Shaping My Knowledge

Warm-up

Tell a joke about the Sun. For example, *"Why did the Sun go to school?" (Answer: to get brighter)*. Invite students to invent or look up other jokes about the Sun and share them with the class.

Teaching Tip

For Exercise 1
After listing objects in Exercise 1, ask students to brainstorm what they know about each one. Tell students to choose one and briefly research it online. Ask students to share one interesting fact they discovered, identifying the similarities and differences of the celestial objects.

Differentiation Strategy

For Exercise 3
Go to the Differentiation Strategies Bank and adapt this exercise using Strategy 4b.

Flexi Exercises
(To adjust to students' needs, you can either use or not the activities below)

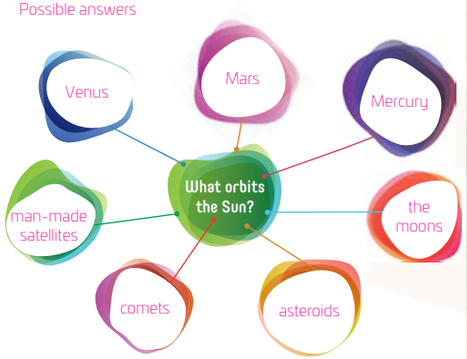
Exercise 4

Science

Why does the Earth move around the Sun?

01 In addition to the Earth, list the celestial objects that orbit the Sun below.

Possible answers



02 Read "Are you down-to-Earth?" Match the laws to their definitions.

1. The first law of motion
2. The second law of motion
3. The law of universal gravitation

a. Masses exert gravitational forces on one another.
b. The gravitational pull between two objects can lead one to curve.
c. Moving objects don't stop.

03 Read the text again. Write the letter of the definition next to its word.

1. substantiate	d	a. no longer moving
2. outweigh	c	b. to fall sharply
3. plunge	b	c. to be heavier than
4. standstill	a	d. to prove
5. hurtle	f	e. the act of increasing speed
6. acceleration	e	f. to move with great speed

Are you down-to-Earth?

Nowadays, we know that apples and other objects fall toward Earth due to its gravitational pull. Similarly, this same force keeps the planets orbiting the Sun. The explanations and the varying effects on the different masses can be found in several crucial laws of physics.

Firstly, Isaac Newton's law of universal gravitation proved that two masses exert a pull on one another. First **substantiated** on Earth, the law also comes into play in outer space since the celestial bodies in our Solar System are attracted to one another. However, as the Sun is millions of times more massive than the Earth, its influence on the Earth **outweighs** that of the Earth on the Sun.

Unlike the apple that **plunged** straight to Earth, the planets stay in space, orbiting the Sun. This comes from Newton's first law, which states that an object in motion stays in motion. Since the Earth is already propelled forward, it won't just come to a **standstill**. Instead, it continues accelerating. Were it not for the Sun, we would be **hurtling** into space. Newton's second law of motion states that the mutual gravitational pull of the Earth on the Sun causes the centripetal, or circular, **acceleration** of our planet around the Sun. As much as the Earth may try to jerk forward, it cannot go in a straight line, as it is tugged back toward the Sun, thus maintaining a continuous orbit.

04 With a classmate, think of a popular movie that theorizes about the impact of a heavenly body with Earth. Discuss the questions below.

- In the movie, what object impacts or will impact our planet?
- According to the movie, how does the impact affect Earth and its orbit?
- What happens to life on Earth?

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Language Structures and Functions Tip

For Exercise 6
After completing Exercise 6, tell students to write three sentences missing the modal verb. Then, ask them to share their new sentences with a classmate so they can complete the gaps. Finally, if time allows and you deem necessary, review the grammar point in detail.

Teaching Tip

For Exercise 8
Before acting, elicit simple language phrases that students could use to get started with the role play. Write the beginning of the dialogue on the board for everyone to use if they choose to. For example:
Geocentrist: Newton, could you tell me more about your ideas of heliocentrism?
Newton: Of course.

Differentiation Strategy

For Exercise 7
Go to the Differentiation Strategies Bank and adapt this exercise using Strategy 9.

Wrap-up

First, in small groups, ask students to discuss the following questions.
1. *Considering the difficulties that scientists before Newton had, why must scientists show proof of their work?*
2. *Why is it important for society to believe scientists?*

Afterward, ask students to compare their ideas with those of another group to see what is similar or different.

Flexi Exercises
(To adjust to students' needs, you can either use or not the activities below)

Exercise 5

05 **Read the sentences. Match the underlined words to their meanings.**

a. future possibility | b. weak possibility | c. formal request for permission | d. strong possibility | e. informal request | f. polite request

1. It's very possible that my favorite professor will offer his astronomy class again next year. — d
2. I might take the astronomy class next year if there is space. — b
3. I can take an astronomy class next year as there is space. — a
4. Could you answer some questions I have about Newton? — f
5. Professor Adam, may I present a counterargument? — c
6. Hey, Eric! Can I ask you about that scientist guy? — e

06 **Complete the blanks with the best word to complete them. Create two sentences more of your own.**

1. Hi Katie! Can / Could you help me study for the physics test?
2. Teacher, may I get your advice on my essay?
3. Grandma, can / could you give me advice on my essay?
4. It's extremely likely that we can go to the science museum next month.
5. It's somewhat likely that we might go to the science museum next month.
6. It's possible that we could go to the science museum next month.
7. Answers will vary.
8. Answers will vary.

07 **Design an experiment for NASA that will prove Newton's law of gravity as it applies to the pull of the Sun on the Earth.**
Answers will vary.

08 **With a classmate, act out a role-play in which one of you is Isaac Newton and the other is a geocentrist. Brainstorm some arguments for your role.**
Answers will vary.

Newton's arguments	Geocentrist's arguments