Name:

Physics 11
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Universal Gravitation

Block:

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 2.0×10^{-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 1.0×10^5 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
   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) 1.5×10^8 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 6.39×10^{23} 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? ($R_{Moon} = 1.74 \times 10^6$ m ; $M_{Moon} = 7.35 \times 10^{22}$ kg)