Honors Physics 1

3.7 – Newton's Universal Law of Gravitation

Assessment

Name:_____   Period:_____

1) A 3.08×10^4 kg meteorite is on exhibit in New York City. Suppose this meteorite and another meteorite are separated by 1.27×10^7 m (a distance equal to Earth's average diameter). If the gravitational force between them is 2.88×10^{-16} N, what is the mass of the second meteorite?

2) In 1989, a cake with a mass of 5.81×10^4 kg was baked in Alabama. Really. Suppose a cook stood 25.0 m from the cake. The gravitational force exerted between the cook and the cake was 5.0×10^{-7} N. What was the cook's mass?

3) The largest diamond ever found has a mass of 621 g. If the force of gravitational attraction between this diamond and a person with a mass of 65.0 kg is 1.0×10^{-12} N, what is the distance between them?

4) The passenger liners Carnival Destiny and Grand Princess, both now in service, have a mass of about 1.0×10^8 kg each. How far apart must these two ships be to exert a gravitational attraction of 1.0×10^{-3} N on each other?

5) In 1874, a swarm of locusts descended on Nebraska. The swarm's mass was estimated to be 25×10^9 kg. If this swarm were split in half and the halves separated by 1.0×103 km, what would the magnitude of the gravitational force between the halves be?

6) Deimos, a satellite of Mars, has an average radius of 6.3 km. If the gravitational force between Deimos and a 3.0 kg rock at its surface is 2.5×10^{-2} N, what is the mass of Deimos?