Workbook Preview

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Grade 6 Science – 2022 Curriculum

Space

	Curriculum Expectations	Pages
E1.1	analyse the impact that conditions in space have on humans engaged in space exploration, and explain how humans meet their social, emotional, and physiological needs in space	106-110, 116-123
E1.2	assess the role of space exploration technology in observing and understanding environmental changes on Earth, including climate change	114-123
E1.3	evaluate the social and environmental impacts of space exploration, while taking various perspectives into	111-113, 136-141
E2.1		31, 46
E2.2		40-42, 51-53
E2.3	describe the relationship between the force of gravity and the weight of a body	32-34, 37, 40-42
E2.4	identify the types of bodies in space that emit light and those that reflect light	43-45
E2.5	describe various effects of the relative positions and motions of Earth, the Moon, and the Sun	46, 54-57, 62-67, 70-84
E2.6	identify various technologies used in space exploration, and describe how technological innovations have contributed to our understanding of space	85-91, 94-96, 106-113, 116-123

Preview of 100 pages from this product that contains 211 pages total.

Grade 6 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	19-20, 129, 132
A1.2	use a scientific experimentation process and associated skills to conduct investigations	35-36, 38-39, 58-59
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	19-20, 47-50, 60-61, 68-69, 92-93
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	19-20, 35-36, 38-39, 47-50, 58-61, 68-69
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	19-20, 35-36, 38-39, 47-50, 58-61, 68-69
A2.1	write and execute code in investigations and when modelling concepts, with a focus on obtaining input in different ways for a variety of purposes	97-105, 124-130
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades	97-105, 124-125, 127-129
A3.1	describe practical applications of science and technology concepts in various occupations, including skilled trades, and how these applications address real-world problems	124-125, 127, 129, 131, 133-135
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	124-125, 127-129, 131-135
A3.3	analyse contributions to science and technology from various communities	124-125, 127-128

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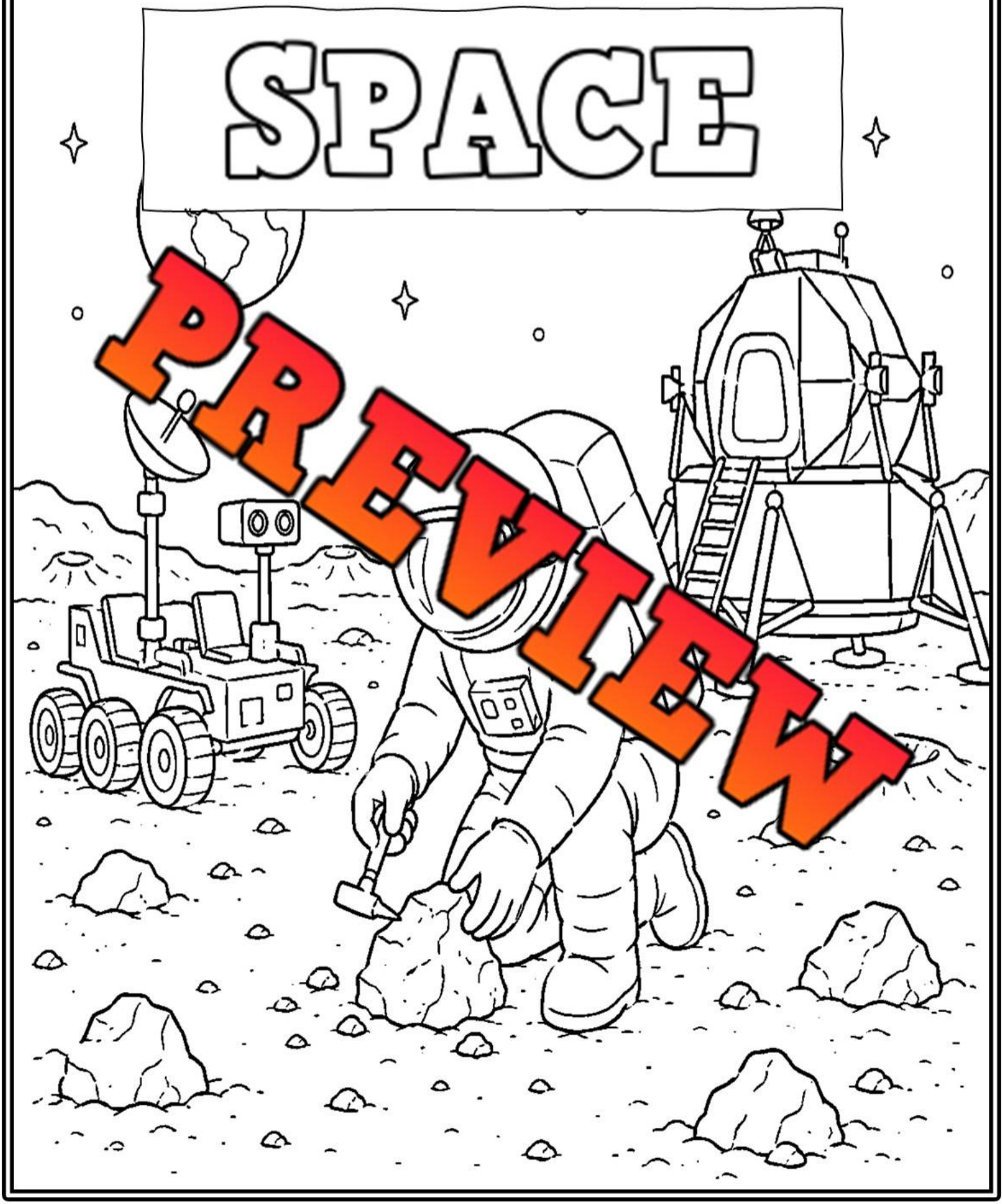

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Name: _____ 11

Curriculum Connection
E2.1

The Universe

What is the Universe?

The **universe** is everything we can touch, feel, sense, measure, and detect. This means it is everything that is living, planets, galaxies, dust clouds, light, and even time. Before the universe was created, time, space, and matter did not exist.



Planet



Star



Natural Satellite

What

A **galaxy** is a mas on of gas, dust, and billions of stars and their solar sys th re all ether by gravity.

We live on the et E part of our solar system. Our solar system has eight planets and is o part o **Way Galaxy**. When we look up at night and see the stars, we are seeing sta y. Scientists estimate that the Milky Way has 400 billion stars. Most o stars h t one planet orbiting them. In our solar system, the sun is the star and the ei anets round it.

PREVIEW

The Universe – An Unimaginably Large Entity

This picture was taken by the Hubble Space Telescope. It sh thousands of galaxies as each of the tiny dots are galaxies.



Each galaxy has upwards of 400 billion solar systems. Our solar system has 8 planets and one Sun, which means our Milky Way Galaxy could have upwards of 3.2 trillion planets and 400 billion Suns.

It is also estimated that there are approximately 2 trillion galaxies that we can see from our planet. That's a lot of stars, solar systems and planets!

The universe is home to many celestial bodies. A **celestial body** is an object in space. Celestial bodies include stars, planets, natural satellites (moons), comets, asteroids, galaxies, and meteors or meteorites.



Meteor

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Curriculum Connection
E2.1

Questions

Answer the questions below using evidence from the text.

1) What is the difference between a solar system and a galaxy?

2) How big is the Universe? Explain using the terms: galaxies, stars, and solar systems.

PREVIEW

Visualizing

Draw what you were imagining while you were reading. Explain the picture.

True or False

Is the statement true or false?

1) Galaxies are larger than the Universe.	True	False
2) A galaxy can have upwards of 400 billion solar systems.	True	False
3) A solar system has 100 billion planets in it.	True	False
4) The universe has around 2 trillion galaxies.	True	False
5) There could be 3.2 trillion planets in our galaxy.	True	False

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Curriculum Connection
E2.1

Newspaper Article: New Solar Discovery

New Solar Discovery Highlights Sun's Importance

Publish Date: July 3, 2026

Scientists [illegible]ade an exciting discovery about ou[illegible]ch confirms its crucial role [illegible]sys[illegible] Sun is the center of the sol[illegible]d t[illegible]source of energy for al[illegible]arth. T[illegible] discovery helps us un[illegible]st[illegible] about why the Sun is so imp[illegible]

Dr. Laura Johnson, a solar scientist at t[illegible] National Space Institute, said, "The Sun provides the energy needed for plants to grow, which in turn supports all life on Earth. Without the Sun, our planet would be a frozen wasteland.

"The Sun is a massive ball of hot gases, mainly hydrogen and helium. It is about 4.6 billion years old and is 109 times wider than Earth. The Sun's energy comes from nuclear fusion, a process where hydrogen atoms combine to form helium, releasing a huge amount of energy.

Timothy Nguyen, an astronaut who has studied the Sun from space, shared his experience: "Seeing the Sun up close is incredible. Its surface is around 5,500 degrees Celsius, and its core can reach up to 15 million degrees Celsius.

"Every second, the Sun converts 600 million tons of hydrogen into helium, producing energy that reaches Earth in [illegible]ut eight minutes. This energy powers [illegible]a[illegible] cycle, weather patterns, and photo[illegible]sis in plants.



[illegible]sts also discovered that the Sun's activity, like solar flares and sunspots, affects satellite communications and power grids on Earth. Understanding these activities helps protect our technology and improve our way of life.

PREVIEW

Name: _____ 14

Curriculum Connection
E2.1

True or False

Is the statement true or false?

)1. The Sun is mostly made of oxygen.	True	False
2) Sunspots increase satellite communication efficiency.	True	False
3) The Sun's energy reaches Earth in eight minutes.	True	False
4) The Sun is 109 times wider than Earth.	True	False
5) The Sun is about 4.6 billion years old.	True	False

Questions

Write questions you have about the text.

1)	
2)	

Questions

Answer the questions below.

1) What process generates energy in the Sun?

2) Why is it important to study the Sun?

PREVIEW

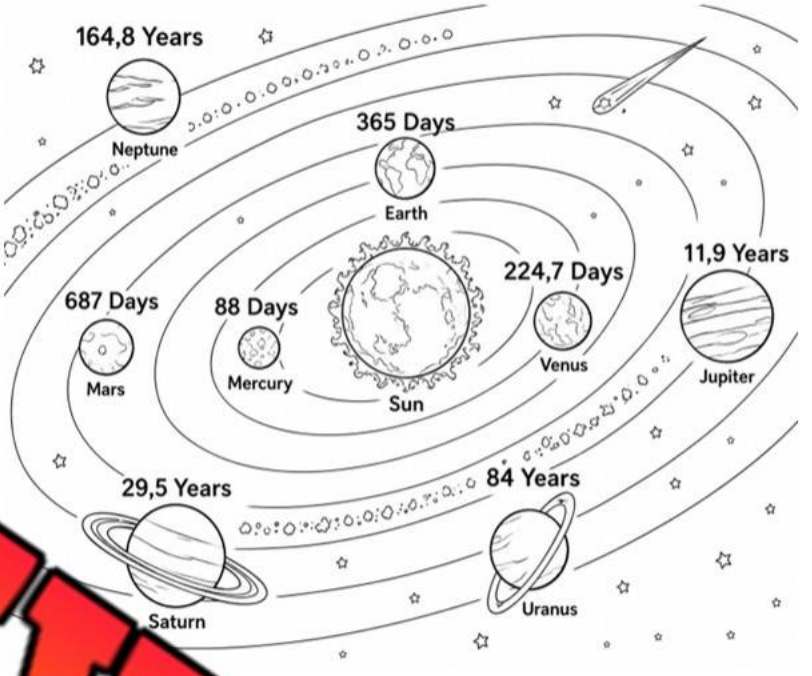
Name: _____ 15

Curriculum Connection
E2.1

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 b[illegible] in the form of asteroids [illegible] and comets.



Age of [illegible] Solar S[illegible]

Our solar syst[illegible] as [illegible]ned 4[illegible] billion years ago. It [illegible]ieve[illegible] billion years ago, gravity [illegible] a cloud of dust and gas together [illegible]m [illegible]. The massive concentration of dust and gas created a molecular clou[illegible]ould e[illegible]ly form the Sun. With the birth of the Sun, the planets began to form 100 mi[illegible] years [illegible]round it.

Size and Structure of the Solar System

The image above shows the size and structure of our solar [illegible]. A[illegible] the size of the Earth is small compared to the size of Jupiter, Saturn an[illegible]

The furthest object that we can see in our solar system is Sedna, w[illegible] 143.73 billion km away from the Sun. This means the diameter of the solar system is 287.46 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.

PREVIEW

Name: _____ 16

Curriculum Connection
E2.1

Questions

Answer the questions below using evidence from the text.

1) What is our solar system? When was it formed?
2) What is ze of our solar system? Did anything surprise you about the size of the planets?

PREVIEW

Questioning

Write 3 que u h 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

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark ____

Compare Earth and Jupiter using the two criteria given below.

Size	
Orbit Time	

Name: _____ Mark ____

Compare Earth and Jupiter using the two criteria given below.

Size	
Orbit Time	

Name: _____ Mark ____

Compare Earth and Jupiter using the two criteria given below.

Size	
Orbit Time	

Name: _____ Mark ____

Compare Earth and Jupiter using the two criteria given below.

Size	
Orbit Time	

PREVIEW

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Name: _____ 18

Curriculum Connection
E2.1

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	



PREVIEW

Name: _____ 19

Curriculum Connection
A1.1, A1.3, A1.4, A1.5

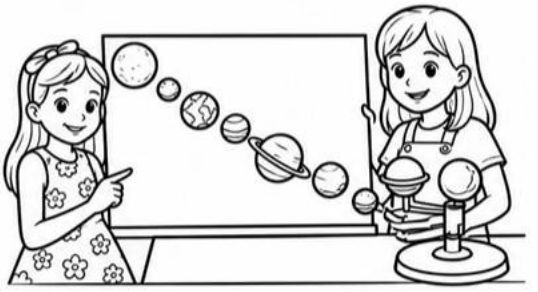
Solar System Assignment

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 pro

Yo represent the 8 planets in our solar system. You should try to be as ac as poss ir position relative to each other. This mea ve the Earth closest to the Sun becau uppos e third planet from the Sun.



In addition, the size o ets considered and created to scale. For ex upite diameter is about 11 times larger than E n's and t un is imes wider than Jupiter!

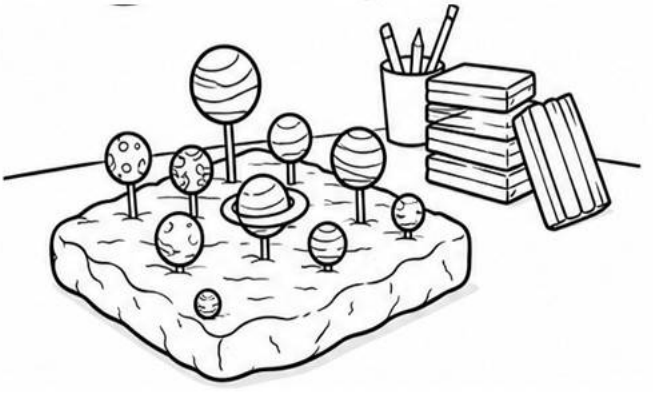
When you are finished, you can present y ar sy to the class. Your class could do a science fair where you show your mod er cla

PREVIEW

Ideas

Check out some ideas for models below. Search em o e.

- 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



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Name: _____ 20

Curriculum Connection
A1.1, A1.3, A1.4, A1.5

Planning | Explain the model you chose.

1) Describe the model you will make.

_____

_____

_____

2) What m[illegible]will you need?

3) Write the planets in order from sm[illegible] to bigg[illegible]

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?

_____

_____

_____

PREVIEW

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Name: _____ 21

Curriculum Connection
E2.1

Planet Profile – Research Activity

Research Choose a planet and fill in the information below.

1) Name of the planet you chose: _____

2) Draw the planet below. Be sure to draw any moons the planet may have.

Information	Details
Diameter	
Mass	
Moons	
Or[illegible]od	
S[illegible] Tem[illegible]ur	
How many pl[illegible]om the Sun?	

PREVIEW

3) Is your planet habitable for humans? Why or why not?

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Name: _____ 22

Curriculum Connection
E2.1

Research Answer the questions below.

4) What do the terms gas giant and terrestrial planet mean? Which type is your planet?

Gas Giant	
Terr[illegible]	
Your Planet	

5) How long would it take to [illegible] om Earth? Explain the speed and time it would take.

6) Interesting facts about your planet.

PREVIEW

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Name: _____ 23

Curriculum Connection
E2.1

What are Moons?

What are Moons?

Moons are natural objects that orbit planets. Scientists call moons "natural satellites" because a satellite also orbits a planet. Most people think satellites are just machines we send in to space to orbit a planet, but satellites can be natural too.

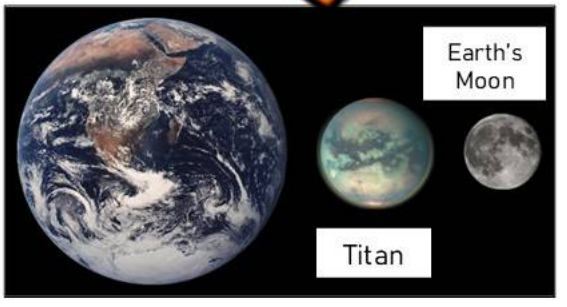
Plan[illegible]nd asteroids orbit the Sun, but moons orbit planets. Moons come in different s[illegible]d sizes and are made of rock. Most moons are airless, but some have atmo[illegible]ev[illegible]den oceans. We know a lot more about the moon because in 1969, t[illegible]Ameri[illegible]nded on the moon and took rock samples back to Earth to study them.

Moons and Planets

The Earth has one moon t[illegible]it arou[illegible]re are 214 moons in our solar system. Most of the moons orbit around [illegible]gas [illegible]e and Saturn. Smaller planets usually have less moons, Mars has two, [illegible]nus an[illegible]ury don't have any. Although scientists aren't 100 percent sure, they believe Jup[illegible]as 79[illegible]oons.

It was discovered in 2019, that Saturn has [illegible]y m[illegible]ists didn't know about. This gives Saturn a total of 82 moons. Saturn's g[illegible]oo[illegible]"Titan[illegible]rger than the planet Mercury! Check out the size comparison in the photo b[illegible]. Th[illegible] larger than Titan, but Titan is larger than our moon.

The Earth's moon can be seen by us each evening on a clear night, b[illegible]s really far away! It is 384,399 kilometres from the Earth! It took the American astronauts 3 days travelling at an average speed of 3,280 kph.



How was Earth's Moon Formed?

There are many theories that try to explain how the moon was formed. No one knows for sure! The most accepted theory is that the moon formed when the Earth and another small planet collided. The debris from the collision began to orbit the Earth. Over time, the debris collected to form a moon.

PREVIEW

Name: _____ 24

Curriculum Connection
E2.1

Questions

Answer the questions below using evidence from the text.

1) What are moons? Do all planets have moons?

2) How w Earth's moon formed?

PREVIEW

Summarize

What is t idea o eading and supporting details?

True or False

Is the statement true or false?

1) Moons are natural satellites because they orbit planets.	True	False
2) Moons orbit around the Sun, not around planets.	True	False
3) Scientists know exactly how many moons there are in our solar system.	True	False
4) Most moons have atmospheres (air) and oceans.	True	False
5) Moons are made of rock materials.	True	False

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) What is another name for a moon?	Natural satellite
	Asteroid
2) How many moons are in our solar system?	79
	214
3) How far is the Moon from Earth?	384,399 km
	38,439 km
4) Titan is a moon of:	Saturn
	Earth

Name: _____ Mark

Circle the correct answer.

1) What is another name for a moon?	Natural satellite
	Asteroid
2) How many moons are in our solar system?	79
	214
3) How far is the Moon from Earth?	384,399 km
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	Earth

Name: _____ Mark

Circle the correct answer.

1) What is another name for a moon?	Natural satellite
	Asteroid
2) How many moons are in our solar system?	79
	214
3) How far is the Moon from Earth?	384,399 km
	38,439 km
4) Titan is a moon of:	Saturn
	Earth

PREVIEW

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Name: _____ 26

Curriculum Connection
E2.1

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 A ds

There ar f steroids that are categorized based on which elements make up the aster e main t steroids are carbon, stony, and metallic.

1. **Carbon Aster** fro ocks that are rich in carbon. These asteroids are very dark in colou ke up asteroids in the solar system.
2. **Stony Asteroids** – nd some metal
3. **Metallic Asteroids** – mad ost ainly iron and nickel but often have small amounts of stone mixed



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 on the 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.

PREVIEW

Name: _____ 27

Curriculum Connection
E2.1

Questions

Answer the questions below using evidence from the text.

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

2) What is the asteroid belt?

Visualizing

Draw what you pictured while you were reading. Explain the picture.

PREVIEW

True or False

Is the statement 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

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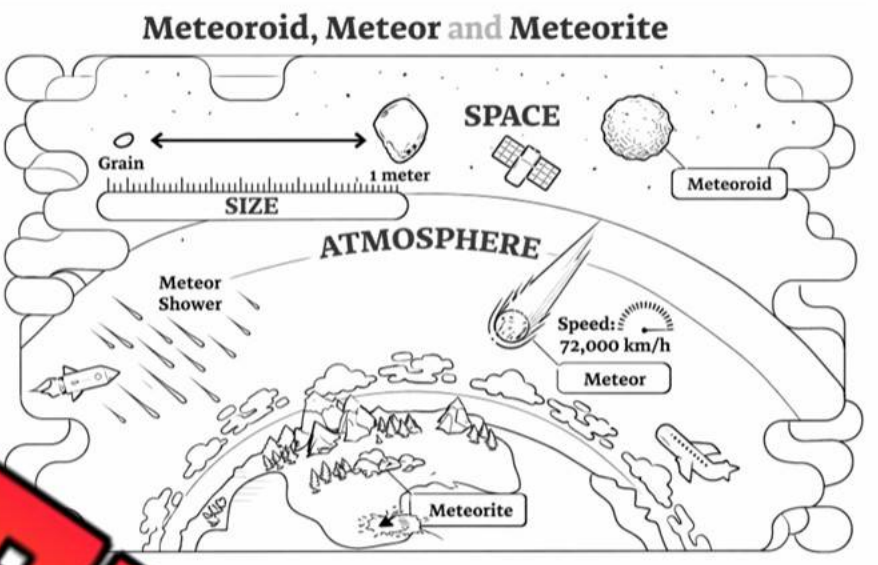
Meteors, Meteorites, and Comets

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 [illegible] the Earth. This is not dange[illegible]ause our atmosph[illegible]z[illegible] and burns the la[illegible]ds [illegible] nothing [illegible]ains. [illegible] process happe[illegible] see a "shooting [illegible]" [illegible]he sky.

Very rarely, a[illegible]l pie[illegible] of the asteroid will su[illegible]ey t[illegible] the atmosphere and land on the Earth's surface. These pieces are [illegible] **met**[illegible] **meteoroid** is a meteor that hasn't entered the earth's atmosphe[illegible]s ju[illegible]id, but much smaller.

A meteor enters the Earth's upp[illegible]spher[illegible],000km/h! Meteors can be seen at any time, but it is best to look [illegible]em du[illegible]ete[illegible]showers. These occur around the same dates each year, when the Ea[illegible]sses through a stream of dust left behind a passing [illegible]t.



What is a Comet?

A **comet** is a celestial body that orbits the Sun. They are on the edge of our solar system, beyond the orbit of Pluto. We can s[illegible] they get close enough to the Sun because they display a visible coma (fuzzy [illegible]f gas 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 seen 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.

PREVIEW

Name: _____ 29

Curriculum Connection
E2.1

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]et? Why is Halley's comet the most well known?

PREVIEW

Questioning

Write 3 q[illegible]ou ha[illegible]ut 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

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Check only the true statements.

Statement	✓
A meteor burns or vaporizes as it enters Earth's atmosphere.	
Every meteor reaches the surface of Earth.	
A meteorite is a piece of rock that survives its trip through the atmosphere and lands on Earth.	
A meteoroid is a small rocky object that has not entered Earth's atmosphere.	
Comets are made only of solid metal.	
Comets orbit the Sun.	
Halley's Comet can be seen from Earth every year.	

Name: _____ Mark

Check only the true statements.

Statement	✓
A meteor burns or vaporizes as it enters Earth's atmosphere.	
Every meteor reaches the surface of Earth.	
A meteorite is a piece of rock that survives its trip through the atmosphere and lands on Earth.	
A meteoroid is a small rocky object that has not entered Earth's atmosphere.	
Comets are made only of solid metal.	
Comets orbit the Sun.	
Halley's Comet can be seen from Earth every year.	

Name: _____ Mark

Check only the true statements.

Statement	✓
A meteor burns or vaporizes as it enters Earth's atmosphere.	
Every meteor reaches the surface of Earth.	
A meteorite is a piece of rock that survives its trip through the atmosphere and lands on Earth.	
A meteoroid is a small rocky object that has not entered Earth's atmosphere.	
Comets are made only of solid metal.	
Comets orbit the Sun.	
Halley's Comet can be seen from Earth every year.	

PREVIEW

Name: _____ 31

Curriculum Connection
E2.1

Identifying Celestial Bodies



Which Type?	Which celestial body does the description represent?

Word Bank			
Meteor	Meteorite	Meteoroid	Planets
steroid	Comet		Star
N tellite	Solar System		Galaxy

PREVIEW

1)	l rock t s ide of the Earth's atmosphere. Is often a pi ero that breaks off
2)	Collection ts and estial bodies that orbit a star because stro
3)	Small rock that ent rth's re
4)	Smaller than planets, bu ger t These orbit around the Sun.
5)	Huge celestial bodies made up of g ses. The it th own heat and light and often have planet ng th
6)	Small rock that lands on the Earth's surface
7)	Collection of solar systems, including billions of s
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

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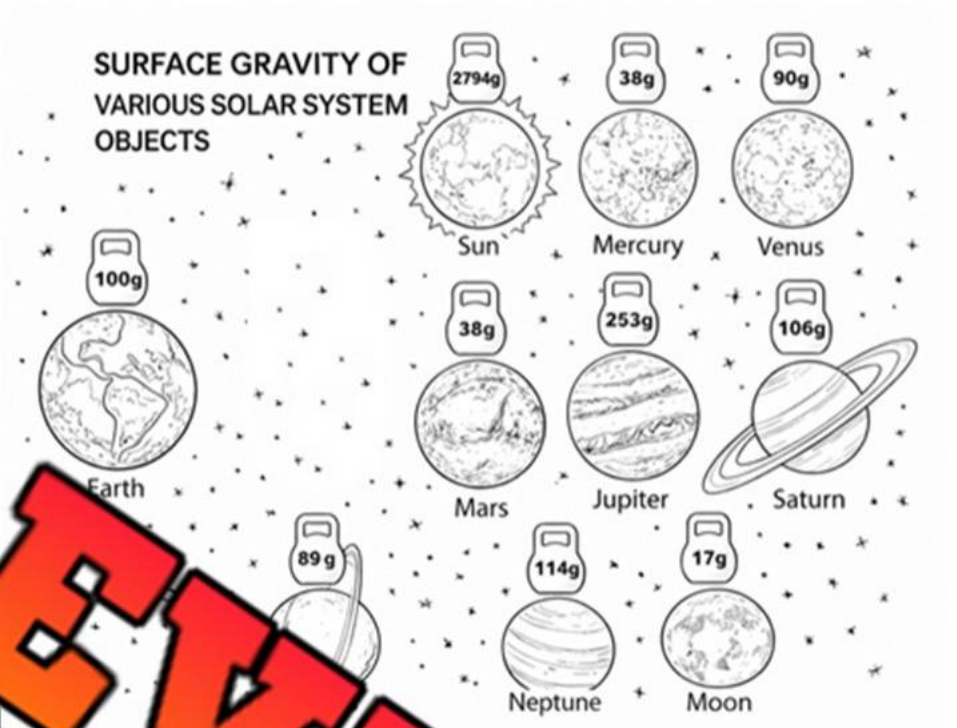
Name: _____ 32

Curriculum Connection
E2.2, E2.3

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. A massive objects (planets a) have a gravitatio at pull matte re. is a tar but the S is mu The Sun has a er gravitational pul e Earth because the la the planet/star, the more gravitational pull it has. We not feel the Sun's gravitational pull as much as Earth's because we are away e Sun. The Sun's gravitational pull is important however, because it ke all of th nets ur solar system in orbit around the Sun. Without the Sun's gravity, no pl aste uld stay close to it and there would be no orbiting.



PREVIEW

Sir Isaac Newton

In 1966, Newton observed an apple falling from a tree. He ed de the apple fall downward instead of simply floating away. He figure out t attract the apple, which is why it falls straight downward. He calls t etween 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.

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Name: _____ 33

Curriculum Connection
E2.2, E2.3

Visualizing

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

True or False

Circle whether each statement is true or false.

1) The gravitational pull is stronger on small planets.	True	False
2) Gravity is the force that pulls objects to the center of Earth.	True	False
3) All objects have their own gravitational pull.	True	False
4) The Sun has a gravitational pull that keeps the Earth in orbit around it.	True	False
5) Without gravity, life would be great because we could float around.	True	False

Questions

Use information from the text to support your answers.

1) Why is gravity so important to our life?

2) What is the difference between mass and weight?

PREVIEW

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Name: _____ 35

Curriculum Connection
A1.2, A1.4, A1.5

Gravity – Science Experiment

Information | What is this experiment about?

What affects the forces of gravity? If we drop two objects that weigh the same but are different in shape, which will fall first? What if the objects weigh different amounts but have the same shape?

Research Question
Out of the [illegible] we chose, which item will fall the fastest (have the strongest gravitat[illegible]? Which will fall the slowest?

Hypo[illegible] – Ran[illegible]cts in order of how fast they will fall.

_____

_____

_____

Materials

1. 5 different objects – choose item[illegible] the sa[illegible]d resistance (no feathers)
2. Stopwatch
3. High point to stand on



Procedure

1. Move to the high point where you will drop your ob[illegible]
2. Have a friend ready with a stopwatch.
3. The stopwatch operator says go when they are ready, and t[illegible] person up high drops the object.
4. When the object hits the floor, the stopwatch operator clicks stop.
5. Do this for all 5 objects and record your times in the chart below.

Object	Time

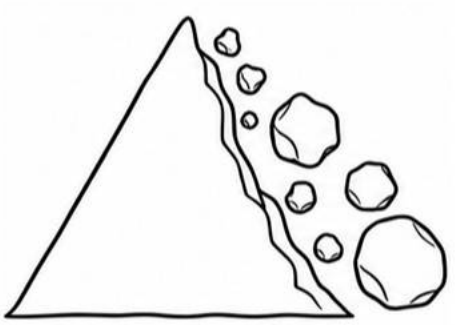
PREVIEW

Name: _____ 36

Curriculum Connection
A1.2, A1.4, A1.5

Rank Rank the objects in order of how fast they fell.

Rank 1 – Fastest 5 - Slowest	**Object**
1	
2	
3	
4	
5	



Result Answer the qu[illegible] below [illegible] the experiment.

1) Was your hypothesis correct? Why[illegible] not?

2) What did you notice about the results? Does the weight of an[illegible] gravitational pull on the object? Does the shape of the object affect [illegible]

3) Why do you think you saw these results?

PREVIEW

Name: _____ 37

Curriculum Connection
E2.2, E2.3

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 gravitation[illegible]ll is stronger or weaker. For example, our weight on the moon would be about 6 times les[illegible] earth because the moon is much smaller and has 6 times less of a gravitatio[illegible]ver, our mass is the same everywhere, including on the moon because our b[illegible]e s[illegible]mount of matter.

PREVIEW

Math Time

[illegible]ght[illegible]arth by 6 to find the weight on the moon.
M[illegible]e weig[illegible]moon by 6 to find the weight on earth.

Weight o[illegible]oo[illegible]	Weight on Earth
15 kg	
50 kg	
	[illegible]0
110 kg	
	[illegible]kg



Questions Use information from the text to support your answ[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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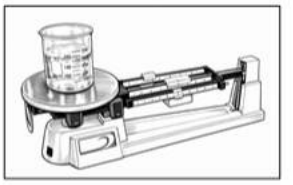
Name: _____ 38

Curriculum Connection
A1.2, A1.4, A1.5

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.

PREVIEW

Materials - What you need for the experiment?

- Spring scales - to determine the weight of objects in Newtons or grams
- Balance scales - to determine the mass of objects in grams
- 6 objects that are not too large for the scales (check both)
- Optional - Bucket to hold the objects that you will put your objects in

Procedure - How will you perform the experiment?

1) Weigh each object using the spring scale and the balance scale
2) When weighing using the spring scale, if you are using a bucket you 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 Gram Balance Scale	Mass in Kilogram

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Name: _____ 39

Curriculum Connection
A1.2, A1.4, A1.5

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 the rela tween Newtons and the weight of an object?

4) Were the mass and weight of the obj same in.

5) If you weighed the same objects on the moon, how m Lea h? Remember, our weight on the moon is six times less.

PREVIEW

Name: _____ 43

Curriculum Connection
E2.4

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 light off of them.



Examples of Light Emitters

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

The Sun emits so much light for us that it creates daylight for us. That is because the Sun is closer to planet Earth than 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 them shine bright and 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.

PREVIEW

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Curriculum Connection
E2.4

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]mean for the sun to illuminate other celestial objects? Which celestial bodies do[illegible]n illuminate?

PREVIEW

Questioning

Write [illegible]s yo[illegible]out 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

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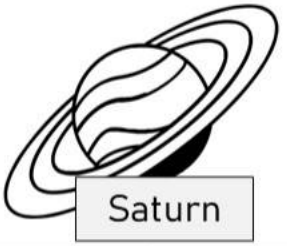
Curriculum Connection
E2.4

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



Star

Emitter | Reflector



Saturn

Emitter | Reflector



Sun

Emitter | Reflector



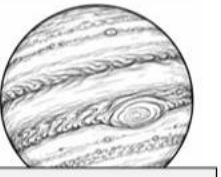
Earth

Emitter | Reflector



Moon

Emitter | Reflector



Jupiter

Emitter | Reflector



Earth's Moon

Emitter | Reflector



Mars

Emitter | Reflector



Emitter | Reflector

PREVIEW

Explain Which celestial bodies reflect light and which emit light.

Emit Light	Reflect Light

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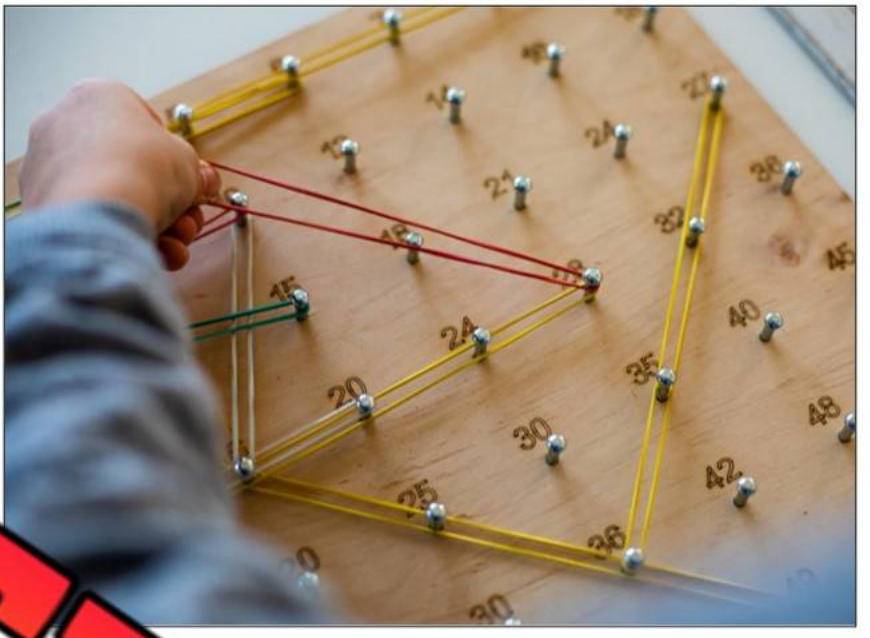
Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Geoboard Constellations

Use a geoboard to represent 4 constellations. You can research your own, or choose from the options provided. Once you [illegible]ated your geoboa[illegible]n, draw it us[illegible] dot pa[illegible]



Materials

W[illegible] need

- Paper with dot paper
- Geoboard
- Elastics
- Constellations

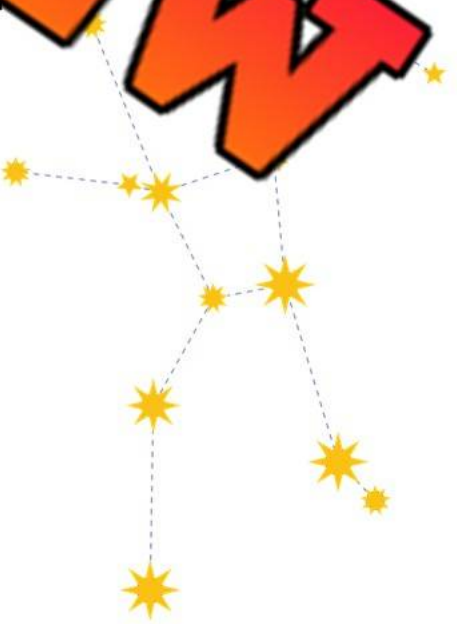


Bora[illegible]nstellation

Procedure

How you perform the experiment

1) Research or choose 4 constellations from the options provided to you
2) One at a time, represent a constellation using elastics on the geoboards. You likely won't be able to represent it perfectly, but do your best!
3) Draw each constellation on the dot paper before moving on to the next constellation



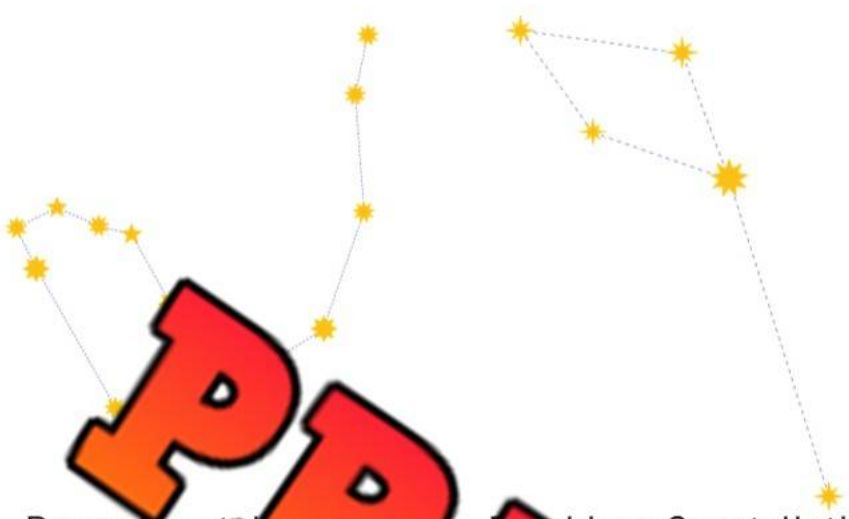
Hercules Constellation

PREVIEW

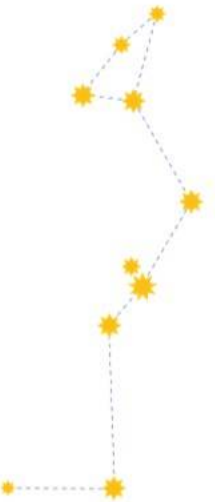
Name: _____ 48

Curriculum Connection
A1.3, A1.4, A1.5

Examples	Below are some examples of constellations you can use.



Draco Const[illegible] [illegible]hinus Constellation



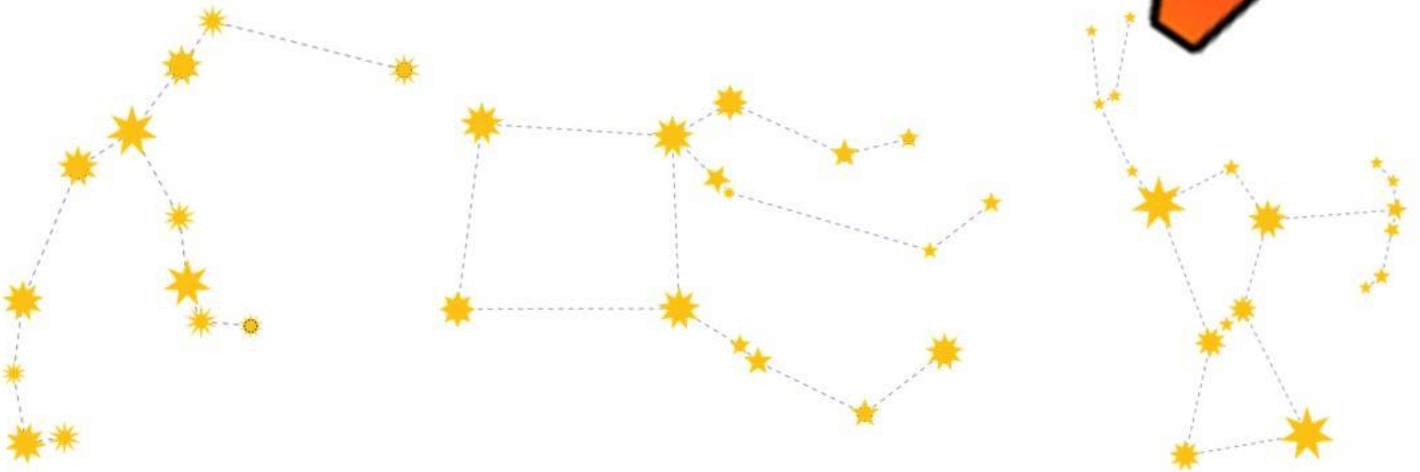
Serpens Constellation



Grus Constellation

Triangulum Constellation

S[illegible]ation



Perseus Constellation

Pegasus Constellation

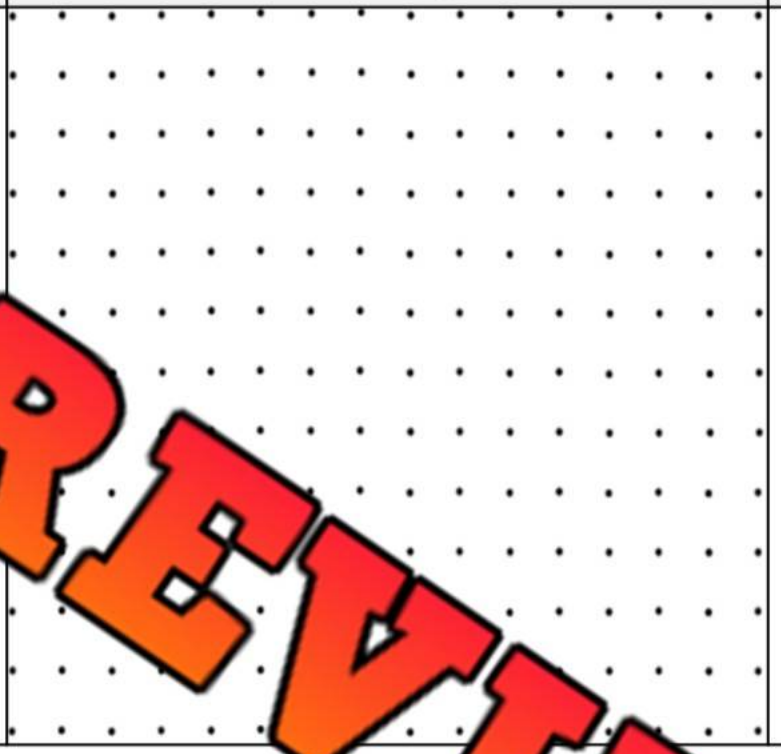
Orion Constellation

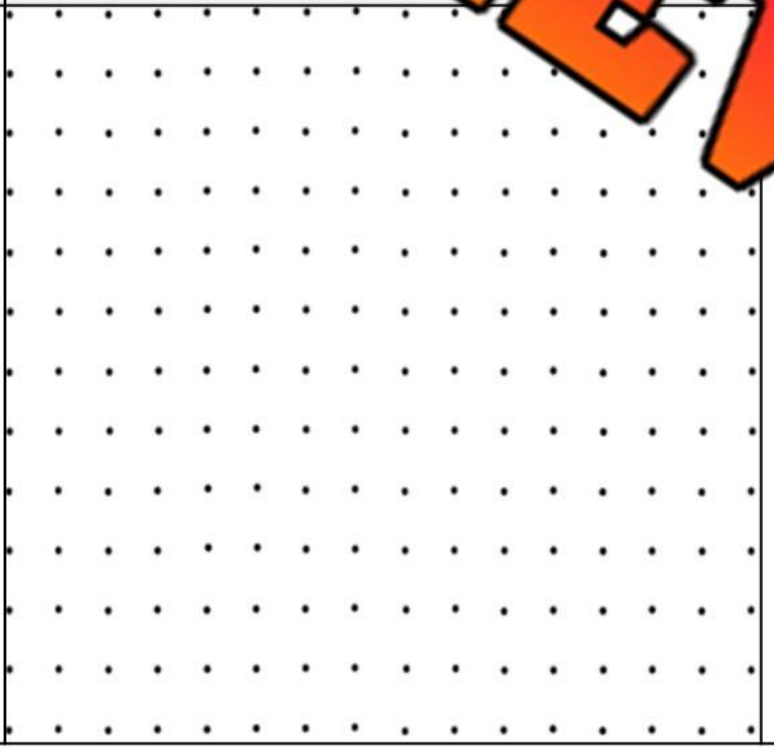
PREVIEW

Name: _____ 49

Curriculum Connection
A1.3, A1.4, A1.5

Draw Draw each constellation you decide to represent on your geoboard.

Constellation Name	Drawing	How Many Stars
		

Constellation Name	Drawing	How Many Stars
		

PREVIEW

Name: _____ 51

Curriculum Connection
E2.2

Conception of the Earth

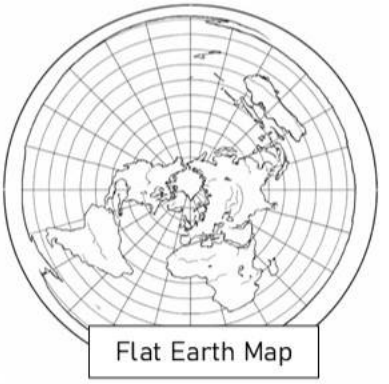
Conception of the Earth

Throughout the history of mankind, scientists and people alike have argued over how the Earth came about. Many theories have come and gone, such as the Flat Earth theory, Earth-centred theory and the Sun-Centred theory. These theories will continue to be argued about as new scientific evidence comes out through space travel and other breakthroughs.

PREVIEW

Flat Earth

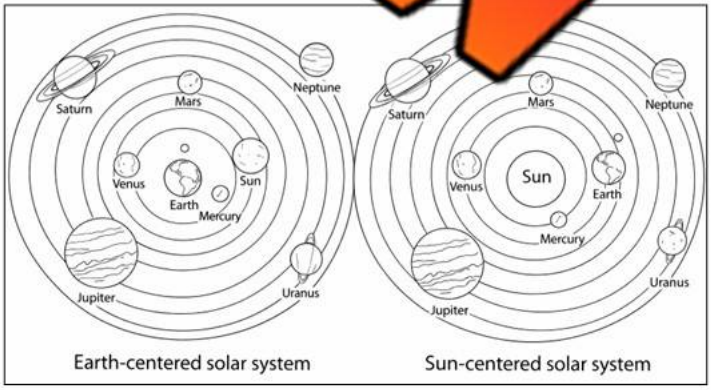
The Flat Earth theory is that the surface of the Earth is flat. This theory was written about thousands of years ago, in the year 276 BC. The reason people believed that the Earth was flat is because it appeared to make sense to walk around the planet's surface and it looks as though it is flat. There is evidence points that way.


Flat Earth Map

Flat Earth supporters believe there is an "Ice Wall" that prevents people from falling off the surface of the Earth. The problem with this theory is that it has been scientifically debunked. Satellite photos have shown that the Earth is a sphere.

Earth-Centred Theory

After the Flat Earth model was debunked, Plato coined the Geocentric model. Literally just means Earth Centred model. In this theory, Plato believed that the Earth was the centre of the universe. He believed that the stars, the sun, the moon, and other planets all moved around the Earth.



Sun-Centred Theory

Nicolaus Copernicus was the astronomer who put forth the theory that the Sun is at rest near the centre of our solar system. In 1543, he detailed his theory that all planets, including the Earth, rotate around the Sun. It took more than 100 years for his theory to be accepted and it is still the accepted theory of today.

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Name: _____ 52

Curriculum Connection
E2.2

Questions

Answer the questions below using evidence from the text.

1) What is the flat earth theory? Why was it debunked?

2) What is the difference between the Earth-Centred and Sun-Centred theories?

3) Is it possible for a theory to emerge that debunks the Sun-Centred theory? Explain.

PREVIEW

Making Connections

What does the reading remind you of in your life?

True or False

Is the statement true or false?

1) Nicolaus Copernicus came up with the flat-earth theory.	True	False
2) Flat Earth supporters are worried people will fall off the side of the earth.	True	False
3) The Geocentric Model means the earth is at the centre of the universe.	True	False
4) The most accepted theory is the Sun-Centred theory.	True	False
5) The Sun-Centred theory means the sun and moon rotate around the earth.	True	False

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Curriculum Connection
E2.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Circle the best answer.

1) What did supporters of the Flat Earth theory believe surrounded the Earth?

a) A ring of fire
b) An "Ice Wall"
c) A wall of water
d) A barrier of clouds

2) According to the Earth-Centred theory, what moves around the Earth?

A) Only the Sun
B) Only the Moon
C) Stars, the Sun, the Moon, and other planets
D) The Earth itself

Name: _____

Circle the best answer.

1) What did supporters of the Flat Earth theory believe surrounded the Earth?

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Name: _____

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A) Only the Sun
B) Only the Moon
C) Stars, the Sun, the Moon, and other planets
D) The Earth itself

PREVIEW

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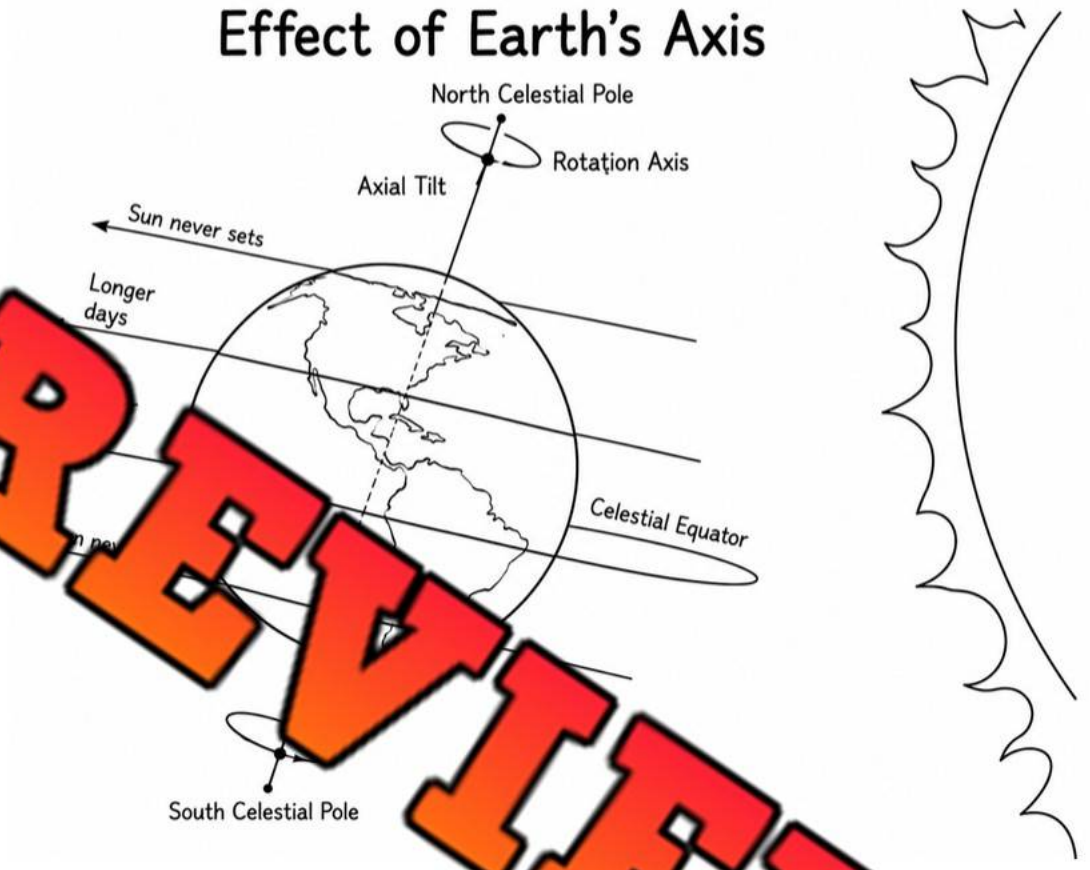
Name: _____ 54

Curriculum Connection
E2.5

Day and Night

What Causes Days and Nights?



Have you ever wondered why we have days and nights? Wh we get more durin parts o day versus during night? It all comes down to the Earth's positioning to the sun.

The Earth spins on an axis very quickly. Scientists have figured out that the Earth spee 00km per hour! It does a full rotation every 23 hours and 56 minutes. Ea axis, the side that is facing the sun experiences daylight. Approximately 1 same side will be facing away from the sun, which means it will be dark. T why we have different time-zones because it is light in China while it is dark in Canada. In fact, in Hong Kong, it is 12 hours ahead of Toronto, or the Eastern Time Zone (Ontario).

PREVIEW

Did you know?

Every location on Earth experiences a different amount of sunlight. Places near the equator receive approximately 12 hours of sunlight each day throughout the year, however, places near the poles can experience 24 hours of sunlight or 24 hours of darkness depending on the season. Could you imagine having a season where it never gets dark!

Name: _____ 55

Curriculum Connection
E2.5

Questions Answer the questions below using evidence from the text.

1) What do you notice about the Earth's axis?

2) Why do ave days and nights? Explain.

PREVIEW

True or False Is th st true se?

1) We have days and nights due to the E sitio the sun.	True	False
2) The Earth spins 1500km/h.	True	False
3) The Earth does one full rotation roughly every ours	True	False
4) When a location on Earth is facing the sun, it is day th	True	False
5) Some places on Earth don't receive any daylight for months.		alse

Visualizing Draw what you were picturing while you were reading. Expl n the picture.

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Name: _____ 58

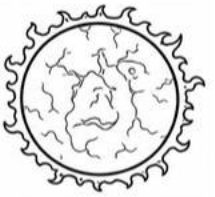
Curriculum Connection
A1.2, A1.4, A1.5

Experiment – Rotating Earth

Research Question

Why do we have day and night?

Why do we have a day with light and a night with no light?





Materials

do we need for our experiment?

- Globe
- Lamp or st flash
- Dark room



Method

How do we compl e exp nt?

1) Take the lamp shade off the lamp.
2) Put the globe about 20 centimetres away li
3) Point the globe so that Canada is being lit up. Notic f the world are dark while Canada is light.
4) Spin the globe slowly. Notice if some parts are now a bit lit up and some places are now in the dark.
5) Keep spinning the globe until Canada is now in the dark. Which countries are now lit up?
6) Now switch the position of the lamp and the globe. Notice when you repeat the steps above that Canada is either further or closer to the Sun. This creates our seasons.



PREVIEW

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Name: _____ 59

Curriculum Connection
A1.2, A1.4, A1.5



Observations | Answer the questions below

1) When it is light in Canada, which countries are in the dark?	
1)	
2)	
3)	
4)	
5)	

2) When Canada is positi… that … loser to the Sun, which season is it?			
Summer	Winter		Spring

3) When Canada is positioned so that it poin… ther… …e Sun, which season is it?			
Summer	Winter	Fal…	Sp…

4) Why do we have seasons? Describe the relative locations of the S… the Earth during each season.	
Summer	
Fall	
Winter	
Spring	

PREVIEW

Name: _____ 60

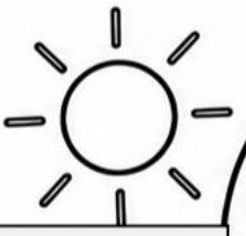
Curriculum Connection
A1.3, A1.4, A1.5

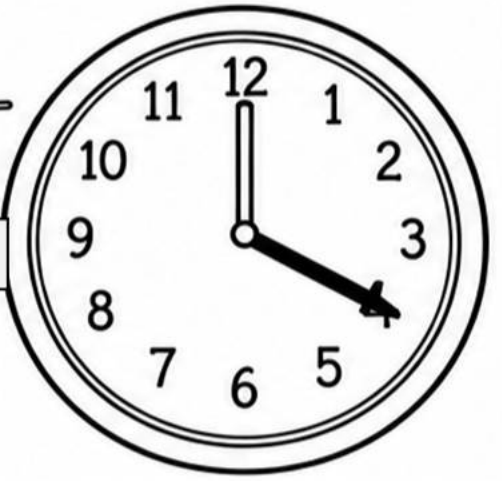
Experiment – Making a Sundial

Research Question

Can we tell time without a watch?

A sundial can be used to tell the time using shadows. Where the shadow points is the time.





Materials

What do we need for our experiment?

- Paper Plate
- Marker
- Pencil
- Playdough or c

Method

How do we [illegible] periment?

Create Your Paper Plate Sundial

1) Write the numbers on the plate, just like [illegible] diagra[illegible]. Your sundial will look just like a clock.

2) Stick a pencil through the middle of the paper plat[illegible] th[illegible] clay to make it stand up.

Using Your Sundial

1) First thing in the morning, find a sunny area where there won't be any shade (away from trees).

2) Put the plate down and check the time. When it is a round number (ex. 9:00am), turn the plate so that the shadow points to the current time.

3) Check back in an hour to see if the sundial is working.

4) When the shadow is between numbers, the time is between those numbers. For example, if it is between 1 and 2, it could be 1:30. If the shadow is closer to the 2, it could be 1:45.

PREVIEW

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Name: _____ 61

Curriculum Connection
A1.3, A1.4, A1.5

Observations

Check your sundial throughout the day.



Where is the Shadow Pointing (Between the ____ and the ____)	**Time Estimate** (Guess the Time)	**Clock Time** (Check afterwards)

PREVIEW

Results

Answer the questions below.

1) How accurate is your sundial?

2) Can you use the sundial to determine the time to the nearest minute or second? Explain.

3) How do sundials work? Does the Earth move in a predictable pattern around the Sun?

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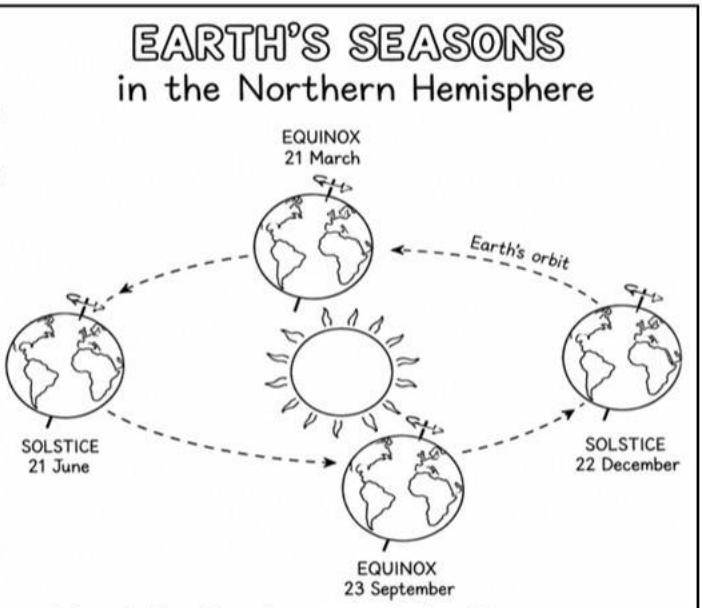
Name: _____ 62

Curriculum Connection
E2.5

Seasons – Earth's Orbit

What Are Seasons?

We have 4 seasons that we divide our year into: summer, fall, winter, and spring. Each season is 3 months long with summer being the warmest and winter the coldest.



Why Do

Seas pen du arth's positioning wit exp ce days and nights d e rota the Earth, but we exper s due orbit of the Earth around the Sun.

The Earth **orbits** the Su me t around the sun once a year, or every 365 days. As the Earth orbits the Sun, ce ts of arth receive more direct sunlight.

The Earth's Tilt

The Earth is tilted on its axis at 23.5 degrees in relation sun. This that as it orbits the sun, for half of the year the northern or southern h phe wards the sun. When the southern hemisphere is pointed towards the sun, hemisphere is colder and experiences winter.

The opposite is true when the northern hemisphere is pointed towards the sun. That is also why the regions closer to the equator are always warm because they are always angled towards the sun and the angle does not change much from season to season.

As you can see from the diagram, we don't experience winter because we are further away. Even though the Earth's orbit is not a perfect circle, we experience seasons because of the Earth's tilt. On December 22, the northern part of the Earth is pointed slightly more away from the Sun than the southern hemisphere. On the contrary, in the summer, the northern hemisphere is pointed more at the sun than the southern hemisphere.

PREVIEW

Name: _____ 63

Curriculum Connection
E2.5

Questions

Answer the questions below using evidence from the text.

1) Why do we experience seasons? Explain.

2) How is [illegible] moving in relation to the Sun. It moves in two ways, explain them both.

PREVIEW

Making Connections

W[illegible] th[illegible] mind you of in your life?

True or False

Is the statement true or false?

1) It takes the Earth 24 hours to orbit around the Sun.	True	False
2) It takes roughly 365 days for the Earth to orbit around the Sun.	True	False
3) During the winter season, the Earth is titled away from the Sun.	True	False
4) During the summer season, the Earth is much closer in its orbit to the Sun.	True	False
5) The Earth is tilted on its axis at 23.5 degrees.	True	False

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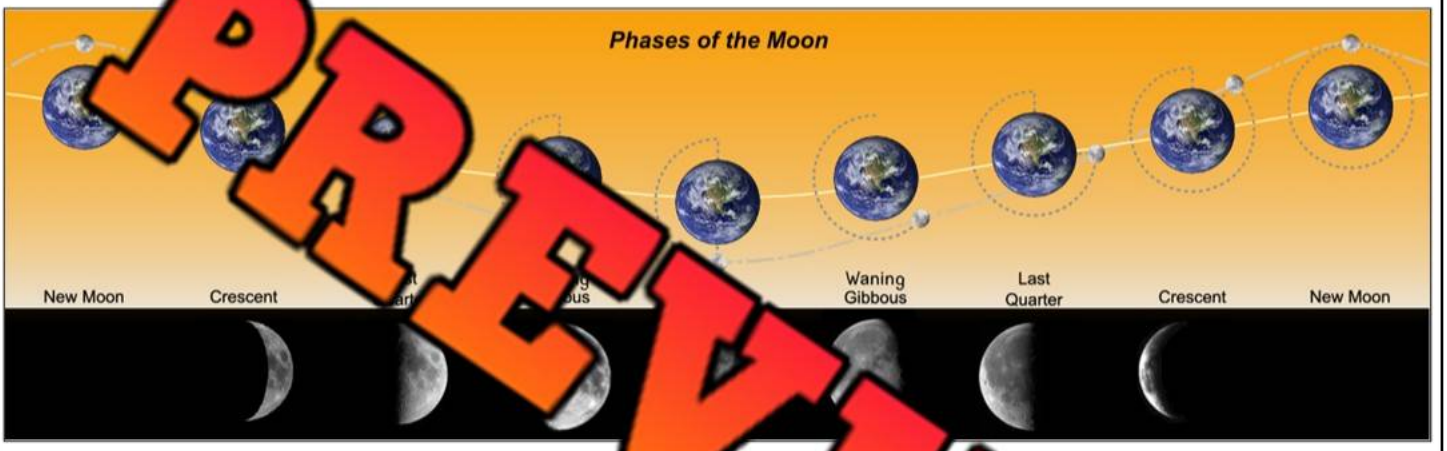
E2.5

Phases of the Moon

What are the Phases of the Moon?

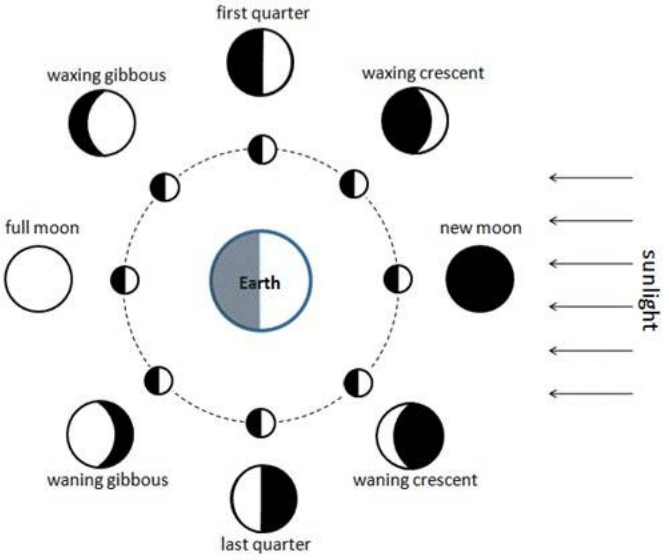
Have you ever noticed that the shape of the moon changes? Some nights the moon is a full circle, while other nights it is a small sliver. Astronomers have figured out that we have 8 main phases of the moon, meaning we have 8 different shapes of the moon that we can see on[illegible]ar night.



PREVIEW

Why does the Moon change shape?

The Moon is shaped like a sphere, and it orbits [illegible] the [illegible]oon takes about 4 weeks to finish one orbit around the Earth. **Orbit** mean[illegible]oon trav[illegible] repeated path around the Earth. Since the orbit is repeated over and [illegible]gai[illegible]lict exactly what phase of moon we will see in the future.



The moon will go throug[illegible]he 8 phases in the 4-week orbit. This is called the **lunar cycle.** We see a different shape because the Sun lights up different parts of the moon as it orbits around the Earth. A new moon can't be seen, while a full moon is completely visible on Earth. The Sun always lights up half of the moon, but what we see depends on where the Moon is in its orbit around the Earth.

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E2.5

Diagram

Draw each of the phases of the moon.

Waxing Crescent	First Quarter	Waxing Gibbous	Full Moon	Waning Gibbous	Last Quarter	Waning Crescent	New Moon

Questi

Answe estions below using evidence from the text.

1) Why do we ha ent ph e moon?

2) What is the lunar cycle? If we see a full moon to ow days until the next full moon?

PREVIEW

True or False

Is the statement true or false?

1) There are 9 phases of the moon.	True	False
2) The lunar cycle is 28 days long.	True	False
3) The Earth orbits around the moon.	True	False
4) The sun always lights up half of the moon.	True	False
5) We cannot see a new moon.	True	False

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Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Moon Phases

Recreate the moon phases using Oreo cookies. Follow the instructions below to complete the activity.



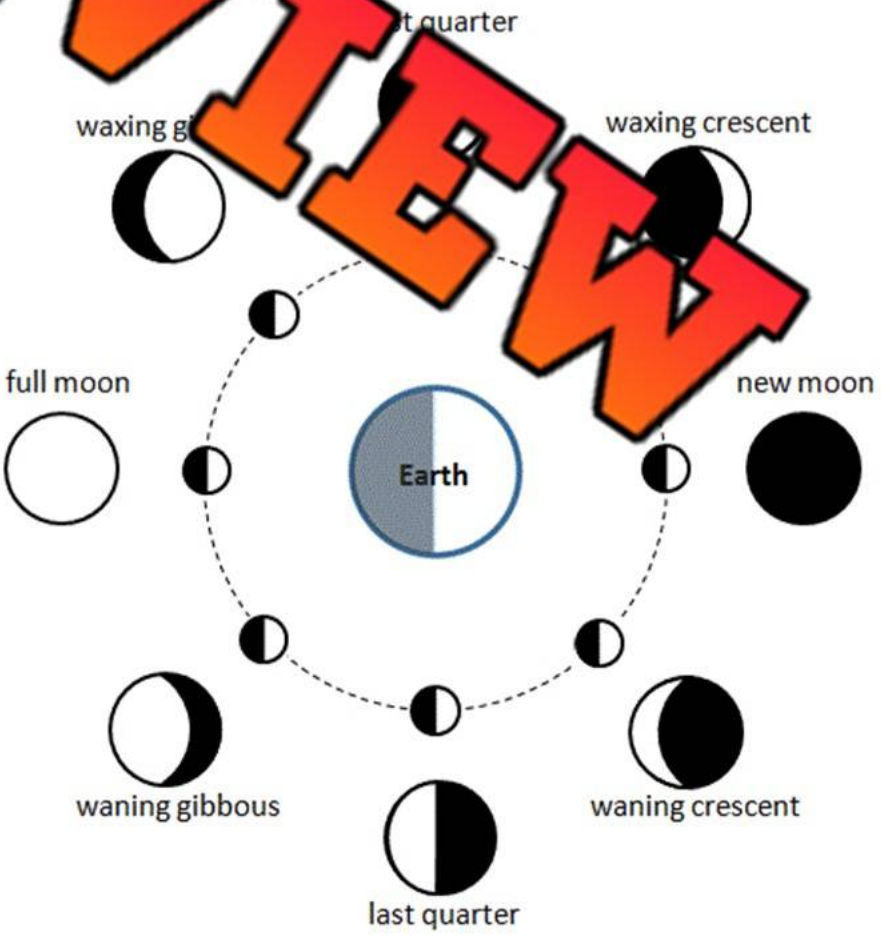
Materials — What you need

- 8 Or
- P late
- A popsicle too
  scraping the

PREVIEW

Procedure — How will y lete ity?

1) Separate the cookie so that the icing is on one side of the cookie and not the other. Twisting the cooking a bit works to achieve this.
2) Use the popsicle stick to create each phase of the moon.
3) Glue the phase of the moon onto the paper plate. Make sure to put them in order.
4) Label the moon phases with their official name.



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Curriculum Connection
A1.3, A1.4, A1.5

Results | Answer the questions below.

1) Does the Moon emit light or reflect light?

2) Does the Moon move around the Earth or does the Earth move around the Moon?

3) Why do[illegible] different phases of the moon?

4) Why are the phases of [illegible]n pred[illegible]? How do astronomers know what moon phase we will have a month[illegible]w?

5) Go online and search "Moon Phase Calculator" [illegible]aw[illegible]n phase we will have on your next birthday. Then find out the mo[illegible] 30th [illegible]day! What about your 60th birthday?

Date	Name of Moon	
Next Birthday		
30th Birthday		
60th Birthday		

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Curriculum Connection
E2.5

Lunar Eclipse vs Solar Eclipse

What is an Eclipse?

An **eclipse** is when one celestial body (planet, sun, moon) moves into the shadow of another. This happens when the celestial body is blocked by another celestial body. The term is commonly used to describe a solar eclipse or a lunar eclipse.

We have to remember that the Sun is very far away from us and the Moon. This means that as the Moon orbits our planet, it sometimes gets right between the Sun and the Earth. Other times the Earth gets in between the Sun and the Moon.

PREVIEW

Lunar Eclipse

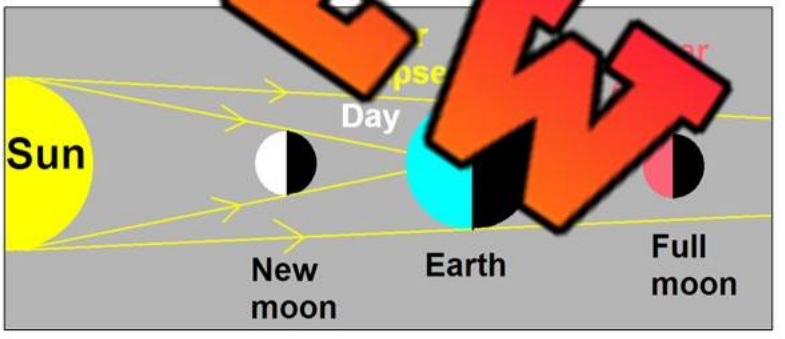
A **lunar eclipse** is when the Earth gets between the Sun and the Moon. This means the Earth's shadow falls on the Moon as the Earth is blocking it. This casts a shadow on the Moon.



Full or Total Lunar Eclipse

During a total lunar eclipse, you'll see Earth's shadow moving across the moon's face. Once it totally covers the moon, the moon will appear red, rusty orange or copper-coloured.

A **partial lunar eclipse** happens when the three celestial bodies don't form a straight line. When this happens, only part of the moon is behind the Earth.



Solar Eclipse

A **solar eclipse** occurs when the Moon passes between the Earth and the Sun. During a solar eclipse, the light from the Sun cannot reach the Earth. During a total solar eclipse, the Moon blocks out the Sun completely. A partial eclipse is when the Moon blocks out a portion of the Sun.

An annular eclipse happens when the Moon is at its furthest point in orbit and does not cover the Sun completely. We see a thin ring of light emerging from outside the rim of the moon.

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Curriculum Connection
E2.5

Questions Answer the questions below using evidence from the text.

1) Why do eclipses happen?

2) What is the difference between a solar eclipse and a lunar eclipse?

Diagram Draw a diagram of a lunar and solar eclipse. Label the Sun, Moon, and Earth.

Lunar Eclipse	Solar Eclipse

True or False Is the statement true or false?

1) A lunar eclipse is when the Moon blocks the Sun's light to the Earth.	True	False
2) A solar eclipse is when the Earth blocks the Sun's light to the Moon.	True	False
3) An partial eclipse happens when the Sun's light is completely blocked.	True	False
4) An annular eclipse happens when we see a thin ring of light.	True	False
5) A total eclipse is when the Moon/Earth blocks the Sun completely.	True	False

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Curriculum Connection
E2.5

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Fill in the Blanks Questions.

1) A solar eclipse occurs when the _____ passes between the Earth and the Sun.

2) A partial solar eclipse happens when the Moon blocks out a _____ of the Sun.

3) During an annular eclipse, a thin ring of _____ can be seen around the Moon.

Name: _____

Fill in the Blanks Questions.

1) A solar eclipse occurs when the _____ passes between the Earth and the Sun.

2) A partial solar eclipse happens when the Moon blocks out a _____ of the Sun.

3) During an annular eclipse, a thin ring of _____ can be seen around the Moon.

Name: _____

Fill in the Blanks Questions.

1) A solar eclipse occurs when the _____ passes between the Earth and the Sun.

2) A partial solar eclipse happens when the Moon blocks out a _____ of the Sun.

3) During an annular eclipse, a thin ring of _____ can be seen around the Moon.

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E2.5

Types of Eclipses

Questions Which type of eclipse is the picture showing?

Word Bank		
Annular Solar Eclipse	Partial Solar Eclipse	Total Solar Eclipse
Total Lunar Eclipse	Partial Lunar Eclipse	



















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Curriculum Connection
E2.5

Lunar and Solar Eclipses

Research Fill in the table below about each of the different eclipses.

Eclipse	What is it?	Draw – What does the Moon look like?	Timing - When was the last eclipse?
Partial Lunar Eclipse			
Total Lunar Eclipse (Blood Moon)			
Partial Solar Eclipse			
Total Solar Eclipse			
Annular Solar Eclipse			

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Curriculum Connection
E2.5

Memory Game: Space Object Match-Up

Objective

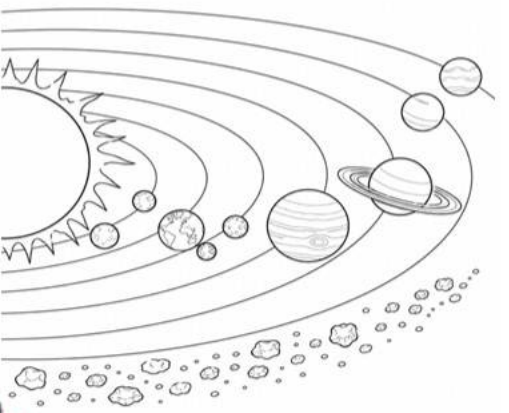
What are we learning about?

Students will identify different objects found in space and match each object with its correct characteristic or description.

Materials

What will you need for the activity?

- Memory game cards (provided) with the terms on one set and definitions on another set.
- A flat surface like a table or floor to lay out the cards.



Instructions

How will you complete the activity?

1) Divide the class into groups of 3 or 4. Give each group a set of Memory Game cards. (Provided)
2) Have each group lay all the cards face down in a grid on a flat surface.
3) The students take turns flipping over two cards at a time, trying to find a matching term and its definition.
4) If a student finds a match, they remove those cards from the grid and keep them.
5) If the cards do not match, they are turned back over, and the next student takes a turn.
6) The game continues until all the cards have been matched.
7) After the game, review the terms and definitions with the class.
8) Discuss how understanding the characteristics of space objects helps scientists classify, observe, and learn more about our solar system.

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Curriculum Connection
E2.5

Cards | Space objects and matching characteristics

Object Found in Space	Characteristic / Description
Sun	A star that gives off its own light and heat.
Earth	The planet we live on and the third planet from the Sun.
Moon	A natural satellite that orbits Earth and reflects light from the Sun.
Mercury	The planet closest to the Sun.
Venus	A very hot planet covered by a thick atmosphere.

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Curriculum Connection
E2.5

Cards | Space objects and matching characteristics

Object Found in Space	Characteristic / Description
Mars	A rocky planet often called the Red Planet.
J r	The largest planet in our solar system.
Saturn	arge t known for vis of rings.
Uranus	A planet that ates on its side.
Neptune	The farthest major planet from the Sun.

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E2.5

Cards | Space objects and matching characteristics

Object Found in Space	Characteristic / Description
Comet	An object made mostly of ice, dust, and rock that orbits the Sun.
[illegible]id	A rocky object that orbits the Sun and is smaller than a planet.
Meteoroid	[illegible]iece of rock or [illegible]velling [illegible]e.
Meteor	A streak of light [illegible]aced when a meteoroi[illegible]enters Earth's atmosphere and heats up.
Meteorite	A piece of a meteoroid that survives the atmosphere and reaches the ground.

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Curriculum Connection
E2.5

Cards | Space objects and matching characteristics

Object Found in Space	Characteristic / Description
Dwarf Planet	A round object that orbits the Sun but has not cleared other objects from its orbital path.
	A huge ball of hot gas that produces its own light and energy.
Planet	A ge, rly round object hat n an orbit and r.
Natural Satellite	A natural object t travels in an orbit around a planet or other larger body.
Asteroid Belt	A region between Mars and Jupiter containing many rocky objects.

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Curriculum Connection
E2.5

Celestial Objects in the Night Sky

What is a Celestial Object?

A **celestial object** is a natural object which is located outside of the Earth's atmosphere. The Moon, the Sun, an asteroid, planet or star are all examples of celestial objects.

We can see the same celestial objects in our night sky, between sunset and sunrise. If the sky i[illegible]r with no clouds, many celestial objects can be seen with an unaided eye, binocular[illegible]escope. Sometimes, we can only see certain celestial objects during certa[illegible]is is because we are orbiting the Sun and other planets are also orb[illegible]g the [illegible] travelling at different speeds, but these speeds, orbits, and rotations are p[illegible] which [illegible]ientists the ability to understand when certain celestial objects wi[illegible]isib[illegible]

List of Celestial Objects We

- **The Moon –** Can be observed a[illegible]ost [illegible]epe[illegible] if the sky is clear.
- **Jupiter** – Jupiter is the largest planet [illegible]our sola[illegible]em [illegible] very bright and exciting to observe. It is best observed just hours bef[illegible]nrise [illegible]s [illegible] visibility of it lessens when the sky gets brighter.
- **The 5 Visible Planets –** the five planets that are closest t[illegible]e b[illegible]be easily seen in the night sky with the naked eye. These planets from closest to the Sun are – Mercury, Venus, (Earth), Mars, Jupiter, Saturn. With a telescope, you can see dynamic features like Jupiter's cloud belts, Saturn's rings and Mars' ice caps.



- **The Big Dipper** – The best known constellation - collection of stars that consists of seven stars.

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Curriculum Connection
E2.5

Questions

Answer the questions below using evidence from the text.

1) Why are some celestial bodies only visible during certain times of the year?

2) Why is [illegible]r visible? When should we look to see Jupiter?

PREVIEW

Making Connections

[illegible] a celestial body? Explain.

True or False

Is the statement true or false?

1) The Earth is a celestial body.	True	False
2) The Big Dipper is a collection of 7 stars.	True	False
3) Uranus is part of the 5 visible planets.	True	False
4) Jupiter can be seen with the naked eye .	True	False
5) We see stars and planets randomly on random days throughout the year.	True	False

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Curriculum Connection
E2.6

Story: Chris Hadfield: A Canadian Space Pioneer

"Chris Hadfield: A Canadian Space Pioneer"

Chris Hadfield is one of Canada's most famous astronauts. Born on August 29, 1959, in Sarnia, Ontario, Chris Hadfield dreamed of going to space ever since he was a ch dream came true when he became an astronaut with the Canadi cy (CSA).

Hadfie first e was in 1995 aboard the Space Shuttle Atlantis. During this mission, build sian space station Mir. In 2001, he went to space again, this th e Endeavour. During this mission, Hadfield became the firs an t pace. He spent nearly 15 hours outside the spacecraft, workin on t atic Space Station (ISS).



In December 2012, Chris Hadfield made his th nd most famous trip to space. He served as the c mar of the ISS, becoming the first Canadian to comman spaceship. Hadfield spent five months aboard the ISS, conducting scientific experiments and sharing his experiences with the world through social media. He even played guitar and sang David Bowie's "Space Oddity," which became a viral hit.

Hadfield's contributions to space science and technology are significant. He has inspired millions of people, showing that with hard work and determination, even the sky is not the limit. His work has helped advance our understanding of space and made Canadians proud of their achievements in space exploration.

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Curriculum Connection
E2.6

True or False

Is the statement true or false?

1) Hadfield's first space trip was in 1995.	True	False
2) Hadfield's third space trip was on Space Shuttle Endeavour.	True	False
3) Hadfield helped build the ISS during his first mission.	True	False
4) He conducted scientific experiments on the ISS.	True	False
5) Hadfield[illegible]ce Oddity" video went viral.	True	False

Quest[illegible]

[illegible]uestions you have about the text.

1)	
2)	

Questions

Answer the questions below.

1) What did Hadfield dream of being? Did he achieve his drea[illegible]

2) What are Hadfield's biggest achievements?

PREVIEW

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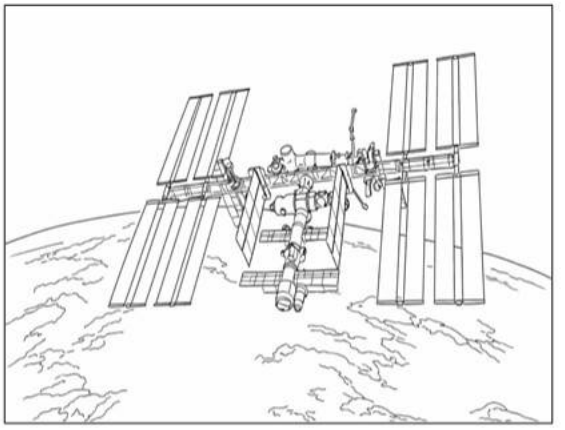
Curriculum Connection
E2.6

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

The ISS i a c nsule—it's roomy, as big as a six-b se laboratories, a gym, and even e for a to sleep! The crew aboard the ISS c eri nts that can't be done anywhere else. They study how the human bo a in sp ke observations of Earth, and test out new technologies.

All Aboard!

The ISS isn't owned by one c It's a t. Astronauts from all over the world live and work together aboard t oun like the United States, Russia, Canada, Japan, and many in Europe b d mana ISS. Six astronauts can live on the ISS. The crew rotates out – 3 returning to n an ving 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
E2.6

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 do require teamwork from different countries?

Think List three int facts ISS from the report.

1)	
2)	
3)	

True or False Circle whether the statement is 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
A1.3

Activity: Designing a Mock Satellite

Research Question

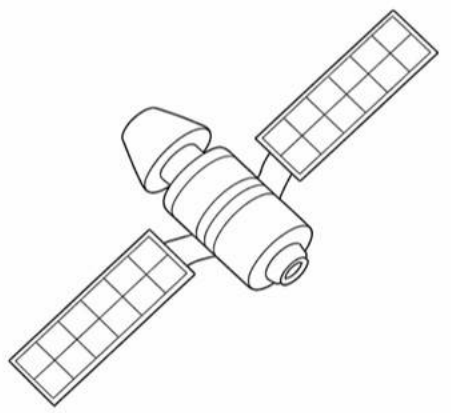
What are we learning more about?

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?

- ✓ [illegible]per
- ✓ [illegible]rs
- ✓ Glue or ta[illegible]
- ✓ String o[illegible]
- ✓ Coloured ma[illegible]r pa[illegible]tion
- ✓ Small LED light [illegible]



Method

How do we comple[illegible]e the [illegible]

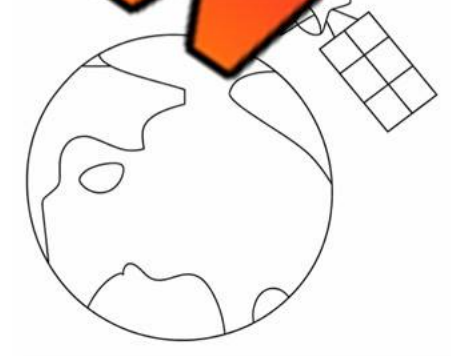
1) Using cardboard or thick paper, design and [illegible] out the main body of your satellite. It can b[illegible] simple shape like a circle or rectangle.

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
A1.3

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 satellite's mission be? For example, is it for weather forecasting, GPS, or scientific r

3) How will you represent s on of y tellite in your design? For example, if your satellite can forecast weathe nee ystem.

4) Draw the satellite you will build. Think of the materials you have a materials you will use in the drawing.

PREVIEW

Name: _____ 94

Curriculum Connection
E2.6

Decoding Abstraction in Computer Science

What is Abstraction?

Abstraction in computer science is a method of simplifying complex systems by breaking them down into manageable parts and focusing on the most important elements. The idea is to concentrate on 'what' a system does rather than 'how' it does it.



Determi[illegible]eep and What to Ignore

An i[illegible]tion is deciding which details are impo[illegible]ch[illegible]be overlooked. For example, when programming a digital clock, the [illegible]details[illegible]lude the hours, minutes, and seconds, but not the exact mechanism of h[illegible]hands.

Removing Unnecessary Details

The process of abstraction also involve[illegible]ng rid[illegible]ls[illegible]at are not needed. If we continue with the digital clock example, details l[illegible]colo[illegible]nt of the numbers may not matter to the function of the clock and ca[illegible]ic[illegible]action process.

Identifying Important Information

Abstraction requires understanding the main idea of what you're tr[illegible]or example, if you're programming a game, the important information migh[illegible]de the rules of the game, the players' scores, and the game's outcomes, but not necessarily the colour of the game board.

Generalizing Patterns

Finally, abstraction involves identifying patterns that can be generalized. If you find that certain lines of code are repeated multiple times in your program, you might create a function that performs that task and call that function whenever the task needs to be performed. This helps keep your code organized and easier to read.

PREVIEW

Name: _____ 95

Curriculum Connection
E2.6

Questions

Answer the questions below to help plan your satellite.

1) What is abstraction in computer science?

2) Write a detailed step-by-step process for making cereal for breakfast. Use as many details as you can, including size of bowl, spoon, amount of milk/cereal, etc.

1	
2	
3	
4	
5	
6	

3) Abstract the above by removing unnecessary details and focusing on essential steps.

PREVIEW

True or False

Circle whether the statement is true or false.

1) Abstraction is a method of making things more complex.	True	False
2) In abstraction, we focus on what a system does.	True	False
3) In abstraction, all details are important.	True	False
4) In programming a digital clock, the colour of numbers is crucial.	True	False
5) Abstraction involves recognizing patterns.	True	False

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Curriculum Connection
E2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) Abstraction focuses on a system's ___.	
Function	Structure
2) Which detail is usually ignored in a digital clock?	
Time units	Clock colour
3) Abstraction helps identify ___ information.	
Important	Random
4) Repeated tasks can be grouped into a ___.	
Function	Pattern only

Name: _____ Mark

Circle the correct answer.

1) Abstraction focuses on a system's ___.	
Function	Structure
2) Which detail is usually ignored in a digital clock?	
Time units	Clock colour
3) Abstraction helps identify ___ information.	
Important	Random
4) Repeated tasks can be grouped into a ___.	
Function	Pattern only

Name: _____ Mark

Circle the correct answer.

1) Abstraction focuses on a system's ___.	
Function	Structure
2) Which detail is usually ignored in a digital clock?	
Time units	Clock colour
3) Abstraction helps identify ___ information.	
Important	Random
4) Repeated tasks can be grouped into a ___.	
Function	Pattern only

PREVIEW

Name: _____ 97

Curriculum Connection
A2.1, A2.2

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.

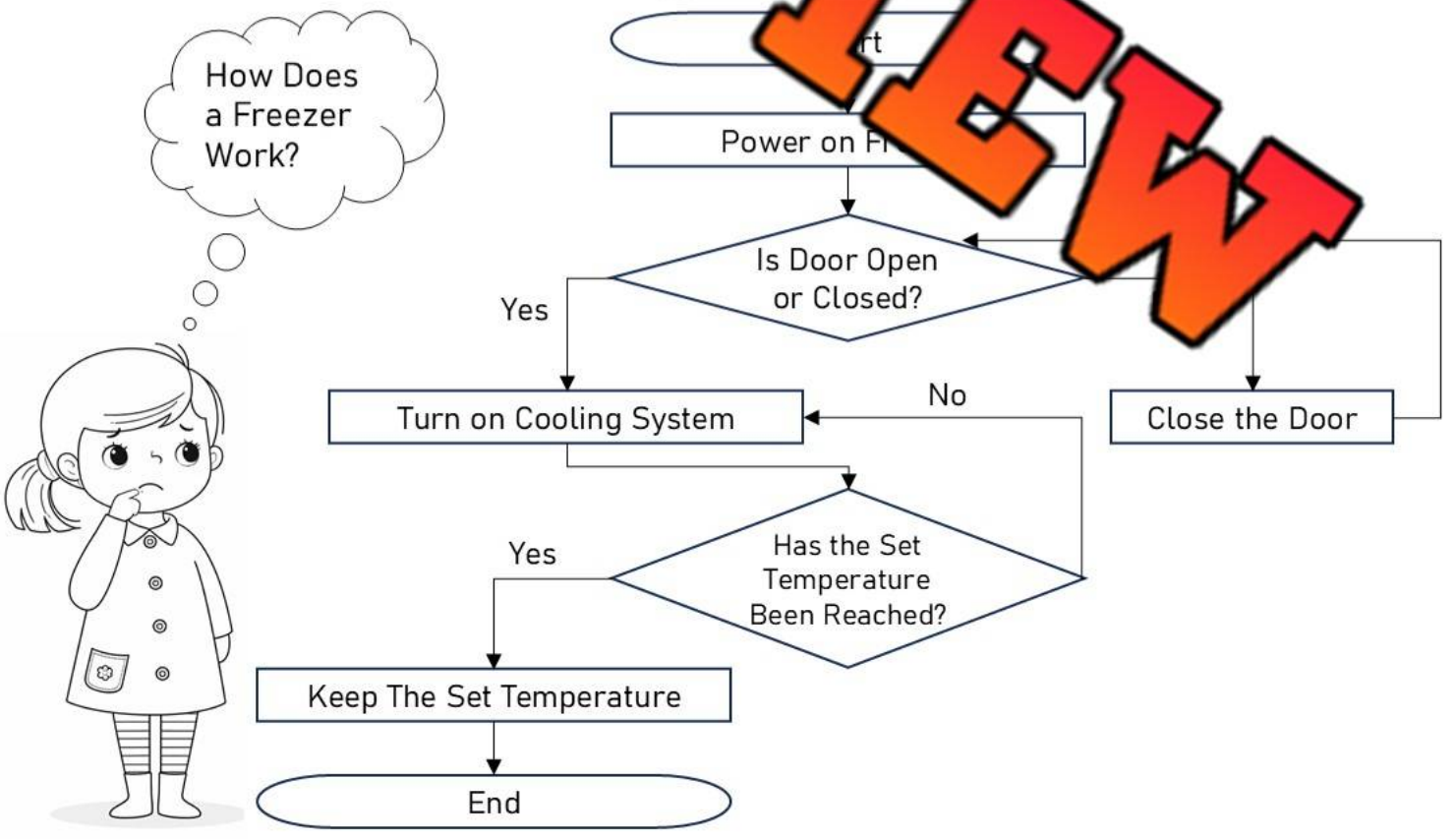
1) Start/End Symbol: This is usually represented by an oval shape. It shows where the process starts or ends. There's typically one start and one end symbol for each process.

2) Proce[illegible]bol: This is a rectangle. It represents a task or work being done. For exa[illegible]o the power' or 'set the temperature.'

3) [illegible]n Symb[illegible]a diamond shape. It represents a decision or a question that need[illegible] to be [illegible]ke '[illegible]the power on?' or 'is the door open?'

4) Arrow Symbo[illegible]e are [illegible]th arrows that connect the symbols. They show the direction of t[illegible]ro[illegible]w[illegible]row should start from a process or decision symbol and end at a[illegible]symbol.

5) Input/Output Symbol: This is [illegible]para[illegible]sents information entering or leaving the system, such as user in[illegible]displ[illegible]sults.



PREVIEW

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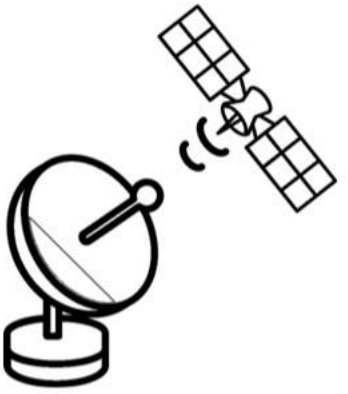
Name: _____ 98

Curriculum Connection
A2.1, A2.2

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 previous 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 "Launch" 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 another 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.

PREVIEW

Name: _____ 99

Curriculum Connection
A2.1, A2.2

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



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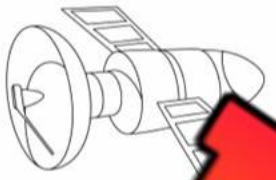
Name: _____ 100

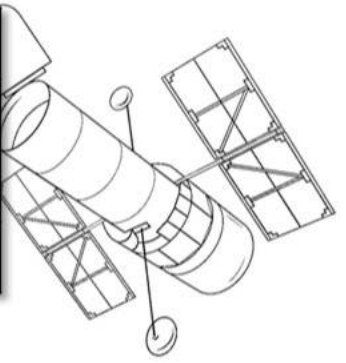
Curriculum Connection
A2.1, A2.2

STEM Assignment – Space Machine

Create your own space related machine. Use the list below for ideas and consider combining ideas to make a revolutionary invention that will sell well.



Rover	Satellite
Telescope	Space Probe
Rocket Launcher	Astronaut Suit
Space Capsule	Spacecraft



PREVIEW

Plan Pla tion below.

1) What invention will [illegible] do?

2) How does your machine work? Does it have buttons? W[illegible]ess[illegible] it need to perform?

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Curriculum Connection
A2.1, A2.2

Plan Plan your invention below.

3) Write a simplified step-by-step process of how your machine will work. For example, the telescope is turned on, it looks for movement in the sky, it records any movement, it moves with the movement of the object, it stops recording when the movement stops, it loops again to the start as it looks for more objects moving.

4) Draw your machine below. Label the different comp

PREVIEW

Name: _____ 103

Curriculum Connection
A2.1, A2.2

Questions Answer the questions about your machine below.

1) Why should anyone buy your machine? List 3 or more reasons.

2) W[illegible]is[illegible]for social media that markets your machine.

Name of C[illegible]n _____

Check it out at www._____.com

PREVIEW

3) How much does it cost to make your machine? How much will you sell it for?

Cost		**Price**	

4) If you sell 20 machines today, how much money will you make? Remember to factor in how much it costs to make your machine.

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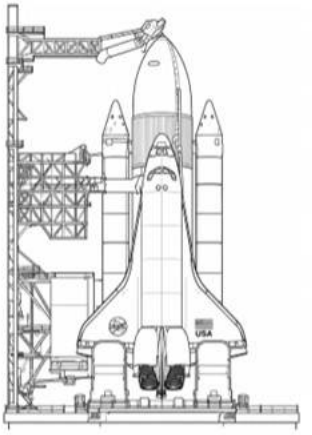
Name: _____ 109

Curriculum Connection
E1.1, E2.6

Surviving in Space

Human Needs in Space



Humans have basic needs in order to survive on Earth and in space. Having these needs met in space is challenging. Astronauts must have oxygen, food, water, and rest. On Earth, it is pretty simple to meets these nee in space, it becomes much more complicated.

Oxyg

The gase n spac pp t human life. Worse yet, is the fact that most of space contains no ga hat is ntists call space a vacuum. Spacecrafts need to supply astronauts wi yg When an astronaut leaves the spacecraft, their spacesuit provides th he ox itrogen they need.

Food

When humans first travelled to space, they brough n the -dried food on their missions. Astronauts would add water to the foo at it roved their menu for astronauts, allowing them to bring lots of dif foods, such as, soups, crackers, and fruits. Foods low in salt are important for astronauts because eating salty foods can bring on bone loss, which is a problem in space.



Astronaut Strawberries

Rest

Even on the most important space missions, the astronauts still need to rest their bodies. Sleeping on a spacecraft is a little more challenging because there is no sunset in space. Most astronauts wear blindfolds to block the sun. Another issue is the lack of gravity. Astronauts sleep in special sleeping bags that are strapped down to the floor.



PREVIEW

Name: _____ 110

Curriculum Connection
E1.1, E2.6

Questions

Answer the questions below using evidence from the text.

1) How do astronauts survive without oxygen in space?

2) What fo[illegible] astronauts eat in space? What did they use to eat?

PREVIEW

Questioning

Write 3 [illegible]s you [illegible]bout the reading.

1)	
2)	
3)	

True or False

Is the statement true or false?

1) Gravity allows astronauts to sleep in beds.	True	False
2) Astronauts can eat whatever they'd like now in space.	True	False
3) Most of outer space has no gas – it is considered a vacuum.	True	False
4) Astronauts do not need to rest as much as we do.	True	False
5) We have the same needs on Earth as we do in space.	True	False

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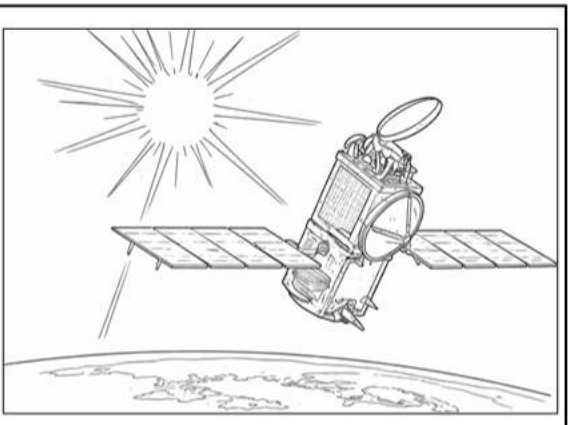
Name: _____ 111

Curriculum Connection
E1.3, E2.6

Benefits of Space Exploration - Satellites

Satellites



A **satellite** is a small object that orbits around the Earth. The first satellites were designed to study the space environment and test whether a satellite or spacecraft could survive in Earth's orbit. Since then, there are 6,542 artificial satellites currently orbiting the Earth. Below is a list of ways you have used satellites lately.

1) **Eating Toast** – The bread you ate used ingredients harvested by farmers. Farmers use satellites to monitor their wheat fields.
2) **Watching TV** – Many people around the world have satellite TV. The shows you watch are transmitted by satellite to the satellite dish on our house and into our TV.
3) **Making a Phone Call** – Let's say you have a problem – call the park ranger with your satellite phone. It will never not have reception.
4) **Posting a Story on Social Media** – Satellite internet is becoming more popular, especially in rural areas. It can provide high-speed internet anywhere in the world.
5) **Paying for a Hot Chocolate** – When you use your card, a satellite signal is made between the business and your bank to use the money in your bank account.
6) **Deciding What to Wear** – Weather apps use satellites to collect data on temperatures, precipitation, cloud movement, and wind direction.
7) **Tracking a Flight** – If your picking up a friend from the airport, you can track their flight because of satellites. Airplanes send a signal to satellites while in flight.
8) **Crossing a Bridge** – Driving across town to grab a bite to eat? When you cross a bridge, feel confident because satellites are monitoring ground movement, as well as bridge and road stability.
9) **Breathing Fresh Air** – The Canadian satellite SCISAT gathers information about 40 different atmospheric gases. They research the quality of the air.
10) **Finding Directions** – GPS uses satellites to pinpoint your location. Since they know where you are, they can direct you to your destination.

PREVIEW

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Name: _____ 112

Curriculum Connection
E1.3, E2.6

Questions

Answer the questions below using evidence from the text.

1) Why are satellites important to our everyday lives?

2) Which ... would you miss the most if we didn't have satellites in space?

PREVIEW

Making Connections

How have yo... ...ately?

Word Scramble

Unscramble the words below using the word bank.

Satellite	Orbit	Transmit	Research	Signal	Artificial

TTINRMAS		ISELTTEAL	
AISGLN		ARLCITIIFA	
ITROB		HCSREARE	

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Curriculum Connection
E1.3, E2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Are the statements below true or false?

1) There are 6,542 natural satellites orbiting the Earth.

True False

2) Farmers use satellites to know when to water wheat fields.

True False

3) Satellites are not used to monitor bridge stability.

True False

Name: _____

Are the statements below true or false?

1) There are 6,542 natural satellites orbiting the Earth.

True False

2) Farmers use satellites to know when to water wheat fields.

True False

3) Satellites are not used to monitor bridge stability.

True False

Name: _____

Are the statements below true or false?

1) There are 6,542 natural satellites orbiting the Earth.

True False

2) Farmers use satellites to know when to water wheat fields.

True False

3) Satellites are not used to monitor bridge stability.

True False

PREVIEW

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Name: _____ 119

Curriculum Connection
E1.1, E1.2, E2.6

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 the planet that is most similar to Earth. It is the most likely planet to have life on it. Check out some of the similarities and differences below.

	Earth	Mars
Distance From Sun	150 million km	228 million km
Length of Day	23 hours 56 minutes	24 hours 37 minutes
Force of Gravity	2.6 times stronger than Mars	0.375 times weaker than Earth
Moons	One Moon	Two Moons
Average Temperature	13 Degrees Celsius	-62 Degrees Celsius
Size - Diameter	12,755 km	6,791 km
Water	71% of Earth covered in water	100 times drier than the driest parts 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.

PREVIEW

Name: _____ 120

Curriculum Connection
E1.1, E1.2, E2.6

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 think people could eventually live on Mars? Explain what we would need in order to survive there.

PREVIEW

Visualizing

Draw what you are picturing as you were 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

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Curriculum Connection
E1.1, E1.2, E2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Fill in the Blanks Questions.

1) The first Mars rover could travel at only _____ kph.

2) Mars rovers provide scientists with information about the planet's _____, atmosphere, and landforms.

3) The Perseverance Rover has a helicopter named _____.

Name: _____

Fill in the Blanks Questions.

1) The first Mars rover could travel at only _____ kph.

2) Mars rovers provide scientists with information about the planet's _____, atmosphere, and landforms.

3) The Perseverance Rover has a helicopter named _____.

PREVIEW

Name: _____

Fill in the Blanks Questions.

1) The first Mars rover could travel at only _____ kph.

2) Mars rovers provide scientists with information about the planet's _____, atmosphere, and landforms.

3) The Perseverance Rover has a helicopter named _____.

Name: _____

Fill in the Blanks Questions.

1) The first Mars rover could travel at only _____ kph.

2) Mars rovers provide scientists with information about the planet's _____, atmosphere, and landforms.

3) The Perseverance Rover has a helicopter named _____.

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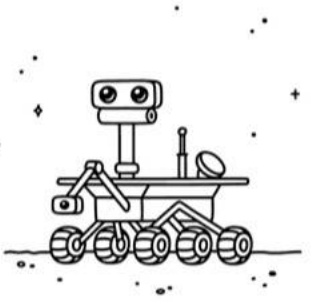
Name: _____ 124

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

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 Rover

Here in California, but on Mars it is 6:00 pm. A robotics engineer named begins her 10-hour shift to drive the Mars rover. She has been driving on Mars since 2008. She lives in two different worlds, spending time as well as on Earth.

Verma worked on developing the software program used by Perseverance. The new rover is able to move around safely on Mars by receiving constant direction from the team on Earth. Perseverance can even identify interesting rocks on its own.

Commanding the Rover

To get the rover to follow instructions, the robotics engineers write codes for the rover to follow. They beam the codes up to Mars through the Deep Space Network, which is NASA's interplanetary communications network. The network uses radio frequency transmissions that travel through large antenna systems.

With the distance between Mars and Earth being so large, it takes about 20 minutes for the commands to reach the rover. This makes it challenging to tell the rover 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]

PREVIEW

Name: _____ 125

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

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 can do many things on Mars without the driver's commands.	True	False
5) It is the[illegible]e on Mars than on Earth.	True	False

Question[illegible] Answ[illegible]stions below using evidence from the text.

1) How does the dr[illegible]ommu[illegible]e[illegible]the rover on Mars?

2) Does the Perseverance rover use code? Expla[illegible]

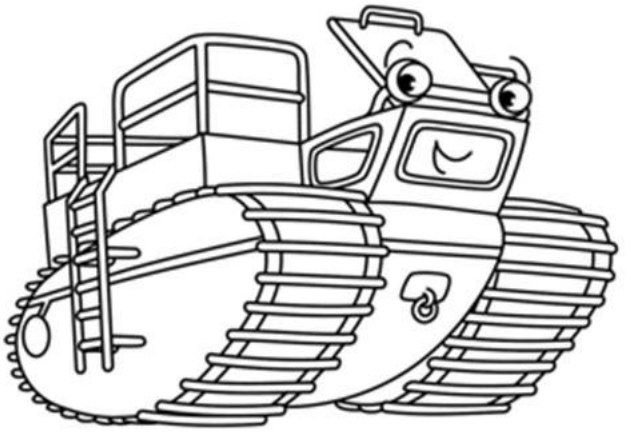
PREVIEW

Directions

Read the program and follow the instructions to draw the 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
A2.1

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 comet is made of ice, rock, and dust	then	Move left 3 spots
5)	If Earth is the largest planet	then	Move down 3 spots
6)	If Jupiter is closer to the Sun	then	Move down 4 spots
7)	If we weigh more on the Moon than on Earth	then	Move left 2 spots
8)	If we have the same mass on the Moon as on Earth	then	Move left 2 spots
9)	If the moon emits light	then	Move up 3 spots
10)	If the Sun emits light	then	Move right 4 spots

PREVIEW





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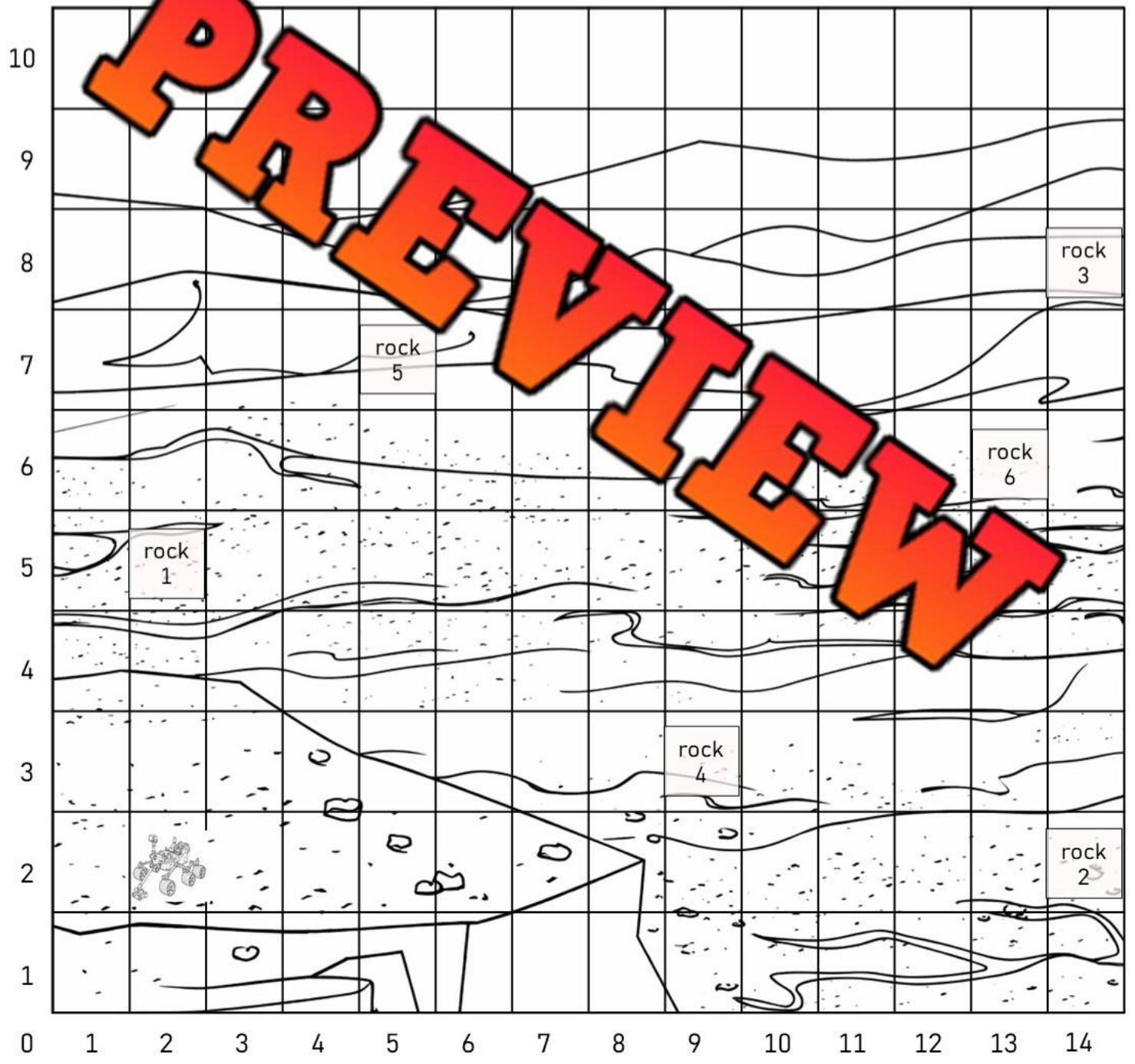
Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

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.



PREVIEW

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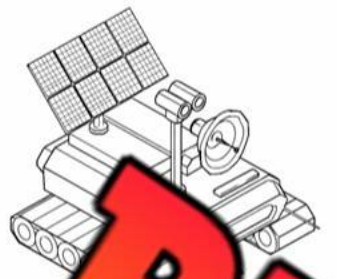
Name: _____ 128

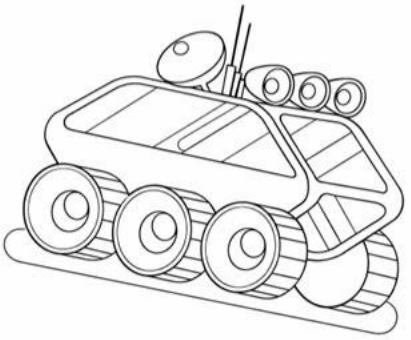
Curriculum Connection
A2.1, A2.2, A3.2, A3.3

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



Exam

- move to (3, 7)
- take 5 pictures of rock7
- move to (5, 5)
- take 3 pictures of rock8



Code

PREVIEW

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

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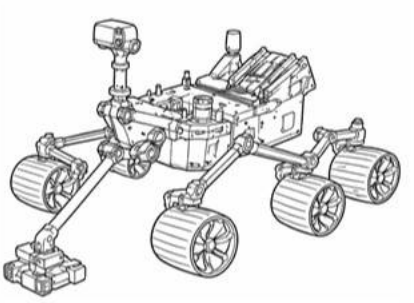
Curriculum Connection
A1.1, A2.1, A2.2, A3.1, A3.2

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 fl[illegible]?
- Can it [illegible]quickly?
- Can it [illegible]e dark?
- Doe[illegible] vision allowing it to see living things?

What w[illegible]our ro[illegible]d to do?
- Will it chec[illegible]the[illegible]ets?
- Will it check [illegible]et for [illegible] humans could live in?

PREVIEW

Questions	Answe[illegible]uestions[illegible]our rover below.

1) What is the name of your rover?

2) What tools will your rover have?

3) What is your rover capable of doing?

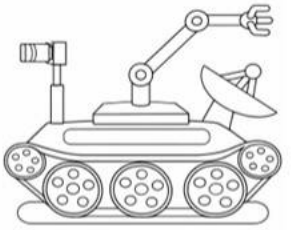
4) What will your rover be designed to do?

Name: _____ 130

Curriculum Connection
A2.1

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 the flashlight button is pressed

THEN turn on the flashlight

IF/THEN

...de for each tool that your rover has so that you can control the tools.

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

PREVIEW

Name: _____ 134

Curriculum Connection
A3.1, A3.2

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?

- ✓ Ca
- ✓ [illegible]
- ✓ Gl
- ✓ Small wh[illegible]wed from an old toy
- ✓ Straws or [illegible]dowel
- ✓ Paper and ma[illegible]for
- ✓ A small box to repr[illegible]equipr[illegible]rried by the rover

PREVIEW

Method
How do we complete the [illegible]ent?

1) Draw and cut out a rectangular base for yo[illegible] rover on the cardboard. Make it big enough[illegible] hold four wheels and a small box.

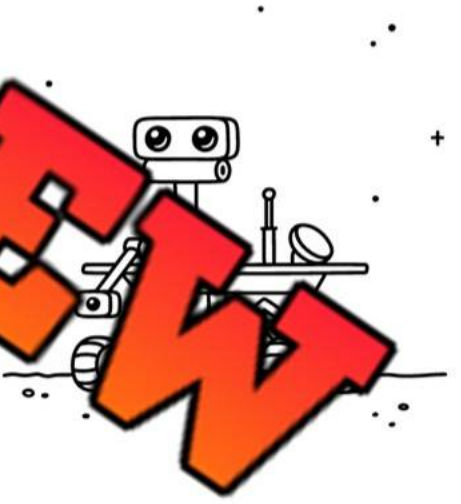
2) Draw and cut out four smaller rectangular strips. These will serve as the axles for the wheels.

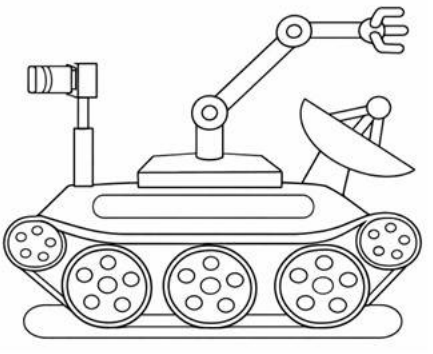
3) Attach the rectangular strips to the base of the rover with glue and insert the wheels into these strips using straws/dowels as axle holders.

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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Name: _____ 135

Curriculum Connection
A3.1, A3.2

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

Reflect Answer the questions below.

1) Why do you think the rover is designed the way they are?

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

3) Draw the new and improved rover.

PREVIEW

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 Venus	2) Which is the largest? a) The Earth b) The Milky Way Galaxy c) Our Solar System d) The Universe
3) Which is a terrestrial planet? Jupiter 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 burns up as it falls the way to the Earth's surface? Asteroid b) Meteor c) Meteorite d) Comet	6) Which was the name of which of the following a) Asteroid b) Meteor c) Meteorite d) Comet
7) Which planet is closest to the sun? Venus b) Earth c) Mars d) Mercury	8) The Earth orbits the Sun in a) 24 hours b) 12 hours c) 30 days 4) 365 days
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

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

Term	Definition (what does it mean)
Asteroid	
Galaxy	
Solar System	

Short Answer Questions (2 marks each)

1) What do astronauts need to survive?

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

3) Why do we have seasons, night, and day?

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Long Answer (5 marks each) **/10**

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 are the benefits and drawba[illegible] space [illegible]n? Do you think it is worth it? Explain.

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