

## Family Guy Physics

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We are going to attempt to learn some real physics by watching and analyzing a short clip from the TV show *Family Guy*. From the clip, we will calculate what must be Peter's mass if he did in fact have his own significant gravitational pull.

Watch the clip, and measure/estimate the following three pieces of information about the apple moving in an orbit around Peter.

Time for 5 Orbits: \_\_\_\_\_ Radius of Orbit: \_\_\_\_\_ Mass of Apple: \_\_\_\_\_

### Calculations

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1. What was the period of the orbit of the apple? (Put another way: how many seconds did it take the apple to go around Peter once?)
2. What was the linear speed of the apple? (Put another way: how fast was the apple moving around Peter?)
3. What was the centripetal acceleration of the apple as it traveled around Peter?
4. Calculate the centripetal force on the apple as it traveled around Peter?
5. Now comes the harder part. Where did this centripetal force come from?
6. So what was the gravitational force between the apple and Peter?
7. Finally, what would Peter's mass have to be in order for an apple to orbit around him as shown in the video?
8. In the clip, Brian also puts the TV in orbit around Peter. The mass of a TV is about 100 times the mass of an apple. Could the TV have stayed in the same orbit as the apple like it did in the video clip? (We will ignore the whole issue of how the TV was still on, because that is obviously not realistic.)

Answers: (Using 13 s, 1 m & 0.2 kg for the data) 1) 2.60 s      2) 2.42 m/s      3) 5.84 m/s<sup>2</sup>  
4) 1.17 N      5) gravitational attraction between apple and Peter      6) 1.17 N      7) 8.76 x 10<sup>10</sup> kg