1. THE MOON

If you lived on the Moon, would you always see the same 'face' of the Earth in the sky? **NO**

Suppose you look up at the sky and there is a first quarter Moon just setting. What time of night must it be? **MIDNIGHT**

Now imagine you were standing at the same time on the Moon instead, somewhere along the 'terminator' (the line dividing light from dark on the Moon). What would be the phase of the Earth? **THIRD QUARTER**

The next night, at the same time, will the Moon have risen yet? **YES**

2. THE PLANETS

What configuration will Mars be near when it goes into retrograde motion? **OPPOSITION**

Is the time between successive oppositions of Mars the same time as Mars takes to go once round its own orbit? **NO**

If you could view the Earth from Venus, would you see it go through a whole cycle of phases? **NO**

If you could view the Earth from Mars, would you see it go through a whole cycle of phases? **YES**

We know that the planets stay close to the ecliptic, but otherwise “wander” round the sky, so sometimes a planet is close to the Moon. Why couldn’t you see Venus rising close to a 3d quarter Moon? [**Hint:** What time of night would it be?] A 3d quarter Moon rises at midnight, and so must be 90° from the Sun. However, Venus can NEVER be more than 47° from the Sun.

3. ANGLES AND DISTANCES

The angular diameter of the Moon is 0.5° as seen from Earth. Do you think the Earth has the same **X**, bigger **X**, smaller **X** angular diameter when seen from the Moon?

The Sun has an angular size of 0.5° in our sky, and we are at a distance of **1** AU from the Sun. If you went to Jupiter, whose distance from the Sun is **5.2** AU (find in the textbook), the Sun would have an angular size of **0.1°**.

If you could observed the Sun and Earth from another star at a distance of 1 parsec from the Sun, what would be their angular separation? **1 arc second**

[**Hint:** No calculation required! Remember the definition of a parsec.]
4. KEPLER’S LAWS

The Moon’s distance from the center of the Earth is 384,000 km and it orbits the Earth in 27.3 days. Consider a satellite in Earth orbit that has an orbital period of 24 hours.

Would this satellite appear to move in the sky? **NO**

From Kepler’s 3d Law, do you expect this satellite to be less than ____ X or more than ____ 384,000 km from the center of the Earth?

Is this satellite in an orbit just above the surface of the Earth? **NO**

Imagine a point beneath your feet, half way toward the center of the Earth. Is this point moving faster ____ or slower ____ X than you are as the Earth spins on its axis?

5. NEWTON’S LAWS

Suppose we discovered a solar system around another “Sun” whose mass was exactly half the mass of our Sun, and this solar system had a planet just like the Earth orbiting at the same distance that our Earth orbits the Sun. Would the period of that planet’s orbit be longer ____ X or shorter ____ than a year?

Recall how we define *weight*. Suppose the Earth suddenly lost half its mass. How would your weight change? ____ Factor of 2 LESS

Supposing the Earth kept the same mass but suddenly shrunk to half its radius. How would your weight change? ____ Factor of 4 MORE