

SECOND QUARTER

UNIT 2: MOTION

UNIT 3: PLANETARY MOTION, PHASES, SEASONS, AND ECLIPSES

II. UNIT 3: PLANETARY MOTION, PHASES, SEASONS, AND ECLIPSES

Time:

Approximate Dates:

a. Unit Introduction:

b. Standards:

1. C28 Explain the effect of gravity on the orbital movement of planets in the solar system.
2. C29 Explain how the regular motion and relative position of the sun, Earth, and moon affect the seasons, phases of the moon, and eclipses.
 1. graphs.

CT State Grade Level Expectations (Draft)

GRADE-LEVEL CONCEPT 1: ◆ Gravity is the force that governs the motions of objects in the solar system.

1. Earth is part of a system of celestial bodies that are grouped together around a central star, the Sun. This system includes objects of different masses and composition such as planets, moons, asteroids, minor planets, and comets. These objects move in predictable paths determined by gravity.
2. Gravity is a force of attraction between two objects. The strength of gravitational force depends on the total mass of the two objects and the distance between them. The greater the total mass, the greater the force of gravity. The greater the distance between two objects, the less the force of gravity.
3. The difference between an object's mass and its weight is explained by gravity. Mass is the measure of the amount of matter in an object; weight is the force of gravity between an object and the celestial body it is on. Bodies in the solar system have different masses; therefore the same object has a different weight on each celestial body.
4. Objects in the solar system are held in their predictable paths by the inward-pulling gravitational attraction of the very massive sun. The interaction of the center-pulling force of gravity with a moving object's inertia (tendency to keep moving) keeps one object in circle-like motion (revolution) around another. This causes planets to orbit around the center of the solar system and moons to orbit around planets.
5. The Earth and other planets move through space in two ways: rotation on an axis and revolution around the sun. Earth revolves around the sun in a near-circular path, explaining cyclical phenomena such as seasons and changes in visible star patterns (constellations).
6. The time it takes for an object to complete one revolution around the sun depends on the speed at which it is moving and the size of its orbit. Objects more distant from the sun's

gravitational pull move slower than those that are closer. Earth's period of revolution is about 365 days (year); planets that are more distant from the sun take longer to orbit (revolve) around the sun, resulting in longer years.

GRADE-LEVEL CONCEPT 2: ♦ The motion of the Earth and moon relative to the sun causes daily, monthly and yearly cycles on the Earth.

1. Earth rotates around an axis or rotation, a line going through the center of the earth from the north pole to the south pole. The tilt of Earth's axis relative to its orbital path, combined with the spherical shape of the earth, cause differences in the amount and intensity of the sun's light striking different latitudes of the earth.
2. Earth experiences seasons as northern or southern hemispheres are tilted toward the sun over the course of its 365-day revolution period. Earth's tilt causes seasonal differences in the height of the perceived path of the sun and the number of hours of sunlight. Seasons are not related to a change in distance between the Earth and the Sun, since that distance changes very little.
3. The moon changes its position relative to the earth and sun as it revolves around the earth in a period of about 29 days. The same half of the moon is always reflecting light from the Sun; some of the reflected light reaches Earth. Phases of the moon are explained by changes in the angle at which the sun's light strikes the moon and is reflected to Earth. The relative position of the Sun, Earth and moon can be predicted given a diagram of a moon phase.
4. Eclipses occur when the moon, Earth and sun occasionally align in specific ways. A solar eclipse occurs when the moon is directly between the Earth and the sun (during new moon phase) and the moon blocks the sun's light, creating a moving shadow on parts of the earth. A lunar eclipse occurs when the Earth is directly between the moon and the sun (full moon phase), the Earth blocks the sun's light, casting a shadow over the moon.

Ocean tides on Earth are caused by the moon's gravitational force pulling on large bodies of water as the Earth and moon move around each other daily. The regular daily and monthly movement of the water (tides) can be predicted.

c. Essential Questions:

1. What are the two ways in which earth moves in space?
2. What causes the seasons on Earth?
3. What two factors affect the strength of the force of gravity between two objects?
4. What causes the phases of the moon?
5. What causes an eclipse?

d. Essential Concepts:

1. Earth moves through space in two ways: rotation and revolution.
2. The tilt of Earth's axis causes the cycle of seasons on Earth.
3. The two factors that affect the strength of the force of gravity between two objects are the mass of the two objects and the distance between them.
4. Inertia and gravity are the forces that keep one object in orbit around another.
5. The phases of the moon are caused by the change in the relative positions between the sun, the Earth and the moon.

6. During a solar eclipse, the moon keeps sunlight from reaching parts of the earth.
7. During a lunar eclipse, Earth keeps sunlight from reaching the moon.

e. Essential Skills:

f. Vocabulary:

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| 1. Axis | 10. Weight |
| 2. Rotation | 11. Inertia |
| 3. Revolution | 12. Phases |
| 4. Orbit | 13. Eclipse |
| 5. Solstice | 14. Solar Eclipse |
| 6. Equinox | 15. Lunar Eclipse |
| 7. Force | 16. Umbra Penumbra |
| 8. Gravity | |
| 9. Mass | |

LABS/ACTIVITIES:

Moon Phases

Reason for the Seasons

Eclipse

Tides

Galileo (Reading)

Essay Assessment: What if the moon didn't exist?

QUARTERLY ASSESSMENT

SEASONS

MOON PHASES

RFI: GALILEO

ASSESSMENT