

Chapter 7.1 Notes - p.153-160 in CPO Physical Science

Earth in Space Learning Target: *I can explain how gravity is the force that keeps objects in the solar system in regular and predictable motion and describe the resulting phenomena. I can explain the interactions that result in Earth's seasons.*

Gravity comes from mass *This is the main topic for this page of text.*

Paragraph Topics <i>The main ideas to the left of each paragraph</i>	Notes <i>Write down notes about each paragraph. Include information from the diagrams used to show the concepts in that paragraph. Also make special note of new vocabulary.</i>
Gravitational force, mass, and distance	<i>Gravity attracts all objects that have mass together. We don't feel gravity unless the object has a huge mass, like a planet.</i>
Direction of the gravitational force	<i>Gravity works from the center of an object. As you move, the direction of force changes. 'Down' is the directional force of the Earth.</i>

The force of gravity

Paragraph Topics	Notes
Mass and gravity	<i>Mass and distance determine the strength of gravity. More mass = more force. Newton's law of universal gravitation states that mass and distance affect the force of gravity.</i>
Distance and gravity	<i>The further one mass is from another mass, the weaker the gravity. The closer, the more attraction they have.</i>
Weightlessness	<i>Astronauts are still affected by the Earth's gravity and are actually falling around the Earth. They are essentially in orbit themselves.</i>
Summary of p. 154-155	<i>Gravity works on all objects that have mass. They are attracted to each other according to their masses and the distance between them. It is hard to feel this force unless the object is the size of a planet.</i>

Orbital Motion

Paragraph Topics	Notes
Gravitational force and orbits	<i>When a moving object (in space) gets near a large gravity source (planet, star), sideways forces bend the path of the object. If it is slow enough, it gets bent all the way into a circle and goes into orbit.</i>
Why the Moon doesn't fall to Earth	<i>This is an analogy (a comparison between two things). When you takes notes on your own, you may choose to leave these out.</i>
The Moon falls around Earth	<i>The moon is moving fast enough and with enough sideways acceleration to keep it in orbit.</i>

Earth and the Sun

Paragraph Topics	Notes
Gravity from the Sun	<i>The sun has 330,000 times the mass of the Earth and has a diameter 110 times larger. It's gravity is much, much stronger than the Earth's.</i>
The Sun's gravity on Earth	<i>Even though, the sun's gravity is stronger, the Earth's gravity has a much larger effect on us. This is because gravity weakens with distance and the sun is so much farther away than the center of the Earth</i>
Earth's orbit	<i>The sun's gravity is still strong enough to keep the Earth in orbit around it. The Earth is moving at a speed of 66,800 miles per hour, but we don't feel it because the speed does not change.</i>

Summary of p. 156-157: *In space, smaller objects orbit larger ones because there is enough gravitational force to attract the smaller object and it is moving at the right speed to be affected by the gravity, but not be pulled into the larger object. Because gravity weakens with distance, we are more affected by the gravity of the Earth than the Sun.*

The Earth and Moon

Paragraph Topics	Notes
The Moon	<i>The moon is much smaller than the Earth (mass) and therefore has only 1/6 the gravity of Earth.</i>
Gravitational locking	<i>Earth's gravity has made it so the moon's rotation is 27.3 days long, the same time it takes to complete on orbit.</i>
The Moon's orbit and the lunar cycle	<i>Because the moon is tilted 5 degrees from the orbit of the Earth, it is not in the Earth's shadow except during eclipses. The phases of the moon are not caused by the Earth's shadow.</i>
Why the Moon has "phases"	<i>The moon has phases because we see the moon's shadow on itself. We see it at a different angle every day.</i>
Summary of p.158: <i>The moon orbits the Earth and rotates every 27.3 days. We see different phases of the moon because we see the moon at different angles relative to the sun every day.</i>	

Tides

Paragraph Topics	Notes
Tides are caused by the Moon's gravity	<i>The Earth also feels the affect of the moon's gravity. The tides of the oceans are evidence of this gravitational pull.</i>
The mystery of the "second tide"	<i>The tides also rises on the part of the Earth directly opposite the moon.</i>
The center of mass	<i>The moon and the Earth revolve around a common center of mass every 27 days. This point is about 75% of the way to the surface of the Earth.</i>
Explaining the "second" tide	<i>The force of inertia of this revolution causes the ocean to expand out on the opposite side.</i>
Summary of page 159: <i>Tides are caused by a combination of the gravity of the moon working on the ocean's water and the gravitational connection between the Earth and moon.</i>	

Below, answer questions #3 and #6 from p.160.