Miscellaneous FAQs hrs

Q: Did Newton really discover gravity when he saw an apple fall from a tree?
A: No, of course not. Even the experience with the apple is apocryphal. What he first realized was that objects in the sky obeyed the same laws as objects on the earth. The way Newton's discovery should be stated is that the *Moon obeys the same laws as a mere apple*. Prior to Newton, people thought that a dichotomy existed between things in the sky (using terms like "sublime matter," "divine," "immortal," or "perfect forms") and things on the earth (terms like "worldly," "profane," "mortal" or "imperfect"). Such views can be traced back to Plato, but they were reinforced by the opinions of medieval churchmen. They had to have an explanation for why the sky never ran down or made noise, yet everything on the earth stopped, died, broke, or got dirty. It seemed to them that the only way of doing this was to divide the universe into two separate categories. Newton, upon realizing that the Moon and planets were like everything else, worked out the laws of gravitation assuming the planets were moving in a vacuum and that gravity obeyed a simple inverse-squared law of force. Within 50 years people were predicting the position of planets to high precision, and the rest is modern science.

Q: Is there anything that space movies consistently get wrong?
A: There are lots of things:

1) In space, you can't hear anything. Yet spacecraft of the evil aliens, when they finally get their comeuppance, explode with a satisfying boom.
2) You can see bright stars in the same image as spacecraft. If the spacecraft were that well lit, the stars would be much too dim to see easily. Nebulae are too bright as well.
3) Stars and planets are hanging around like berries. In space, there is a lot of *nothing*, and the stars are a fixed background.
4) Not just space movies, but *all* movies, play fast and loose with the moon. Keep track of appearances of the moon: the crescent phase is wrong for the hemisphere and the time of day, the full moon rises at midnight, heights of certain phases over the horizon are messed up, the size is too big, markings are wrong, etc. They seldom get it right.

I have no problem with artificial gravity, faster-than-light drives, hand blasters, etc. Those are covered in the rules of SF. But most moon errors are ignored because moviemakers don't know or care.

Q: Why suddenly are all these asteroids whizzing by? They didn't used to.
A: They always did. Now we just catch more of them in the act.

Q: I have heard that my chances of dying in an asteroid impact are higher than what I would think? Do you know what the chances are?
A: This is one of those cases where mishandled statistics can be used to scare people unnecessarily. If a world-killer asteroid hits the earth on the average once every 60 million years and the current population of the earth is 6 billion, or 6000 million, then the number of people killed 'per year' is less than 1000. But *in any given year* no one dies of asteroid impact. Another way of thinking about it is 60 years divided by 60 million years means a one in a million chance that you'll bite the dust that way during your lifetime.

Q: What is the “red shift” anyway? And do red shifted stars in general look redder?
A: Rainbow spectra are marked by dark lines. If the emitting body is at rest with respect to you, you see these lines at well calibrated wavelengths. But in the case of rapid motion of the emitter toward or away from you, the wavelength is found either bluer or redder than the listed wavelength. Blue if it is coming, red if it is going. The universe is largely red-shifted with respect to us, and small distant galaxies are more red shifted than large nearby galaxies. Only a few are blue shifted. There are a number of other explanations for this:

1) Distant galaxies are actually moving away from us at high speed.
2) The laws of physics have slowly been changing over the lifetime of the Universe.
3) There is some sort of distance effect that red shifts light, like a finite mass for the photon and a very weakly-interacting force slowing them down.

Since we have no evidence for alternate explanations, we have to assume the first cause, that they’re actually moving away, is correct for now.

As long as the red-shift is not too great, bluer stars move into the slots formerly filled by redder stars, and the red-shifted galaxy’s appearance is not too much altered.

Q: I want to see the sky at higher than naked-eye brightness, but with no magnification. Is there any optical system that will do this?
A: No. It is theoretically impossible. In optics there is something called a Lagrange invariant that prevents it. Unless you use active amplifiers (like image intensifier tubes), there is no way to increase radiance along a light ray. This can be traced back to the conservation of energy. Sorry.

Q: There is a maker of expensive little telescopes that claims their exquisite workmanship makes their telescope as good as bigger ones. Is this true.
A: It is true if we consider telescopes *on the average*. That is because so many telescopes are not made as well as possible. The tradeoff is price. Few people are willing to pay for a telescope that is made as well as a human being can do it. Your expensive little telescope is made this way. Unfortunately, the jewel-like little telescope still must obey light-gathering power restrictions. When power is pushed, the image still darkens.