# Department of Education

# Grade 8

## Comets, Meteors, and Asteroids
## Second Quarter - Week 6


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## EXPECTATIONS

**Most Essential Learning Competency:**

Compare and contrast comets, meteors, and asteroids.
**(S8ES-IIg-22)**

**Objectives: Comets, Meteors and Asteroids**

1. Characterize comets, meteors and asteroids and identify their distinct features.
2. Describe the changes that happens to a fragment from a comet, asteroid or meteor as it enters the Earth's atmosphere.
3. Simulate the impacts of asteroids and comets on Earth
4. Present observations on simulating the impacts of asteroids and comets using drawing/ illustrations.

## PRE-TEST

**Before we start the lesson in this module, let us see what you already know about comets, meteors, and asteroids.**

***Directions:*** Read each question carefully and choose the BEST answer.

1. Which of the following describes a meteorite?
   A. celestial object that have fallen on the earth.
   B. meteor that makes it through the earth's atmosphere.
   C. piece of rock or metal that is travelling through space.
   D. piece of icy rock and dust that has its own orbit.
2. Most of the asteroids orbit the sun in a belt between the orbits of_____.
   A. Venus and Earth
   B. Mars and Jupiter
   C. Jupiter and Saturn
   D. Earth and Mars
3. Scientists believe that most asteroids, meteoroids and comets come from the_____.
   A. debris from the planets in other galaxies
   B. materials that have evaporated from the surface of the planets.
   C. part of materials that is left when solar system was still forming.
   D. pieces of older planets in the solar system that exploded.
4. Which of the following explains that comets are members of the solar system and not just interstellar objects passing near the sun?
   A. they follow elliptical orbit.
   B they are too hot to be interstellar objects.
   C. there are no interstellar objects as large as comets.
   D. they are moving too fast to have come from interstellar space
5. How can you distinguish meteor from a comet when viewed from earth?
   A. difficult to see with the unaided eye because it is far from the earth.
   B. moves swiftly and seems to fall on the ground.
   C. moves swiftly but stays on the atmosphere for a longer time.
   D. slowly moves in the sky and appears on the sky for a longer time.

6. Why does the tail of a comet become longer when it gets nearer the sun?
   A. because the ice melts
   B. because it loses its energy
   C. because sunlight strikes the dust trails
   D. due to friction while revolving around the sun
7. When does a comet tail become visible? When it gets_____.
   A. closer to the sun  C. far away from the sun
   B. closer to the earth  D. far away from the earth
8. Halley's Comet was last seen last 1986. When will it appear again in the sky if it takes 76 years to finish one revolution around the sun?
   A. 2026  B. 2062  C. 2093  D. 2095
9. When is the best time to watch a meteor shower?
   A. after sunset  C. between midnight and dawn
   B.. before sunset  D. between dawn and sunrise
10. Why does meteor shower appear to come from only one point in the sky?
   A. because they are travelling in a very fast speed
   B. because they are travelling in parallel path with the same velocity.
   C. meteoroids travelling in the same path collide producing streak of light.
   D. meteoroids travelling in a very slow velocity meet at the same point.
11. Which of these space objects is the largest asteroid in the solar system?
   A. Vesta  B. Ceres  C. Pallas  D. Hygiea
12. What are the three parts of a comet?
   A. the head, body, and tail  C. the nucleus, protons, coma
   B. the nucleus, coma, and tail  D. body, gas, protons
13. Which of the following space objects is defined as a small rocky or metallic objects orbiting the Sun?
   A. asteroids  B. comets  C. meteoroid  D. planets
14. What will a Near-Earth-Object (NEO) be called if its orbit crosses the Earth's and the object is larger than 140 meters across it is considered as_____?
   A. NEA  B. PHO  C. Kuiper Belt  D. Oort cloud
15. Which of the following space objects is defined as icy bodies or objects and considered as remnants from the formation of our solar system?
   A. asteroids  B. comets  C. meteoroid  D. planets

## LOOKING BACK

**Directions:** Identify the type of tropical cyclone being described in the statement.

_____ 1. Maximum Winds speed of 62 kph up to 88 kph.

_____ 2. Maximum Winds speed exceeding of 220 kph or more.

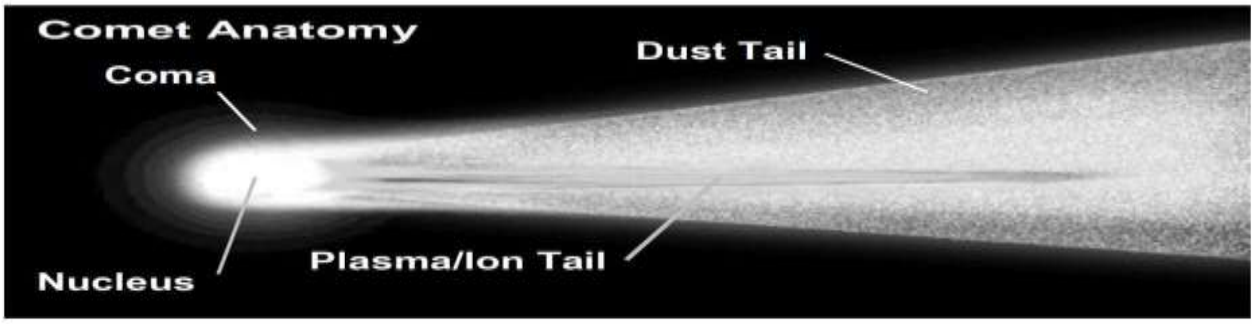
_____ 3. Maximum Winds speed of 89 kph up to 117 kph.

_____ 4. Maximum Winds speed of up to 61 kph.

_____ 5. Maximum Winds speed of 118 kph to 220 kph.

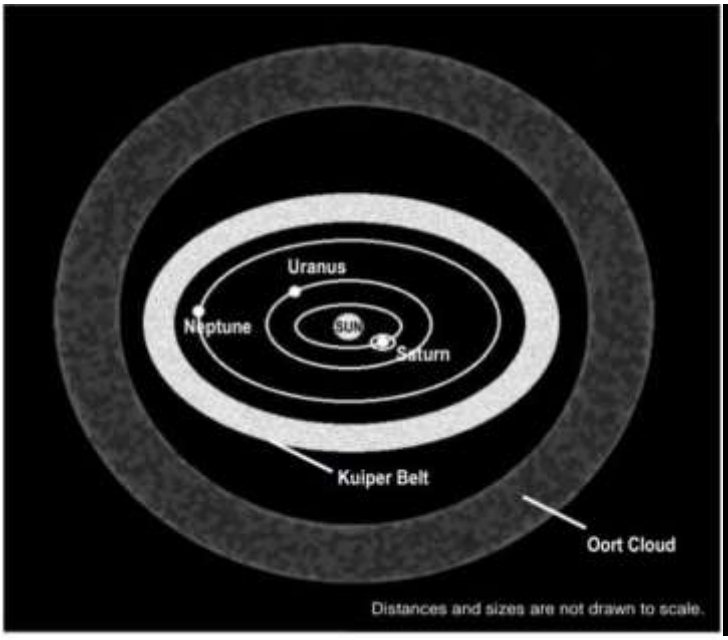
## BRIEF INTRODUCTION

Comets are one of the celestial objects that have elliptical orbit that revolves around the sun. At perihelion or it becomes closer to the sun we can see visibly its popular shape because of its vaporizing tail caused by solar radiation. This small member of our solar system is composed mainly of a mixture of ice, dust that has three parts namely, nucleus, coma and tail.




*Permission obtained from the Center for Science Education (CSE), UC Berkeley Space Sciences Laboratory*

The closer the comets get to the sun (perihelion), the hotter it gets, and the more gas and dust it releases. So the closer the comet is to the sun, the longer the tails will become. These tails always point away from the sun. Comets have a highly elliptical orbit. One complete orbit around the sun is called a comet's period. There are short and long comets, but their name has nothing to do with the length of their tails. Instead short comets have a period of less than 200 years. Haley's Comet is a short comet with a period of 76 years. Short comets usually come from the Kuiper Belt, a band of icy space objects past Neptune. Long comets have a period of more than 200 years. Scientists think long comets come from the Ort Cloud, a theoretical distant cloud of space objects.

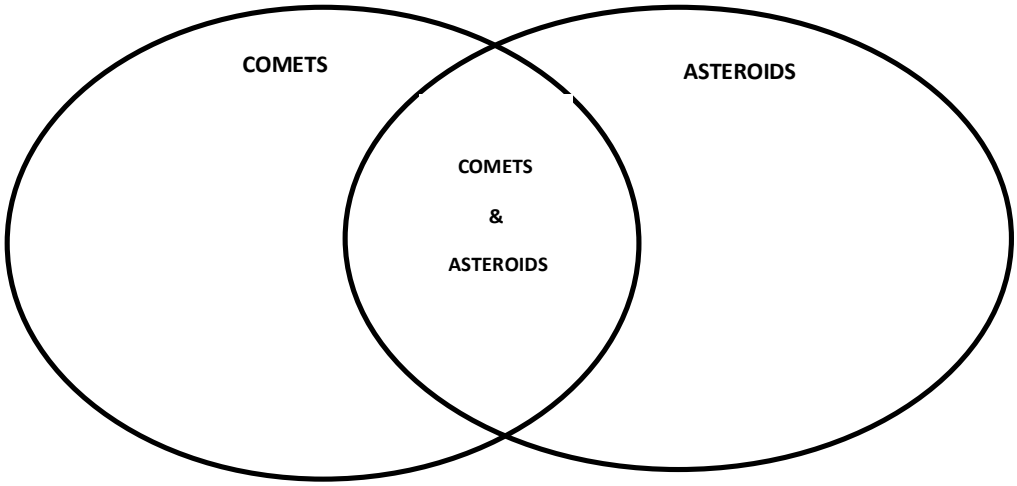



## ACTIVITIES

### Activity 1.So what's with Comets and Asteroids?

***Direction:*** Using the Venn diagram below, compare and contrast **comets** from **asteroids**. Use the information provided in the box.

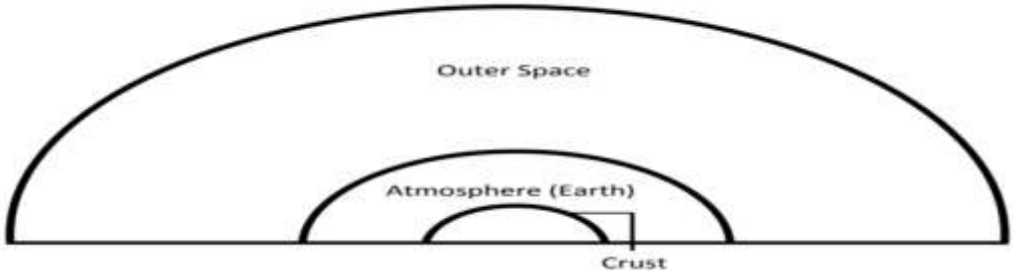
| | |
|---|---|
| *Have a long gas tail | *made of rock and/or metal |
| *Orbit the Sun | * have no atmosphere |
| *Have no tail | *Ceres is the biggest |
| *Have a long dust tail | *some close to the earth |
| *Part of our Solar System | |
| *Also known as planetoids | *Sun grazers are ones that crash into |
| *Have a long ion tail | *some have hit the earth |
| *surrounded by hydrogen cloud | *highly elliptical orbit |
| *most orbits between Mars and Jupiter | *made of frozen ice, gas and dust |




### Activity 2. Meteoroid, meteor, and meteorite: How are they related?

***Direction:***

Using the diagram below, draw where the meteoroids, meteors, and meteorites are found. Please do label them.



Q1. What is a meteor?

Q2. What is a meteoroid?

Q3. What causes a meteor?

Q4. What is a meteorite?

Q5. How are a meteor, meteoroid, and meteorite related?

**Activity 3.What happens when a comet or an asteroid hits earth?**

**Introduction:**

Has earth ever been hit by a comet or an asteroid?
How have such impacts affected Earth?
In this activity, you will make your own craters by dropping pebbles into a tray of flour.

**Objectives:**

1. Describe how impact craters are formed when a comet or asteroid hits earth based on a simulation

2. Present observations on simulating a comet or asteroid impact using drawings.

**Materials Needed:**

1 aluminum foil tray
2 pieces of pebbles (small and big-sized)
All-purpose flour * can be replaced with colored starch (using food color)or sand
Ruler
Cocoa powder or colored starch
Pencil


**Procedures:**

1. Lay down a sheet of newspaper or towel under the tray.
2. Fill the tray with flour about 5 cm deep.
3. Put a thin layer of cocoa powder on top of the flour.
4. Drop the pebbles one after another into the tray half a meter above it.
5. Observe what happened to the flour and cocoa powder. Use the ruler to measure how far the flour and cocoa powder spread.
6. Look at the resulting crater made by the two pebbles. Draw the shape of these “craters” on the flour as:

a. viewed from the top

b. viewed from the side

7. Smooth out the surface of the flour on the tray and put a new layer of Cocoa Powder on top. Try throwing the pebbles sideways or hitting the flour at an angle instead of coming down straight. How is the resulting impact pattern different from when you dropped the pebbles straight down? _____
_____

8. Compare the shape of the pebble's "crater" with the shape of the impact crater shown below. _____
_____

*Meteor Crater near Winslow, Arizona, USA*
*(Permission obtained from the Center for Science Education, UC Berkeley Space Sciences laboratory.*

**Q1.** What do you think happened to the plants and animals living in the area where the comet or asteroid crashed?
**Q2.** How often does a comet or an asteroid hit Earth?

**REMEMBER**

**Craters** are round, bowl-shaped depressions surrounded by a ring, like the one shown below. **Impact craters** are made when a **meteorite** crashes into a planet or moon (as opposed to volcanic craters, which are created when a volcano erupts). Just like in your science experiment, the size and shape of the crater depends on how big the meteorite was and how fast it was going when it hit the ground. A bigger, faster-moving meteorite will create a bigger crater, sometimes throwing material very far away from the impact site.

Some of the craters on the Moon are so big that you can see them with the naked eye! While Earth has over 100 known impact craters, not all of them are obvious. Unlike the Moon, Earth has an atmosphere with weather that causes erosion (wind and rain), along with animals and plants that can move soil and change landscapes over time. So, some craters on Earth's surface may be eroded or overgrown. Many **meteoroids** (they are called meteor**oids** while they are still in space, and meteor**ites** once they hit the ground) also burn up in Earth's atmosphere, never reaching the ground at all.

## CHECK YOUR UNDERSTANDING

### ASTEROID, COMET, OR METEOR?

Direction: Put a check in the box which indicate the appropriate feature of asteroid, comet, and meteor.

| | ASTERIOD  | COMET  | METEOR  |
|---|---|---|---|
| 1. orbits around the sun | | | |
| 2. often called “shooting star” | | | |
| 3. found mostly between the orbits of Mars and Jupiter | | | |
| 4. most famous as “Halley” | | | |
| 5. originates from Kuiper belt and Oort Cloud | | | |
| 6. also called minor planets | | | |
| 7. space rock fragments | | | |
| 8. has a more rounded orbit | | | |
| 9.appear as streak of light | | | |
| 10. referred as Near-Earth objects | | | |

## POST TEST

**Directions:** Encircle of the correct answers.

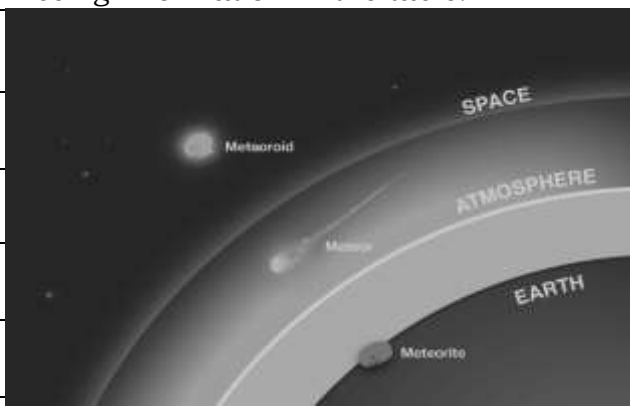
1. What is the cause of the bright streak of light when a meteoroid enters in our atmosphere?
   - A. sunlight reflected from the solid body of the meteoroid.
   - B. frictional heating as the meteoroid speeds through the gases of our atmosphere.
   - C. a process similar to the aurora that is triggered by the meteoroid's disturbing the Earth's magnetic field.
   - D. the meteoroid's disturbing the atmosphere so that sunlight is refracted in unusual directions.
2. What is the cause of Meteor showers such as the Perseids during August?
   - A. passing asteroids triggering auroral displays.
   - B. the breakup of asteroids that hit our atmosphere at predictable times.
   - C. the Earth passing through the debris left behind by a comet as it moves through the inner Solar System
   - D. nuclear reactions in the upper atmosphere triggered by an abnormally large meteoritic particle entering the upper atmosphere.

3. What do you call on the deep impression on surface of a planet or moon striked by a strong objects impact?

A. sinkhole B. plateau C. crater D. canyon

4. What is the term for many meteors appearing to come from the same point in the sky over a few hours or days?
A. Asteroid shower B. Asteroid impact C. Meteor shower D. Meteorite shower
5. What are the huge chunks of rock and metal that were believed to be a love over fragments of solar systems creation?
A. Asteroids B. Comets C. Meteor C. Meteoroids
6. What is the similarity that exists between asteroids, comets, and meteoroids?
A. are made of rock C. come from the Oort Cloud
B. come from the Asteroid Belt D. orbit around the sun
7. What is the name used to refer a meteoroid STRIKES the surface of the earth?
A. Asteroids B. Comets C. Meteors D. Meteorites
8. What is the shape of a comet's orbit?
A. Circular B. Oval C. Elliptical D. Quadratical
9. The tail of a comet always points
A. toward the sun C. toward earth
B. away from the sun D. away from the Oort Cloud
10 – 12. Use the diagram to fill-in the missing information in the table.

| A. Meteor C. Meteorite<br>B. Space D. Earth | |
|---|---|
| Space body | Location |
| Meteoroid | 10._____ |
| 11._____ | Earth |
| 12._____ | Atmosphere |




13. What do scientists think may have killed the dinosaurs?
A. The impact of a huge space object with Earth
B. The fiery tail of a comet passing near Earth
C. Fright, caused by seeing meteors in the sky
D. Most comets travel around the Sun in perfect circles.
14. What are the three major types of meteorites?
A. Stony-Iron, Iron-Stony, Wood C. Iron, Stone, Meteorite
B. Stone, Plastic, Iron D. Iron, Stone, Stony-Iron
15. Who was the first person to predict the return of a comet?
A. Edmund Halley C. Charles Messier
B. Daniel Kirkwood D. Catherine Herschel

# Answer Key

**Activity 1. Comparing and contrasting Comets from asteroids using a Venn diagram.**




| PRE-TEST. | POST TEST |
|---|---|
| 1. A. | 1. B. |
| 2. B | 2. C |
| 3. C | 3. C |
| 4. A | 4. C |
| 5. B | 5. A |
| 6. C. | 6. D |
| 7. A | 7. D |
| 8. B | 8. C |
| 9. C | 9. B |
| 10. B | 10. B |
| 11. B | 11. A |
| 12. B | 12. C |
| 13. A | 13. A |
| 14. B | 14. D |
| 15. B | 15. A |

**LOOKING BACK**

1. Tropical Storm
2. Super Typhoon
3. Severe Tropical Storm
4. Tropical Depression
5. Typhoon





**ACT 3. What happens when a comet or an asteroid hits earth?**

**#6 answer.** Drawings a & b will depend on the students actual observation. However, their drawing should have accuracy to show more or less that pebble crater have either rounded shape or a slight oblong shape.

**#7 answer.** Both impacts caused the flour to be thrown out to the surface and fly outward when hit by the pebbles.

There is pattern difference around the crater occurred when you vary the manner on how you hit the surface of the powder. When simply dropped the pebbles created a well-defined patter n around the crater, whereas when thrown sideways or at an angle the pebble formed asymmetrical pattern as more flour and cocoa powder were thrown out in only one direction.

**#8 answer**. The pebble's crater is similar to the impact crater shown in the photo.

**Q1.** The plants and animals living in that area are most likely to have died on impact.

**Q2.** About once a year, an automobile-sized asteroid hits Earth's atmosphere, creates an impressive fireball, and bursts up before reaching the surface. Every 2,000 years or so, a meteoroid the size of a football field hits Earth and causes significant damage to the area.

The chance for a comet to hit the earth in any given year is roughly 1 in 300,000.

**Activity 2. Meteoroid, meteor, and meteorite: How are they related?**

**Q1.** A meteor is a bright streak of light we see in the sky.

**Q2.** A meteoroid is a chunk of metallic or stony.

**Q3.** A meteor appears when a chunk of metallic or stony matter called a meteoroid enters the Earth's atmosphere from outer space. Air friction heats the meteoroid so that it glows. It creates a shining trail of gases and melted meteoroid particles.

**Q4.** A meteorite is a fragment from a meteoroid that reach the earth's surface.

**Q5.** A meteor, meteoroid and meteorite are related due to its origin and appearance. Indeed, a meteor appears when a chunk of metallic or stony matter called a meteoroid enters the Earth's atmosphere from outer space. Thus, once hit ground, it will called as a meteorite.

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**BOOKS**

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