

Review guide: Physics in the universe. Last test of the semester!

Elliptical orbits.. how to calculate eccentricity given a drawing of an ellipse. What it means to have an eccentricity close to zero vs close to one.

Video/discussion: Einstein's Big Idea. What did the work of Antoine Lavoisier show? What kinds of experiments did he do (as shown in the film). How were these new ideas? When did he live and how did he die? What did Emilie du Chatelet contribute to science? What was her greatest accomplishment? What kinds of experiments was she interested in? When did she live? How was she able to contribute so much to science? How did she die? The speed of light: What does C stand for? How does the speed of light fundamentally differ from other 'speeds' in the universe? (other than it is so great). What kinds of questions did Einstein pose in his thoughts about how light must operate? What conclusions did her reach?

Momentum. What is the definition of momentum? What does it mean to say that momentum is conserved? How does momentum differ from kinetic energy? What does it mean to say that energy is conserved? How does the conservation of momentum differ from the conservation of energy differ from the conservation of mass? What made these commonly taught subjects (today) so difficult for early scientists to understand? What is an 'impulse', in the sense of momentum? How does an elastic collision differ from an inelastic collision? (students are encouraged to review the 'chapter review' questions at the end of the posted, chapter 7 reading on momentum from the conceptual physics text).

Martian Physics..

Chapter 25 questions:

1. The 'transmission time' for communications between Earth and Mars is 14 minutes. How does this affect communications between Watney (The Martian) and NASA? Why is does it take so long for communications to go back and forth?
2. In preparation for the launch of the MAV (the escape vehicle), Watney is instructed to remove thousands of Kilograms of parts, including the nose-cone and the windows. Why is this NOT AN ISSUE with launching the vehicle into space?
3. What effect will removing all of the weight have on the launch itself?
4. Watney is quoted as saying he was "pissing rocket fuel". Why is this true?
5. The launch acceleration we be as great as 12 'g's'. (12 x the acceleration of gravity on Earth). Assuming that he weighs 170 lbs. on Earth, what will his weight be during launch?

Chapter 26 questions:

1. Seeing that the Mav was much lower in its orbit than was expected, what solution did the team on the rescue ship come up with? What was good about their solution and what was bad?
2. What effect will blowing the door lock off have on the rescue vehicle? What 'conservation' law is being put to use here?
3. Why does it not matter whether it's a big hole or a small hole with regard to the goal, of changing the rescue vehicles speed?
4. How much energy measured in joules, does 1 kg of sugar contain? How many sticks of dynamite is this equivalent too?
5. What does *sehr gefährlich* mean (use Google Translate, from German). Why does the scientist say this several times?