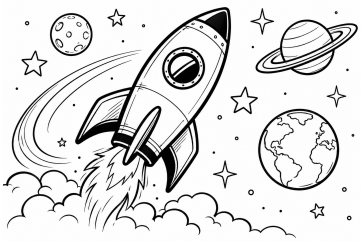
Ready for Lift-Off: Your 8th Grade Summer Packet



Congratulations on completing 7th grade! This summer packet is designed to help you keep your academic skills sharp and prepare you for a successful start to 8th grade.

Throughout this packet, you will practice important skills that you will use across all subject areas next year. Take your time, do your best work, and remember that learning is a journey!

Skills You Will Practice:

- Reading informational texts carefully
- Finding and using evidence from a text
- Writing clear and organized responses
- Analyzing and interpreting information
- Answering reading comprehension questions
- Reading and creating graphs
- Explaining your thinking using facts and data

Before We Begin...

Take a moment to think about the year ahead!

➔ **1. What is something you are excited about as you enter 8th grade?**

➔ **2. What is one academic goal you would like to achieve during 8th grade?**

What is CER?

CER is a method used to organize your thinking and support your ideas with clear evidence in science. It helps you explain your answers in a logical and structured way.

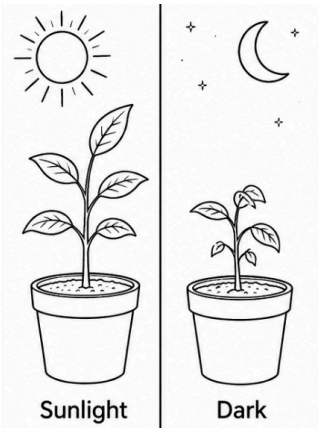
CLAIM:

What is it?

A statement or conclusion that answers a question or explains what you think is happening.

Example:

The plant grows faster in sunlight than in the dark.



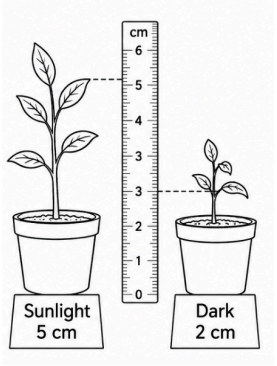
EVIDENCE:

What is it?

Facts, data, or observations you have from experiments, research, or real-world experiences that support your claim.

Example:

In an experiment, the plant exposed to sunlight grew 5 cm, while the plant in the dark grew only 2 cm.



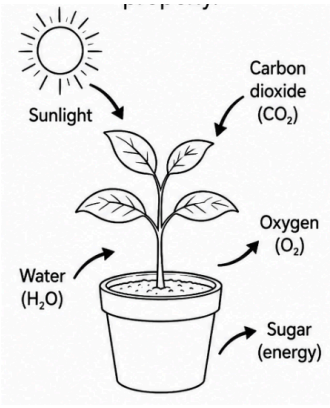
REASONING:

What is it?

Explains why your evidence supports your claim. You make connections to scientific concepts or principles.

Example:

Plants need sunlight for photosynthesis, which helps them grow. Without sunlight, the plant cannot produce enough energy to grow properly.



HOW TO WRITE A CER STATEMENT:

1. Claim:

Answer the question or state your conclusion.

2. Evidence:

Provide data, facts, or observations that support your claim.

3. Reasoning:

Explain why the evidence supports your claim, using science concepts.

EXAMPLE CER RESPONSE:

Question: Does sunlight help plants grow?

1. Claim:

Yes, sunlight helps plants grow faster.

2. Evidence:

In the experiment, the plant in sunlight grew 5 cm, while the plant in the dark only grew 2 cm.

3. Reasoning:

Sunlight is essential for photosynthesis, which is how plants make energy. Without sunlight, the plant cannot produce enough energy to grow efficiently.

WHY IS CER IMPORTANT?

- It helps you build strong, evidence-based arguments.
- It teaches you how to explain your thinking clearly.
- It shows you how science concepts connect to the real world.

Remember: CER is a tool to help you think like a scientist. Practice using it to improve your scientific explanations!

The Universe and Our Solar System

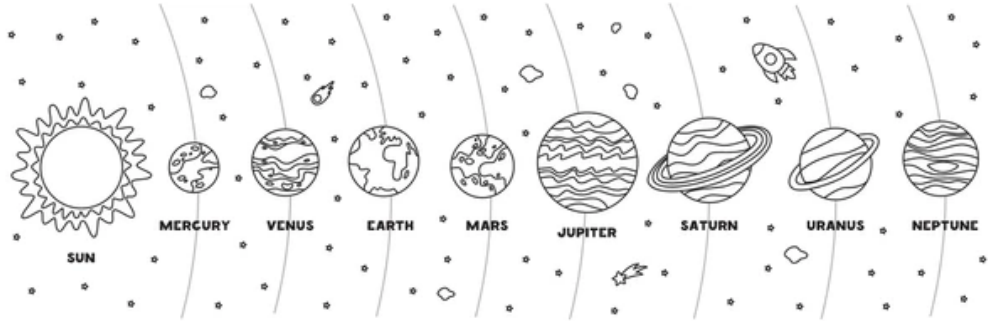
Have you ever looked up at the night sky and wondered where everything came from? Scientists have spent centuries studying space, and while there is still much to learn, they have discovered fascinating information about the universe.

The most widely accepted explanation for the beginning of the universe is called the **Big Bang Theory**. According to this theory, the universe began about **13.8 billion years ago** as an extremely hot and dense point. Suddenly, it began expanding. This expansion created space, time, matter, and energy. The universe is still expanding today. Scientists know this because they observe that most galaxies are moving away from one another.

Our home is part of a galaxy called the **Milky Way**, which contains billions of stars. One of these stars is our Sun. The Sun is at the center of our **solar system**, which includes eight planets that orbit around it.

The eight planets, in order from the Sun, are:

1. Mercury
2. Venus
3. Earth
4. Mars
5. Jupiter
6. Saturn
7. Uranus
8. Neptune



These planets can be divided into two groups. The first four planets are called **rocky planets** because they have solid surfaces. The last four are called **gas giants** or **ice giants** because they are much larger and made mostly of gases and icy materials.

Earth is currently the only known planet that supports life. Scientists continue searching for planets beyond our solar system, called **exoplanets**, that may have conditions similar to Earth. Thousands of exoplanets have already been discovered.

Astronomy, the study of space and celestial objects, helps us understand our place in the universe. By using powerful telescopes, satellites, and space probes, scientists can learn about distant stars, planets, and galaxies. Every new discovery helps answer old questions while creating exciting new ones.

Although we have learned a great deal about the universe, many mysteries remain. Scientists are still studying dark matter, black holes, and what the future of the universe may look like billions of years from now. The more we explore, the more we discover how amazing and complex our universe truly is.

CER Activity: The Universe and Our Solar System

Remember:

- **Claim:** Answer the question.
- **Evidence:** Use facts and details from the text.
- **Reasoning:** Explain how the evidence supports your claim.

➔ Why do scientists believe the Big Bang Theory is the best explanation for the beginning of the universe?

CLAIM:

_____

_____

EVIDENCE:

_____

_____

REASONING:

_____

_____

➔ How does the reading show that astronomy is important for understanding the universe?

CLAIM:

_____

_____

EVIDENCE:

_____

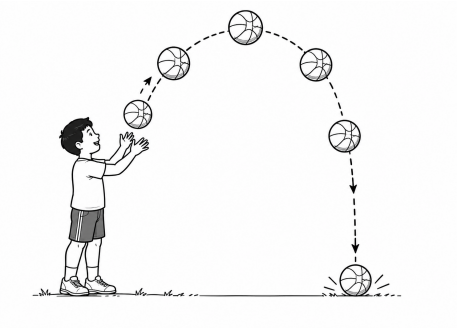
_____

REASONING:

_____

_____

Gravity: The Force That Holds the Universe Together



Imagine tossing a ball into the air. What happens? The ball eventually falls back to the ground. This happens because of **gravity**, one of the most important forces in the universe.

Gravity is a force of attraction between objects that have mass. The more mass an object has, the stronger its gravitational pull. For example, Earth has much more mass than a basketball, so Earth's gravity is much stronger. Gravity is the reason we stay on the ground instead of floating into space.

Gravity does much more than keep our feet on Earth. It plays a major role throughout the universe. The Sun's gravity holds all eight planets in our solar system in orbit. Without gravity, Earth and the other planets would travel in straight lines through space instead of circling the Sun. In the same way, Earth's gravity keeps the Moon in orbit around our planet.

Gravity also helps create stars, planets, and galaxies. Long ago, clouds of gas and dust in space were pulled together by gravity. As these clouds became denser, they formed stars and planets. Even today, gravity continues to shape the universe by influencing how galaxies move and interact with one another.

One of the most famous scientists to study gravity was **Isaac Newton**. In the 1600s, Newton developed a theory explaining how gravity works. He realized that the same force causing an apple to fall from a tree also keeps the Moon in orbit around Earth.

Hundreds of years later, another scientist, **Albert Einstein**, expanded our understanding of gravity. Einstein explained that massive objects, such as stars and planets, bend the fabric of space and time. This bending creates what we experience as gravity. Einstein's ideas helped scientists better understand how the universe works on a large scale.

Gravity affects everything in the universe, from tiny particles to enormous galaxies. It controls the movement of planets, helps form stars, and influences the structure of the cosmos. Although scientists continue to study gravity, one thing is certain: without it, the universe would look very different. Gravity is truly the force that holds the universe together.

Reading Comprehension: The Force That Holds the Universe Together

1. What is gravity?

A. A type of energy found in stars

B. A force of attraction between objects with mass

C. The movement of planets around the Sun

D. A gas found in Earth's atmosphere

2. Why do objects fall back to Earth after being thrown into the air?

A. Earth's gravity pulls them downward.

B. The Sun pushes them toward Earth.

C. Air pressure forces them down.

D. The Moon attracts them.

3. According to the passage, what keeps the planets orbiting the Sun?

A. Earth's gravity

B. The planets' own motion

C. The Sun's gravity

D. Magnetic forces

4. Which scientist explained gravity as the bending of space and time?

A. Galileo Galilei

B. Isaac Newton

C. Nikola Tesla

D. Albert Einstein

5. Which statement best describes the main idea of the passage?

A. Gravity only affects objects on Earth.

B. Gravity is an important force that shapes and influences the universe.

C. Scientists fully understand everything about gravity.

D. Gravity was discovered by Albert Einstein.

True or False:

6. _____ Gravity helps form stars, planets, and galaxies.

7. _____ Without gravity, planets would continue orbiting the Sun exactly as they do now.

8. _____ Isaac Newton studied gravity and developed a theory explaining how it works.

9. Explain one way gravity affects life on Earth and one way it affects objects in space. Use

complete sentences.
10. Why do scientists consider gravity one of the most important forces in the universe? Use evidence from the passage to support your answer.

Many planets in our solar system have moons. The gravitational interaction between a planet and its moon keeps the moon in a relatively constant orbit around the planet.

Data Table below shows some information about Jupiter and Saturn.

Planet	Moon	Mean Orbiting Distance of Moon from Planet (km)	Gravitational Force Exerted on Moon (N)
Jupiter	Io	4.22×10^5	6.3×10^{22}
Saturn	Enceladus	2.40×10^5	7.3×10^{19}

11. Which argument explains why Enceladus experiences a weaker gravitational force than o from the planet it orbits, even though Enceladus is closer to its planet?

A. The gravitational force exerted on a planet's moon is affected by the planet's magnetic field.

B. The strength of the gravitational force exerted by a planet on its moon is the same as the strength of the gravitational force exerted by the moon on a planet.

C. The speed of Enceladus results in a kinetic energy that decreases the strength of the gravitational force exerted by Saturn.

D. The masses of the planet and its moon affect the strength of the gravitational force exerted on the moon by the planet.

Why Do Scientists Use Graphs?

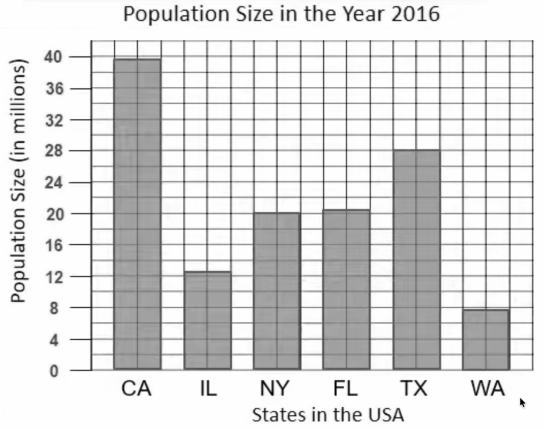
Scientists collect large amounts of information, called **data**. Graphs help organize data so it is easier to understand, compare, and analyze. Astronomers use graphs to study planets, stars, weather patterns on other worlds, and much more.

Different types of graphs help us answer different questions.

★ Bar Graphs:

A **bar graph** is used to compare different categories or groups.

For example, if scientists want to compare the sizes of the planets, a bar graph can show which planets are larger or smaller than others.



A bar graph:

- Uses rectangular bars
- Compares categories
- Helps readers quickly see differences

Use a bar graph when comparing things.

★ Line Graphs:

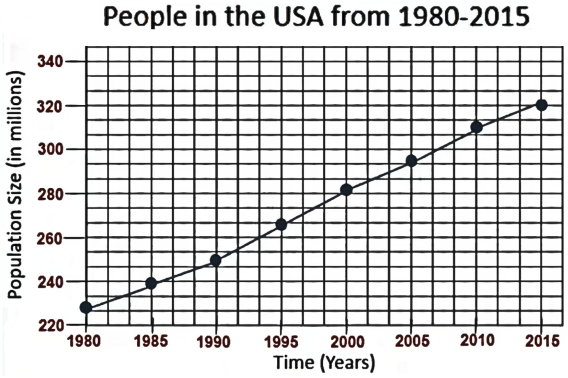
A **line graph** is used to show change over time.

For example, scientists could track the number of exoplanets discovered each year. A line graph would show whether discoveries are increasing or decreasing.

A line graph:

- Uses points connected by lines
- Shows trends and changes
- Helps readers identify patterns over time

Use a line graph when showing change over time.

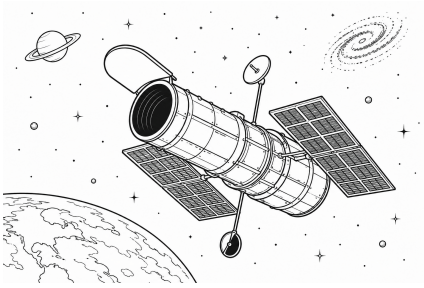


Parts of Every Graph

Every graph should have:

✓ A title ✓ A labeled x-axis (horizontal)	✓ A labeled y-axis (vertical) ✓ A scale that is easy to read	✓ Accurate data

Space Exploration: Discovering New Worlds



For thousands of years, people could only observe the planets in our solar system with their eyes. Today, powerful telescopes and spacecraft allow scientists to explore space in ways that were once impossible.

One exciting area of astronomy is the search for **exoplanets**, which are planets that orbit stars outside our solar system. The first confirmed exoplanet was discovered in 1992. Since then, scientists have found thousands more.

As technology has improved, astronomers have been able to discover new planets more quickly. Space telescopes such as Kepler and TESS have helped scientists identify planets that may have conditions similar to Earth.

Scientists also study the planets in our own solar system. Some planets, such as Jupiter and Saturn, are much larger than Earth. Others, such as Mercury and Mars, are much smaller. Comparing planetary data helps scientists better understand how planets form and evolve.

Graphs are important tools in astronomy because they help scientists organize information, identify patterns, and communicate discoveries. Whether comparing planet sizes or tracking discoveries over time, graphs allow scientists to make sense of complex data.

Graphing Activity 1: Create a Bar Graph

Planet Distances from the Sun

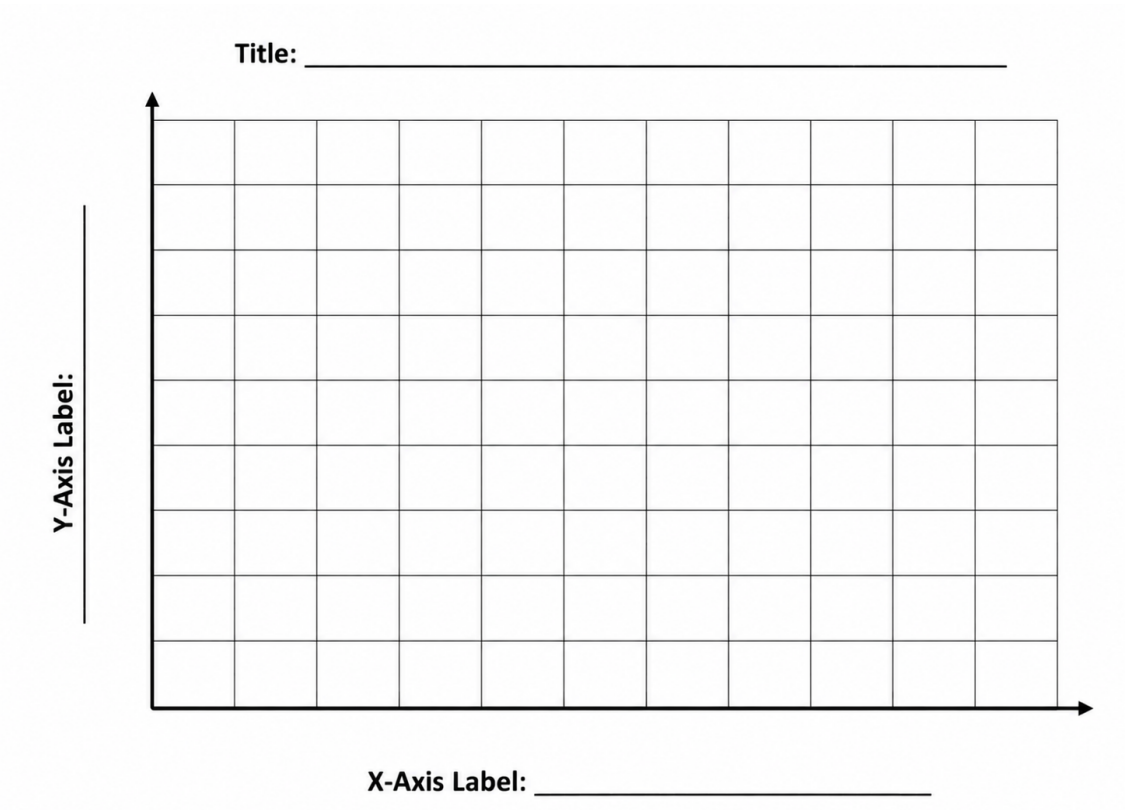
Using the data table below, create a **bar graph** showing the average distance of each planet from the Sun.

Before You Begin

1. Give your graph a title.
2. Label the **x-axis** with the names of the planets.
3. Label the **y-axis** "Distance from the Sun (million km)."
4. Choose an appropriate scale for the y-axis. A scale of 25 million kilometers works well.
5. Draw one bar for each planet using the data provided.
6. Make sure your graph is neat and easy to read.

Planet Distances from the Sun

Planet:	Distance from the Sun (million km)
Mercury	58
Venus	108
Earth	150
Mars	228



Answer the following questions using your completed graph:

1. Which planet is farthest from the Sun in this data set?

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2. Which planet is closest to the Sun?

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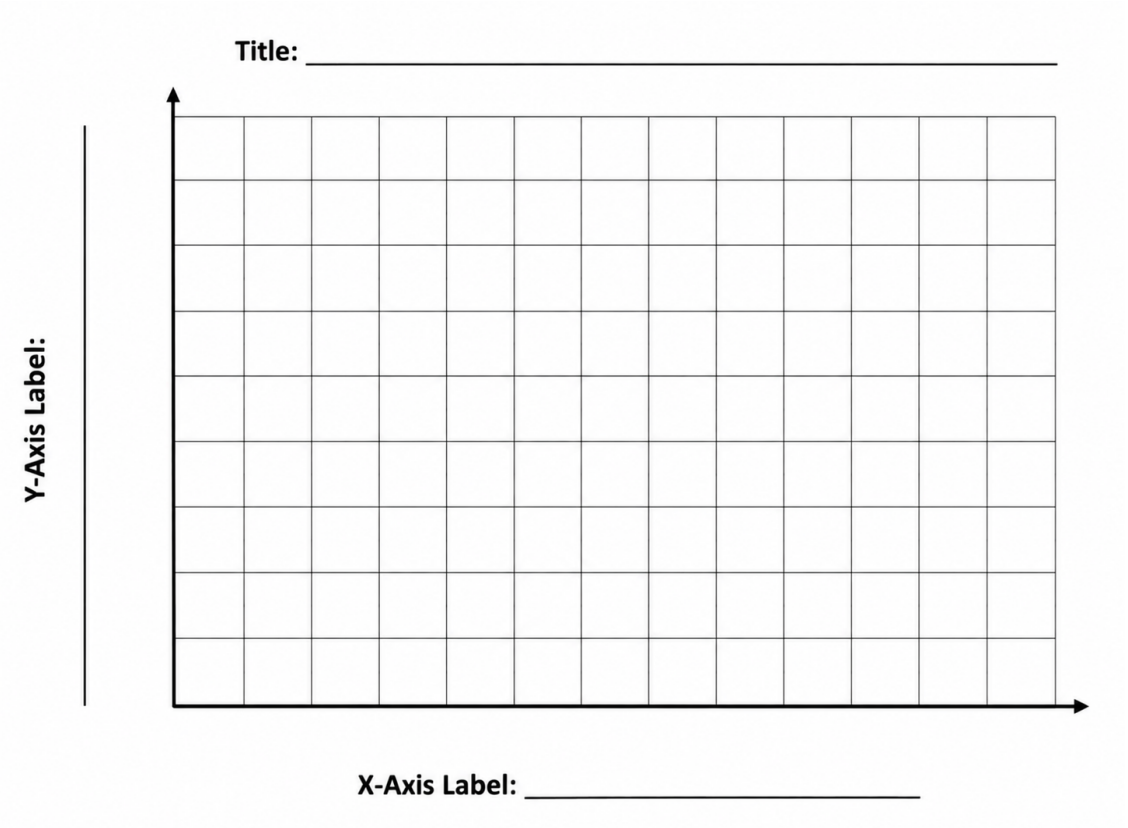
3. Why is a bar graph a good choice for comparing the distances of different planets?

Graphing Activity B: Create a Line Graph

Distance Traveled by a Space Probe

Use the data below to create a **line graph** showing the distance traveled by a fictional space probe during its mission.

Day:	Distance from Earth (million km)
1	5
2	10
3	15
4	21
5	28
6	36
7	45



Analysis Questions

1. What trend do you notice in the graph?

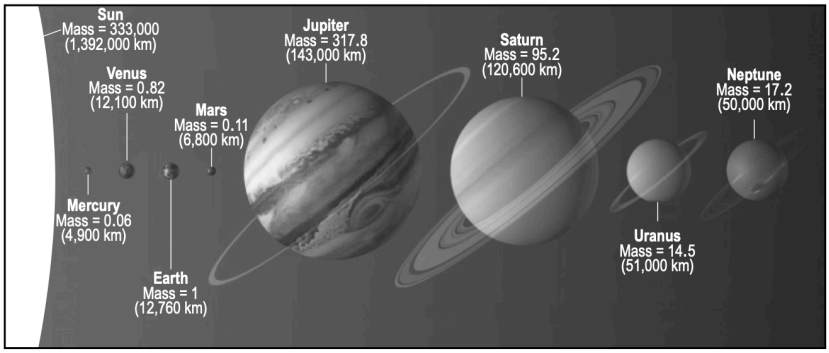
2. On which day was the probe farthest from Earth?

3. Predict approximately how far the probe might be from Earth on Day 8.

Scale Properties in Our Solar System

The eight planets of our solar system travel in nearly circular orbits around the Sun. As the distance from the Sun increases, a planet's orbit becomes larger and the planet travels slower. The planets' speeds keep the planets in stable orbits around the Sun.

The model below represents the mass (relative to Earth's mass = 1) and equatorial diameter of the Sun and the eight planets. The equatorial diameters are drawn to scale and indicated in parentheses. The distances between solar system objects are not drawn to scale.



➔ **Which claim correctly describes the orbital motion of a planet in our solar system?**

A. Mercury travels the fastest because it experiences the strongest gravitational fiel exerted by the Sun.

B. Mars travels the fastest because it is affected the most by the gravitational forces exerted by both the Sun and Jupiter.

C. Jupiter travels the slowest because it has the greatest mass of all the planets.

D. Neptune travels the slowest because it has the shortest orbital path around the Sun.