Name: _____

Class: _____

Due Date: _____

Physics Topic 19B - Gravitational Potential Energy and Gravitational Potential

Answer the following questions. The solutions to this worksheet can be found on the YouTube channel Go Physics Go.

1. C: The following problem refers to *gravitational potential energy* E_{P}.

   a. Define *gravitational potential energy* E_{P}. Is it a scalar or a vector?

   b. What is the equation of the *gravitational potential energy* E_{P} of an object when it is near the surface of a planet? What is the general equation of the *gravitational potential energy* E_{P}? What is the significance of the negative sign? What are the units of *gravitational potential energy* E_{P}?

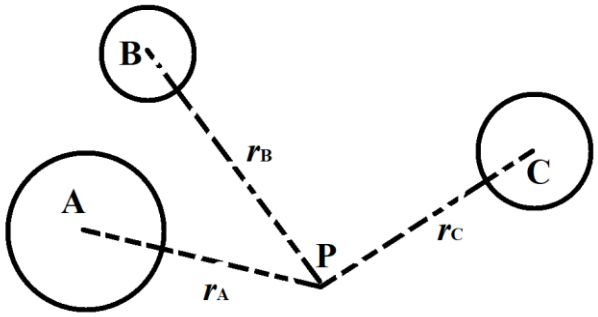
2. E: What will be the gravitational potential energy of a 5.20×10^5 kg rocket orbiting Saturn at an altitude of 1.00×10^4 km? Saturn has a mass of approximately 5.68×10^{26} kg and a radius of approximately 6.00×10^7 m.

3. C: The following problem refers to *gravitational potential* V_g.

   a. Define *gravitational potential* V_g. Is it a scalar or a vector?

   b. What is the equation for *gravitational potential* V_g? What are the units of *gravitational potential*?

4. E: Determine the gravitational potential at point P from three massive objects.



$m_A = 8.67 \times 10^{15}$ kg
$m_B = 5.30 \times 10^{15}$ kg
$m_C = 9.36 \times 10^{15}$ kg
$r_A = 2.70 \times 10^{3}$ m
$r_B = 1.30 \times 10^{3}$ m
$r_C = 6.50 \times 10^{3}$ m

5. C: What is the relationship between the gravitational field strength g and gravitational potential V_g?

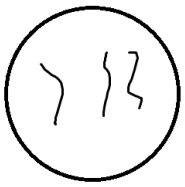
6. C: What is constant in a *gravitational equipotential surface*?

7. C: How much work is done in moving a mass along the same *equipotential surface*?

8. C: How much work is done in moving a mass along two different *equipotential surfaces*? State the equation.

9. C: What is the relationship between an objects *gravitational equipotential surfaces* and *gravitational field lines*?

10. C: **Use a pencil and ruler!** Draw gravitational field lines and equipotential surfaces for each figure.

A fixed uniform spherical mass	Two fixed uniform spherical masses with equal mass and equal radius
	
Two fixed uniform spherical masses $M_1 \gg M_2$