

AP Physics – Gravity – 2

Identity of Student _____ Per _____

Life is no brief candle to me. It is a sort of splendid torch which I have got a hold of for the moment, and I want to make it burn as brightly as possible before handing it onto future generations. -- George Bernard Shaw

1. A 15 500 kg railroad car traveling at 3.85 m/s overtakes and couples with a 12 850 kg car traveling at 1.75 m/s. (a) What is the new velocity of the two cars after they join up? (b) What is the change in kinetic energy?
2. A space hamster has a mass of 0.250 kg. It is 255 m from a 6 550 kg asteroid. What is the force of gravity acting between them?
3. A 5.50 kg ball traveling east at 3.50 m/s smacks head on into a 3.45 kg ball that is at rest. If the velocity of the first ball after the collision is -2.15 m/s, what is the velocity of the second ball after the collision?
4. The earth's mass is 5.98×10^{24} kg, the distance from the earth to the moon is 3.90×10^8 m. The mass of the moon is 7.30×10^{22} kg. The radius of the moon is 1.79×10^6 m and it, the moon, has a mass of 7.30×10^{22} kg. Your mass is 60.0 kg. (a) What is the force of gravity between earth and the moon? (b) How much do you weigh on the moon?
5. A 1.5 kg rock is whirled around in a flat circle at the end of an 85 cm string. It has a linear speed of 1.80 m/s. (a) Draw a FBD for the thing. (b) What is the centripetal acceleration and (c) the centripetal force acting on the rock?
6. You toss a ball straight up in the air, it goes up, comes down, and you catch it. If it took 3.6 s from when you threw it to when you caught it, how high did it go?
7. The speed of sound is 345 m/s. You have built a really fantastic car that can really go fast. If the car can accelerate at 22.4 m/s^2 , (a) how much time till you reach the speed of sound? (b) How many kilometers will you travel before you reach that speed? The mass of the car is 1250 kg, (c) What is the kinetic energy of the car when it reaches its final speed? (speed of sound)
8. Three blocks are connected by light strings as shown. The angle for the ramp is 48.0° . The masses are as follows: m_1 is 1.15 kg, m_2 is 1.35 kg, and m_3 is 2.50 kg. The coefficient of kinetic friction is 0.230. Find: (a) the acceleration of the system and (b) the tension in the string.

