. Order from lowest to highest pressure.



A. Y<Z<X
B. Y<X<Z
C. Z<X<Y
D. X<Z<Y
E. two are equal

Question 2: _____

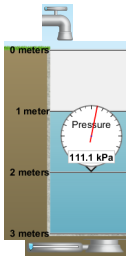
3. What will happen to the pressure if more water is added?



A. increase
B. decrease
C. stay the same

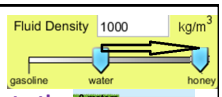
Question 3: _____

4. What will happen to the pressure if more water is added while the same amount is removed?

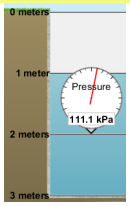


A. increase
B. decrease
C. stay the same

Question 4: _____

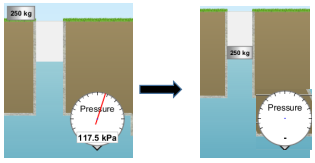


5. What will happen to the pressure if the fluid were changed to honey?



A. increase
B. decrease
C. stay the same

Question 5: _____

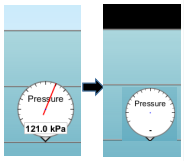


6. If the 250 kg mass was put on the water column, what will happen to the pressure?

A. increase
B. decrease
C. stay the same

Question 6: _____

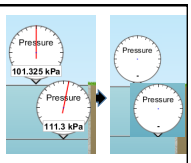
7. If the only change was to remove the air pressure , what will happen to the pressure?



A. increase by 101.3 kPa
B. decrease by 101.3 kPa
C. stay the same
D. Something else

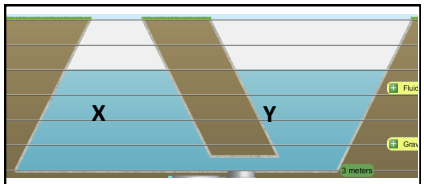
Question 7: _____

8. If the only change was to go to a place where the gravity was doubled, what will happen to the pressure?



A. Both pressures would double
B. Only the air pressure would double
C. The air pressure would double, and the water pressure would increase some
D. Something else

Question 8: _____



9. How do the pressures at the two locations compare?

A. X>Y
B. Y>X
C. They are the same

Question 9: _____