Name: DISC: Score: / 20Instructions:

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| --- | --- | --- | --- |
| Q1 | Q2 | Q3 | Q4 |
|  |  |  |  |
| 5 | 5 | 5 | 5 |

* Do your own work.
* Answer the questions below in the space provided.
* Make sure you show all your work and any equations that you use.
* Please place a box around your answers.
* Remember to give the correct units with all numerical answers

1. A barometer can be used to measure atomspheric pressure . In a barometer an evacuated tube is inserted into a pool of liquid, usually mercury. Let’s investigate what happens:



| **MERCURY** |  |  |
| --- | --- | --- |
|  |  | UNKNOWN |

Explanation (2pts):

* 1. Why is the height of the mercury in the tube related to the atmospheric pressure?
  2. You observe the height of mercury in the tube is . Find the atmospheric pressure (hint: )

Pressure (3 pts):

|  |  |  |
| --- | --- | --- |
| **ARCHIMEDES’ PRINCIPLE** |  |  |
|  |  |  |

1. Remarkably aircraft carriers don’t sink in the ocean. Employ Archimedes’ Principle to explain why. (Hint: You may approximate the carrier as a rectangle of area )

Floating Carriers (5 pts):

1. Hook’s Law, , describes the force exerted on an object by a spring.
   1. An object is attached to a horizontal spring and rests on a frictionless surface. The spring is displaced from the equilibrium position. Does the object experience *constant* acceleration (yes/no)?

Answer:

* 1. Draw a free-body diagram describing the situation in part (a). Remember to include a coordinate system and all force labels.

Free-body Diagram (2pts):

* 1. Using and *energy conservation* explain why the *speed* of the object depends on its *position* . Let the initial displacement of the spring be .

Explanation (2 pts):

1. Foucault’s Pendulum is a simple harmonic oscillator. It was used to demonstrate the rotation of the earth.
   1. Does Foucault’s Pendulum experience constant acceleration (yes/no)?

Answer:

* 1. If the pendulum length is , use to find the period of the pendulum’s swing.

Period (2 pts):

* 1. Now take your Foucault’s Pendulum to another planet. You want to measure the acceleration of gravity. You set up your pendulum and notice that . What is the acceleration of gravity on the new planet, ?

(2 pts):