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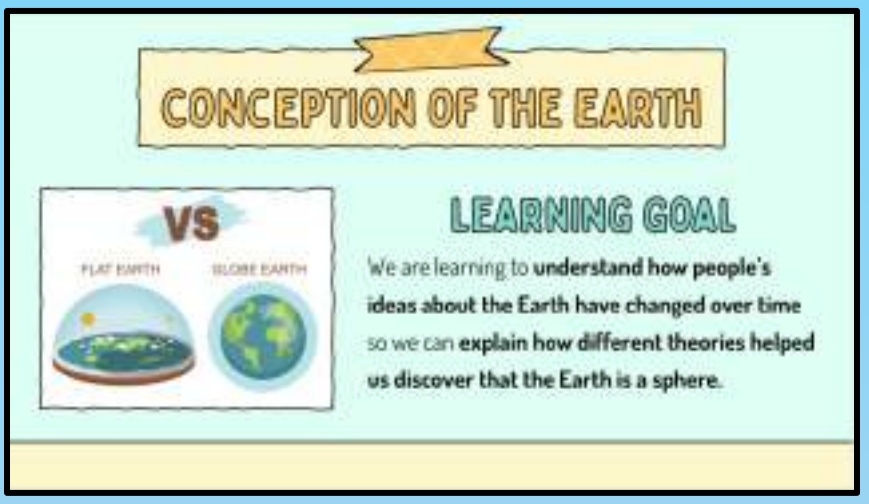
Google Slides Lessons Preview

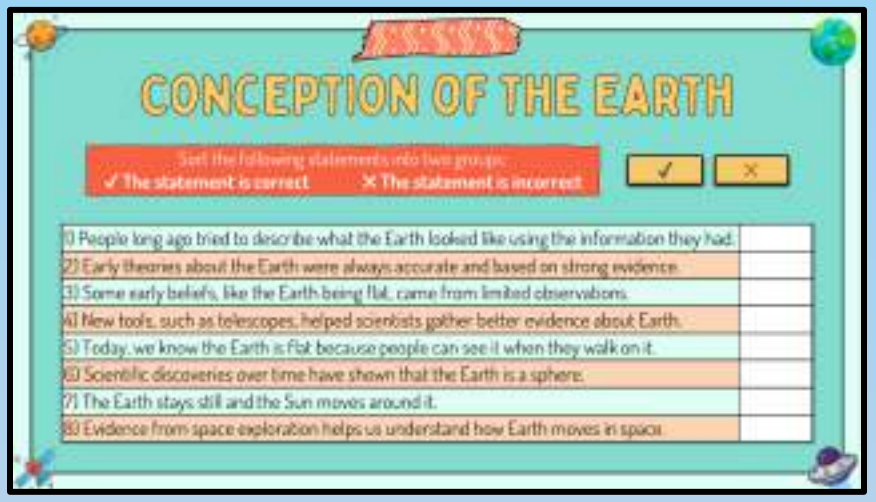
Alberta Science Curriculum
Space Unit – Grade 6

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!



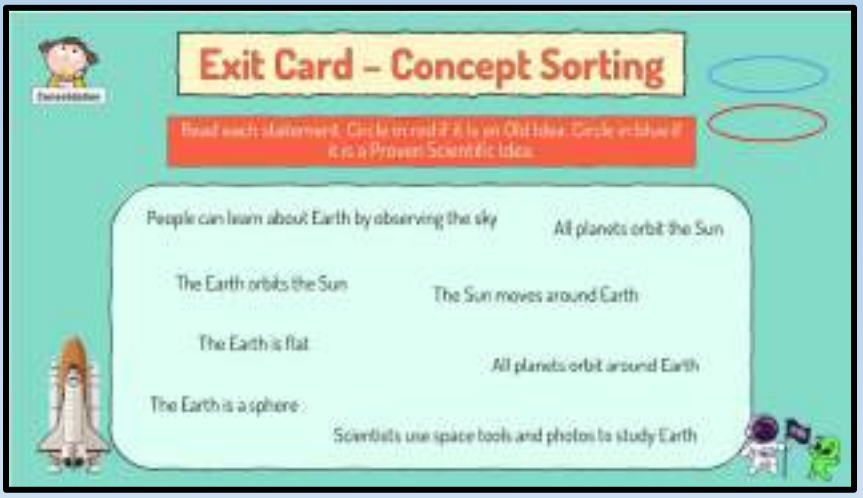


Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!



Alberta Science Curriculum
Space Unit – Grade 6

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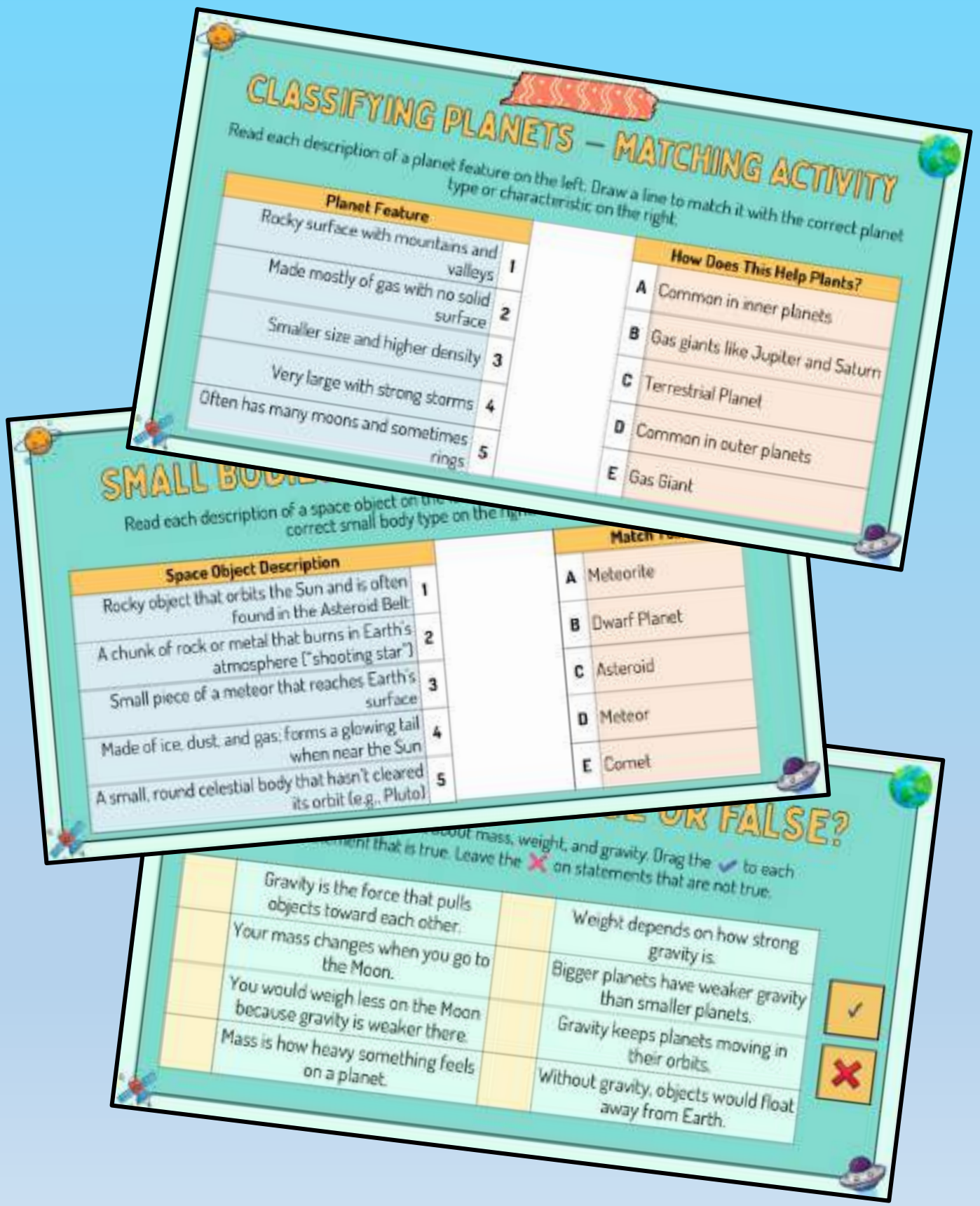
Space Unit – Grade 6



Workbook Preview

Grade 6 – Science Unit

Organizing Idea: Space: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.

Guiding Question: In what ways can the solar system be explored?

	Learning Outcome - Students investigate and interpret astronomical phenomena.	Pages
S.1	Scientific exploration of space has revealed that Earth is an interconnected part of a group of planets that orbit the Sun.	7 – 10
S.2	The solar system is a complex group of celestial bodies that include the Sun (a star), planets and their moons, dwarf planets, asteroids, comets, meteoroids, Celestial bodies are natural bodies located beyond Earth's atmosphere	11 – 14, 40 – 42, 46 – 50
S.	Celestial bodies have characteristics that vary in many ways, including surface conditions; e.g., temperature, gravity, and atmosphere	15 – 33,
S.		5
S.		9
S.		2
S.	planets and the distance between them.	5
S.8	Technologies that are used to explore the solar system include telescopes, satellites, probes, rovers, manned spacecraft, and space stations, computer modelling	57 – 62, 73 – 74, 92 – 103
S.9	Satellites are objects in space that orbit around another larger object. An orbit is the recurring path of an object around another object in space. Natural satellites are celestial bodies. Artificial satellites are constructed and put into orbit by humans.	75 – 76
S.10	The first satellite put into orbit by Alberta (Ex-Alta 1) was designed by a group of students and faculty at the University of Alberta (AlbertaSat) and was successfully launched from the International Space Station in 2017.	77 – 78
S.11	The International Space Station is a research facility that orbits Earth.	79 – 82
Computer Science:		
CS.1	Students examine abstraction in relation to design and coding, and describe impacts of technologies.	63 – 72, 83 – 91

NAME: _____

Space

Name: _____ 11

Curriculum Connection
5.2

Celestial Bodies in our Solar System

Celestial Bodies in our Solar System
Our solar system is a collection of celestial bodies orbiting our very own star, the Sun. Each object in the solar system, from the smallest meteoroid to the largest planet, plays a significant role in the cosmic dance that happens in the vastness of space.

The Centre of Attraction: The Sun
The heart of our solar system is the Sun. It's not just any star; it's the one that provides us with warmth and light. All the other bodies in the solar system orbit around the Sun due to its strong gravitational pull. It is the engine that powers the solar system.

Planets and Their Moons
Circling around the Sun are eight planets, each unique in its own way. Some are rocky, like our Earth, while others are gas giants. Each planet orbits the Sun at a different speed and distance. Many of the planets have their own moons, smaller bodies that orbit the planets. Earth, for example, has one moon.

Dwarf Planets, Asteroids, and Comets
Apart from the Sun, planets, and moons, our solar system is home to an array of smaller, yet equally fascinating celestial objects. These include:

- Dwarf planets: These are like regular planets but smaller, and they haven't cleared their orbit of other debris. This means they have lots of pieces of rock, ice, and other celestial debris floating around them. Pluto and Eris are examples.

- Asteroids: Small, rocky objects orbiting the sun, mostly found in the Asteroid Belt between Mars and Jupiter.

- Comets: Made up of ice, rock, and dust, they develop a bright tail when they get close to the Sun.

- Meteoroids: These are tiny particles or chunks of metal and rocks. When they enter a planet's atmosphere, they burn up and look like shooting stars in the sky.

Name: _____ 12

Curriculum Connection
5.2

Celestial Bodies in our Solar System

Questions

Answer the questions below using evidence from the text

1) How is the Sun important to life on Earth?

2) What is [illegible] Write two examples.

Write

Write a list comparing the f[illegible]net and a dwarf planet. What are the similarities and diff[illegible]? Wri[illegible]eas.

1)	
2)	
3)	
4)	

True or False

Is the statement true or false?

1) The Sun is the largest body in our solar system.	True	False
2) Jupiter is a dwarf planet.	True	False
3) The solar system includes eight planets.	True	False
4) Meteoroids are tiny particles or chunks that enter Earth's atmosphere.	True	False
5) Dwarf planets have no objects floating around them.	True	False

Name: _____ 13

Curriculum Connection
5.2

Solar System - Size, Structure, Age

What is a Solar System?

Our **solar system** is the collection of eight planets and their moons in orbit around the Sun. It also includes the smaller bodies in the form of asteroids, m and comets.

Age of

Our solar system w .6 billion years ago. ved th 4.7 billion years ago, g cloud of dust and gas togeth our m. The massive concentration of dust and gas created a molecular ud th lly form the Sun. With the birth of the Sun, the planets began to for million around it.

Size and Structure of the Solar System

The image above shows the size and structure of our sol As y see the size of the Earth is small compared to the size of Jupiter, Satu nd t

The furthest object that we can see in our solar system is Sedn 73 billion km away from the Sun. This means the diameter of the solar system 7.46 billion km.

There are eight planets in our solar system and one sun that each planet orbits around. An **orbit** is a regular, repeating path that one object takes around another. Therefore, all the planets orbit the Sun, as they all travel in a circle around the Sun. Since planets are further away from the Sun, it takes them longer. In fact, it takes Neptune 165 years to orbit the Sun once! Earth orbits the Sun every 365 days. Earth is the 3rd planet from the Sun, or some refer to it as the 3rd rock from the Sun.

Name: _____ 14

Curriculum Connection
5.2

Solar System - Size, Structure, Age

Questions

Answer the questions below using evidence from the text

1) What is our solar system? When was it formed?

2) What is [illegible] solar system? Did anything surprise you about the size of the planets

Questioning

Write 3 questi[illegible] have [illegible] the reading

1)	
2)	
3)	

True or False

Is the statement true or false?

1) The Sun orbits around the planets	True	False
2) All the planets orbit the Sun every 365 days	True	False
3) The Sun is the largest object in our solar system	True	False
4) The Earth orbits the Sun every 365 days	True	False
5) Our solar system was formed 4.6 billion years ago	True	False

Name: _____ 15

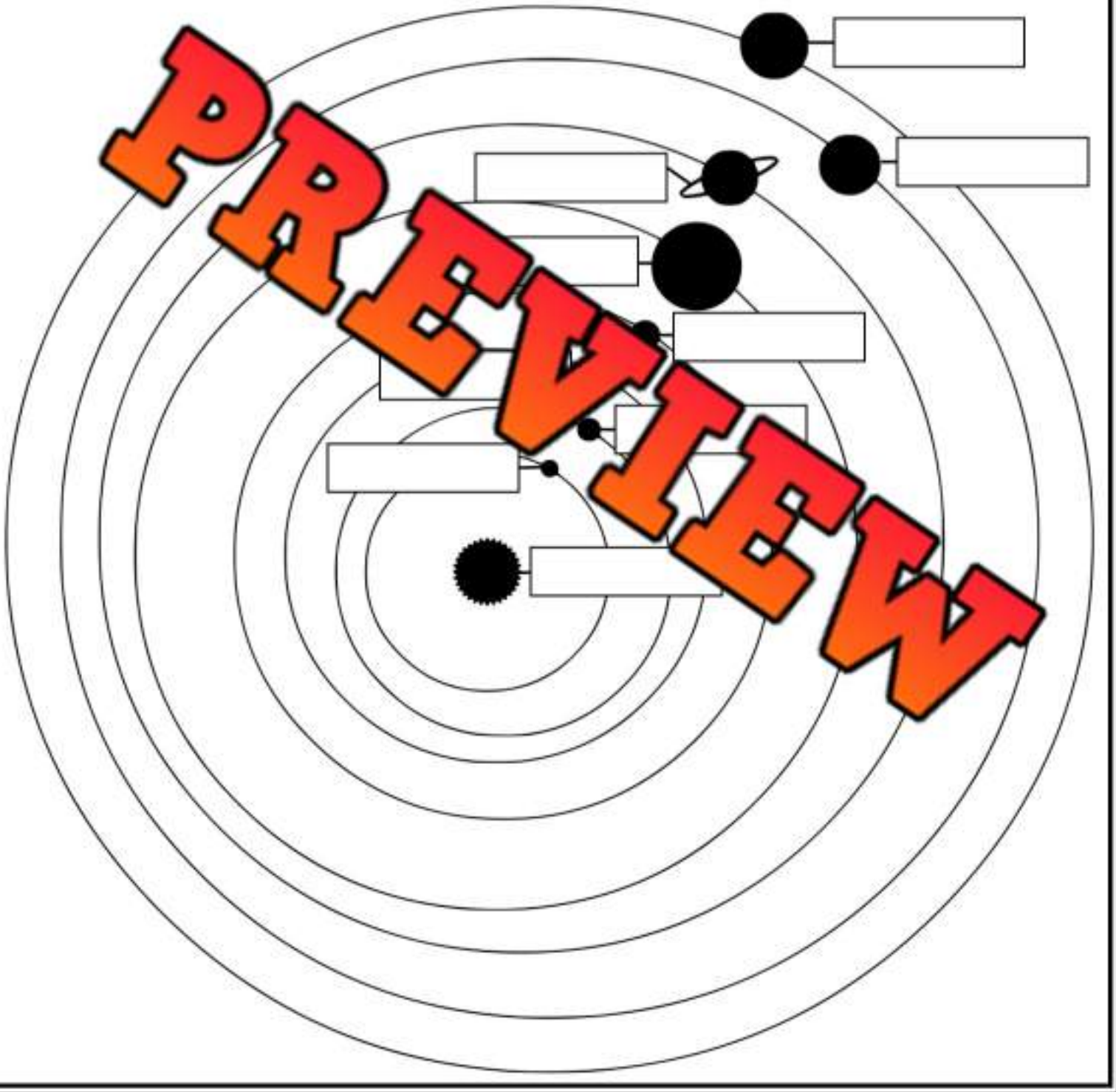
Curriculum Connection
5.3

Diagram of our Solar System

Diagram of our Solar System

Label the solar system using the word bank

Word Bank				
Mercury	Uranus	Earth	Jupiter	Saturn
Neptune	Mars	Venus	Sun	



Name: _____ 16

Curriculum Connection
5.3

Classifying Planets - Gas Giants

What is a Gas Giant?

Planets in our solar system can be classified as either a gas giant or a terrestrial planet. Gas giant planets are made of gas, unlike the rocky terrestrial planets. In our solar system, we have four gas giants: Jupiter, Saturn, Neptune and Uranus. Check out some of the characteristics of gas giant planets below.

Characteristics of Gas Giant Planets

- ☑ Compos… y are primarily composed of hydrogen and h… amounts of other gases such as methane, ammonia, and water va…
- ☑ Size: They a… th… restrial planets and have a massive size, Jupiter is the largest pl… r sola… for example.
- ☑ No solid surface: Gas … s do … e a solid surface that one could stand on. They have thick atmo… at b… gressively denser as you move deeper into the planet.
- ☑ Weather patterns: They have interna… ources … intense weather patterns, such as powerful storms and winds tha… reac… several thousand miles per hour.
- ☑ Strong magnetic fields: Gas giant planets have stron… c field… are much larger than Earth's.
- ☑ Rings and moons: Gas giant planets, such as Saturn and Jupiter, o… us moons and ring systems that orbit around them.
- ☑ High density: Despite their large size, gas giant planets have a relatively high average density, indicating that they have a relatively small rocky core, and large hydrogen and helium atmosphere.
- ☑ Different colors and patterns: Gas giant planets have different colors and patterns depending on the composition of their atmospheres and the weather patterns that occur in them.
- ☑ Life on a Gas Giant: It is unlikely that life as we know it could exist on a gas giant planet. With nothing to stand on and an atmosphere with intense pressure and temperatures, the species we have on Earth would not survive.

Name: _____ 17

Curriculum Connection
5.3

Classifying Planets - Gas Giants

Questions

Answer the questions below using evidence from the text

1) What is a gas giant planet? What planets in our solar system are gas giants?

2) Summa[illegible]eristics of gas planets. Choose some of the characteristics that sto[illegible]u.

True or False

Is the statement true or false?

1) Gas giants are made of rock	True	False
2) Gas giants are typically made of mostly oxygen and nitrogen	True	False
3) Gas giants are composed mostly of hydrogen and helium	True	False
4) Gas giants have no solid surface to live on	True	False
5) Gas giants have powerful storms and winds	True	False
6) Gas giants have no rocky core	True	False
7) Jupiter is the largest planet in our solar system	True	False

Name: _____ 18

Curriculum Connection
5.3

Classifying Planets - Terrestrial

What is a Terrestrial Planet?
A terrestrial planet is a type of planet that is primarily composed of rock or metal and has a solid surface. They are also known as Earth-like planets, as they are similar in composition and structure to Earth. The four terrestrial planets in our solar system are Mercury, Venus, Earth, and Mars.

Characteristics of Terrestrial Planets

- ☑ Composition: They are primarily composed of rock or metal and have a solid surface.
- ☑ Size: They are relatively small compared to the giant planets and have a higher density.
- ☑ Solid surface: Terrestrial planets have a solid surface that one could stand on, and they have relatively thin atmospheres compared to the gas giants.
- ☑ Geology: They have a varied geology, with features such as mountains, valleys, canyons, and other landforms.
- ☑ Different atmospheres: Terrestrial planets have different atmospheres depending on the specific planet, for example, Earth has a diverse mix of gases and weather patterns, while Venus has a thick atmosphere that causes a greenhouse effect.
- ☑ Strong magnetic fields: Some terrestrial planets like Earth have strong magnetic fields that protect the planet from harmful solar radiation.
- ☑ Different colors and patterns: Terrestrial planets have different colors and patterns depending on the composition of their surfaces and atmospheres.
- ☑ Closer to the sun: Terrestrial planets are located in the inner part of the solar system, closer to the sun.
- ☑ Life on Terrestrial Planets: Life on other terrestrial planets hasn't been discovered. Mars has a dry and cold environment that we are currently searching for life on. Scientists are constantly searching for signs of life on the other planets as well, although we haven't touched down on them yet. We are looking at life on Venus, as well as other planets and moons in our solar system and beyond.

Name: _____ 19

Curriculum Connection
5.3

Classifying Planets - Terrestrial

Questions

Answer the questions below using evidence from the text

1) What is a terrestrial planet? What planets in our solar system are terrestrial planets?

2) Summa[illegible]eristics of terrestrial planets. Choose some of the charact[illegible]st[illegible] to you.

True or False

Is the statement true or false?

1) Earth is a terrestrial planet	True	False
2) Terrestrial planets are made primarily of rock or metal	True	False
3) Terrestrial planets all have the same atmosphere	True	False
4) All terrestrial planets have the same geology with mountains and valleys	True	False
5) Terrestrial planets are further from the sun	True	False
6) Terrestrial planets are larger than Gas Giants	True	False
7) Venus has a thick atmosphere that causes a greenhouse effect	True	False

Name: _____ 20

Curriculum Connection
5.3

Comparing Earth to Mars

Comparing Earth and Mars

The vast universe we inhabit is home to an array of celestial bodies, each with its unique set of characteristics. Two such fascinating bodies are Earth, our home, and Mars, our neighbor in the solar system.

Earth and Mars share similarities but also have many stark differences. This report will compare these two planets based on various criteria including surface conditions, composition, size, and shape.

Criteria	Earth	Mars
Temperature	[illegible]C; about 1	Varies from -140°C to 20°C; average about -63°C
Gravity	Strong 807	Weaker, 3.72076 m/s²
Atmosphere	Contains Nitrog[illegible], Oxygen (21%), and other gases	[illegible]ated by Carbon Dioxide (9[illegible]d other gases
Surface Composition	Primarily solid and liquid, contains rocks, water	Prim[illegible]ontains rocks, [illegible]h gives it [illegible]d app[illegible]ce)
Presence of Rings	No visible rings	[illegible] visi[illegible]
Size - Diameter	Larger, approximately 12,742 km	Smaller, approxim[illegible]779 km
Shape	Nearly spherical, due to gravity	Nearly spherical, due to gravity

In conclusion, Earth and Mars are both unique and intriguing celestial bodies. Despite being in the same solar system, they offer a contrasting picture of surface conditions, composition, size, and shape.

These differences contribute to Earth being a habitable planet teeming with life, while Mars, despite ongoing exploration, remains a cold, lifeless planet.

Name: _____ 21

Curriculum Connection
5.3

Comparing Earth to Mars

Questions

Answer the questions below using evidence from the text

1) How are the gases on Earth and Mars different? Why is that important in deciding if we can survive there?

2) Why ... humans to survive on Mars?

Compare

Write a list of 4 simila... ...etween Mars and Earth.

1)	
2)	
3)	
4)	

True or False

Is the statement true or false?

1) Mars' average temperature is colder than Earth's.	True	False
2) Earth has a weaker gravity than Mars.	True	False
3) Mars' atmosphere is dominated by Oxygen.	True	False
4) Both Earth and Mars have visible rings.	True	False
5) Mars is red because of iron oxide dust.	True	False

Name: _____ 22

Curriculum Connection
5.3

Comparing Jupiter and Mercury

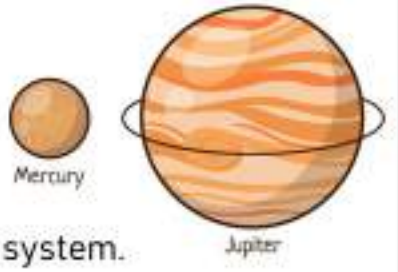
A Comparison of Jupiter and Mercury

Our solar system is an incredible place filled with diverse celestial bodies, each with their own unique characteristics. Today, we're going to take a closer look at two of these: Jupiter, the largest planet in our solar system, and Mercury, the smallest planet closest to the Sun.

Criteria	Jupiter	Mercury
Tempe	Jupiter has an average emperature of -145 degrees	Mercury experiences extreme temperature changes, from -173 degrees Celsius at night to 427 degrees Celsius during the day.
avity	tional force on /s².	The gravitational force on Mercury is 3.7 m/s².
Atmosphere Composition	's at (98%) helium	Mercury has a very thin atmosphere, composed mostly of oxygen, sodium, hydrogen, helium, potassium.
Surface Composition	Jupiter is a gas giant small rocky core.	is a rocky planet, made heavy metals and
Presence of Rings	Jupiter has a faint ring system made up of dust particles.	rings.
Size - Diameter	Jupiter's diameter is approximately 139,820 kilometers.	Mercury's diamet approximately 4,
Shape	Jupiter's rapid rotation causes it to be slightly flattened at the poles and to bulge at the equator.	Mercury is spherical but is slightly elongated compared to Jupiter due to its slower rotation.

In conclusion, Jupiter and Mercury show us just how diverse the planets in our solar system can be. Despite being in the same solar system, they are vastly different in their size, surface conditions, composition, and shape.

Understanding these differences helps us appreciate the wide variety of celestial bodies that exist in our incredible solar system.



Name: _____ 23

Curriculum Connection
5.3

Comparing Jupiter and Mercury

Question If you were on the planet below, what would you see and feel?

Jupiter

Mercury

Compare Write a list of 4 similarities and differences between Jupiter and Mercury

True or False Is the statement true or false?

1) Mercury experiences extreme temperature changes.	True	False
2) The gravitational force on Mercury is stronger than Jupiter.	True	False
3) Jupiter's atmosphere is mostly hydrogen and helium.	True	False
4) Mercury has a very thick atmosphere.	True	False
5) The diameter of Jupiter is larger than Mercury.	True	False

Name: _____ 24

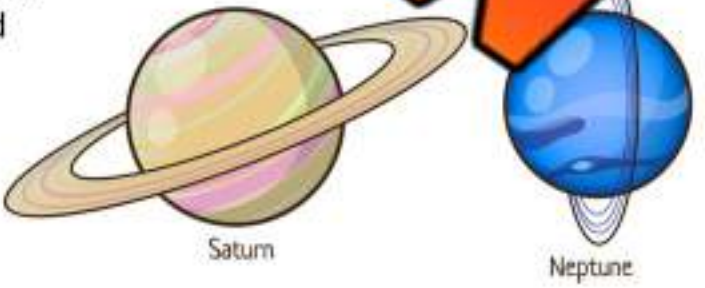
Curriculum Connection
5.3

Comparing Saturn and Neptune

Comparing Celestial Bodies: A Closer Look at Saturn and Neptune
Looking up at the sky can make you wonder about all the amazing things in space. Today, let's learn about two cool planets: Saturn and Neptune. Saturn is famous for its bright rings, and Neptune is the planet farthest from the Sun in our solar system. Both have interesting features that make them special.

Criteria	Saturn	Neptune
Temp[illegible]e	-178 °C	-214 °C
[illegible] Earth)	1.07 times	1.14 times
Atmosphe[illegible] Composition	[illegible]stly H[illegible]%) and	Mostly Hydrogen (80%), Helium (19%), and Methane (1%)
Surface Composition	[illegible]an	Ice Giant
Presence of Rings	Yes	Yes
Size - Diameter	116,460 km	[illegible]
Shape	Oblate Spheroid	[illegible]

Saturn and Neptune: How Are They Different?
Saturn is well-known for its shiny rings and is the second-biggest planet in our solar system. Neptune is smaller but really interesting because it has a deep blue color and super-fast winds, the speediest in the solar system.



Saturn is a gas giant, which means it's mostly made of gas, like hydrogen and helium, rather than solid stuff like rocks or ice. It's big, but not heavy for its size. Neptune, on the other hand, is an ice giant. It's got a lot of water, ammonia, and methane, substances that can turn into a sort of 'icy' material when they're really cold. Despite the name, it's not made of the kind of ice you'd put in your drink.

Name: _____ 25

Curriculum Connection
5.3

Comparing Saturn and Neptune

Questions

Answer the questions below using evidence from the text

1) How are the two planets similar? Write at least 2 ways.

2) How are [illegible] different? Write at least 2 ways.

Draw

Draw Saturn and N[illegible] an[illegible] based on their descriptions

True or False

Is the statement true or false?

1) Saturn is an ice giant.	True	False
2) Neptune is the planet closest to the Sun.	True	False
3) Saturn is known for its bright rings.	True	False
4) Neptune's winds are the slowest in the solar system.	True	False
5) Neptune's substances can turn into an icy material when very cold.	True	False

Name: _____ 26

Curriculum Connection
5.3

Comparing Uranus and Venus

Comparing Uranus and Venus

Our universe is full of exciting and fascinating celestial bodies. Today, we'll take a closer look at two of these - Uranus and Venus. Uranus, known for its icy-blue color, and Venus, sometimes referred to as Earth's "sister planet", each have their own unique characteristics that set ther rt.

Venus

Cri	Uranus	Venus
Te	mely cold at -197°C	Extremely hot, averaging 462°C
Gravity	we 87 m/s²)	Similar to Earth (8.88 m/s²)
Atmosphere	tly Hy d Helium a hi (which blue	Thick, mostly Carbon Dioxide, with clouds of sulfuric acid
Surface Composition	An icy m su rock and meta	Rocky, with mountains, valleys, nd tens of thousands of volcanoes
Rings	Yes	No
Size - Diameter	Large - 50,724 km	Si 12,104 km
Shape	Slightly squashed sphere ("oblate spheroid")	perf here

Saturn and Neptune: How Are They Different?

While Uranus and Venus are both part of our solar system, they couldn't be more different. Uranus, which is the seventh planet from the Sun, is recognized for its appealing blue-green hue, a result of its icy covering made of substances such as water, ammonia, and methane. It also has a set of rings around it.

Uranus

Venus, being the second planet from the Sun, has extremely hot temperatures, surpassing even those on your oven! It has dense clouds that trap in the Sun's heat. Below the clouds, the surface is covered in volcanoes.

Name: _____ 27

Curriculum Connection
5.3

Comparing Uranus and Venus

Fact Sheet Write a one-sentence fact about each category in the table (temperature, gravity, etc.) for both Uranus and Venus.

Uranus Fact Sheet

Venus Fact Shee

Story - Dream Tour Through the Solar System

Dream Tour Through the Solar System

Once upon a time, in the heart of a small town lived a dreamer named Alex. Every night, Alex would look up at the star-studded sky and dream about visiting each planet in the solar system.

One night, as Alex was drifting off to sleep, he had an extraordinary dream. He found himself aboard a magical spaceship ready to embark on a celestial journey.

First, he visited Mercury. He passed the Sun. It felt like standing in a giant desert, extremely hot on one side and freezing cold on the other side in the shadow. He could see countless craters from meteors that have hit the planet over the years.

Next, he approached Venus. The intense heat and yellow clouds were intimidating. The spaceship could not land because the surface was [illegible] the air pressure was like being under the sea. It was a stark contrast [illegible]

The third stop was our home, Earth. Alex felt a warm familiarity, admiring the beautiful blue oceans and the vibrant green land from space.

Next was Mars, the Red Planet. It felt like being in the world's biggest desert. The surface was rocky and dusty, but Alex was thrilled by the sight of the largest volcano in the solar system, Olympus Mons.

Story - Dream Tour Through the Solar System

Jupiter, the gas giant, was the next stop. Alex was amazed at its size. He could see the Great Red Spot, a storm that has been going on for hundreds of years. But landing was impossible as there was no solid surface to step on.

The s[illegible]then made its way to Saturn. Its beauti[illegible]nd rock were a sight to behold. As they m[illegible]ed clo[illegible]der hood that he couldn't land on Saturn either, [illegible] anoth[illegible]iant. He would sink right through and get crushed by the pressu[illegible]f th[illegible].

The journ[illegible]ued [illegible]us, an ice giant. It was like a big, blue-green snowball [illegible]ace[illegible]s icy surface. Alex found it amusing that it [illegible]s on[illegible]ared to other planets.

Finally, he reached Neptune, the farth[illegible]p[illegible]m the Sun. Its intense cold and supersonic winds were [illegible]merizing, and its deep blue color was a sight to remember.

As the dream came to an end, Alex woke up with a broad smile, cherishing the exciting journey through the solar system. He knew that this was a dream he would never forget, and it only fueled his passion to learn more about these fascinating planets. And who knows? Maybe one day, he would really get to visit them!

Name: _____ 31

Curriculum Connection
5.3

Activity - Writing Your Own Space Story

Write Write your own story that shows your understanding of the planets or one planet

Name: _____ 34

Curriculum Connection
5.7

Solar System Assignment

Assignment | What are we learning more about?

Our solar system is a fascinating collection of planets, moons, asteroids, comets, meteoroids, and our star – the Sun. The components of our solar system are in certain positions that scientists have figured out using high-powered telescopes, satellites, and space probe

Your i e to represent the 8 planets in our solar system. You should try to be as accu eir position relative to each other. T ans y t have the Earth closest to the Sun beca sed the third planet from the Sun.

In addition, the size o ets sh considered and created to scale xan diameter is about 11 times larger than E d the 0 times wider than Jupiter!

When you are finished, you can present your s yste el to the class. Your class could do a science fair where you show you els t

Ideas | Check out some ideas for models below. Searc nli re

- A fruit inspired solar system on a paper plate
- Brownie solar system
- Play dough solar system
- Styrofoam solar system
- Button solar system
- Yarn wrapped solar system
- Plastic lid solar system
- Solar system mobile
- Coat hanger solar system

Name: _____ 35

Curriculum Connection
5.7

Solar System Assignment

Planning | Explain the model you chose

1) Describe the model you will make.

_____

_____

_____

2) What [illegible] ed?

3) Write the planets in order from smalles[illegible] bigges[illegible] w.

4) Write the planets in order from closest to the Sun to furthest.

5) How will you make sure the planets will be the right size and in the right order from the Sun?

_____

_____

_____

Name: _____ 38

Curriculum Connection
5.5

Asteroids and the Asteroid Belt

What is an Asteroid?

An **asteroid** is a chunk of rock and metal in outer space that is in orbit around the Sun. Asteroids are not round, but instead are shaped like potatoes. They vary in size from less than a meter in diameter to hundreds of kilometers across.

Types of Asteroids

There are 3 [illegible] of asteroids that are categorized based on which elements make up the asteroid. Th[illegible] of asteroids are carbon, stony, and metallic.

1. **Carb[illegible]** [illegible]om rocks that are rich in carbon. These asteroids are very dark in colour a[illegible] 75% [illegible] all asteroids in the solar system.
2. **Stony Asteroid[illegible]** up of [illegible]ck and some metal
3. **Metallic Asteroids** – [illegible]s, mainly iron and nickel but often have small amounts of stone m[illegible]

Asteroid Belt

There are hundreds of thousands of asteroids that form a scattered ring of asteroids that orbit the sun. These asteroids form what scientists call the asteroid belt. The asteroid belt is located between the planets Mars and Jupiter. The Kuiper Belt is located [illegible] outer part of the solar system. It is much thicker, but is also made up of rock and metal chunks that were left over after the planets formed.

Sometimes asteroids are forced out of the asteroid belt by gravity and sent towards the outer solar system. Luckily, not many get too close to Earth!

Largest Asteroids

The largest asteroids are so large, they are considered dwarf planets or minor planets. The four largest asteroids are Ceres, Vesta, Pallas, and Hygiea.

Name: _____ 39

Curriculum Connection
5.5

Asteroids and the Asteroid Belt

Questions Answer the questions below using evidence from the text

1) What is an asteroid? What types of asteroids are there?

2) What is [illegible] belt?

Visualizing Draw what you [illegible] were reading. Explain the picture

True or False Circle whether the statement is true or false

1. An asteroid is always made from rock and stone	True	False
2. Some asteroids are so large, they are considered minor/dwarf planets	True	False
3. The asteroid belt is between Earth and Mars	True	False
4. Some asteroids are smaller than a meter in diameter	True	False
5. An asteroid will never escape the asteroid belt	True	False

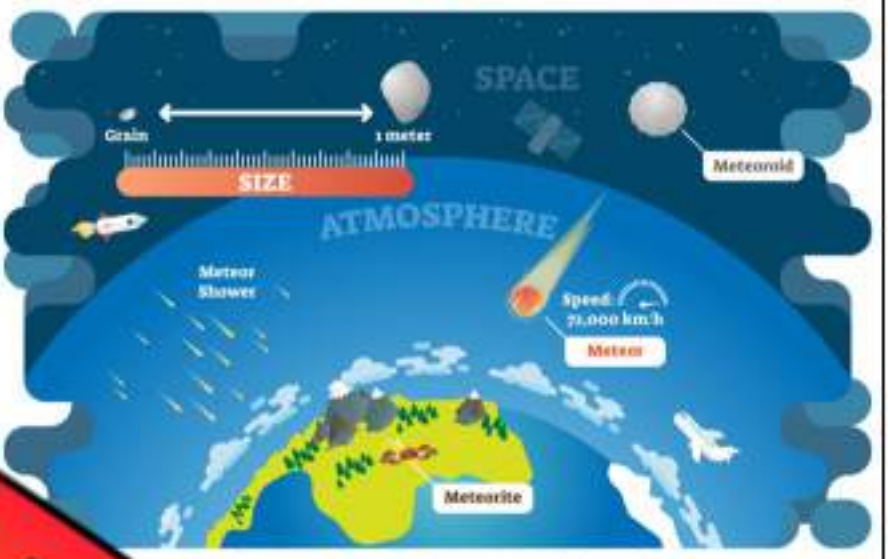
Name: _____ 40

Curriculum Connection
5.2

Meteors, Meteorites, and Comets

What is a Meteor?

A **meteor** is an asteroid or other object that burns or vaporizes when it enters the Earth's atmosphere. Sometimes asteroids will be on a trajectory to collide with the Earth. This is not dangero[illegible]ecause our atmosphere [illegible]zes and burns the larger [illegible]s that nothing [illegible]e [illegible]is process [illegible]ening [illegible] see a "shooting [illegible]ky.



Very rarely, [illegible] piece[illegible] of the asteroid will s[illegible]e its [illegible]ugh the atmosphere and land on the Earth's surface. These p[illegible]known [illegible]**teorites**. A **meteoroid** is a meteor that hasn't entered the earth's a[illegible]e. I[illegible] an asteroid, but much smaller.

A meteor enters the Earth[illegible]pper [illegible]t 72,000km/h! Meteors can be seen at any time, but it is best to look f[illegible] duri[illegible]eor showers. These occur around the same dates each year, when[illegible]e Earth[illegible]es through a stream of dust left behind a passing [illegible].

What is a Comet?

A **comet** is a celestial body that orbits the Sun. They a[illegible] the edge of our solar system, beyond the orbit of Pluto. W[illegible] se[illegible]hey get close enough to the Sun because they display a visible coma[illegible]s and dust. Comets are made of dust, ice, and small rocky particles.

Halley's comet is the most well known comet because it can be s[illegible]by the naked eye every 75 to 76 years. It was last seen on Earth in 1986 and will be visible in 2061 again when it appears in the inner solar system. The comet is named after English astronomer Edmond Halley, who examined reports of a comet approaching Earth in 1531, 1607, and 1682. He figured out that these three comets were actually the same comet returning over and over again. He predicted that the comet would come again in 1758.

Even though he wasn't alive to see the comet's return, he was correct in his prediction. The comet was eventually named after him. He is credited with discovering that comets can orbit the Sun, which means they become visible to us at predictable times.

Name: _____ 41

Curriculum Connection
5.2

Meteors, Meteorites, and Comets

Questions

Answer the questions below using evidence from the text

1) What is the difference between a meteor and a meteorite?

2) What is [illegible] Halley's comet the most well known?

Questioning

Write [illegible] about the reading

1)	
2)	
3)	

True or False

Is the statement true or false?

1. A meteorite is a shooting star – an asteroid burned up completely	True	False
2. A meteor is a piece of meteorite that lands on the Earth's surface	True	False
3. A comet orbits the sun on the outer edge of the solar system	True	False
4. Halley's comet can be seen every 70 years	True	False
5. A comet is most visible when it is near the sun	True	False

Name: _____ 42

Curriculum Connection
5.2

Identifying Celestial Bodies

Which Type? Which celestial body does the description represent?

Word Bank			
Meteor	Meteorite	Meteoroid	Planets
Asteroid	Comet	Star	
Natural Satellite	Solar System	Galaxy	

1)	Small ... is outside of the Earth's atmosphere. Is often a ... that breaks off	
2)	Col... on of ... other celestial bodies that orbit a star becau... g gr...	
3)	Small rock th... s the ... osphere	
4)	Smaller than planet... ... than ...roids. These orbit around the Sun.	
5)	Huge celestial bodies made up of ga... ... ir own heat and light and often have ... orbiti...	
6)	Small rock that lands on the Earth's surface	
7)	Collection of solar systems, including billions ... ars	
8)	Celestial bodies that orbit planets	
9)	Made of ice, rock, and dust, these orbit the sun. We can see a tail on them when they get close to the Sun.	
10)	Examples – Jupiter, Mars, Saturn	
11)	Examples - Titan, Triton, Phobos, Europa, Mimas, Io	
12)	Examples – Milky Way, Andromeda, Cygnus A, Virgo A	
13)	Examples – Sirius, Polaris, Rigel, Vega, Pleiades, Antares	
14)	Examples – Ceres, Eros, Hathor, Hermes, Icarus	
15)	Examples – Halley, Chron, Encke, Arend-Roland, Hale-Bopp	

Name: _____ 43

Curriculum Connection
5.4

Emitting or Reflecting Light?

Emitting Light vs Reflecting Light

Light sources that create light for us to see are **light emitters.** Emitting light means they create light. Our solar system emits a lot of light for us on Earth.

On the other hand, some things look like they emit light, but really they just reflect light from a light source. **Reflecting light** means the object doesn't create their own light, they just bounce the light off of them.

Examples of Light Emitters

The Sun in our solar system are light emitters because they are all sources of light. They all create light instead of just reflecting it. The Sun is actually a star, and it is a pretty average size star. There are about 200 billion stars in our Milky Way Galaxy.

The Sun emits so much light that it creates daylight for us. That is because the Sun is close to our planet. Any other star. Those other stars are also producing similar amounts of light, but they are much, much further away from the Earth.

Stars are balls of burning gases, mostly hydrogen and helium. They emit light because their gravity causes its gases to fuse together. This process releases energy in the form of light and heat and it makes the star glow.

Examples of Light Reflectors

The moon, other planets and their moons, asteroids, and comets are all examples of light reflectors. The moon is a light reflector that reflects the light from the Sun. That is why you can stare directly at the moon, but not at the Sun. Staring at the Sun can cause blindness because it is such a powerful light emitter, but the moon won't cause you any damage because it is not creating any light and it reflects a much lower amount of light energy.

When we see other celestial bodies in outer space, we can only see them because they reflect light from the stars, mainly the Sun. These stars illuminate the other comets, planets, asteroids, and moons in our solar system. The moon's composition is mostly oxygen, silicon, magnesium, iron, calcium, and aluminum. Together, these materials reflect only 3 to 12 percent of the sunlight that falls on it. This means the moon isn't a great light reflector.

Name: _____ 44

Curriculum Connection
5.4

Questions - Emitting or Reflecting Light

Questions

Answer the questions below using evidence from the text

1) What is the difference between a light emitter and a light reflector?

2) What do[illegible] from the sun to illuminate other celestial objects? Which celestial bodies [illegible]?

Questioning

Write 3 questi[illegible] the reading

1)	
2)	
3)	

True or False

Is the statement true or false?

1. A light emitter is a light source that creates light	True	False
2. A light emitter only reflects light and does not create it	True	False
3. Stars, and the sun (also a star) are light emitters	True	False
4. The moon is a light emitter because it is bright	True	False
5. The moon is a good light reflector that reflects 100 percent of sunlight	True	False

Name: _____ 45

Curriculum Connection
5.4

Emitting or Reflecting Light?

Which Type? Is the picture an example of a light emitter or light reflector?

Star

Emitter	Reflector

Saturn

Emitter	Reflector

Sun

Emitter	Reflector

Earth

Emitter	Reflector

Emitter	Reflector

Jupiter

Emitter	Reflector

Earth's Moon

Emitter	Reflector

Mars

Emitter	Reflector

Emitter	Reflector

Explain Which celestial bodies reflect light and which emit light

Emit Light	Reflect Light

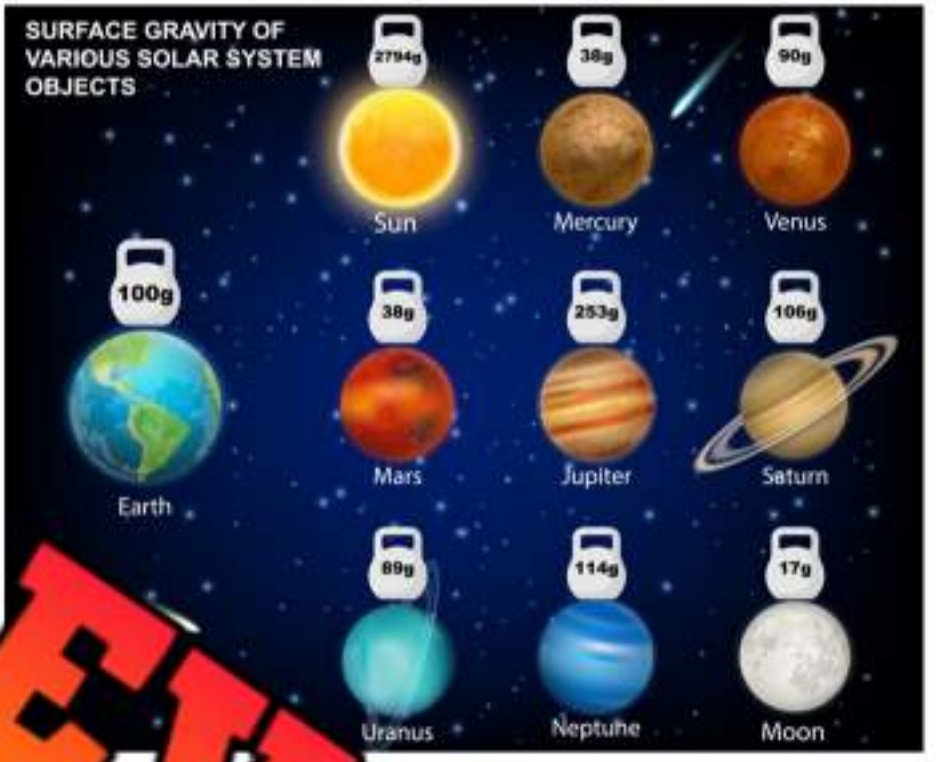
Name: _____ 46

Curriculum Connection
5.2

Gravity

What is Gravity?

Gravity is the force of attraction that pulls together all matter. The Earth has a gravitational pull that pulls all matter towards the centre of the earth. All massive objects (planets and stars) have a gravitational pull that pull matter towards the centre.



Earth has a gravitational pull, but the Moon has a much smaller pull. The Sun has a much stronger gravitational pull than the Earth because the Sun is a bigger planet/star, the more gravitational pull it has. We do not feel the Sun's gravitational pull as much as Earth's because we are too far away from the Sun. The Sun's gravitational pull is important however, because it keeps all of the planets in our solar system in orbit around the Sun. Without the Sun's gravity, no planets or asteroids would stay close to it and there would be no orbiting.

Sir Isaac Newton

In 1966, Newton observed an apple falling from a tree. He realized what force made the apple fall downward instead of simply floating away. He realized that the Earth must attract the apple, which is why it falls straight downward. He called the force between the Earth and Matter – gravity.

Why is Gravity Important

Without gravity, we wouldn't be able to stay on the Earth's surface. We would float away along with all of our stuff. Gravity is also the force that keeps the Earth orbiting around the Sun.

Mass vs Weight

Our weight is based on gravity. **Weight** is the measurement of the force of gravity pulling on an object. This means our weight is how much gravity is pulling us towards the Earth's surface. Mass is different. **Mass** is the amount of matter in an object.

On other planets or on the moon, we weigh a different amount because their gravitational pull is stronger or weaker. However, our mass is the same on all planets because our bodies have the same amount of matter.

Name: _____ 47

Curriculum Connection
5.2

Gravity

Visualizing

Draw a picture of what you were picturing while you were reading

True or False

Circle whether the statement is true or false

1. The gravitational pull [illegible] planets	True	False
2. Gravity is the force that pul[illegible] Earth	True	False
3. All objects have their own gravitational [illegible]	True	False
4. The Sun has a gravitational pull that kee[illegible] the Earth [illegible] Sun	True	False
5. Without gravity, life would be great because we [illegible] fly a[illegible]	True	False

Questions

Use information from the text to [illegible] your answer

1) Why is gravity so important to our life?

2) What is the difference between mass and weight?

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Curriculum Connection
5.2

Mass vs Weight

Mass vs Weight

Our weight is based on gravity. **Gravity** is the force of attraction that pulls together all matter. The Earth has a gravitational pull that pulls all matter towards the centre of the earth.

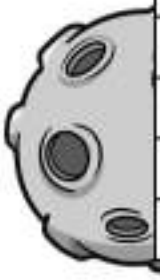
Weight is the measurement of the force of gravity pulling on an object. This means our **weight** is how hard gravity is pulling us towards the Earth's core. Mass is different. **Mass** is the amount of matter in an object.

On other planets or on the moon, we weigh a different amount because their gravitational [illegible] stronger or weaker. For example, our weight on the moon would be about 6 time[illegible]n on earth because the moon is much smaller and has 6 times less of a gravitati[illegible]er, our mass is the same everywhere, including on the moon becaus[illegible]ame amount of matter.

Math Time

[illegible]e w[illegible] on earth by 6 to find the weight on the moon.
[illegible]y the [illegible] the moon by 6 to find the weight on earth.

Weight on t[illegible]n	Weight on Earth
15 kg	
50 kg	
110 kg	



Questions

Use information from the text to support your a[illegible]

1) What is the difference between mass and weight?

2) Why would you weigh less on the moon than on Earth?

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Curriculum Connection
5.2

Mass vs Weight - Experiment

A **spring scale** measures the downward pulling force that happens because of Earth's gravity. When we use a spring scale, we are finding the weight of the object, as weight is a measure of gravitational pull.

A **balance beam scale** measures the amount of mass in an object. When we use a triple bean balance, each beam has a weight on it with a known mass. When we balance the weights with the object we are studying, we can calculate its mass.

This cup has a mass of: 30 + 300 + 5 = 335 grams.

Materials — What you need for the experiment

- Spring scale - to measure the weight of objects in Newtons or grams
- Balance scale - to measure the mass of objects in grams
- 6 objects that are heavy for your scales (check both)
- Optional - Bucket or bag from which to hang that you will put your objects in

Procedure — How to perform the experiment

1) Weigh each object using the spring scale and the balance scale
2) When weighing using the spring scale, if you use a bucket, you will need to subtract the weight of the bucket
3) Convert the units from the spring scale into grams and kilograms

Observations — Fill in the table below with your observations

Object Name	Force of Gravity (N) Spring Scale	Weight of Objects Spring Scale (g or kg)	Mass in Balance Scale	Mass in Kilogram

Name: _____ 50

Curriculum Connection
5.2

Mass vs Weight - Experiment

Results | Answer the questions below

1) What force is acting on the spring scale?

2) How does a 3-beam balance scale work? How does it tell us the mass of an object?

3) What is the rel[illegible]tweel[illegible]ns and the weight of an object?

4) Were the mass and weight of the objects the same? [illegible]ain.

5) If you weighed the same objects on the moon, how much would each [illegible]r, our weight on the moon is six times less.

Curriculum Connection
5.6

Pluto - From Planet to Dwarf Planet

Pluto's Early Years: Once a Planet

When Pluto was first discovered in 1930, it was quickly classified as a planet. It became the ninth planet in our solar system, intriguing scientists with its unique orbit and icy surface.

A List of Unique Characteristics

- Smallest planet in our solar system when first discovered
- Farthest from the sun
- Has five
- Surface made of ice
- Orbit is more to other planets

Pluto's Journey from P to

In the vastness of space, scientists found that were a lot like Pluto. They were about the same size, made of the same stuff, and around the Sun in a similar way. This made them think: "Maybe Pluto isn't just one of our planets."

For example, Pluto lives in a neighborhood called the Kuiper Belt, which is like a busy space highway filled with lots of small, icy objects. Pluto hasn't tidied up its space lane—it still has lots of other things floating in it.

In 2006, space scientists at the International Astronomical Union came up with a new word—"dwarf planet"—for things that were round like a planet but hadn't cleaned up their space lane. When they looked at Pluto with these new rules in mind, they saw that it was a better fit as a dwarf planet than a planet.

This decision to move Pluto from the planet group to the dwarf planet group caused a lot of chatter and debate. But no matter what we call it, Pluto is still super interesting to study and learn about!

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Curriculum Connection
5.6

Pluto - From Planet to Dwarf Planet

Questions

Answer the questions below using evidence from the text

1) What is the Kuiper Belt and why is it significant in the discussion about Pluto's classification?

2) How [illegible] the term "dwarf planet" affect Pluto's classification?

Draw

Draw a simple sketch of our so[illegible] Pluto, label the Kuiper Belt.

True or False

Circle whether the statement is true or false

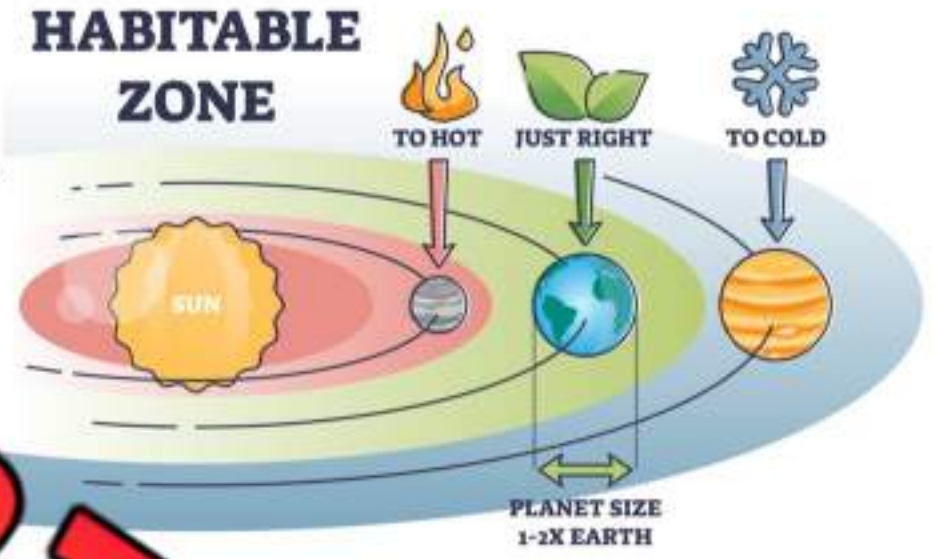
1) Pluto was discovered in 1930.	True	False
2) Pluto was originally classified as a comet.	True	False
3) Pluto has five known moons.	True	False
4) Pluto is found in the Kuiper Belt.	True	False
5) The term "dwarf planet" was introduced in 2000.	True	False

Name: _____ 53

Curriculum Connection
5.3

What is the Habitable Zone?

What is the Habitable Zone?
The **habitable zone**, also known as the "Goldilocks zone," is the region around a star in which the temperature is just right for liquid water to exist on the surface of a planet. It is a region where the temperature is not too hot and not too cold, but just right for life as we know it.



The habitable zone is not a fixed distance from a star, as the distance that a planet orbits from its star, its size, and the properties of the star itself all play a role in determining the temperature of the planet. For example, a larger planet will have a stronger gravitational pull, which may make it more likely to retain an atmosphere, and that atmosphere can help regulate the planet's temperature.

The habitable zone around a star can change over time. A star's luminosity increases as it ages, so the habitable zone may move further away from the star as it ages.

Characteristics Needed For Life
There are several characteristics that scientists typically believe are necessary for life to exist on other planets:

- ☑ Liquid water: Water is a key component of all known forms of life, and the presence of liquid water is considered to be a key indicator of the potential for life on a planet or moon.
- ☑ Organic molecules: Life as we know it is based on organic compounds, such as amino acids and nucleic acids. The presence of these molecules on a planet or moon would be a strong indication that life could exist there.
- ☑ Energy: All forms of life require a source of energy to survive. This could come in the form of sunlight, chemical reactions, or geothermal energy.
- ☑ Stable environment: Life needs a stable environment to survive, which means a planet or moon with a stable climate and geology.
- ☑ Protective atmosphere: An atmosphere that can protect life from harmful radiation and provide the necessary pressure and temperature range would be necessary.

Name: _____ 54

Curriculum Connection
5.3

What is the Habitable Zone?

Questions

Answer the questions below using evidence from the text

1) What is the habitable zone? How can it differ depending on the star?

2) Descr[illegible]t[illegible]eded for life on a planet.

Visualizing

Draw what you were pictu[illegible]le yo[illegible]reading. Explain the picture

True or False

Is the statement true or false?

1) The habitable zone is always around 100 000 km from the sun	True	False
2) The older a star is, the brighter it is	True	False
3) Earth is in the habitable zone in our solar system	True	False
4) We need an atmosphere to protect us from radiation from the sun (star)	True	False
5) A stable climate has unpredictable weather and extreme storms	True	False

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Curriculum Connection
5.3

Potential Life in our Universe

Life on Other Planets in our Solar System

The concept of "habitability" refers to the potential for a planet to support life as we know it. In order for a planet to be considered potentially habitable, it must have certain characteristics, such as a stable climate, the presence of liquid water, and the right atmospheric conditions.

In our Solar System, the most likely candidate for a potentially habitable planet is Mars. Although it is currently dry and cold, scientists believe that in the past, Mars had a more Earth-like climate, with liquid water on its surface, and it has been proposed that microbial life could exist underground.

Another candidate is Europa, a moon of Jupiter, which scientists believe may have a subsurface ocean beneath its icy surface. The ocean could potentially have the right conditions to support

Exoplanets – Planets that orbit a star outside of our Solar System

Beyond our Solar System, scientists have discovered thousands of exoplanets, many of which are located in the habitable zone around their star. Some of these exoplanets have been found to be similar in size and composition to Earth and are good candidates for potentially habitable planets.

Kepler-186f is a potentially habitable exoplanet that was discovered in 2014 by NASA's Kepler spacecraft. It is located about 500 light-years away from Earth in the constellation Cygnus and is about the same size as Earth.

One of the most important factors in determining whether a planet is habitable is its distance from its star. Kepler-186f is located within the habitable zone of its star, Kepler-186, which is a red dwarf. This means that the planet is at the right distance from its star for liquid water to exist on its surface.

Kepler-186f compared to Earth

However, it's worth noting that the planet orbits a red dwarf star, which is much cooler and less luminous than our sun. This means that the planet would need to be closer to its star in order to be in the habitable zone, but this also means that the planet would be more likely to be tidally locked, meaning one side of the planet would always face the star while the other side would be in eternal darkness.

Additionally, red dwarfs are known to be active and emit flares and high energy radiation, this could potentially erode the atmosphere of any nearby planet, making it difficult for life to survive. Therefore, while Kepler-186f is in the habitable zone, it's not guaranteed that it would be able to support life as we know it.

Name: _____ 56

Curriculum Connection
5.3

Potential Life in our Universe

Questions Answer the questions below using evidence from the text

1) Where could life be found in our solar system?

2) Why do [illegible] at Kepler-186f could be habitable?

Draw Draw your own habitable planet [illegible] its d[illegible] from its sun as well as the conditions on the planet that ma[illegible] habitab[illegible]

Curriculum Connection
5.8

Technology Needed for Space Exploration

Technologies Needed for Space Exploration

There are 5 technologies that are needed to explore space. (1) spacecraft, (2) super-high-speed optical communication, (3) telescopes, (4) spectroscopes, and (5) life-support systems.

Spacecraft

A spacecraft is a vehicle used for travelling in space. A rocket is used to launch a spacecraft into space. Once the spacecraft has left the rocket is lost in the process. The spacecraft must provide the astronauts with the things they need to survive in space (oxygen, water).

Super-High-Speed Comm

The astronauts in space need to communicate with the team on Earth who help support the mission. Communication from a spacecraft takes a long time, as the distance is much farther than say sending a message from China to Canada. As of now, it takes 90 minutes to send a photo from Mars to Earth.

Telescopes

Telescopes allow scientists on Earth to study distant objects in the Universe by detecting the heat or radio waves they emit. Knowing what is in our Universe allows us to plan for space exploration.

Spectroscopes

Spectroscopy provides information about molecules, atmospheric conditions, and composition that gives scientists a better understanding of the solar system. This information gives astronauts more understanding of what they may encounter in space.

Life-Support Systems

The spacecraft provides life-supporting needs like air, water, air temperature, waste disposal, and pressure regulation. Without these life-supporting systems on the spacecraft, no astronaut could survive.

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Curriculum Connection
5.8

Technology Needed for Space Exploration

Questions

Answer the questions below using evidence from the text

1) What technologies are needed for space exploration?

2) How do [illegible]s communicate with people on Earth?

True or False

[illegible]ate [illegible]r false?

1. A spaceship and rocket are the same th[illegible]	True	False
2. It takes 90 minutes to send a photo from Mars t[illegible]	True	False
3. Telescopes and Spectroscopes provide information [illegible]o	True	False
4. Spacecrafts need to supply us with things we need to surv[illegible]ace	Tru[illegible]	False
5. Astronauts need to communicate with mission control on Earth		[illegible]lse

Visualizing

Draw what you were picturing while you were reading. Expl[illegible] the picture

Curriculum Connection
5.8

Mars Rover

Why Explore Mars

Mars is the fourth planet from the Sun. Even though Venus is closer to Earth than Mars is, it is a lot more difficult to visit than Mars. Since Venus is closer to the Sun, its surface temperature is hot! In fact, it is 426 degrees Celsius! That and its carbon-dioxide-rich atmosphere that is 90 times denser than Earth's, make it very difficult to explore.

Mars is [illegible]anet that is most similar to Earth. It is the most likely planet to have life other than E[illegible]t some of the similarities and differences below.

	Earth	Mars
Distance From	[illegible]illion km	228 million km
Length of Day	2[illegible]inutes	24 hours 37 minutes
Force of Gravity	[illegible]n Mars	0.375 times weaker than Earth
Moons	M[illegible]	Two Moons
Average Temperature	13 Degree[illegible]	-62 Degrees Celsius
Size - Diameter	12,75[illegible]	6,791 km
Water	71% of Earth covered i[illegible]	V[illegible]000 times drier [illegible]rts of Earth

Mars Rovers

Over the last 25 years, NASA has sent 5 rovers to Mars to learn more about the planet. The first rover weighed only 23 pounds and could travel at only 0.03 kph. In 2021, the Perseverance Rover landed on Mars. It weighs 2,260 pounds and can travel 0.12 kph (4 times faster). The Perseverance Rover even has a helicopter named Ingenuity. Together, they are looking for signs of past or present life in hopes to see if humans could one day explore Mars.

Rovers provide information to scientists on Earth. They can tell us what different parts of the planet are made of, what gases make up the atmosphere, and provide pictures of landforms on Mars. The information above has been collected by rovers on Mars.

Name: _____ 60

Curriculum Connection
5.8

Mars Rover

Questions

Answer the questions below using evidence from the text

1) Which planet would be easier to live on – Mars or Venus? Explain.

2) Do you ... ld eventually live on Mars? Explain what we would need in order t... ...here

Visualizing

Draw what you were pictu... ...te yo... ...reading. Explain the picture

True or False

Is the statement true or false?

1) Mars is bigger than Earth	True	False
2) Mars has a lot of water, so maybe human life could survive there	True	False
3) It is warmer on Earth than on Mars	True	False
4) Mars is the closest planet to Earth	True	False
5) The Perseverance Rover is looking for life on Mars	True	False

Name: _____ 61

Curriculum Connection
5.8

Rovers on Mars

Learn more about the Mars rovers by researching them online. Try searching, "the Mars rovers" to find information about each rover that has explored Mars.

Research Learn more about the rovers that have landed on Mars

1) a) What was the first rover to land on Mars?	
b) What was [illegible]ht of the rover?	
c) Wha[illegible]e rover?	
d) When did it la[illegible]	
e) What was the speciality of the r[illegible]?	

2) a) What were the second and third rovers to land on Mars?	
b) What was the weight of the rovers?	
c) What was the top speed of the rovers?	
d) When did they land on Mars?	
e) What was the speciality of the rovers?	

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Curriculum Connection
5.8

Rovers on Mars

Research Learn more about the rovers that have landed on Mars

3) a) What was the fourth rover to land on Mars?	
b) What was the weight of the rover?	
c) What was [illegible] speed of the rover?	
d) When [illegible] land on Mars?	
e) What was the speciality of the rover?	

4) a) What was the fifth rover to land on Mars?	
b) What was the weight of the rover?	
c) What was the top speed of the rover?	
d) When did it land on Mars?	
e) What was the speciality of the rover?	

Name: _____ 63

Curriculum Connection
CS.1

Coding - Driving the Mars Rover

About the Perseverance Rover

On July 30th, 2020, the Perseverance rover launched and began its voyage to Mars. Fast forward to February 18th, 2021, and the car-sized Perseverance rover landed inside the Red Planet's Jezero Crater. The goal of the rover is to search for signs of ancient Mars life and collect samples for its return to Earth.

Driving the M Rover

Here on Ear 30 am in California, but on Mars it is 6:00 pm. A robotici begins her 10-hour shift to drive the Mars rove he has g rovers on Mars since 2008. She lives in two different worlds, spendin ng on well as on Earth.

Verma worked e program used by Perseverance. The new rover is able to move aroun Mar eeding constant direction from the team on Earth. Perseverance can ide rocks on its own.

Commanding the Rover

To get the rover to follow instructions, the robotic te co rover to follow. They beam the codes up to Mars through the Deep Sp ASA's interplanetary communications network. The network uses ue sions that travel through large antenna systems.

With the distance between Mars and Earth being so large, it take bo nutes for the commands to reach the rover. This makes it challenging to tell the ro what to do. The driver on Earth will command the rover to move up to 100 metres. After 20 minutes, they can see if the rover is approaching a cliff or other dangerous obstacle.

The driver can also command the rover to perform science experiments on Mars or investigate targets that were previously discovered.

if rover sees an interesting rock	move to [new rock]
then define its location as [new rock]	then [take pictures] of [new rock]

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Coding - Driving the Mars Rover

True or False Circle whether the statement is true or false

1) Commands are sent immediately from Earth to the rover on Mars	True	False
2) The driver has to wait 20 minutes for the rover to execute a command	True	False
3) There are cliffs on Mars that could be dangerous if the rover went over	True	False
4) The rover c[illegible] do many things on Mars without the driver's commands	True	False
5) It is the sa[illegible] on Mars than on Earth	True	False

Quest[illegible] An[illegible] questions below using evidence from the text

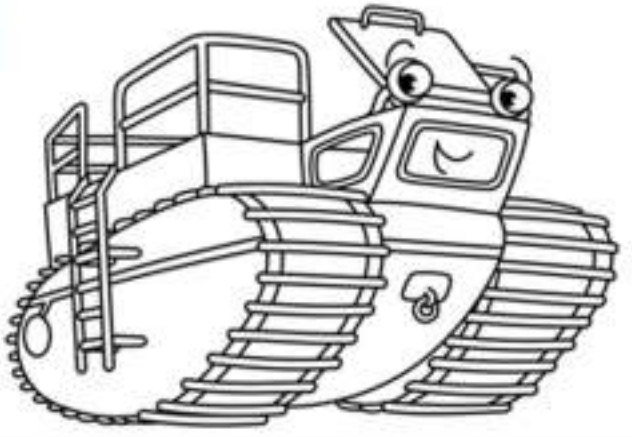
1) How does the [illegible] munic[illegible] the rover on Mars?

2) Does the Perseverance rover use code? Explain

Directions Read the program and follow the instructions to draw [illegible] output

If ► is clicked

- colour the tracks [black]
- colour the body [orange]
- colour the ladder and rails [yellow]
- colour the hatch [grey]
- colour the windows [blue]



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Curriculum Connection
CS.1

If Then Conditional Statements - Activity

Directions Follow the if/then statements to move the rover to the rocks

1)	If our solar system is bigger than the universe	then	Move down 3 spots
2)	If the Earth is closer to the Sun than Mars	then	Move right 5 spots
3)	If the Sun is a star	then	Move down 4 spot
4)	If a co[illegible]s made of ice, rock, and dust	then	Move left 3 spots
5)	If Ju[illegible] largest planet	then	Move down 3 spots
6)	[illegible]he Sun	then	Move down 4 spots
7)	If we weig[illegible] m[illegible]an on Earth	then	Move left 2 spots
8)	If we have the [illegible] mass [illegible] than on Earth	then	Move left 2 spots
9)	If the moon emits ligh[illegible]	then	Move up 3 spots
10)	If the Sun emits light	then	Move right 4 spots

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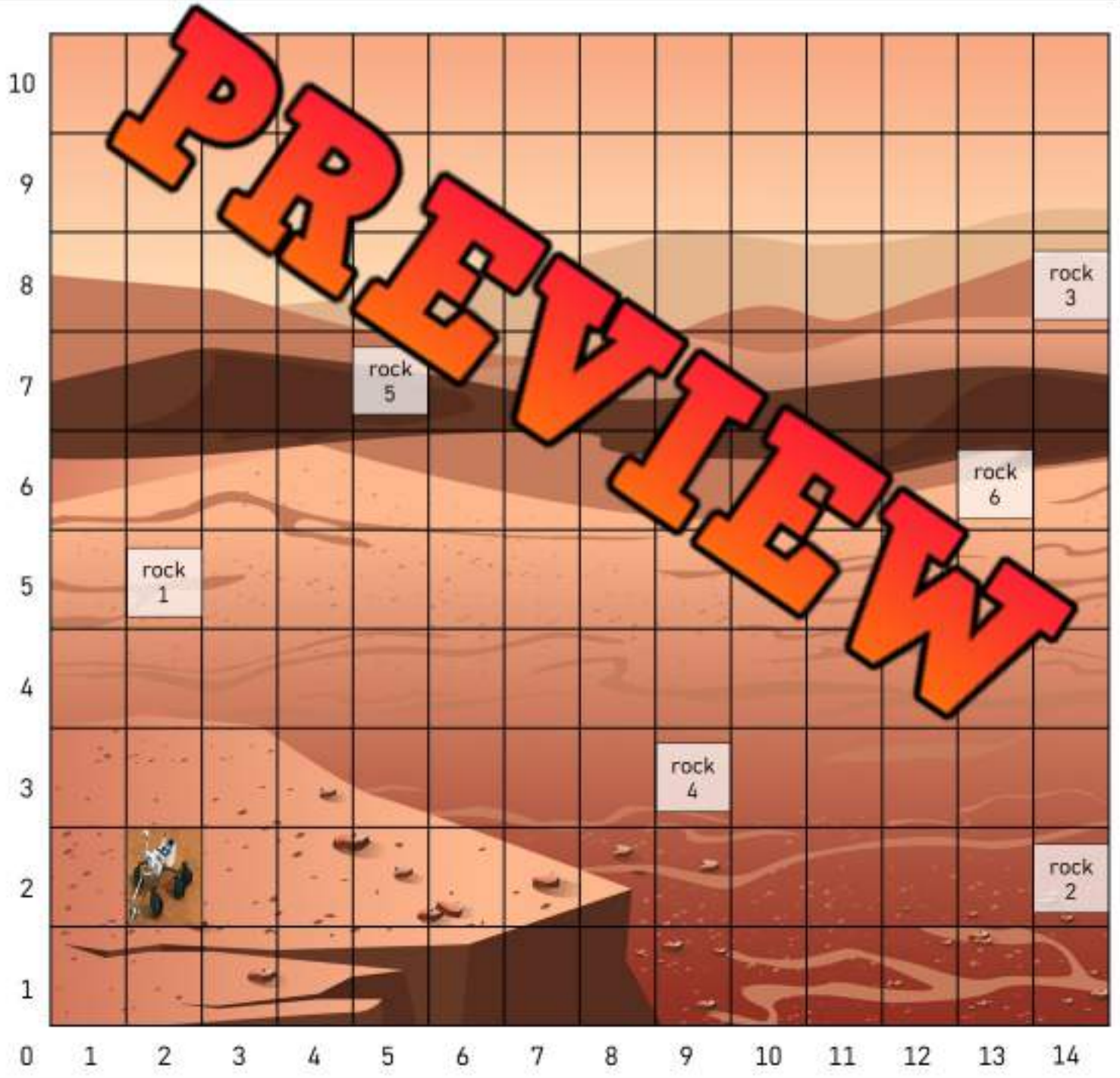
Coding - Driving the Mars Rover

The map below shows the Jezero Crater on Mars. There is a cliff in the front that the rover should not travel over, or it could break. The rover has found interesting rocks and defined those areas as rock1, rock2, rock3, rock4, rock5, and rock6.

Mapping | Use this map to write the code on the next page



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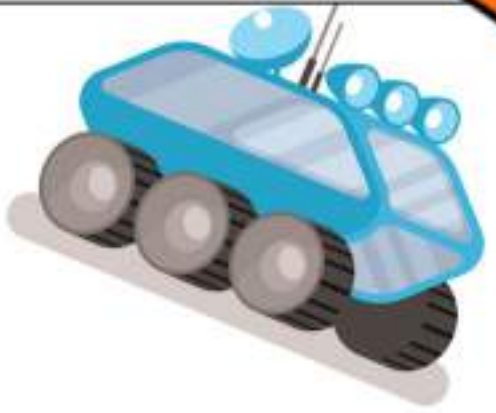
Curriculum Connection
CS.1

Coding - Driving the Mars Rover

Coding Write code that moves the rover to all 6 interesting rocks. Have the rover take pictures at each location.

Example Code

- move to (3,
- take 5 pictures
- move to (5, 5)
- take 3 pictures of rock



Code

Question What would happen if the rover stopped working because of a crash? How bad would that be?

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STEM Assignment - Designing a Rover

Create your own rover that can explore a new planet. Consider the following questions.

What tools does your rover need?
- camera, hatch to collect samples, propeller to fly, etc.

What is your rover capable of doing?
- Can it fly?
- Can it travel quickly?
- Can it se[illegible]e dark?
- Does it h[illegible]red vision allowing it to see living things?

What w[illegible]r r[illegible]d to do?
- Will [illegible]ck for [illegible]r planets?
- Will it check [illegible]co[illegible]ons humans could live in?

Questions	A[illegible]er t[illegible]out your rover below

1) What is the name of your rove[illegible]

2) What tools will your rover have?

3) What is your rover capable of doing?

4) What will your rover be designed to do?

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STEM Assignment - Coding My Rover

Write simple If/Then statements so that the driver of the rover can send instructions for the rover to follow. For example, to work a flashlight on the rover, the code could look like this.

IF/THEN	Write code for each tool that your rover has so that you can control the tools

If: If the flashlight button is pressed
THEN: THEN turn on the flashlight

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

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STEM Assignment - Drawing My Rover

Draw Draw your rover below. Make sure the rover has the tools you included in your plan

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STEM Assignment - Rover Exploration

Which planet will your rover explore? Choose a planet and learn more about the size of the planet as well as the conditions the rover will need to navigate through.

Questions | Answer the questions about the planet your rover will explore

1) Which planet will your rover explore?	

2) What is th… looking for on this planet?

3) How big is the plan… …ompare to the size of the Earth?

4) Will your rover be able to explore much of this p… giv… …k about how fast the rover can move and how it moves in your answ…

5) What are the conditions on this planet? Is it hot or cold? Is there water? Does it have mountains or volcanoes? Can your rover survive these conditions?

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STEM Assignment - Journal Entries

Now that your rover has landed on this planet, what has it discovered? Pretend you are driving the rover and at the end of your driving shift, you write a short journal entry of everything you saw. Did you encounter any other life forms? Did you drive your rover to a new area on the planet?

Journal	Write your three journal entries below

Day 1 – Journal Entry

Day 2 – Journal Entry

Day 3 – Journal Entry

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Activity: Building a Mock Space Rover

Research Question What are we learning more about?

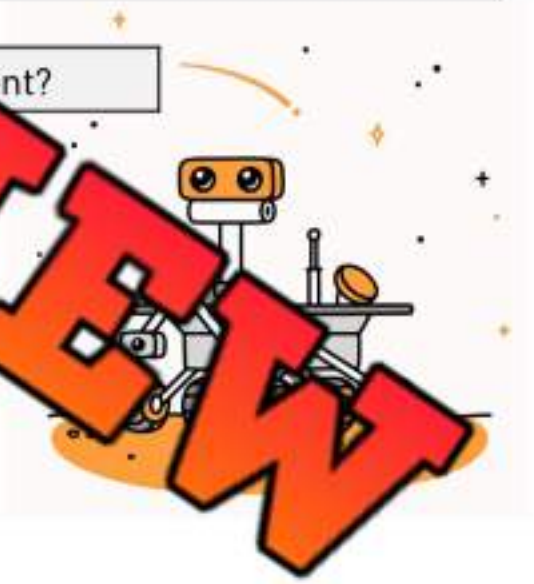
To learn about the design and functionality of space rovers, and their role in exploring celestial bodies in our solar system.

Materials What do we need for our activity?

- ✓ Cardb
- ✓ Sciss
- ✓ G
- ✓ Sm heels (borrowed from an old toy
- ✓ Straws or w s
- ✓ Paper and r deco
- ✓ A small box to ent t carried by the rover

Method How do w let ent?

1) Draw and cut out a rectangular base your rover on the cardboard. Make it big enough t hold four wheels and a small box.
2) Draw and cut out four smaller rectangular strips. These will serve as the axles for the wheels.
3) Attach the rectangular strips to the base of the rover with glue and insert the wheels into these strips using straws/dowels as axle holders.
4) Attach the small box (representing the rover's equipment) on top of the base.
5) Decorate your rover. You can make it look like the Mars rovers, or create your own design.
6) Try moving your rover around. How does it handle different surfaces (e.g. flat table, carpet, small obstacles)?



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Curriculum Connection
5.8

Activity: Building a Mock Space Rover

Plan Draw the rover you will make. Think of the materials you have available to you and label the materials you will use.

Reflection Answer the questions below

1) Why do you think spa[illegible] the way they are?

2) What modifications would you make to your rover design based on your observations?

3) Draw the new and improved rover.

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Curriculum Connection
5.9

Orbiting Objects: The Story of Satellites

Orbiting Objects: The Story of Satellites

Our Earth, like many other celestial bodies, is surrounded by objects that constantly travel around it. These objects are called satellites, and they can be either natural or human-made.

Natural Satellites: Celestial Companions

Natural satellites are celestial bodies that orbit around larger objects in space. For example, the Moon is a natural satellite of Earth. Here are some key features of natural satellites:

- They are naturally occurring objects.
- They revolve around planets.
- The Moon is the Earth's only natural satellite.

Artificial Satellites: Human-Made Helpers

While the Moon is Earth's only natural satellite, it is not alone in orbiting our planet. Humans have built and launched objects known as artificial satellites into space. Here are some important points about artificial satellites:

- They are constructed and launched by humans.
- They serve different purposes like weather monitoring, GPS, and research.
- Artificial satellites orbit Earth at different distances based on their functions.

The Path They Follow: Understanding Orbits

Whether a satellite is natural or artificial, it follows a recurring path around another object in space. This path is known as an **orbit**. The Moon orbits the Earth, and Earth orbits the Sun. Each orbit is determined by the gravitational pull of the larger object and the speed of the satellite. This delicate balance allows satellites to consistently follow their paths without veering off into space.

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Curriculum Connection
5.9

Orbiting Objects: The Story of Satellites

Questions

Answer the questions below using evidence from the text

1) What is the difference between a natural and an artificial satellite? Give examples.

2) What [illegible] it determined?

Draw

Draw a picture of Earth [illegible] ficial satellites. Use arrows to show their orbits.

True or False

Is the statement true or false?

1) There are natural and artificial satellites.	True	False
2) Humans have launched artificial satellites into space.	True	False
3) The path a satellite follows is called an orbit.	True	False
4) The Sun is a natural satellite of the Earth.	True	False
5) All satellites follow the same path.	True	False

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Curriculum Connection
5.10

Ex-Alta 1: Alberta's Star in the Sky

Launch into History: Alberta's First Satellite

Back in 2017, something really exciting happened in Alberta! For the first time, a team from our province launched a satellite into space. The special group who did this were students and faculty from the University of Alberta. They were part of a team known as AlbertaSat. Their goal w design and launch Ex-Alta 1, the first-ever satellite from Alberta.

The Tea e: AlbertaSat

The team made e, AlbertaSat, was an awesome mix of students and teachers from t y of A They worked together, put their sc skill d showed us how cool and exciting sp e can

Ex-Alta 1: Alberta's Space Pioneer

The Ex-Alta 1 is Alberta's first foray into space, built the ingenious minds at the University of Alberta. B what makes it extra special? Let's dive into some more

1) Students and teachers at the University of Alberta built it.
2) The launch happened from the International Space Station (ISS), which a science lab in space!
3) Ex-Alta 1's main job is to contribute to an international space project called the QB50 Mission. This mission involves 50 small satellites, known as CubeSats, from all over the world, collecting data about the lower layers of the atmosphere.
4) Space weather, influenced by the sun's activity, can disturb satellite communications on Earth. Ex-Alta 1 helps keep an eye on this space weather. With its data, we can understand how to protect our satellites better.

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Curriculum Connection
5.10

Ex-Alta 1: Alberta's Star in the Sky

Questions

Answer the questions below using evidence from the text

1) What is the Ex-Alta 1? Who created it?

2) What [illegible] Ex-Alta 1?

Questioning

Write [illegible] out the reading

1)	
2)	
3)	

True or False

Is the statement true or false?

1) The Ex-Alta 1 was launched in 2019.	True	False
2) AlbertaSat is a group of students and faculty.	True	False
3) Ex-Alta 1 was launched from the Moon.	True	False
4) The International Space Station is like a science lab in space.	True	False
5) The Ex-Alta 1 collects data about Earth's weather.	True	False

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Curriculum Connection
5.11

International Space Station

Introduction to the ISS

Floating in the space above us is an impressive construction known as the International Space Station, or ISS. This structure isn't just for show; it's a functioning research facility that orbits the Earth.

Inside the IS

The ISS isn' capsule—it's roomy, as big as a six-bedroo lt has laboratories, a gym, and even a to sleep! The crew aboar iments that can't be done anywhere else. They study how the human body ch ace make observations of Earth, and test out new technologies.

All Aboard!

The ISS isn't owned by one It's a rt. Astronauts from all over the world live and work together s like the United States, Russia, Canada, Japan, and many in Europ buil ISS. Six astronauts can live on the ISS. The crew rotates out – 3 ret o Ear riving up to the station.

The ISS and Earth

The ISS doesn't stay in one place. It moves quickly, making an entire orbit around the Earth in just about 90 minutes. That means the crew sees 16 sunrises and sunsets every day!

List of Interesting ISS Facts

- The ISS travels at a speed of about 28,000 kilometers per hour.
- The first part of the ISS was launched in 1998, and the first crew arrived in 2000.
- The ISS is about 408 kilometers above Earth.
- The station is as long as a football field.
- Up to six spacecrafts can be attached to the ISS at the same time.

A Space Staple

The International Space Station is a significant symbol of global cooperation and scientific advancement. It provides a unique setting for important research and helps us prepare for future space exploration. So next time you look up at the sky, remember there's a station orbiting above, filled with knowledge and discovery.

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Curriculum Connection
5.11

International Space Station

Questions

Answer the questions below using evidence from the text

1) What is the international space station? Describe it and how it moves.

2) Why [illegible] teamwork from different countries?

Think

List three interes[illegible] fac[illegible]S from the report.

1)	
2)	
3)	

True or False

Is the statement true or false?

1) The ISS orbits around the Earth.	True	False
2) The ISS is as big as a one-bedroom apartment.	True	False
3) The ISS is owned and operated by Canada.	True	False
4) The first crew arrived at the ISS in 2000.	True	False
5) The ISS is about 100 kilometers above the Earth.	True	False

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Curriculum Connection
5.11

Activity: Designing a Mock Satellite

Research Question What are we learning more about?

To understand the basic components of a satellite and their functions, and to understand how satellites orbit around the Earth.

Materials What do we need for our activity?

- ✓ Cardb[illegible]ick paper
- ✓ S[illegible]
- ✓ G[illegible]tape
- ✓ String or yarn
- ✓ Coloured [illegible]int [illegible]oration
- ✓ Small LED lig[illegible]onal)

Method How do [illegible]let[illegible]ment?

1) Using cardboard or thick paper, des[illegible]d cut out the main body of your satellite. It can be a simple shape like a circle or rectangle.

2) On another piece of cardboard, draw and cut out additional elements of a satellite like solar panels or antenna. Remember, these elements have specific functions. For instance, solar panels are used to generate power for the satellite.

3) Glue or tape the solar panels and antenna to your satellite's body.

4) Decorate your satellite with markers or paints. You may even stick a small LED light to represent the communication signals.

5) Attach a piece of string or yarn to the top of your satellite. Now, you can hang it up and simulate its orbit around Earth!

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Curriculum Connection
5.11

Activity: Designing a Mock Satellite

Plan Answer the questions below to help plan your satellite

1) What shape will you choose for your satellite's body? Why?

2) What wi[illegible]'s mission be? For example, is it for weather forecasting, GPS, or scientif[illegible]

3) How will you represent the mi[illegible]f y[illegible]n your design? For example, if your satellite can forecast weather, it will need[illegible] sys[illegible]

4) Draw the satellite you will build. Think of the materials you have availabl[illegible] the materials you will use in the drawing.

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Programming Flow Chart

Program Flow Chart – Basics

To represent an abstraction of how a system works, we can use a flow chart that simplifies the process. We use different shapes for different parts of the flowchart.

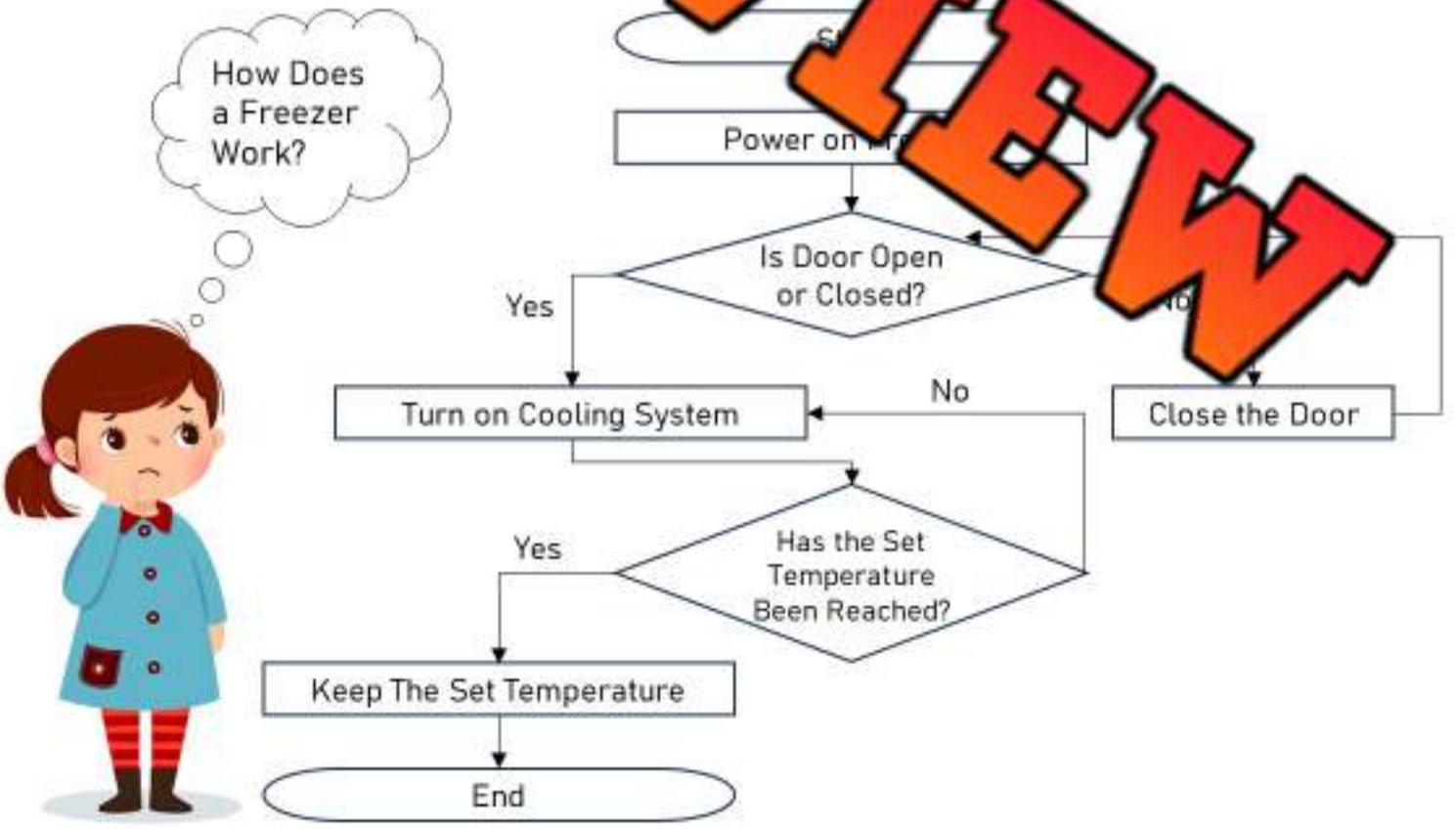
1) Start/End Symbol: This is usually represented by an oval shape. It shows where the process starts or ends. There's typically one start and one end symbol for each process.

2) Process Symbol: This is a rectangle. It represents a task or work being done. For example, 'turn the power' or 'set the temperature.'

3) Decision Symbol: This is a diamond shape. It represents a decision or a question that needs to be answered. For example, 'is the power on?' or 'is the door open?'

4) Arrow Symbol: These are the lines with arrows that connect the symbols. They show the direction of the process flow. An arrow should start from a process or decision symbol and end at another symbol.

5) Input/Output Symbol: This is also called a parallelogram. It represents information entering or leaving the system, such as user input or displaying results.



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CS.1

Programming Flow Chart - Satellites

1) Prepare for Launch: Get the satellite ready for launch. Draw a rectangle with the words "Prepare for Launch" inside.

2) Launch: Send the satellite into space. Draw another rectangle with the word "Launch" and connect it to the first rectangle with an arrow.

3) Detach Rocket: Once in space, detach the rocket. Draw another rectangle labeled "Detach Rocket", connected to the "Launch" rectangle with an arrow.

4) In Correct Orbit?: Check if the satellite is in the correct orbit. Draw a diamond (representing a decision point) labeled "In Correct Orbit?", connected to the "Detach Rocket" rectangle.

   - If Yes, move to the next step.
   - If No, go back to the "Detach" step. Draw an arrow from the "No" side of the diamond back to the "Launch" rectangle (this is a loop).

5) Unfold Solar Panels: Unfold the solar panels to collect sunlight. Draw a rectangle labeled "Unfold Solar Panels" connected to the "Yes" side of the "In Correct Orbit?" diamond.

6) Collect Data: Use instruments to collect data. Draw a rectangle labeled "Collect Data", connected to the "Unfold Solar Panels" rectangle.

7) Transmit Data: Send the data back to Earth. Draw another rectangle labeled "Transmit Data", connected to the "Collect Data" rectangle.

8) Data Received on Earth?: Check if the data has been received on Earth. Draw a diamond labeled "Data Received on Earth?" connected to the "Transmit Data" rectangle.

   - If Yes, move to the next step.
   - If No, go back to the "Transmit Data" step. Draw an arrow from the "No" side of the diamond back to the "Transmit Data" rectangle (this is another loop).

9) Process Data: Process and analyze the data on Earth. Draw a rectangle labeled "Process Data", connected to the "Yes" side of the "Data Received on Earth?" diamond.

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Programming Flow Chart

Program Draw a flow chart for how a satellite works using the guide on the previous page

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Curriculum Connection
5.8

Space - Extreme Environment

Space is one of the most extreme environments imaginable. The spaceships are subjected to extremes temperatures, both hot and cold, and the threat of radiation damage. Each spacecraft that is launched into space deals with many dangerous situations throughout its journey.

1. When the spacecraft is launched, the rocket that sends the spacecraft into orbit will shake violently and it is extremely loud inside the spaceship. The engineers who build the spacecraft must test whether it will hold up under these conditions. To test it, they simulate the conditions of a launch in a laboratory.
2. Temperatures in space can range from extremely cold – hundreds of degrees below freezing to many hundreds of degrees above – especially when the spacecraft goes closer to the Sun.
3. The radiation (heat) from the Sun can damage technology on the spacecraft to malfunction if the spacecraft is not protected properly.
4. While in outer space, there is no air and no gravity. The space suits astronauts wear protect them from the low pressure in space. If they took off their suit, the low pressure would cause their blood to start to bubble, removing oxygen from the blood and starving the brain of oxygen.

5. Sickness is an issue for people in space. Humans are built to live under conditions with gravity. The feeling of weightlessness due the zero gravity causes symptoms of nausea, vomiting, dizziness, headaches and tiredness.
6. With no gravity, showers do not work. Instead, astronauts will take a sponge bath
7. Astronauts need to exercise in space because without gravity, they do not exercise their muscles. They secure their bodies and lift using bands that create tension. Regular weights wouldn't work as weight is the force of gravity!

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Curriculum Connection
5.8

Space - Extreme Environment

Questions

Answer the questions below using evidence from the text

1) Why is living in space an extreme environment?

2) What do[illegible]d be the hardest part of being in space?

Visualizing

Draw what you we[illegible]ere reading. Explain the picture

True or False

Is the statement true or false?

1. Extreme temperatures go from 0 to hundreds of degrees above 0	True	False
2. Living in space can lead to nausea, headaches, tiredness, and vomiting	True	False
3. Astronauts must wear a space suit to maintain an ideal pressure	True	False
4. Astronauts take showers to keep clean in space	True	False
5. Muscle loss is common for astronauts in space	True	False

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5.8

Controversy of Space Travel

Controversy of Space Travel

Human spaceflight has been debated for its positives and negative outcomes for many years. NASA retired its Space Shuttle program in 2011 because it was too expensive to maintain and did not deliver the major leap forward in scientific research. Read below to learn about the positives and negatives to space travel.

Positives

There is no [illegible]hat space exploration has improved our knowle[illegible]be[illegible]fferent fields.

- Unders[illegible]ing th[illegible]dy
- Performing ris[illegible]proce[illegible]om medical technologies that were inspired by Canadian robotics [illegible]e
- Cell phone capabilities – [illegible]ce ar[illegible]s calls would be impossible without satellites
- Satellites give us information on weath[illegible]ate an[illegible]change
- Information about our solar system, galaxy, and [illegible]se
- Development of technologies such as orange dri[illegible]sta[illegible]lculators

Negatives

The main concerns of space exploration is the risk and the cost.

- In the USA alone, over 20 astronauts have lost their lives while wor[illegible]g
- Astronauts that make it home alive were exposed to strong radiation as a [illegible]ult of being so close to the sun. This might affect their health later in life.
- The past few space shuttle missions did not provide scientists with new information. So what is the point?
- Space pollution – debris from spacecrafts continue to orbit the Earth!
- The COST! The Apollo space program cost the US government $25.4 billion in the 1960's. With inflation, that cost would be about $152 billion of today's dollars. This tax money could have been spent on improving our schools or hospitals.

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Curriculum Connection
5.8

Controversy of Space Travel

Questions

Answer the questions below using evidence from the text

1) What are some of the drawbacks to space travel?

2) What do[illegible] Should we continue to pay for space exploration? Explain.

Questioning

Write 3 questi[illegible]d have [illegible] reading

1)	
2)	
3)	

True or False

Is the statement true or false?

1) No one has lost their life in space	True	False
2) Space travel can be dangerous	True	False
3) Space travel costs a lot of money, billions of dollars	True	False
4) We have benefitted from technologies made for space travel	True	False
5) Satellites give us information about climate, weather, and climate change	True	False

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Space Activities

Word Search

Find the word bank words in the puzzle!

H	K	K	U	V	C	J	K	X	M	Z	J	Y	K	J	P	W	T	C
M	E	T	E	O	R	I	T	E	G	T	Z	R	B	Z	L	B	K	T
E	P	O	C	S	E	L	E	T	F	A	R	C	E	C	A	P	S	N
L	N	S	D	Y	E	Q	S	R	C	G	U	U	A	C	N	A	X	A
Z	P	B	A	Y	T	R	C	I	Z	N	N	D	R	E	S	C	H	
Y	H	B			H	B	L	J	W	I	E	P	T	T	T	U		
W	Z			H		Z	Q	T	S	V	B	O	B	E	E	Y		
B	O	O		G			E	T	E	M	Y	Y	R	E	J			
U	J	V	G	E		W			R	M	F	T	O	O	L			
R	H	F	S	I	F					V	X	S	I	G	S			
Z	H	S	Q	U	L	R						Y	D	Q	T			
Z	T	B	Q	C	C	A	D	P					B	H	I			
S	W	S	A	V	V	L	C	A	P	H		M	E		R	S		
O	B	I	F	Q	N	O	M	C	U	N	W	R	B					
W	F	O	N	B	V	S	F	E	W	E	A	R			M			
L	S	R	G	B	H	T	I	B	R	O	J	K	E	N		Y		
H	P	B	S	K	T	Z	Q	O	E	L	M	V	A	U	I		C	
S	T	A	R	X	Y	T	I	V	A	R	G	C	A	S	G	D	S	Z

Word Bank

- ❑ Space
- ❑ Solar
- ❑ System
- ❑ Planet
- ❑ Asteroid
- ❑ Meteor
- ❑ Comet
- ❑ Meteorite
- ❑ Moon
- ❑ Gravity
- ❑ Spacecraft
- ❑ Telescope
- ❑ Universe
- ❑ Earth
- ❑ Orbit
- ❑ St

Word Scramble

Read the clue and then unscramble the word

RMEETO		An asteroid that enters the Earth's atmosphere
IRTBOS		Each planet does this around the sun
SDOERAIT		Part of a belt between Jupiter and Mars
EMOCT		Found on the edge of the solar system
TOTEERIEM		These are found rarely on the Earth's surface
RIGYATV		There is less of this on the Moon and in Space

Name: _____ Date: _____

Unit Test - Space

Multiple Choice /10

1. Which planets are beside the Earth? a) Mars and Jupiter b) Mercury and Mars c) Venus and Mars d) Jupiter and V[illegible]us	2. Which is the largest? a) The Earth b) The Milky Way Galaxy c) Our Solar System d) The Universe
3. Which pla[illegible]terrestrial planet? a) Jupit[illegible] b) Mercury c) Earth d) Mars	4. Which planet is **not** a gas planet? a) Neptune b) Jupiter c) Saturn d) Mercury
5. What is a piece of rock that [illegible]he way to the Earth's surface? a) Asteroid b) Meteor c) Meteorite d) Comet	[illegible]vas the name of which of the following a) Asteroi[illegible] b) Met[illegible] c) M[illegible]te d) Comet
7. Which planet is closest to the sun? a) Venus b) Earth c) Mars d) Mercury	8. Which year di[illegible]be[illegible]et? a) 1930 b) 1996 c) 2006 d) 2022
9. Which planet would you weigh the most on? a) Jupiter b) Earth c) Mars d) Neptune	10. Which of the following emits light? a) Stars b) Asteroids c) Planets d) Shooting stars

Definitions – What does the term mean (1 mark each) /3

Term	Definition (what does it mean)
Asteroid	
Dwarf Planet	
Met	

Short Answer Questions (2 m

1. Why was Pluto reclassified as a dw et?

2. What is the Asteroid Belt? Where is it located?

3. What is the International Space Station? Why is it important?

Long Answer

Answer the long answer questions. Each question is 5 marks

1) Write about one planet in our solar system. Include the following information: gas or terrestrial, size, moons, temperature, how many planets from the sun and whether it is habitable for humans.

2) What is the difference between natural and artificial satellites. Give examples of both and how we benefit from artificial satellites.