Universal Gravitation

1. Two people, A and B, are sitting on a bench 0.60 m apart. Person A has a mass of 55 kg and person B a mass of 80 kg. Calculate the magnitude of the gravitational force exerted by B on A. (8.2 x 10-7 N)
2. Mount Logan in the Yukon is 5959 m above sea level, and is the highest peak in Canada. Earth’s mass is 5.97 x 1024 kg and Earth’s equatorial radius is 6.38 x 106 m. What would be the difference in the magnitude of the weight of a 55.0-kg person at the top of the mountain as compared to at its base. Assume that Earth’s equatorial radius is equal to the distance from Earth’s centre to sea level. (1.00N)
3. The mass of the *Titanic* was 4.6 x 107 kg. Suppose the magnitude of the gravitational force exerted by the *Titanic* on the fatal iceberg was 61 N when the separation distance was 100 m. What was the mass of the iceberg? (2.0 x 108 kg)
4. The Moon has a mass of 7.35 x 1022 kg and its equatorial radius is 1.74 x 106 m. Earth’s mass is 5.97 x 1024 kg and its equatorial radius is 6.38 x 106 m. Calculate the magnitude of the gravitational force exerted by
   * 1. the Moon on a 100-kg astronaut standing on the Moon’s surface (162 N)
     2. Earth on a 100-kg astronaut standing on Earth’s surface (978 N)
     3. Explain why the values of *F*g in part (i) are different from (ii).