Orbital Motion

1. An object in orbit is constantly changing direction, therefore, it is accelerating.
2. Gravity acts over a distance and can travel through a vacuum.
3. If an object's trajectory equaled that of the circumference of the Earth, the object goes into orbit.
4. Orbital motion is falling motion, but the object has enough inertia to never reach the ground because it keeps missing.
5. While in orbit, an object always accelerates towards the center.

Weightlessness

1. "Zero G" or weightless is not a correct term
2. A person in a spaceship orbiting around Earth would feel gravity of Earth, yet so does the spaceship.
3. Both the person and spaceship are in motion and move at the same rate, so there is no net acceleration in between them.
4. A better term is free fall, because both objects fall at the same rate.
5. The person would appear and feel weightless relative the their surroundings (the spaceship).

Escape Velocity

1. The equation to find the escape velocity of an object is $\mathbf{V^2=G*(M/R)}$, where V is the escape velocity, G is the gravitational constant, M is the mass of the object to be escaped, and R is the radius from the center of the object to be escaped.
2. Escape velocity is the minimum velocity that an object will escape into orbit.
3. For the surface of the Earth, the escape velocity is about 11.2 km/sec, or 25,000 miles/hour (neglecting air resistance).
4. The equation to find the velocity for an object to escape out of orbit and into space is represented by $\mathbf{V_{escape\ orbit}^2 = 2G(M/R)}$ or $\mathbf{\sqrt{V_{escape\ orbit} = 2V_{escape\ velocity\ of\ circular\ orbit}}}$.
5. Two planets with same mass, but different radii – the larger planet is easier to escape from
6. Two plants with same radius, but different mass – the smaller mass planet is easier to escape from
7. In relation, escape velocity can be used to determine how fast the atmosphere of a planet leaks.
8. A colder atmosphere is retained better because of slower motion of the atoms; hotter gases have higher velocities.
9. If the velocity of the object is between the escape velocity and the escaping orbit velocity, the orbit of the object is elliptical; the closer it is to escape, the more circular the orbit, and the closer it is to escaping orbit, the more elongated the orbit.