SCIENCE

SAMPLER

- **Supports STEM Initiatives**
- **Ecosystems**
- **Solar System & Simple Machines**

GRADES 5-8

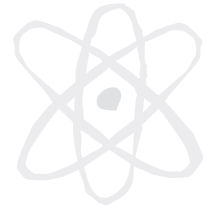# Change in Ecosystems

1. **a)** What does the word **balance** mean to you?

_____

_____

b) Can you think of situations where balance is **very** important? One line has already been filled for you. Can you think of **four** more?

Balancing on a tightrope in a circus

1 _____

2 _____

3 _____

4 _____

2. **Complete each sentence with a word from the list. You may use a dictionary to help.**

population   succession   ecosystem   biotic   environment   composition

a) [_____] describes what happens when something changes over a long period of time.

b) The word that describes a group of things that work and live together in an environment is an [_____] .

c) In an ecosystem, you will find abiotic things (non-living things) and [_____] things (living things).

d) The [_____] where someone or something lives includes the whole area surrounding them.

e) The [_____] of a jar of jellybeans includes all the different colors of jellybeans that are in the jar.

f) A group of similar individuals living in the same geographic area is called a [_____] .
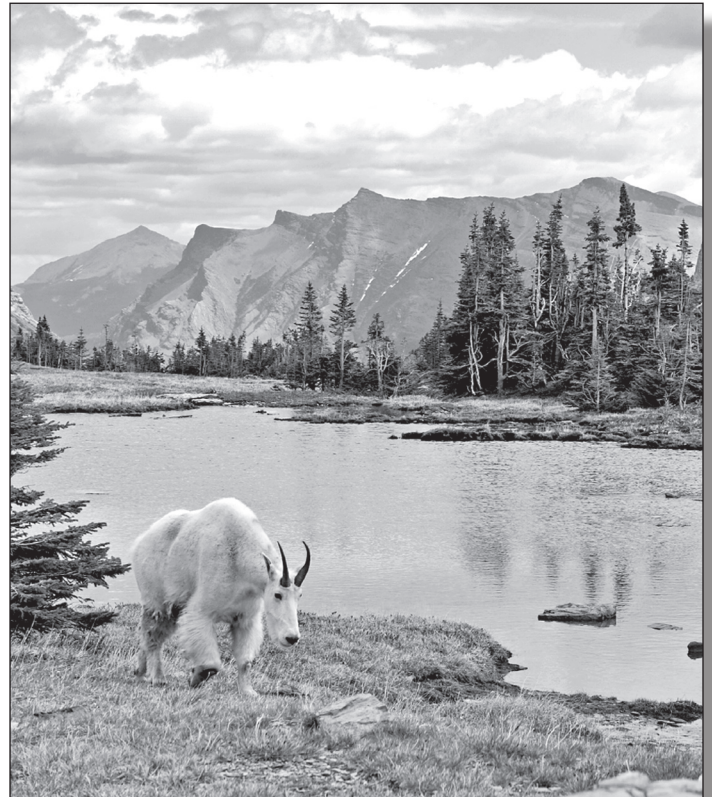
Change in Ecosystems

Do Ecosystems Change Over Time?

Everything that lives in our world changes over time. Humans change. Our bodies change. Animals change. Plants change. Every living thing changes over time, including ecosystems. What an ecosystem looks like changes, and so does its composition. The **composition** of an ecosystem describes everything that is part of an ecosystem. This includes both living and non-living things, both biotic and abiotic things.

STOP

Look around you right now. Pick the first thing you see. Describe how it changes over time.

_____

_____

_____

_____

When an ecosystem changes over a long period of time, it is called **succession**. The populations in an ecosystem change during succession. A population may become smaller over time. A population may even disappear completely. A population may become much bigger. Something else may happen during succession. Species from ecosystems close by might come and move into the ecosystem. These are all changes that may happen to an ecosystem over time. They are all part of succession.
An ecosystem might also change because of humans. For example, when we develop land for houses, we cut down trees. We change the environment for all plants and animals. Some animals can adapt to the change. Others can not. Their population is then affected.

NAME: _____

Change in Ecosystems
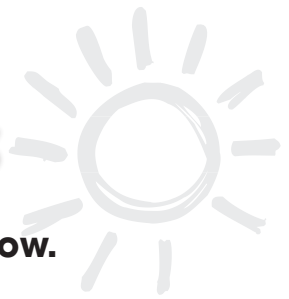
1. Write the answer that best completes the sentences below.

a) [_____] (**Some / Every**) living thing changes over time.

b) Animals and plants change over time. [_____] (**Ecosystems / Atmospheres**) also change over time.

c) The [_____] (**energy / composition**) of an ecosystem includes both biotic and abiotic things.

d) Populations in an ecosystem [_____] (**change / stay the same**) during succession.

e) An ecosystem might change because of natural causes but it may also change because of [_____] (**heavy rain / humans**).

2. Circle the word True if the statement is true. Circle the word False if it is false.

T   F   a) Humans, animals, and plants change over time but ecosystems do not change over time.

T   F   b) The composition of an ecosystem describes everything that is part of an ecosystem.

T   F   c) When an ecosystem changes over a long period of time, it is called evolution.

T   F   d) During succession, a population may get bigger but it might also disappear completely.

T   F   e) Cutting down trees, building houses, and dumping garbage are all examples of how humans can harmfully affect an ecosystem.

Change in Ecosystems

3. What is the composition of an ecosystem?

_____

_____

4. How can an ecosystem change over time during **succession**?

_____

_____

5. Describe how humans can have a large **impact** on an ecosystem. Give at least two examples.

_____

_____

Extension & Application

6. SAVE OUR ECOSYSTEMS T-shirt Design Contest!

You have already read about how humans can harm an ecosystem. Cutting down trees for houses is one way. Can you think of another one?

You have been entered into a T-shirt design contest. **Your task is to design a T-shirt that shows what humans can do to stop harming our ecosystems.** Pick ONE harmful human activity and use it for your T-shirt design.

Your T-shirt should have:
- a slogan (a sentence telling humans what to stop doing, for example, "Stop Cutting Down Trees!")
- words and pictures that support your slogan
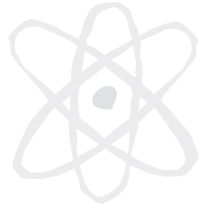
Harmful human activity chosen: _____

Slogan on T-shirt: _____

Remember, be creative and design a T-shirt that you would like to wear!

T-Shirt Design Contest!

Write "Save Our Ecosystems!" on the line in the shirt

📖 Before You Read
• • • • • • • • • • • • • • • • • • • •

Producers, Consumers & Decomposers

1. **Produce, consume, decompose.** What do these words mean? Look up these three words. <u>First</u>, use a dictionary to write down the word's definition. <u>Second</u>, use the word in your own sentence, showing that you understand its meaning.

A **produce**

Dictionary: _____

Own sentence: _____

B **consume**

Dictionary: _____

Own sentence: _____

C **decompose**

Dictionary: _____

Own sentence: _____

2. **Complete each sentence with a word from the list. You may use a dictionary to help.**

producers	sun	consumer	recycle	decomposer

a) The [_____] is the main source of energy for everything on our Earth. It gives off light and heat.

b) [_____] are things that break down material in dead organisms.

c) We [_____] things so that we can use them again.

d) Something that can make its own food is called a [_____] .

e) A [_____] is something that uses something else to get food and energy.

Producers, Consumers & Decomposers

All organisms in an ecosystem get energy from the same place. All energy comes from the Sun. Green plants absorb this energy. This energy is then shared with all parts of an ecosystem. Every organism in an ecosystem gets their energy and food a different way. This divides all organisms into three kinds: **producers**, **consumers**, and **decomposers**. The difference between these three kinds of organisms is the way they find food and energy. Let us now look at the three different kinds now.

STOP

Think about your favorite food. Explain how the Sun played an important role in its growth.

_____

_____

_____

A **producer** is an organism that produces its own food. An example of a producer is a green plant. It takes in energy from the Sun and makes food which is then passed on to **consumers**. A **consumer** is an organism that cannot make its own food. It is called a **consumer** because it depends on others. It gets food by eating other organisms. **Decomposers** play a very important role too. **Decomposers** break down materials in dead organisms. Humans recycle certain things so that we can use them again. **Decomposers** do the same thing. They recycle nutrients from dead organisms and return them to the soil. They can then be used again by **producers**. Imagine that these three kinds of organisms all live in a cycle. They all depend on each other for energy and food. Without each other, they would not survive.

Producers, Consumers & Decomposers

1. **Draw a line between two circles to match up the words with their definitions.**

producer

A
To reuse something once it has died or has been thrown away

consumer

B
The main source of energy for everything living on Earth.

C
An organism that breaks down materials in dead organisms.

decomposer

D
An organism that depends on others for food.

E
An organism that produces its own food

recycle

the sun

Answer the questions in complete sentences.

2. In what way can we divide all organisms? Use words from the reading passage in your answer.

_____

_____

3. What is the difference between a **producer** and a **consumer**?

_____

_____

After You Read

Producers, Consumers & Decomposers

Answer the questions in complete sentences.

4. What is the role of a **decomposer**?

_____

_____

5. How do producers, consumers, and decomposers all live in a **cycle**?

_____

_____

Extension & Application

6. **Imagine you have just bought your own business.** Right now you have too much work so you need to hire some people to work for you. You will need to hire a **PRODUCER**, a **CONSUMER**, and a **DECOMPOSER**. These jobs do not exist in the human world, but for this activity, use your imagination.

You have been given space to advertise these three jobs in the local newspaper. What would you write? Copy down the chart below onto your own piece of paper. You can come up with your own design or you can follow the format below.

You should have **THREE** advertisements to complete this activity, one for each job: **producer**, **consumer**, and **decomposer**.

Newspaper Name - Classifieds

Today's Date:_____

Looking for a: _____

Job Description: _____

_____

Salary:_____

Please Apply by: _____

---

4. Breaks down materials in dead organisms

5. They all depend on each other for food and energy

6. Answers will vary

1.
producer – **E**
decomposer – **C**
consumer – **D**
recycle – **A**
the sun – **B**

2. Into 3 categories: producers, consumers, decomposers

3. Producers make their own food, consumers depend on others for food

1. Answers will vary

2.
a) sun
b) decomposer
c) recycle
d) producer
e) consumer

Answers will vary

3. All parts of an ecosystem

4. Population may grow, shrink, or disappear; species might move into ecosystem

5. Answers will vary (i.e. cut down trees, develop land for houses)

6. Answers will vary

1.
a) every
b) ecosystems
c) composition
d) change
e) humans

2.
a) **F**
b) **T**
c) **F**
d) **T**
e) **T**

1.
a) Answers will vary
b) Answers will vary

2.
a) succession
b) ecosystem
c) biotic
d) environment
e) composition
f) population

Answers will vary

EZ✓

📖 *Before You Read*

What Are Force, Motion, and Work?

1. **Use a straight line to match the word on the left to its meaning on the right. Use a dictionary to help you.**

1	**force**		the force of Earth's attraction	A
2	**friction**		change of position	B
3	**gravity**		a measure of distance	C
4	**meter**		a push or a pull	D
5	**motion**		the force that resists sliding motion	E

2. **Circle the word True if the statement is true. Circle the word False if it is false.**

a) Force is a pull or a push.

True **False**

b) Friction is the force that makes things fall to the ground.

True **False**

c) All machines have motors.

True **False**

d) Changes in motion are caused by forces.

True **False**

e) Weight is measured in gallons.

True **False**

What Are Force, Motion, and Work?

Carrying a 50-pound rock around on your shoulder all day sounds like hard **work**. If you think so, you are half right. It would be hard, but it wouldn't be work—at least not the way the word work is used in science.

To understand what work is we first have to understand **force** and **motion**. You may remember that a force is a push or a pull. You can **exert** a force on something by pushing or pulling with your hands. **Gravity** and **friction** are also common forces.

We can see motion, so we already have a feeling for what it is. When something moves from one place to another, that is motion.

When a force acts on something, it sometimes makes the thing move. If the thing moves *in the direction* that the force is acting, *that* is work. Carrying the rock wasn't work because the force on it was pushing up, and the rock was moving sideways.

Lifting the rock onto your shoulder *is* work. The force is the same as the weight of the rock and the direction of motion is up. Throwing a ball is also work because the ball moves in the direction of the force exerted by your hand.
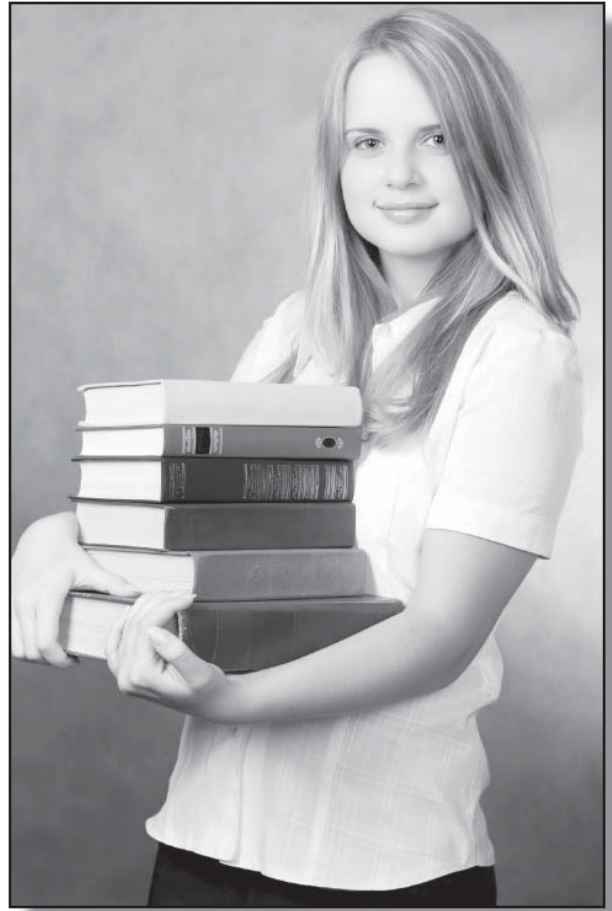
What Are Force, Motion, and Work?

There is a way to measure the amount of work done:

Work equals force times distance (W = F X d)

The force is the force that makes something move, and the distance is the total distance the thing moves. Work is measured in foot-pounds. One foot-pound is the work done by exerting one pound of force on something while moving it one foot. If your shoulder is 4 feet high, you do 200 foot-pounds of work when lifting a 50-pound rock to your shoulder (4 X 50 = 200).

STOP

Tell what causes the force of gravity and in which direction it acts.

_____

_____

When you do work on something, you can increase its **energy**. Raising something to a greater height increases its **potential energy**. Making something move faster increases its **kinetic energy**.

In the **metric system**, distance is measured in **meters**, force is measured in **newtons**, and work is measured in **joules**. A meter is about three feet, a newton is about a quarter pound, and a joule is about three-quarters of a foot-pound.

Sometimes you get paid for doing work. When life is fair, your pay depends on how much work you do *and* on how fast you do it. The speed at which work is done is called **power**. Power is measured in joules per second. One joule per second is one **watt**. When you pay your bill to the electric company, you pay for the number of watts of electricity you used.

To find power, divide work by time (P = W ÷ t).

NAME: _____

What Are Force, Motion, and Work?

1. Put a check mark (✓) next to the answer that is most correct.

a) Which are *both* forces?

○ **A** work and power

○ **B** power and gravity

○ **C** gravity and friction

○ **D** friction and work

b) How do you find the amount of work a force does?

○ **A** force plus distance

○ **B** force times distance

○ **C** force minus distance

○ **D** force divided by distance

c) Which word means "the speed at which work is done"?

○ **A** force

○ **B** power

○ **C** kinetic

○ **D** energy

d) What do you need to know to find out how much work you do when you pick up a cat?

○ **A** how far you lift the cat and how much it weighs

○ **B** how fast you lift the cat and how long you hold it

○ **C** how long you hold the cat and how far you walk with it

○ **D** how far you walk with the cat and how fast you walk

2. Circle the words or groups of words that mean "work".

force	foot-pounds	force times distance	joules
watts	newtons	power	

After You Read 📖

What Are Force, Motion, and Work?

Answer the questions in complete sentences.

3. Explain why carrying a ten-pound bag of groceries to the car is **not** work.

_____

_____

4. Write a sentence that tells what the words "**distance**," "**force**," and "**work**" have to do with each other..

_____

_____

Extension & Application

5. Nicole planted a new rosebush in her garden. This is what she had to do:

1) She carried the rose bush from her truck to the garden.

2) She dug a hole in the ground.

3) She shoveled the soil from the hole into a wheelbarrow.

4) She wheeled the wheelbarrow full of soil to the street.

5) She pushed the wheelbarrow up a board into the back of a truck and dumped the soil.

a) During which tasks did Nicole **do work**?

_____

b) For each task where she did work, tell what you would need to know to find out **how much** work she did.

_____

_____

_____

_____

NAME: _____

What Are Simple Machines?

1. (Circle) the word True if the statement is true. (Circle) the word False if it is false.

a) Simple machines have no moving parts.

True **False**

b) When we use a simple machine we do less work.

True **False**

c) A motor scooter is a simple machine.

True **False**

d) A screwdriver is a simple machine.

True **False**

e) A screw is a simple machine.

True **False**

2. **Put a check mark (✓) next to the answer that is most correct.**

a) **All of these are simple machines, *except* _____.**

  ○ **A** an axe
  ○ **B** a toaster
  ○ **C** a bottle opener
  ○ **D** a wheelchair ramp

b) **What does force times distance equal?**

  ○ **A** power
  ○ **B** speed
  ○ **C** work
  ○ **D** weight

c) **Which action is work?**

  ○ **A** lifting a pencil
  ○ **B** reading a school book
  ○ **C** pushing a wheelbarrow
  ○ **D** carrying an armload of firewood

What Are Simple Machines?

A **machine** is something that makes work easier by changing the force you apply to do work. A machine can change the amount of force you apply, and it can also change the direction of the force. A **simple machine** is a machine with only one kind of movement.

There are six kinds of simple machines: **lever, wheel and axle, pulley, inclined plane, wedge,** and **screw.** Look at the pictures of the six simple machines. It's easy to see how most of these work and how they change the force. We will look at each of these machines later in this book.

It is important to understand that simple machines make work easier, but they don't change the *amount* of work you have to do. (That's the bad news.) What machines change is the **effort** you have to put out. (That's the good news.)

For example, you can use a kind of lever to pull a nail out of a board. You could never pull a nail out with your fingers. You might have to push the lever down ten inches to pull the nail up one inch. The nail comes right out because the pull on the nail is ten times the force of your push on the lever.

Wheel and Axle
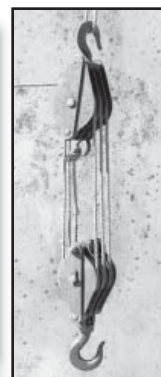
Inclined Place   **Pulley**

Wedge   **Screw**   **Lever**

> **STOP**
>
> **How does a bottle opener change the force you apply to the handle of the opener?**
>
> _____
>
> _____

Later, we will learn more about what you lose and what you gain when you use a simple machine.

What Are Simple Machines?

1. Circle the word True if the statement is true. Circle the word False if it is false.

   a) A wheel and axle is a simple machine.

         True   **False**

   b) A simple machine has only one kind of motion.

         True   **False**

   c) We use simple machines so we don't have to do as much work.

         True   **False**

   d) A simple machine can change the direction of force.

         True   **False**

   e) A simple machine can change the amount of force.

         True   **False**

2. **Put a check mark (✓) next to the answer that is most correct.**

   a) **Which of these is a simple machine?**

      ○ **A**   bicycle
      ○ **B**   clock
      ○ **C**   pulley
      ○ **D**   toaster

   b) **Which of these is *not* a simple machine?**

      ○ **A**   lamp
      ○ **B**   lever
      ○ **C**   screw
      ○ **D**   wedge

   c) **A simple machine can do all of these things, *except* _____.**

      ○ **A**   change the amount of work
      ○ **B**   change the amount of force
      ○ **C**   change the amount of effort
      ○ **D**   change the direction of force

1.
a) True
b) True
c) False
d) True
e) True

2.
a) ⊘ C
b) ⊘ A
c) ⊘ A

14

Answers will vary (i.e. When you apply an upward force, the opener applies a greater force to the bottle cap. OR (Depending on the type of opener) when you apply a downward force, the opener applies a greater upward force to the cap.)

13

1.
a) False
b) False
c) False
d) True
e) True

2.
a) ⊘ B
b) ⊘ C
c) ⊘ A

12

---

3. Answers will vary (i.e. The force is upward, but the motion is sideways.)

4. Work equals force times distance.

5. a) Tasks 2, 3, and 5

b) Task 2: how deep the hole was and how much the soil weighed.

Task 3: how high the wheelbarrow was and how much the soil weighed.

Task 5: how high the truck bed was and how much the wheelbarrow and soil together weighed.

11

Answers will vary (i.e. Gravity is caused by the attraction between the mass of an object and the mass of the Earth. It acts downward or toward Earth's surface.)

9

1.
a) ⊘ C
b) ⊘ B
c) ⊘ B
d) ⊘ A

2. Circle
foot-pounds
force times distance
joules

10

1.
D — 1
E — 2
A — 3
C — 4
B — 5

2.
a) True
b) False
c) False
d) True
e) False

7

NAME: _____

The Outer Planets

1. Pluto used to be considered an outside planet but has since lost its status. What do you know about this? Do you have an opinion on it? Write a response in your notebook that answers these questions. Make some predictions about the reason why Pluto is not a real planet any more.

2. For each of the words listed below, find a synonym from the word bank. Remember that a synonym is a word that has the same meaning.

a) zone _____

b) belt _____

c) giant _____

d) gas _____

e) dwarf _____

f) orbit _____

g) rotate _____

h) geyser _____

i) spot _____

Word Bank

little	area
band	spin
hoop	encircle
vapor	mark
huge	spring

3. Label the diagrams below with terms from the following list:

rotate	orbit	ring	spot
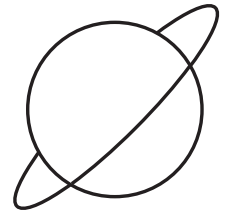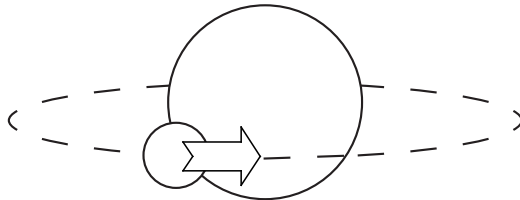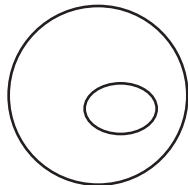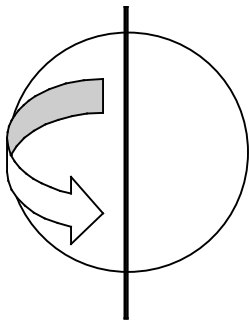
a) _____ b) _____ c) _____ d) _____

The Outer Planets

unlike the inner planets, the outer planets are made of gas. They are lighter, they move fast and most of them are larger than the inner planets. The outer planets are: **Jupiter, Saturn, Uranus,** and **Neptune**.

If you were traveling from the Sun to the other end of the solar system, you would first pass the four inner planets. Then, you would go through the **asteroid belt** in the large space that divides the inner and outer planets. The first of the outer planets that you would come across is Jupiter.
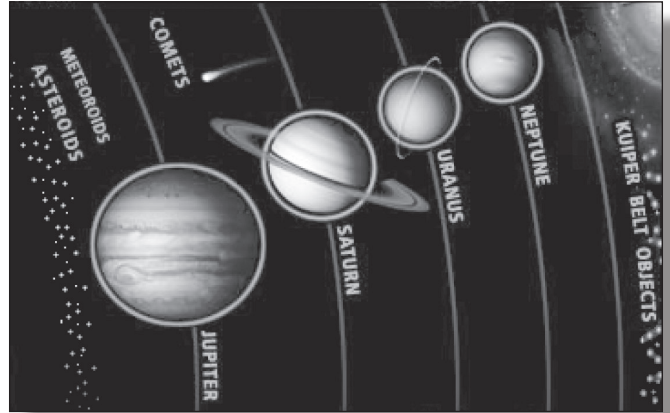
Jupiter is the fifth planet from the Sun and the largest planet in the solar system. It is so big that more than one thousand Earths could fit inside it! You would not be able to land on Jupiter because it is a **gas giant**, which means it is almost entirely made of gas. You may recognize Jupiter because of its large **red spot** and the wide bands around it. Fast-moving clouds surround Jupiter to form the wide bands called **zones** and the narrow bands called **belts**. Scientists think that the red spot in one of the zones is probably a huge gas storm that has lasted for hundreds of years. This storm is three times the size of our planet Earth. Jupiter has rings, active volcanoes, lightning bolts and at least seventeen moons.

STOP

Visualize: Based on what you have just read about Jupiter, draw a sketch of this planet in your notebook. Include as much detail as possible and neat labels. You may need to re-read the paragraph for more detail.

Saturn is the sixth planet from the Sun. It is also a gas giant, but it is best known for it's brilliant **rings**. The rings around Saturn are made of chunks of rock, ice and dust. Scientists think that rings form around a planet when objects get too close. The planet's gravity pulls them into **orbit** around the planet. The actual planet has a striped appearance like Jupiter. The stripes are swirling clouds. Saturn also has at least twenty-two moons! One of the moons, Titan, is the largest moon in the solar system.

The Outer Planets

Uranus was just discovered about 200 years ago. A scientist was looking through a telescope and spotted the gas planet. Uranus looks blue-green because of the **methane gas** in the atmosphere. It has faint gray rings around it and at least fifteen moons. Uranus **rotates** (spins) differently than the other planets. It spins as though it is lying on its side. Scientists thought another planet's gravity might be pulling it to spin like that. They looked for another planet that might be doing this and found Neptune and Pluto! This is how the next two planets in our solar system were discovered.

Neptune is the eighth planet from the Sun. It is also a gas giant. It is a very cold planet, and it is very far away. It takes twelve years to get there! Neptune is also a blue-green planet, like Uranus, but it is very stormy. Neptune has eight moons. One of the moons, Triton, has many geysers. **Geysers** are springs that shoot up super-heated vapors (gases) constantly.

The four gas giants that you have just read about are similar in many ways. They are made of gas, they are very large, and they have many moons and rings. **Pluto** used to be considered the last of the outer planets, but it just didn't seem to fit in! First, Pluto is tiny. It is the smallest planet in the universe. Second, Pluto has just three moons. The largest one is named Charon. It's only a bit smaller than Pluto, so some scientists called Pluto and Charon **"double planets"**. (Earth and its moon, Luna, are also known as double planets because their sizes are similar.) The other two moons, Xena and Ceres, were just discovered in 2005. Finally, Pluto is made of ice and rock, unlike the gas giants.

On August 24th, 2006, scientists re-named Pluto as a **"dwarf planet"**, which means it can no longer be counted with the other eight planets. Poor Pluto lost its planetary status! As far as we know, Pluto is the end of the solar system. Scientists agree that there could be a lot more to discover beyond Pluto that we just haven't seen yet. After all, Pluto was only discovered in 1930. Who knows what might be discovered next! NASA has launched the **New Horizons** spacecraft. It is set to fly by Pluto and Charon in July of 2015. We're sure to learn more from this mission.

The Outer Planets

1. **Put a check mark (✓) next to the answer that is most correct.**

a) **Which planet has the most known moons orbiting it?**

○ **A** Neptune
○ **B** Saturn
○ **C** Jupiter
○ **D** Earth

b) **Which of the outer planets is the largest?**

○ **A** Neptune
○ **B** Uranus
○ **C** Jupiter
○ **D** Saturn

c) **What are Saturn's rings made of?**

○ **A** rock and ice
○ **B** dust
○ **C** meteorites
○ **D** 'a' and 'b'

d) **Why would Pluto be colder than all of the other planets?**

○ **A** It is so small.
○ **B** It is made out of ice.
○ **C** It is not a real planet.
○ **D** It is farthest from the Sun.

e) **Which of the following is a true comparison of Pluto and the other outer planets?**

○ **A** Pluto is not made of gas like the other giants.
○ **B** Pluto has rings like Uranus.
○ **C** Pluto is around the same size as the other giants.
○ **D** Pluto is warmer than Jupiter.

f) **Why are the Earth and Luna known as "double planets"?**

○ **A** They are both made of rocky material.
○ **B** They both orbit the Sun.
○ **C** They are of similar size.
○ **D** Earth's moon is actually a planet.

The Outer Planets
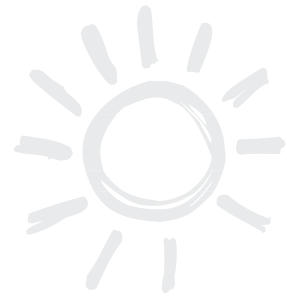
Answer each question with a complete sentence.

2. What causes Uranus to rotate on its side?

_____

_____

3. What do scientists believe is the cause of the red spot on Jupiter?

_____

_____

4. How do scientists think the rings around Saturn were formed?

_____

_____

Research & Extensions

5. The gas giants are so different than Pluto that it's not surprising people have asked if Pluto should even be considered a planet at all. There was great debate from scientists around the world before it finally lost its planetary status in 2006. Create a T-chart in your notebook to outline the case for Pluto to lose its planetary status. On the other side of the chart, outline the case for Pluto to remain as a planet. You may need to research some points. When you are done, pretend you are a lawyer who is arguing for or against Pluto. Write an argument that you would deliver to a judge in court to state your case.

6. Create a **comic book hero** based on each of the four gas planets, and their small friend, Pluto. Include as much detail as you can about each planet in their superhero persona. (For example, Nasty Neptune may be able to ward off her opponents with her steamy geysers.) Illustrate each superhero, and give a description of their powers written below.

7. Research the New Horizons mission to see where it is presently. Create a timeline of the expected highlights of the mission.

WEB CONNECTION
To learn more about the New Horizons mission to the end of the solar system, visit the NASA Missions web page at: www.nasa.gov/mission_pages/newhorizons/main/index.html

The Moon

1. Some people think that a full moon is bad luck. Why do you think that is? Write about the **superstitions** surrounding full moons in your notebook.

2. Use a straight line to match each term with its meaning.

lunar	**A**	One part of a series of steps
phase	**B**	A period of time when a repeating pattern is completed once
cycle	**C**	A bowl-shaped cavity or pit
calendar	**D**	A table that shows the days, weeks and months of a year
reflect	**E**	To throw back light, heat or sound
crater	**F**	Relating to the Moon

3. Write the diagram number that best fits each term below.

_____ **a)** full moon

_____ **b)** new moon

_____ **c)** first quarter moon

_____ **d)** last quarter moon

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

NAME: _____
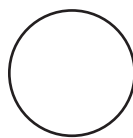
The Moon

The Earth has one moon. It is called **Luna**. There is no air, water or life on the moon. There are a lot of rocks and **craters**. Craters are big holes in the surface of the moon. They were formed when big **meteorites** crashed into the moon millions of years ago. The moon's **gravity** is not as strong as the gravity on Earth, so you could jump really high on the moon.
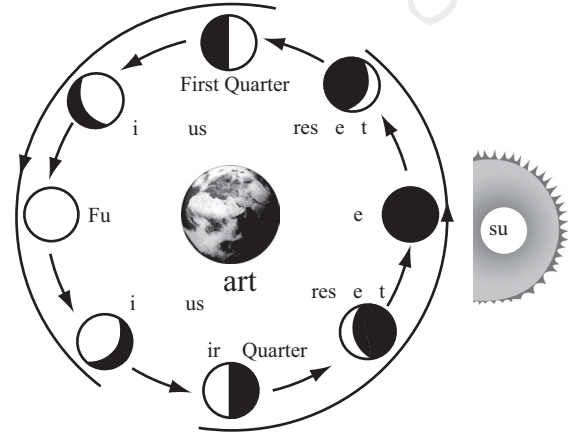
When you look up in the night sky, the largest thing you can see is the moon. That is because the moon is our nearest neighbor in space. It is more than 238 800 miles from Earth. It looks like a bright, white ball, but the moon does not actually make its own light. It just **reflects** the light from the Sun. While the Earth orbits the Sun, the moon is orbiting the Earth. It takes the moon twenty-eight days to orbit around the Earth once. This is called a **lunar cycle**.

MAKE A CONNECTION: Imagine there is less gravity on Earth for one day. List THREE ways that you would make the most of this situation, and give a reason for each one.

_____

_____

You might have wondered why the moon seems to change shape a little bit each night, from a big, bright ball to a tiny sliver, or **crescent**. The moon doesn't actually change shape; it is always round, but sometimes only parts of it are lit up by the Sun. When the moon is round and full, the Sun is shining directly on it. When you can only see a sliver of the moon lit up, the Sun is shining on the backside of it. The moon has days and nights just like the Earth. When the moon looks mostly dark, you are looking at the part that is experiencing night. Look closely and you might still be able to see the dark outline of the rest of the moon. These changes in the moon's appearance are called the **phases** of the moon. The phases are: new moon, half moon (waxing), gibbous moon (waxing), full moon, gibbous moon (waning), half moon (waning), old moon. **Waxing** means growing and **waning** means shrinking. **Gibbous** means swollen on one side. A **lunar calendar** tells people what phase the moon is in every day.

The Moon

1. Number the events from 1 to 6 in the order that they occur in the lunar cycle. (You may wish to draw sketches to help you.)

> **a) Last quarter**: The left half of the moon is illuminated.

> **b) Waxing gibbous**: Most of the moon's surface is illuminated except for a small sliver on the left side that remains in the dark. It is almost fully illuminated.

> **c) Full moon**: The entire side of the moon facing the Earth is illuminated. It looks perfectly round.

> **d) New moon**: The side of the moon facing the Earth is not illuminated. We cannot see the moon at this phase.

> **e) First quarter**: The right half of the moon is illuminated. In the next phase, the moon will seem even larger.

> **f) Waning crescent**: Only a small sliver of the moon is still illuminated on the left side. It is just about to "disappear" completely.

2. a) ~~Cross out~~ the words that are __not__ related to the lunar cycle.

waxing   gibbous   gravity   new   crater   crescent

b) (Circle) the words that describe conditions on the moon.

dry   windy   hot   rocky   bumpy   fiery

c) <u>Underline</u> the words that describe what the moon looks like at different phases of its cycle.

sliver   crescent   pie   octagonal   orb   star

The Moon

Answer each question with a complete sentence.

3. Why is it that astronauts have **less** weight on the moon than they have on Earth?

_____

_____

4. Describe the positions of the **Earth**, **Sun** and **Moon** when the moon is full.

_____

_____

5. Why is the moon so bright on a clear, cloudless night?

_____

_____

Research & Extensions

6. We say that there is a **new moon** when the moon is between the Earth and the Sun. When this happens, we cannot see the lit side of the Moon, so the moon is dark in the night sky. Another time the moon is dark is when there is a **lunar eclipse**.

a) Research eclipses, and create a model or diagram to show the difference between lunar and solar eclipses.

b) In China, people believed that when there was a lunar eclipse a Dragon had swallowed the Moon. Research this legend, and recount it either as a comic strip, short story or poem.

c) Have you ever heard the expression, "Once in a Blue Moon"? Research **Blue Moons** to see if they actually exist. If they do, explain what they are.

d) Design a model that will effectively teach the phases of the lunar cycle and lunar eclipses.

3. The force of gravity is weaker on the Moon.

4. The Earth is between the Sun and the Moon.

5. It reflects the light from the Sun better because there are no clouds in the way.

6.
a) Answers will vary
b) Answers will vary based on resource used
c) Answers will vary based on resource used
d) Answers will vary

26

1.
a) 5
b) 3
c) 4
d) 1
e) 2
f) 6

2.
a) **Cross out:** gravity, crater
b) **Circle:** bumpy, dry, rocky
c) **Underline:** sliver, crescent, orb

25

1. Answers will vary

2.
lunar – F
phase – A
cycle – B
calendar – D
reflect – E
crater – C

3.
a) 5
b) 1
c) 3
d) 7

23

Answers will vary

24

2. The gravitational pull of other planets

3. A very large storm that has been blowing for hundreds of years

4. Gravity pulled in objects that came too close to the planet and they got stuck in orbit around it

5. Answers will vary

6. Answers will vary

7. Accept any answers that can be verified

22

a) ✓ B
b) ✓ C
c) ✓ D
d) ✓ D
e) ✓ A
f) ✓ C

21

1. Answers will vary

2.
a) area
b) band
c) huge
d) vapor
e) little
f) encircle
g) spin
h) spring
i) mark

3.
a) rotate b) spot
c) orbit d) ring

18

Answers will vary

19

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