Name:

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Universal Gravitation

- 1. An 8.0 kg ball is separated from a 6.0 kg ball by 2.0 m. What is the gravitational force of attraction between them?
- 2. Two satellites of equal mass are put 30. m apart. A gravitational force of 2.0 x 10⁻⁷ N acts between them. What is the mass of each satellite?
- 3. The force of gravity on the average person is about 700 N at the Earth's surface. Calculate the gravity on a person 10 times that distance from the centre of the Earth.
- 4. Calculate the force of gravity on a 1.0 x 10⁵ kg space station situated at each of the following locations. ($R_{Earth} = 6.38 \times 10^6$ m; $M_{Earth} = 5.98 \times 10^{24}$ kg)
 - a) on the Earth's surface

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- b) 128 000 km from the centre of the Earth.
- c) 384 000 km from the centre of the Earth (about the distance to the moon)
- d) 1.5 x 108 km from the centre of the Earth (about the distance to the sun)
- 5. The distance from the centre of the Earth to the North Pole is 6 356 km and the the distance from the centre of the Earth to the equator is 6 378 km.
 - a) What is your weight if you are at the North Pole?
 - b) What is your weight if you are on the equator?
 - c) What is the percent difference between your weight on the equator and your weight at the North Pole?
 - d) What is the percent difference between your mass on the equator and your weight at the North Pole?
- 6. Mars has a radius of 3 390 km and a mass of 6.39 x 10²³ kg.
 - a) What is the gravitational field strength on Mars?
 - b) How much would you weigh on Mars?
- 7. A space rock is dropped near the surface of a planet the same size of Earth but of a different mass. It reaches a speed of 15 m/s in 5.0 s. What is the mass of the planet?
- 8. A man jumps on the surface of the moon with an initial velocity of 3.2 m/s upwards. How high does he jump? ($R_{Moon} = 1.74 \times 10^6 \text{ m}$; $M_{Moon} = 7.35 \times 10^{22} \text{ kg}$)

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