

1.1

The Geography of Mesoamerica



You walk among the ruins, gazing at the remains of temple complexes, carved stone sculptures, and towering pyramids. Are you visiting a city that thrived during the time of ancient Egypt? No. You're in the middle of a jungle in a region of North America known as Mesoamerica.

MAIN IDEA

Geographic factors greatly influenced the development of civilizations in Mesoamerica.

HIGHLANDS AND LOWLANDS

Thousands of years ago, advanced civilizations arose in **Mesoamerica**, which stretches from southern Mexico into part of Central America. The region's climate and fertile land helped the civilizations thrive.

Mesoamerica's landscape is divided into two main geographic areas: **highlands**, or land high above the sea, and **lowlands**, or land that is low and level. The highlands lie between the mountains of the Sierra Madre, a mountain system in Mexico, and consist of fairly flat and fertile land. This land was good for agriculture, but it also posed some challenges for its early residents. They were rocked from time to time by volcanic eruptions and powerful earthquakes. The lowlands are less active. They lie along the coast of the

Gulf of Mexico. They are also found in the jungles of the Yucatán (you-kuh-TAN) Peninsula, which is located between the Gulf of Mexico and the Caribbean Sea.

If you hiked from the lowlands to the highlands, you would experience a wide variety of climates, from tropical rain forests to very cold, dry zones. In the higher mountains, in general, the climate in the highlands is cooler and drier than that in the lowlands, where it can rain more than 100 inches a year. The lowlands are also crisscrossed by many rivers. Some of these rivers flood during heavy seasonal rains and wash fertile silt onto their floodplains.

AGRICULTURE

Early Mesoamerican farmers learned what crops would grow well in the different climates of the highlands and lowlands. In the drier highland areas, the main crops included **maize** (also known as corn), squash, and beans. These three crops are often called the **Three Sisters** because they benefit from being planted close together. The beans grow up the maize stalks, while the squash spreads over the ground, preventing the growth of weeds. Farmers in the lowlands grew these three crops as well as palm, avocado, and **cacao** (kuh-COW) trees. Cacao beans were used to make chocolate. Sometimes the beans were even used as money.

Mesoamerica's farmers developed different agricultural practices in the region's varied landscapes. In drier areas, farmers redirected the course of streams to irrigate their fields. In the dense lowland jungles, farmers cleared fields through a technique known as **slash-and-burn agriculture**, shown on the opposite page. These agricultural techniques helped ancient cultures produce food surpluses and allowed people to do jobs other than farming. As a result, civilizations began to arise in Mesoamerica more than 3,000 years ago—first the Olmec and later the Zapotec.

EARLY MESOAMERICAN CIVILIZATIONS, 900–500 B.C.



SLASH-AND-BURN AGRICULTURE



1 Slash
Wooded areas and jungles are too thick to plant crops. Farmers slash, or cut down, trees.



2 Burn
Fallen trees and leaves are burned to clear the land. Ash produced by the fires is used as fertilizer.



3 Fertilize and Plant
Cleared land is fertilized with ash. Farmers plant crops such as maize and squash.



4 Migrate
Farmers move on to new locations after soil on cleared land becomes less productive.

REVIEW & ASSESS

- READING CHECK** What geographic factors influenced the development of civilizations in Mesoamerica?
- INTERPRET MAPS** Why do you think the Olmec and Zapotec civilizations developed along coastal areas?
- COMPARE AND CONTRAST** How did agricultural techniques differ in Mesoamerica's highlands and lowlands?

Day 12:
Read "The Girl Who Lived Forever"

Locate and complete the *During Reading* and *After Reading* pages of your packet. **DO NOT WRITE THE OBJECTIVE SUMMARY ON THIS DAY.**
10-15 minutes of reading

During Reading
Tone, Text Structure, Vocabulary, Mood, and Inference

5. Identify the tone of the section "A Terrifying Regime." What are some words and phrases that establish the tone?

6. Check (✓) the statement that BEST describes the text structure, or how the author organizes information, in the first half of the section "Invasion!"

She explains how Otto Frank solved the problem of life in Amsterdam being very dangerous for Jews.

She describes the cause of the Nazi invasion of the Netherlands.

She compares and contrasts life in Amsterdam before and after the Nazis invaded.

7. Consider this sentence from page 8:

"It was only on the pages of her diary that she could freely vent her feelings and frustrations."

A. What does *vent* mean in this sentence? (Use context clues to help you. Then check a dictionary.)

B. The author could have used another word instead of *vent*. How does her choice of *vent* affect the meaning of the sentence?

8. Describe the mood in the section "Betrayed." What words or phrases contribute to this mood?

Name (First & Last): _____

Team: MAROON OR GOLD

Homeroom Teacher: _____

NTI #13



Work hard. Be nice. Extend grace. Show mercy. Be humble.



Sound Waves in Matter

Name _____

Date _____

Class _____

Lab Preview

Directions: Answer these questions before you begin the Lab.

1. What factors affect the speed of sound?
2. What is the order of increasing density of the materials that you are testing?

In this lab you can hear differences in sound when the sound waves travel through various materials.

Real-World Question

How does the movement of sound waves through different materials affect the sounds we hear?

Goals

- Notice the variations in sound when waves travel through different materials.
- Infer what property of the materials cause the sound waves to produce a different sound.

Materials

- 150-mL Beakers (4)
- corn syrup
- water
- vegetable oil
- pencil
- mace
- syrup



Safety Precautions

1. Use the data table on the next page for your data.

Procedure

1. Use the data table on the next page for your data.
2. Fill a beaker to the 140-mL line with water. Fill another beaker with 140 mL of vegetable oil. Fill a third beaker with 140 mL of corn syrup. Leave the fourth beaker empty.
3. Hold the pencil securely and tap the side of the beaker about halfway down from its rim. Use the metal band near the end of the pencil to make a clear sound.
4. Pay careful attention to the pitch of the sound. Notice whether the sound continues for a moment after the tap or if it stops suddenly. In your data table, write a description of the sound that you hear.
5. Repeat steps 3 and 4 for the remaining beakers. You may wish to tap each beaker several times to be sure you hear the sound well.
6. Compare the sounds made by the beaker filled with air and the beaker filled with the different liquids.

Waves, Sound, and Light 5

Hands-On Activities

Hands-On Activities



Data and Observations

(continued)

Name _____

Date _____

Class _____

Sound Waves through Materials

Beaker	
Water	
Vegetable Oil	
Corn Syrup	
Empty	

Conclude and Apply

1. List the materials in the beakers in order of increasing density.

2. Infer how the pitch of the sound changes as the density of the material in the beaker increases.

3. How does the density of the material in the beaker affect how long the sound continued to be heard after the beaker was tapped?

Communicating Your Data

Compare your results with other students in your class.

6 Waves, Sound, and Light

Directions: Answer the questions on the lines provided.

1. How does a vibrating drum produce a sound wave?

2. Does sound travel outside Earth's atmosphere in space? Explain.

3. Explain how intensity, sound, and energy are related.

4. What are the three main parts of the human ear and what is the function of each?

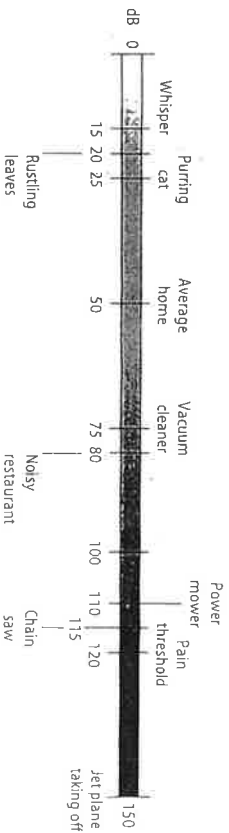
5. Explain why sound travels faster through iron than through air.

Noise is part of everyday life whether you live in the city or in the country. Prolonged exposure to noises above 85 decibels can cause permanent hearing loss. Exposure to loud noises can be a result of walking on a busy street, eating in a crowded restaurant, operating machinery, or engaging in recreational activities.

How do you know if the noise is too loud? One rule of thumb is if you cannot hear peo-

ple talking when you are just a few feet away, the noise may be damaging your hearing. Protect your hearing by decreasing the volume on personal stereos and by wearing hearing protection when you are around loud noises. You may not be sure if you are exposed to noises above 85 decibels. The list below contains the approximate noise level of some sounds. Plot the sounds on the chart below.

- Rock concert 100–130 decibels
- Power mower 105 decibels
- Motorcycle 90–110 decibels
- Personal stereo at a high volume 105–120 decibels
- Chain saw 110 decibels



1. What activities do you do that may expose you to high noise levels?

2. What can you do to prevent hearing damage or loss while you do your activities?

25

Music is one way people enjoy sound waves. All of these musical instruments and the person singing are producing sound waves to make music. The sound waves travel from the instruments, through the air, and into your ears allowing you to hear the sounds they make.



1. Look at each of the musical instruments in the photo. How do you think each instrument vibrates air molecules to start a sound wave?
2. How does the singer vibrate air molecules to create sound waves?
Hint: Put your finger tips on your throat and say a few words. Do you feel something vibrating?

Transparency Activities



THE CONCEPT OF PROBABILITY

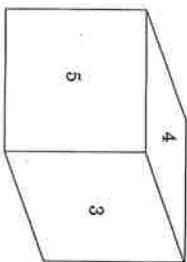
Vocabulary

probability: the chance that an event will occur, written as a ratio

favorable outcomes: the number of successful outcomes



Mmanuel and Luisa are playing a board game. Each player tosses a cube, numbered 1 to 6 to determine the number of spaces to move on the board. To win, Luisa needs to toss a number greater than 4 on her next turn. She wants to know what her chances of winning are, that is, what is the **probability** that she will win?



There are 6 possible outcomes when a number cube is tossed. The sample space is {1, 2, 3, 4, 5, 6}.

Two of the possible outcomes, the numbers 5 and 6, are greater than 4.

Luisa finds the *probability* of tossing a number greater than 4 by writing a ratio.

So, there are 2 **favorable outcomes**. The favorable outcomes are the ones that will help Luisa win the game.

$$\frac{\text{Number of favorable outcomes}}{\text{Total number of possible outcomes}} = \frac{2}{6}$$

The probability of tossing a number greater than 4 is 2 out of 6 possible outcomes, or $\frac{2}{6}$.

$$\frac{2}{6} = \frac{2 \div 2}{6 \div 2} = \frac{1}{3}$$

Reminder
Simplify fractions by dividing the numerator and denominator by the same number.

So, Luisa knows that the probability that she will toss a number greater than 4 is $\frac{2}{6}$, or $\frac{1}{3}$.

Guided Practice

Find each probability.

- On a quiz show, each contestant spins a spinner that is divided into 26 sections. Each section contains one of the 26 letters of the alphabet. Find the probability that the spinner will land on B.
 - How many spaces are on the spinner? 26
 - How many spaces have the letter B? 1
 - What is the probability of landing on the letter B? $\frac{1}{26}$
- Find the probability that the alphabet spinner will land on a vowel.
 - How many vowels are on the spinner? 5 (not including Y)
 - What is the probability of landing on a vowel? $\frac{5}{26}$
- Find the probability that the alphabet spinner will land on a consonant.
 - How many consonants are on the spinner? 21
 - What is the probability of landing on a consonant? $\frac{21}{26}$
- Does a contestant have a greater probability of landing on a vowel or landing on a consonant? Why?
Consonant because $\frac{21}{26}$ is large than $\frac{5}{26}$.

Exercises

Write the sample space for each experiment and the probability of each outcome.

- Experiment: Tossing a coin
 - Sample space _____
 - Probability of getting heads _____
 - Probability of getting tails _____
- Experiment: Spinning this wheel
 - Sample space _____
 - Probability of getting the letter M _____



c. Probability of getting the letter T _____

d. Probability of getting a consonant _____

7. Experiment: Tossing a cube numbered 1 to 6

a. Sample space _____

b. Probability of getting a 4 _____

c. Probability of getting an even number _____

d. Probability of getting an odd number _____

e. Which probability is greater, getting an odd number or getting an even number? Explain.

8. Experiment: Picking a number between 1 and 10 out of a hat

a. Sample space _____

b. Probability of getting a 1 _____

c. Probability of getting an even number _____

d. Probability of getting an odd number _____

e. Probability of getting a number less than 10 _____

f. Probability of getting a number greater than 5 _____

g. Which probability is greater: getting a number less than 10 or getting a number greater than 5? Explain.



EVENTS

Vocabulary

event: any possible outcome of an experiment

Example 1

Yoshiko works after school in the receiving department of a hardware store. It is her job to record all inventory received each day. In a shipment of tools, the boxes in the carton are the same size, but they are not labeled. Yoshiko knows that the carton contains 4 boxes of crescent wrenches, 2 boxes of socket wrenches, 1 box of needle-nosed pliers, and 5 boxes of Phillips screwdrivers. If Yoshiko chooses a box at random, what is the probability it will contain crescent wrenches?

The sample space is: {crescent wrenches, socket wrenches, needle-nosed pliers, Phillips screwdrivers}.

The **event**, choosing a box of crescent wrenches, is one of the possible outcomes in the sample space. There are four different events that can occur if Yoshiko chooses a box at random. However, because there is a different number of boxes for each type of tool, the probability of each event occurring is different.

You can use this formula to find the probability of an event.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$$

$$P(\text{crescent wrench}) =$$

$$\frac{4 \text{ boxes of crescent wrenches}}{12 \text{ total boxes of tools}} = \frac{1}{3}$$

The probability of this event, choosing a box of crescent wrenches, is $\frac{1}{3}$.

Example 2

During her break, Yoshiko plays a game with Jorge. They take turns tossing a coin and rolling a cube numbered 1 to 6. Jorge wants to know the probability of tossing a head and rolling an even number.

Reminder

Simplify fractions by dividing the numerator and denominator by the same number.

Before beginning the game, they find the sample space of all possible outcomes. H-1 means tossing a head on the coin and rolling a 1 on the number cube. T-6 means tossing a tail on the coin and rolling a 6 on the number cube.



The sample space is

(H-1, H-2, H-3, H-4, H-5, H-6, T-1, T-2, T-3, T-4, T-5, T-6)

Jorge sees that 3 of the 12 outcomes in the sample space, H-2, H-4, H-6, would produce the desired event.

$$P(\text{heads and even number}) = \frac{3}{12} = \frac{1}{4}$$

The probability of this event, tossing a head and rolling an even number, is $\frac{1}{4}$.

Guided Practice

- Look back at Yoshiko's inventory of the shipment of tools. Find the probability of the other three events.
 - What is the total number of boxes? 12
 - How many boxes of socket wrenches are there? 2
 - The probability of choosing a box of socket wrenches is $\frac{2}{12} = \frac{1}{6}$.
 - How many boxes of pliers are there? 1
 - The probability of choosing a box of pliers is $\frac{1}{12}$.
 - How many boxes of screwdrivers are there? 5
 - The probability of choosing a box of screwdrivers is $\frac{5}{12}$.
- In the game that Yoshiko and Jorge play, Yoshiko wants to find the probability of the event of tossing a tail and rolling a number less than 3.
 - List the outcomes that would produce the event that Yoshiko wants. (Tail, 1) (Tail, 2)
 - How many outcomes are possible? 2

- What is the probability of this event? $\frac{2}{12}$

Exercises

Yoshiko is sorting washers of different-size diameters by choosing them from a box at random, one at a time. The box contains 10 $\frac{1}{4}$ -in. washers, 15 $\frac{3}{8}$ -in. washers, and 12 $\frac{1}{2}$ -in. washers.

Find the probability of each event.

- Choosing a $\frac{1}{4}$ -in. washer _____
- Choosing a $\frac{3}{8}$ -in. washer _____
- Choosing a $\frac{1}{2}$ -in. washer _____
- Choosing a washer with a diameter less than $\frac{1}{2}$ in. _____
- Choosing a washer with a diameter greater than $\frac{1}{4}$ in. _____

Find the probability of each event in the game that Yoshiko and Jorge play.

- Tossing a head and rolling a 5 _____
- Tossing a tail and rolling a 7 _____
- Tossing a head and rolling an odd number _____
- Tossing a tail and rolling a number greater than 4 _____



COMPLEMENT OF AN EVENT

Vocabulary

complement of an event: all possible outcomes other than the given event

certain event: an event which will always occur

impossible event: an event which cannot occur

Four employees are working together on a team project: Anita, Bashar, Carl, and Daimon. One person will be the recorder. The group decides to choose the recorder by drawing names out of a hat. Anita wonders what her chances are of being chosen as the recorder.

She knows that the number of ways she could be the recorder is 1.

The total number of possible outcomes is 4.

The probability that Anita will be the recorder is $\frac{1}{4}$.

Reminder

P stands for probability.

$$P(\text{Anita is the recorder}) = \frac{1}{4}$$

Example 1

What is the probability that Anita will *not* be the recorder?

The number of ways that Anita will not be chosen is 3.

The number of possible outcomes is 4.

$$P(\text{Anita is not the recorder}) = \frac{3}{4}$$

The probability that Anita will *not* be the recorder is $\frac{3}{4}$.

The probability that Anita will *not* be the recorder is the **complement of the event** that Anita will be the recorder.

The sum of the probabilities of all possible outcomes of a given experiment is 1. In the example, Anita's chance of being the recorder was $\frac{1}{4}$ and her chance of *not* being the recorder was $\frac{3}{4}$.

$$\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$$

Another way to find the complement of an event is to subtract the probability of the event from 1.

Example 2

What is the probability that Anita, Bashar, Carl, or Daimon will be the recorder?

$$P(\text{Anita, Bashar, Carl, or Daimon is the recorder}) = \frac{4}{4} \text{ or } 1$$

The probability of a **certain event** is 1.

Example 3

What is the probability that neither Anita, Bashar, Carl nor Daimon will be the recorder?

$$P(\text{not Anita, not Bashar, not Carl, not Daimon}) = \frac{0}{4} = 0$$

The probability of an **impossible event** is 0.

Guided Practice

1. Soon Yi has a bag of marbles: 4 blue, 4 yellow, and 12 red. If she reaches in and picks a marble, what is the probability that she does *not* pick a blue marble?

a. What is the total number of marbles? 20

b. $P(\text{yellow}) = \frac{4}{20} = \frac{1}{5}$

c. $P(\text{red}) = \frac{12}{20} = \frac{3}{5}$

d. $P(\text{not blue}) = \frac{16}{20} = \frac{4}{5}$

e. $P(\text{blue}) = \frac{4}{20} = \frac{1}{5}$

f. $1 - P(\text{blue}) = 1 - \frac{1}{5} = \frac{4}{5}$

2. Is the probability that Soon Yi will pick a blue, yellow, or red marble certain or impossible?

a. Number of ways to pick a blue, yellow, or red marble 20

b. Number of ways to pick a marble 20

c. $P(\text{blue, yellow, red}) = \frac{20}{20} = 1$

d. $P(\text{blue, yellow, red})$ is certain or impossible? (choose one) Certain

3. Is the probability that Soon Yi will pick a purple marble certain or impossible?

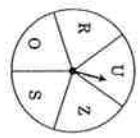
a. Number of ways to pick a purple marble 0

- b. Number of ways to pick a marble 20
- c. $P(\text{purple}) = \frac{20}{20} = 0$
- d. $P(\text{purple})$ is certain or impossible? (choose one) impossible

Exercises

Find the probability of each event.

4. Experiment: Tossing a number cube, numbered 1 to 6
- a. Tossing a 2 _____
- b. Not tossing a 2 _____
- c. Tossing a number less than 3 _____
- d. Tossing a number greater than 3 _____
- e. Tossing a 7 _____
- f. Tossing a number less than 7 _____



5. Experiment: Spinning the wheel
- a. Getting a vowel _____
- b. Not getting a vowel _____
- c. Getting a Z _____
- d. Not getting a Z _____
6. Experiment: Picking a pair of socks from a drawer containing 3 green pairs, 4 blue pairs, 3 red pairs, and 10 white pairs

- a. Picking a green pair _____
- b. Picking a red pair _____
- c. Picking a white pair _____
- d. Picking a blue pair _____
- e. Picking a green, red, blue, or white pair _____
- f. Picking a yellow pair _____

Aztecs

This great civilization was located in Mesoamerica (current day Mexico).

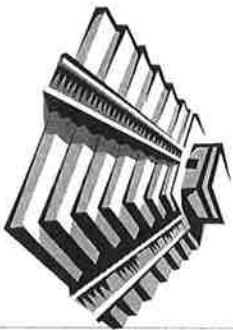
The capital of Aztec culture was Tenochtitlan. Farming was very important to the Aztecs. They used to irrigate with canals and used terraced slopes to prevent erosion. The Aztecs grew crops in chinampas or floating gardens. These floating gardens were islands of land built in swampy lakes.

Some of their main crops included maize (corn), pumpkins, tomatoes, squash, sweet potatoes, avocados, beans, and chili peppers. Aztecs also grew cocoa beans which was a special drink for the rich people and rulers. It was believed to be the food of the gods.

Aztecs developed many roads which they used for trade. They were able to trade gold, silver, gems, feathers, wood, and cocoa. They also created huge pyramids from stone. These pyramids were used to record the movements of the solar system and for religious purposes.

The Aztec empire was at constant war with other tribes. Aztecs warriors were brave and noble and went to war to honor their gods. They were cruel to their enemies that lost in battle.

Men in the Aztec civilization were responsible for taking care of their family by working hard and paying taxes. Women were responsible for taking care of the children and running the household. The Aztecs had free public schools for all of their children.



Mayans

This great civilization was located in Mesoamerica (current day central and southern Mexico, the Yucatan Peninsula, Guatemala, Belize, El

Salvador, and the westernmost part of Honduras. The Mayan civilization did not have a capital city or one main ruler. Each city governed itself and had its own ruler. They did share a common religion. One of the major accomplishments of the Mayan was to

create huge temples or buildings to honor their gods. Chichen Itza was an important trade center for the Mayans. They were able to trade pots, gems, seashells, feathers, and cocoa beans with other travelers.

The Mayan culture had an interesting method of farming called slash and burn. This method cleared the land by cutting down (slashing) plants and burning them. They then planted corn, sunflowers, chili peppers, bananas, beans, and cotton. They would dig holes to collect rain to water their crops.

The Mayans were very interested in keeping track of time. They had three different calendars: a religious one (260 days), one based on the movement of the earth around the sun (365 days), and one that counted long periods of time. They also created a number system that used a series of dots and lines. They were the first to use a zero in counting. Mayans used glyphs (pictures) to write down important information.

The Mayans also participated in sports. They had a ball court and used a solid rubber ball to aim through rings that were 27 feet off of the ground. No one is sure how the game was played exactly, but we do know that it was probably dangerous.



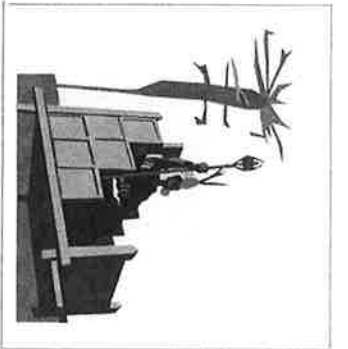
Incas

This great civilization was located in South America (present day Peru, parts of Ecuador, Bolivia, Argentina, and the greater part of Chile). The capital of Incan culture was Cuzco. The Incan empire stretched over 2500 miles from high mountains to low jungle areas. The Incas developed gardens that were cut into the side of mountains. This prevented the water from running down the steep slopes. They also created aqueducts to carry water far distances. Incan farmers were able to grow a variety of crops, such as peppers, avocados, strawberries, peanuts, corn, potatoes, and beans. The llama was a popular animal used by the Incas. The llama was used for meat, transportation, and clothing.

The Incan civilization developed "freeze-dried food." Typically, they would freeze-dry potatoes or meat. They left the food out overnight to freeze. The next day it would dry in the sun. They would repeat the process over and over. This freeze-dried food could last up to a year!

They created roads that went to the different villages for communication and trade. Important messages were sent by using runners. Some popular trading items were handmade clothes and pots.

In the Incan society, it was the job of the father to work and pay the taxes. The mother worked in the house and took care of the children. It was left up to the families to educate their own children. Machu Picchu was an Incan village that was rediscovered in 1911. This site still contains great examples of granite buildings, temples, and houses.



Name _____



Early Civilizations Graphic Organizer



Aztec's Mayans Incas

Name of Civilization	Aztec's	Mayans	Incas
Location of Civilization			
Food grown			
Trade items			
Interesting facts			

Reading
NTI Assignments

Day 13:

Write an **objective summary** on the **After Reading** section from Day 12. To assist you in your writing, a resource will be attached to the back of your packet! You may also utilize Google Classroom.

10-15 minutes of reading

What is an objective summary?

Objective means “not influenced by personal feelings or interpretation.” A *summary* is a short statement that gives the main points or ideas of something. So an *objective summary* is a short statement or paragraph that tells what something is about but does not include irrelevant details or your opinions.

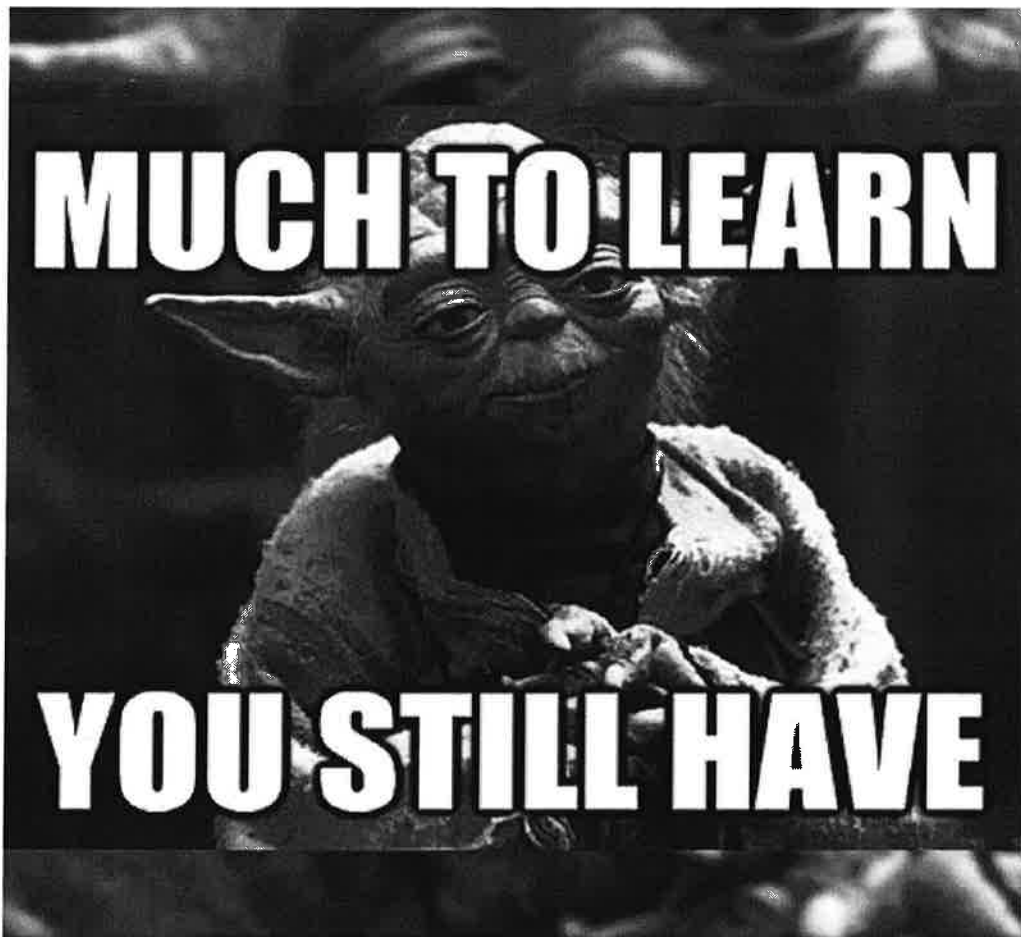
HINT: An objective summary should not be written in the first person (“I”) voice.

Name (First & Last): _____

Team: MAROON OR GOLD

Homeroom Teacher: _____

NTI #14



HISTORY THROUGH OBJECTS: Peruvian Gold Take some time to really examine the artifacts shown in this feature on pages 488–489. Then record your responses to the questions below.

1. Your text asks the question, “What common themes do you notice in the artifacts featured below?” How would you explain what the term “themes” means in that question? And how would you answer the question?

2. **The Lure of Gold** Dr. Fredrik Hiebert, the curator of the exhibition featuring these objects, described gold as the “most special metal.” “Why does gold hold such appeal? Pick your favorite of these artifacts and then write a description of it that you could share with someone who hadn’t seen it. Make sure you explain why this object is your favorite and what makes it so special.

3. How do you think crowds would have reacted to see a leader wearing El Tocado, the beautiful headdress featured on this page?

NATIONAL GEOGRAPHIC EXPLORER: William Saturno Bill Saturno and his students have made some amazing discoveries about the Maya in the jungles of Guatemala. Read the lesson on his work again if you need to, then answer the questions below.

4. **Write a letter** Think about the kind of work Dr. Saturno does, and the conditions in which he works. Write a letter to him to find out more about how he handles such difficult work—and what the rewards are.

5. **Exploring Identity** The Maya are a culture at once ancient and modern—descendants of the Maya still exist today. In what way might that affect how a culture views its identity? From the lesson on Bill Saturno, what is one word that you might use to describe the identity of the Maya?

1.2 PERUVIAN GOLD

HISTORY THROUGH OBJECTS

Pre-Inca Peruvians were master artisans who created fine jewelry and adornments with precious metals such as gold, silver, and copper. They also made pottery that was both beautiful and functional. The artifacts shown here were part of a special exhibition by the National Geographic Museum in partnership with the government of Peru. What common themes do you notice in the artifacts featured below?



Diadem
This noble headdress, called a diadem, symbolizes power and authority. It is a inches wide, made from a single sheet of copper, and covered with gold.



Nose Ornament
Gold and silver are fused together in this bi-metal piece. Call, with its suspended strings and feathers, it was a symbol of power and status.



Moche Mask
When copper is exposed to the elements, it changes in color from a shiny red hue to a pale green, as it did on this funeral mask.

El Tocado
The ruler wore the headdress with multiple parts and radiating feathers. It was made of gold and silver, and set with turquoise and other stones.



Nasca Beak
Pre-Inca artisans decorated clothing with gold ornaments like this beak, which mimics a Nazca bird. It was made of gold and silver.





Bending Light

Lab Preview

Directions: Answer these questions before you begin the Lab.

1. Draw a sketch of a light wave being reflected off a flat surface.

2. Draw a sketch of a light wave being refracted as it passes from one medium into another.

What happens to light waves when they strike the boundary between two materials? Some of the light waves might be reflected from the boundary and some of the waves might travel in to the second material. These light waves can change direction and be refracted in the second material. Transmission occurs when the light waves finally pass through the second material.

Real-World Question

What happens to light waves when they strike a boundary between air and other materials?

Goals

- Compare and contrast the reflection, refraction, and transmission of light.
- Observe how the refraction of white light can produce different colors of light.

Materials

- small piece of cardboard
- tape
- flashlight
- clear plastic CD case
- flat mirror
- 250-mL beaker

Safety Precautions



Procedure

1. Use the data table on the next page to record your observations.
2. Cut a slit about 3 cm long and 2 mm wide in a circular piece of the cardboard. Tape the cardboard to the face of the flashlight to make a mask.
3. In a darkened room, shine the flashlight at an angle toward the mirror. Determine whether the flashlight beam is reflected, refracted, or transmitted. Look at the color of the light beam after it strikes the mirror. Has the white light been changed into different colors of light? Record your observations on the chart.
4. Remove the clear plastic front from an empty CD case. Shine the flashlight at an angle towards the plastic. Does transmission occur? Record your observations about how the direction of the beam changes the colors of the light.
5. Fill the beaker with water. Shine the flashlight toward the side of the beaker so that the light shines through the water. Move the light beam from side to side. Record your observations.
6. Shine the flashlight toward a side of the prism. Move the light beam around until you see the outgoing beam spread into different colors. Record your observations.

Waves, Sound, and Light 7

Hands-On Activities

Hands-On Activities



(continued)

Data and Observations

Surface	Bending of Light by Different Surfaces	
	How Beam Is Affected	Colors Formed
Mirror		
CD case		
Water		

Analyze Your Data

1. For which objects did reflection occur? For which objects did refraction occur? For which objects did transmission occur?

2. For which objects did refraction cause the flashlight beam to be separated into different colors?

Conclude and Apply

1. Compare and contrast the behavior of light waves when they strike the mirror and the CD case.
2. Explain why the beam that passes through the CD case does or does not change direction.
3. Describe how the light beam changes as it passes through the prism.

Communicating Your Data

Create a sketch showing how light refracts in a prism and divides into different colors.

8 Waves, Sound, and Light

Directions: Use the following terms to complete sentences below.

- electromagnetic waves
- infrared waves
- electromagnetic spectrum
- ultraviolet waves

1. Waves that can travel through empty space are _____.
2. The _____ is the complete range of electromagnetic wave frequencies and wavelengths.
3. Waves that have wavelengths between one thousandth and 0.7 millionths of a meter are known as _____.
4. Waves that have wavelengths between about 0.4 millionths and ten billionths of a meter are known as _____.
5. You must protect your skin from _____ because they can damage your skin.
6. All warm bodies emit _____.
7. Night vision goggles use _____ to help locate people in the dark.
8. Visible light waves are part of the _____.
9. All _____ have an electric and magnetic part.
10. The waves emitted by the Sun are _____.

Directions: Answer the questions on the lines provided.

1. Compare and contrast light waves and sound waves.

2. Describe the electromagnetic spectrum.

3. What are ultraviolet waves, X-rays, and gamma rays used for?

4. How do the cornea, lens, and retina aid in the vision process?

5. What are rod and cone cells?

Reading
NTI Assignments

Name: _____ Date: _____

Exploring Text Structures

"Text structure" is the term for how an author organizes information. Authors use different text structures to achieve different purposes, and there are often multiple text structures in one piece of writing.

Directions: Common text structures are listed in the boxes on the right. Use the information in these boxes to help you answer the questions below about the text structures in "The Girl Who Lived Forever."

1. Which text structure does the author use in the introductory section of this article? How do you know?

Description or List
Includes details to help you picture or get to know a person, a place, a thing, or an idea

Cause and Effect
Explains *why* something happened (cause) and *what* happened as a result (effect)

Problem and Solution
Presents a problem and explains how it is solved

Compare and Contrast
Presents the similarities and/or differences between two items, such as a pair of events, time periods, ideas, or places

Sequence of Events
Describes events in the order in which they happen (This is also called chronological order.)

Day 14:

Complete the **Exploring Text Structures** portion of your packet. Read the passage as needed.

10-15 minutes of reading

2. Find one section or passage from the article that uses a cause-and-effect structure. Explain.

3. What problem and solution are described in the section "Invasion"?

4. Which two text structures are used in the section "Fragile Hope"? Which words or phrases help you identify these structures?

5. Reread the section "My Courage Is Reborn." Which text structure does the author mainly use in this section? Support your answer with examples from the text.

6. Which text structures are used in the section "Something Precious"? When does the structure shift?

Work hard. Be nice. Extend grace. Show mercy. Be humble.

Name (First & Last): _____

Team: MAROON OR GOLD

Homeroom Teacher: _____

NTI #15

10 THINGS THAT REQUIRE ZERO TALENT BUT CAN STILL LEAD TO SUCCESS

1. BEING ON TIME
2. MAKING A BIGGER EFFORT
3. IMPROVING YOUR HEALTH AND ENERGY
4. HAVING A POSITIVE ATTITUDE
5. LIVING WITH PASSION
6. USING POWERFUL BODY LANGUAGE
7. WILLING TO LEARN
8. GOING THE EXTRA MILE
9. BEING PREPARED FOR ANYTHING
10. HAVING A STRONG WORK ETHIC

Part A. Vocabulary Review

Directions: Match the terms with the correct phrase below. Write the letter of the correct term in the blank at the left of the phrase.

- | | | |
|-------------------------|----------------------|-----------------------------|
| a. compressional wave | b. diffraction | c. electromagnetic spectrum |
| d. electromagnetic wave | e. frequency | f. infrared waves |
| g. intensity | h. law of reflection | i. pitch |
| j. refraction | k. reverberation | l. transverse wave |
| m. ultraviolet waves | n. wave | o. wavelength |
- the complete range of electromagnetic wave frequencies and wavelengths
 - waves with wavelengths between one thousandth and 700 billionths of a meter
 - causes particles in matter to move back and forth along the same direction in which the wave travels
 - the distance between one point on a wave and the nearest point moving with the same speed and direction
 - the angle that the incoming wave makes with the normal equals the angle that the outgoing wave makes with the normal
 - the amount of energy that a wave carries past a certain area each second
 - the human perception of the frequency of sound
 - repeated echoes
 - waves with wavelengths between about 0.4 millionths and ten billionths of a meter
 - a disturbance that carries energy through matter or space
 - causes particles in matter to move back and forth at right angles to the direction in which the wave travels
 - waves that can travel through matter or empty space
 - the change in direction of a wave when it travels from one material to another
 - the bending of a wave around an object
 - the number of wavelengths that pass by a point each second

Chapter Review (continued)

Part B. Concept Review

Directions: Write the name of the type of wave described in the space beside each phrase.

- | | | |
|-----------------------|--------------------------|----------------------------|
| _____ transverse wave | _____ compressional wave | _____ electromagnetic wave |
|-----------------------|--------------------------|----------------------------|
- can travel through matter or empty space
 - contains high points called crests
 - contains rarefactions in the wave
 - contains electric and magnetic parts
 - detected by the ear
 - detected by the eye

Directions: Answer the following questions on the lines provided.

- Explain the relationship between loudness and sound intensity.

- What are the three parts of the human ear and what is the function of each part?

- Explain how humans see color.

Assessment

Math 15
10 Days

Theoretical Probability	Experimental Probability								
<p>Based on <u>knowing</u> and calculating all of the <u>equally likely</u> outcomes of an experiment.</p> <p>What <u>SHOULD</u> happen.</p> <p>$P(\text{event}) = \frac{\# \text{ of favorable outcomes}}{\# \text{ of possible outcomes}}$</p> <p>Example: If you flip a coin, what is the theoretical probability that you will land on tails? $\frac{1}{2}$ (1) <u># of favorable outcomes</u> <u>outcomes</u> If a coin is flipped 20 times, how often should you land on tails? 10, $\frac{1}{2}$ of 20 is 10.</p>	<p>Based on <u>actual</u> repeated <u>trials</u> of an experiment.</p> <p>What <u>ACTUALLY</u> happened.</p> <p>$P(\text{event}) = \frac{\# \text{ of outcomes that occurred}}{\# \text{ of trials performed}}$</p> <p>Example: Below are the results of choosing a card from a deck of cards, recording the suit and then replacing the card.</p> <table border="1"> <tr> <td>Hearts</td> <td>Diamonds</td> <td>Clubs</td> <td>Spades</td> </tr> <tr> <td>6</td> <td>10</td> <td>7</td> <td>5</td> </tr> </table> <p>What is the probability of choosing a diamond? $\frac{10}{52}$ <u># of outcomes that occurred</u> <u># of trials performed</u></p>	Hearts	Diamonds	Clubs	Spades	6	10	7	5
Hearts	Diamonds	Clubs	Spades						
6	10	7	5						
<p>Theoretical or Experimental? I rolled the die 30 times and it landed with a 6 face up ten times.</p>	<p>16 airheads in a bag; 4 cherry, 7 orange, 5 apple. Probability of picking cherry: $\frac{4}{27}$</p>								

Roll a dice 20 times & record the outcomes:	Use the information from the experiment for questions 1-5.												
<p>Outcome Tally</p> <table border="1"> <tr><td>1</td><td>..</td></tr> <tr><td>2</td><td>..</td></tr> <tr><td>3</td><td>..</td></tr> <tr><td>4</td><td>..</td></tr> <tr><td>5</td><td>..</td></tr> <tr><td>6</td><td>..</td></tr> </table>	1	..	2	..	3	..	4	..	5	..	6	..	<p>1. $P(4)$ Theoretical: Experimental:</p> <p>2. $P(\text{even number})$ Theoretical: Experimental:</p> <p>3. $P(\text{factor of 3})$ Theoretical: Experimental:</p> <p>4. Are the probabilities the same or different? Why do you think that is?</p> <p>5. If the theoretical & experimental probabilities of a trial are far apart, what does that tell you about the experiment?</p>
1	..												
2	..												
3	..												
4	..												
5	..												
6	..												
<p>Find the theoretical probability of the following events.</p>													
6. What is the probability of choosing a Jack from a standard deck of cards?	7. What is the probability of rolling a composite number on a fair number cube?												
8. What is the probability of picking a vowel from the word "MATHEMATICS"?													



Uncovering Maya Murals

Sometimes you're just lucky. Ask William Saturno. He had spent three days—instead of the three hours he thought the trip would take—trudging through the jungles of Guatemala looking for carved Maya monuments. During the search, he and his team had been lost and near death. When a pyramid appeared in the midst of the dense undergrowth, Saturno ducked inside it to escape the terrible heat. He turned around to find a stunning Maya mural of the maize god looking right back at him. Now Saturno's lucky find is rewriting Maya history.

William Saturno is dedicated to preserving and interpreting the remains of the ancient Maya. In this photo, he is seen removing debris from a mural he uncovered at the Maya site of Xultun.

MAIN
Archeologists have provided a site

A LU
National Geographic Explorer William Saturno has spent his life studying the Maya and searching out the civilization's secrets. His greatest discovery occurred in 2001, when he found the mural at a site he later named San Bartolo.

Satur
years excavating the wall painting, which represented the Maya creation story in graceful and sophisticated detail.

How
However, when Saturno dated the work of art, he found that it had been created around 100 B.C.—more than 300 years before the Maya Classic Period had even begun. As Saturno says, "Clearly Maya painting had achieved glory centuries before the great works of the Classic Maya."

surpr
The far end of the mural revealed another surprise—the portrait of a king. "Some scholars thought that at this early stage in Maya history, the Preclassic, city-states had not yet evolved into full-fledged monarchies, with all the trappings seen later," explains Saturno. "But here was a king, named and titled, receiving his crown. In short, this one chamber opened up much of what we thought we knew about the early Maya."

ROOM OF WONDER
About ten years later and just five miles from San Bartolo, Saturno got lucky again. He was digging under a mound in the Maya site of Xultun (shoo'-tuhn) when a

of paint on a wall. "I was curious," Saturno says. "So I excavated to the back wall, and I saw a beautiful portrait of a king. There he was in Technicolor, with blue feathers."

A LUCKY FIND

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Saturno spent several years excavating the wall painting, which represented the Maya creation story in graceful and sophisticated detail.

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Portrait of a scholar in the San Bartolo mural

After more painstaking work, Saturno uncovered an entire room with paintings of other figures and a wall covered with columns of numbers. He thinks that mathematicians had been using the walls like a whiteboard to see whether the movements of the moon and planets matched the dates they had calculated.

The mural and numbers dated back to about A.D. 750, around the time Xultun was beginning to decline. According to Saturno, the Maya knew the collapse of their city had begun. Still, as he says, "They wanted to tie events in their king's life to larger cosmic cycles. They wanted to show that the king would be okay and that nothing would change. We keep looking for endings. It's an entirely different mind-set. I would never have identified this nondescript [uninteresting] mound as special. But this discovery implies that special things are everywhere."

REVIEW & ASSESS

- 1. READING CHECK** Why are William Saturno's discoveries so remarkable?
- 2. DRAW CONCLUSIONS** Saturno emphasizes the luck he's had in his explorations, but what other qualities must he possess to carry out his work?
- 3. ANALYZE LANGUAGE USE** Saturno says that the Maya had "an entirely different mind-set." What do you think he is suggesting about how the Maya viewed the world?

**Reading
NTI Assignments**

Day 15:

Complete the "The Girl Who Lived Forever" Quiz. Use the R.A.C.E. method to complete both constructed-response questions in the space beside the multiple choice questions.

10-15 minutes of reading

Name: _____ Date: _____

"The Girl Who Lived Forever" Quiz

Directions: Read "The Girl Who Lived Forever." Then answer the questions below.

1. Together, the sections "A Terrifying Regime" and "Invasion!"
 - Ⓐ describe the day the Franks went into hiding.
 - Ⓑ provide background information about why the Franks went into hiding.
 - Ⓒ list the effects of the Franks' going into hiding.
 - Ⓓ explain why Anne kept a diary.
2. On page 7, Lewis writes, "Hitler fanned the flames of these age-old prejudices. . . ." What does the idiom *fan the flames* mean?
 - Ⓐ to make something more intense
 - Ⓑ to make efforts to improve a difficult situation
 - Ⓒ to make a loss feel worse through insults
 - Ⓓ to burn something up until it's gone
3. According to the article, which of the following did the Nazis do?
 - Ⓐ They rewarded those who helped them and severely punished those who disobeyed them.
 - Ⓑ They told Germans that Jews were to blame for all of the country's problems.
 - Ⓒ They isolated Jews.
 - Ⓓ all of the above
4. In the sentence "Otto's business flourished" (p. 7), *flourished* most closely means
 - Ⓐ succeeded.
 - Ⓑ remained secret.
 - Ⓒ barely survived.
 - Ⓓ failed.
5. Why did the Franks decide to leave Germany?
 - Ⓐ They knew they'd be able to hide in Otto Frank's office in Amsterdam.
 - Ⓑ They liked Amsterdam's beautiful winding streets and canals.
 - Ⓒ Hitler ordered all of the Jewish people in Germany to leave.
 - Ⓓ Hitler had gained control of Germany, and it was no longer safe for Jews to live there.
6. Which best supports the idea that it was Anne's wish "to share her words with the world" (p. 10)?
 - Ⓐ "Her sole comfort was her diary, her most prized possession." (p. 8)
 - Ⓑ "She vowed to become a famous writer, with her first book to be based on her now overflowing diary." (p. 9)
 - Ⓒ "I can shake off everything if I write," Anne wrote in 1944." (p. 9)
 - Ⓓ "First published in 1947, *The Diary of a Young Girl* . . . is one of the most-read books in the world." (p. 10)

Constructed-Response Questions

Directions: Write your answers to the questions below on the back of this paper or type them up on a computer.

7. Explain what the Franks did to keep their hiding place in the annex a secret. Use text evidence to support your answer.
8. Near the end of the article, Lewis writes that Anne's diary has "given voice to those silenced by the Holocaust." What does Lewis mean?

7.

8.