

# 8th GRADE

NTI Packets: 26-30

8th Maroon & Gold

April 20th-24th

\* Student Name: \_\_\_\_\_

Teachers:

Mrs. Koch & Mrs. Lemons: Reading

Ms. Herrington & Mr. Persinger: Math

Mr. Case & Mr. McEwan: Social Studies

Ms. Hanrahan & Ms. Klausman: Science

Mrs. Thomas & Mrs. Doyle: Resource

Attached you will find work for each day 26-30. You will have a reading, math, social studies, science, and explore class assignment for EACH DAY! Therefore, take it day by day! Everything is broken down for you by subject and by days. So, read each subject's cover sheet to know exactly what assignment you need to do EACH NEW DAY. If you are confused or need help, please email any of your teachers, call the school (859-234-7123) or text/call Mrs. Lemons (859-298-4048) or Mr. Case (859-771-3945).

Have a great week, we miss you very much!

"The way I see it,  
if you want the  
rainbow, you  
gotta put up with  
the rain."

Parade

Always be positive.  
\*Trips down  
the stairs\*  
Whew, I got down  
those stairs fast.

*Cool Funny Quotes.com*

"WE EITHER MAKE  
OURSELVES  
MISERABLE OR WE  
MAKE OURSELVES  
STRONG. THE  
AMOUNT OF WORK  
IS THE SAME."

Failure is  
refusing to get  
up.

WHEN SOMEONE SAYS

YOU CAN'T DO IT.

DO IT TWICE,

AND TAKE PICTURES.

ELA : Reading NTI Packet days 26-30  
NONFICTION

\* Name \_\_\_\_\_

(Reading)  
\* Name \_\_\_\_\_

DAY 26	DAY 27	DAY 28	DAY 29	DAY 30
<p>ASSIGNMENT: Watch one televised daily news program either from local (Lexington-based) or national news such as CNN or FOX.</p> <p>While watching complete the attached sheet labeled " Daily News Connection".</p> <p>Alternate assignment: Read the article attached. If you choose to read the article you will answer the questions that go with the reading for today only. ** Only Days 26 and 29 offer an alternate assignment!</p>	<p>Assignment: Review text structures and complete the activities attached.</p> <p><u>5 types of text structures:</u> Description -describes a topic Cause and Effect - details an event/cause and tells the effects/issues Problem and solution- tells a problem and how to solve it or how it was solved sequence of events -timeline Compare and contrast- similarities and differences</p>	<p>Assignment: Read the article from scope Magazine and complete the attached assignments on text features and sequence of events.</p> <p>Text features help you find information in a text. Common types of text features: Maps, Timelines, Graphs, Charts, Bold Words, Italics, Key, Captions, Photos, Dictionary, Table of Contents, Titles, Subtitles, etc.</p>	<p>ASSIGNMENT: Watch one televised daily news program either from local (Lexington-based) or national news such as CNN or FOX.</p> <p>While watching complete the attached sheet labeled " Daily News Connection".</p> <p>Alternate assignment: Read the article attached. If you choose to read the article you will answer the questions that go with the reading for today only.</p>	<p>Assignment: Description Journaling</p> <p>Describe your experience at Harrison County Middle School/ 8th grade students : reflect on your 3 years at HCMS. Describe what you have loved, what you will miss, and what you look forward to in high school. Also, describe your favorite HCMS memory</p> <p>6th and 7th grade students: describe what you enjoy about HCMS and explain what future 6th grade students need to do in order to succeed at HCMS.</p>

# Daily News Connection

## Day 26

Name:

Directions: While watching the news program, answer the following questions. You must watch the programming for at least 30 minutes. \*Read these questions prior to viewing the program!!\*

1. Day and time of the news program you viewed:

2. What channel or internet site was this program on?

Focus on one story or segment of the news program. Then answer the following questions based on that part of the news.

3. What is happening and What do you think about it?

4. Where and when does this event happen?

5. Why is this information important?

6. How does this make you feel? And Why?



## Play it safe: What kids should know about the coronavirus outbreak

By Jason Bittel, Washington Post on 03.25.20

Word Count **977**

Level **MAX**



Image 1. Children draw a rainbow and the slogan of hope being shared in Italy, "Andrà tutto bene" (Everything will be alright), during quarantine measures amid the novel coronavirus COVID-19 pandemic on March 13, 2020, in Milan, Italy. Photo: Pietro D'Aprano/Getty Images

With schools closing across the nation in response to coronavirus concerns, many students may be jumping for joy. Others are worried, scared or confused. But as the American essayist Ralph Waldo Emerson wrote, "Knowledge is the antidote to fear."

With that in mind, let's answer a few common questions about coronavirus. Let's start with its name.

### **Everybody keeps talking about "coronavirus" and "covid-19." Which is it?**

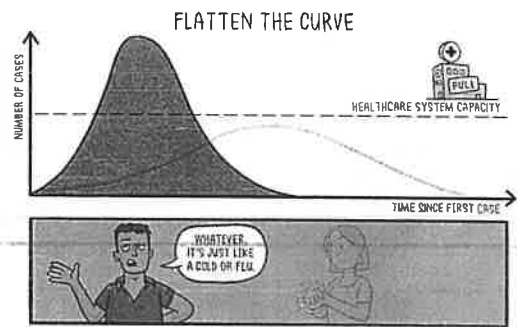
Technically, either of these terms could be correct, depending on how they are used. The actual virus that appeared in China at the end of 2019 and has since hopped across the world is called "SARS-CoV-2." This is short for "Severe Acute Respiratory Syndrome" and "coronavirus." Once the virus gets into a person, it can cause an illness known as "Coronavirus Disease 2019," or covid-19. Also, you might hear it referred to as a "novel coronavirus." This means that scientists already

knew about other coronaviruses, such as the one that caused an outbreak of SARS in Asia in 2003, but that this one is new.

### How does covid-19 affect people?

The most common symptoms of covid-19 include fever, cough and/or shortness of breath. A person might develop one or more of these symptoms in as few as two days after being exposed to the virus. But they may also not feel sick for up to two weeks after contact.

Scientists say most people who get the virus will be able to fight it as they might a bad case of the flu. However, some people will have a harder time than others. Elderly people seem to be especially vulnerable. So are those with other conditions such as heart disease, lung disease or diabetes. Some people who have the virus won't even realize it but in the worst cases, covid-19 can result in death. Fortunately, death is extremely unlikely to happen in infected children and teenagers.



### Can pets get covid-19?

So far, one dog in Hong Kong has tested positive for the coronavirus. However, it isn't showing any symptoms. So it's unclear whether the virus can have a negative effect on pets. According to the World Health Organization, there is no evidence yet that dog owners can catch the virus from their pets. Of course, if you keep your animals inside and avoid walking them in public places, they will be even more unlikely to come into contact with the virus.

### Why are schools, stores and restaurants closing?

Because SARS-CoV-2 is new, our immune systems haven't had a chance to learn how to fight it off. This allows the virus to move around quickly, infecting many new people for each group it comes into contact with. This makes schools, stores, restaurants and other public gatherings the perfect places for the virus to spread.

The biggest concern now is that if enough people get sick at the same time, hospitals might not be able to keep up with the demand for treatment. This concern comes from what happened in Italy. This is a problem for those who need treatment because of covid-19. This is also a problem for anyone else who might need medical services for everything from a twisted ankle or a cut requiring stitches to more serious conditions.

### Can this coronavirus be stopped?

There are many scientists around the world working to develop a vaccine. This could be used to halt the spread of this coronavirus for good. However, it will take time to develop that vaccine. There are measures communities and families can adopt in the meantime to help slow the virus' spread.

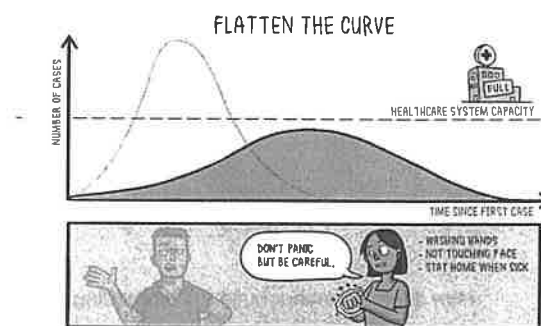
### Why do we have to wash our hands so often?

First, washing your hands after going to the restroom or before handling food is a great practice in general. It can help you avoid catching all sorts of nasty illnesses. But hand-washing has become even more important as this coronavirus spreads. This is the easiest way to ensure you're washing your hands well enough: Use warm or cold water and soap and keep scrubbing every inch of your fingers, thumbs, palms and wrists. Scrub for the time it takes to sing "Happy Birthday to You" twice. The Centers for Disease Control and Prevention (CDC) has more tips at [cdc.gov/handwashing](https://www.cdc.gov/handwashing). (Also, remember to cover your cough with a tissue or at least your inner elbow.)

### What is "social distancing"?

Your parents might not want you to play basketball with your neighbors. Or they might not want you to go to a party that was scheduled for next weekend. This is because of something called "social distancing." And while it seems like a bummer, experts say it's another way everyone can work together to limit the impact of this coronavirus.

The idea behind social distancing is simple. The fewer people we have close contact with each day, the fewer opportunities the virus has to spread. (The CDC says "close" is six feet or less.) And that means not only will you and your family have better chances of avoiding covid-19, but so will your grandparents, your Scout group and the person you sit next to in a bus. Any of these people might be at a higher risk to have a more serious reaction from the virus.



### How long will this last?

Unfortunately, no one can answer that question yet. The CDC recommends that large events be canceled or postponed for at least the next eight weeks. Your parents, teachers and KidsPost will be coming up with creative ways to pass the time.

## Quiz

- 1 Which sentence from the article shows hospitals' MAIN problem?
- (A) Some people who have the virus won't even realize it but in the worst cases, covid-19 can result in death.
  - (B) This makes schools, stores, restaurants and other public gatherings the perfect places for the virus to spread.
  - (C) The biggest concern now is that if enough people get sick at the same time, hospitals might not be able to keep up with the demand for treatment.
  - (D) And that means not only will you and your family have better chances of avoiding covid-19, but so will your grandparents, your Scout group and the person you sit next to in a bus.

- 2 Read the conclusion below.

*Social distancing might be the key to stopping the coronavirus.*

Which sentence from the article provides the BEST support to the statement above?

- (A) Your parents might not want you to play basketball with your neighbors.
  - (B) And while it seems like a bummer, experts say it is another way everyone can work together to limit the impact of this coronavirus.
  - (C) The fewer people we have close contact with each day, the fewer opportunities the virus has to spread.
  - (D) Any of these people might be at a higher risk to have a more serious reaction from the virus.
- 3 How does the author build understanding of the coronavirus pandemic?
- (A) by discussing the difference between "coronavirus" and "covid-19"
  - (B) by listing the symptoms of covid-19 and noting how long it might take to develop them
  - (C) by providing a timeline of the coronavirus pandemic
  - (D) by listing and answering common questions about the coronavirus

- 4 Read the following selection introducing the effect of the coronavirus on pets.

*According to the World Health Organization, there is no evidence yet that dog owners can catch the virus from their pets. Of course, if you keep your animals inside and avoid walking them in public places, they will be even more unlikely to come into contact with the virus.*

What does the author MOST LIKELY want the reader to think about the effect of the coronavirus on pets based on this selection?

- (A) Though it is not likely that pets can spread the virus, pet owners should still take precautions.
- (B) Pet owners should practice social distancing with their pets, as animals are the main carriers of the virus.
- (C) Even though there is no evidence showing dog owners can catch the virus from their pets, it is very likely.
- (D) When social distancing, people should avoid both people and animals.

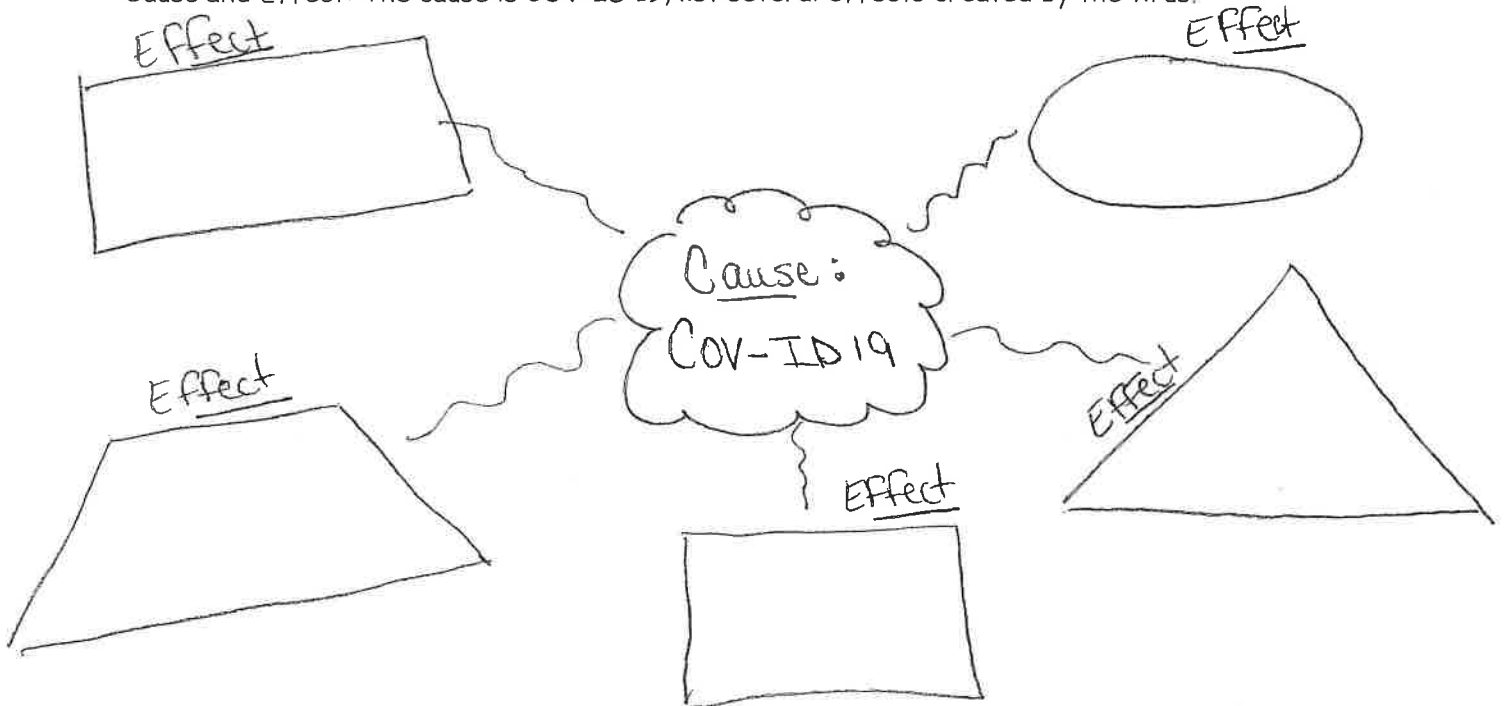


# Text Structures

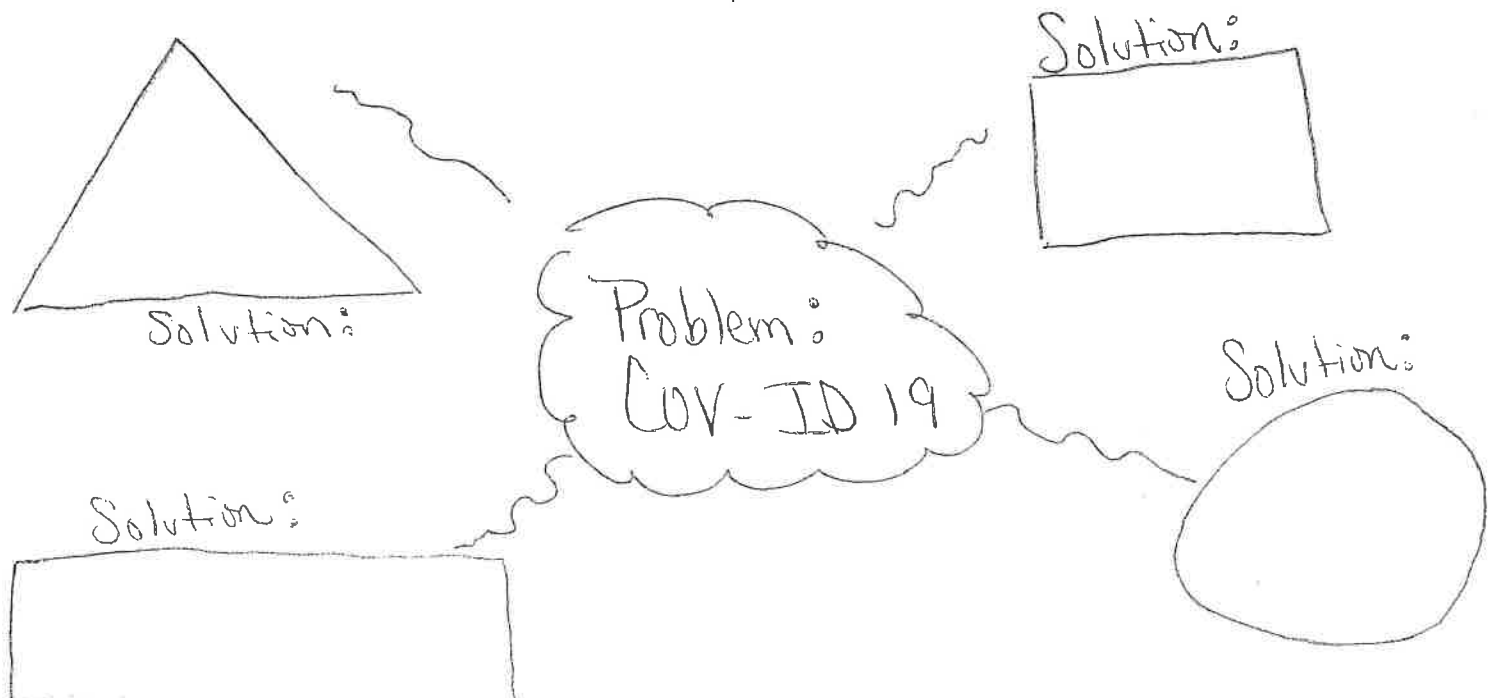
## Day 27

Today we will focus on Cause and Effect and Problem and Solution text structures focusing on COV-ID 19. Using your knowledge and understanding of the virus complete the following activities. Another text structure that can be used is Question and Answer. While completing today's lesson, you can ask the family members in your home or call others to help you complete these activities by asking questions and using their answers to help.

Cause and Effect: The cause is COV-ID 19, list several effects created by the virus.



Problem and Solution: The problem is COV-ID 19, list ways that local, state, and national leaders have tried to solve the problem.



## Text Structures

### Day 28

Text Features and Sequence of Events:

Read the passage "The History of the Trampoline" and complete the following:

1. List 4 text features used in the passage.
2. Sequence of Events: List 4 major events involving the history of the trampoline. Be sure to list them in order of occurrence (1st, 2nd, etc)
3. ENRICHMENT ASSIGNMENT -\*\*OPTIONAL\*\* Complete the "You Be the Editor" activity at the top of page 30.

# You Be the Editor

Day 28

We love this story, but we need your help to edit it.

**Directions:**

- 1. Read the article.
- 2. Note the words in bold.
- 3. Follow the prompts in the circles to revise and polish the writing.



## The History of the

# TRAMPOLINE

It all began with a whimsical idea: **Bouncing** could be a lot of fun.

Trampoline inventor George Nissen (above) rented a kangaroo to bounce with him in New York City's Central Park. Today this would be considered cruel, but back then, animals were often used for entertainment.

**I**t was 1930, and 16-year-old George Nissen was at the circus, watching a trapeze show. But Nissen wasn't watching the performers flipping and twisting high up in the air. His eyes were glued to the safety net stretched below them. At the end of each routine, the trapeze artists would let themselves fall into the net, which caught them like a springy mitt and **1 sent them back up into the air.**

*Now that looks fun,* Nissen thought.

In that instant, the idea for the trampoline was born.

**1**  
Revise this phrase to be more descriptive and fun.

**2**  
These lines all have the same rhythm. Give this paragraph some zing by mixing up the sentence structures.

### A POPULAR PASTIME

**2** Nissen went home and began to work on a new invention. His gymnastics coach helped him. Nissen took a sheet of canvas. He stretched it across a frame made of steel. He called the contraption "the bouncing rig." He came up with a far better name a few years later. The name was trampoline. The name comes from the Spanish word for diving board.

Over the next few years, Nissen worked hard to improve his creation. He gave demonstrations all over the world to promote his trampoline. In 1941, he started a company that produced and sold trampolines—and he made millions of dollars.

Soon, trampolines were popping up all over America. **3** They were appearing in backyards. They were appearing at public "jump centers." They were appearing at some gas stations, where road-weary kids could bounce while their parents filled the gas tank. The U.S. military even used trampolines to train pilots and parachutists.

### A DANGEROUS THRILL

There was no denying the thrill of jumping on a trampoline. But there was—and still is—a major problem: Trampolines are dangerous. Every year, thousands of bouncers are injured, some seriously. According to a 2014 study by the *Journal of Pediatric Orthopaedics*, trampoline-related injuries sent more than 1 million people to emergency rooms between 2002 and 2011—most of them children under age 16.

In 1989, the company Nissen started went out of business because it could not afford the lawsuits from people who were getting hurt on trampolines.

But Nissen never lost his passion for his invention. He continued trampolining until his death at age 96, and he lived to see one of his dreams come true: In 2000, trampolining became an Olympic sport.

**4** So the next time you leap on a trampoline, be careful. And be sure to thank George Nissen for the **5** thrill of flying through the air. ●

**3**  
Combine these three sentences into one.

**4**  
Research trampoline safety and add some tips after this sentence.

**5**  
The author already used this word. Replace it with another.

### Editing Contest

Send your revised article to **Trampoline Contest**. Three winners will each get a \$25 Visa gift card and have their entries published online. See page 2 for details.

Go to **Scope Online** for a great activity.



# Daily News Connection

## Day 29

Name:

Directions: While watching the news program, answer the following questions. You must watch the programming for at least 35 minutes. \*Read these questions prior to viewing the program!!\*

8. Day and time of the news program you viewed:
9. What channel or internet site was this program on?
10. What events or situations have changed since you watched the news on Day 26?

Focus on one story or segment of the news program. Then answer the following questions based on that part of the news.

11. What is happening and What do you think about it?
12. Where and when does this event happen?
13. How do you feel about the news you watched today? And Why?

# A CREEPY

**4**  
**Is This Burger Bad for the Planet?**  
 In the News

**8**  
**Day of Disaster**  
 Nonfiction Feature

**14**  
**"I Was Adopted"**  
 True Teen Story

**18**  
**Is This Ghost Town Cursed?**  
 Weird But True

**20**  
**Sherlock Holmes and the Midnight Killer**  
 Readers Theater Play

**26**  
**Superman Becomes a Star/Superheroes Take Over the World**  
 Paired Texts

**30**  
**Does Lulu Need a Phone?**  
 Debate

**32**  
**Is This Your Future Home?**  
 Infographic

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Lauren Esposito travels the world studying scorpions and spiders. Here's what she wants you to know about these misunderstood creatures. BY ANNA STARECHESKI



**I**f you were to see the animals on this page in real life, what would you do? Most people might run screaming. But not Lauren Esposito. She's a biologist—a scientist who studies living things. And her specialty is arachnids, like spiders and scorpions.

Lauren spends about half her time traveling the world looking for these creatures. Then she comes back home to write about what she found. We talked to her about working with some of the most feared animals on Earth.

**Have you always loved arachnids?**

Not exactly. But I would look

for bugs and worms in my garden as a kid. So I've always been drawn to creepy-crawly creatures.

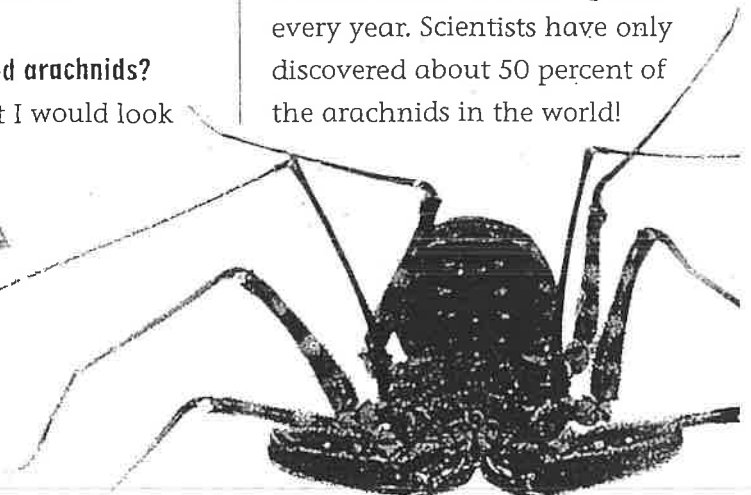
**Why is it important to study arachnids?**

They've been around since before the dinosaurs! They can teach us about how animals survive through time as Earth changes around them.

**What's something that people might find surprising about your job?**

We are finding new species—or types—of arachnids all the time. I collect about 100 new species every year. Scientists have only discovered about 50 percent of the arachnids in the world!

Lauren's favorite arachnid is the whip spider. They've been known to eat lizards and hummingbirds!



# Day 29: Alternate Assignment Continued

ONLINE EXTRA Go scorpion-hunting with Lauren in our video.

## CAREER



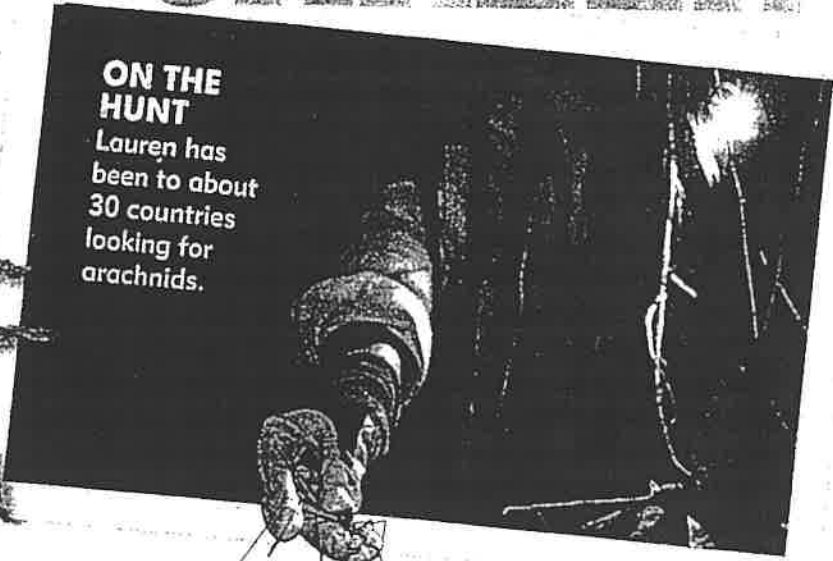
### What is an arachnid?

- No backbone
- Two body sections
- Eight legs
- No wings



### ON THE HUNT

Lauren has been to about 30 countries looking for arachnids.



### What traits does a good biologist need?

You need to be curious and observant—always noticing what’s around you. And you have to be fascinated by nature!

### A lot of people are afraid of arachnids. Why is that?

Well, the way they move is very alien to us. We’re not used to seeing things

walk around on the ceiling with eight legs! Plus, there are *some* arachnids that are venomous—that means they have a poisonous bite or sting. So people think *all* arachnids can hurt them.

### What do you say to those people?

Fewer than 1 percent of all arachnids are dangerous

to humans. Most spiders can’t even bite people—their fangs are too small to get through human skin.

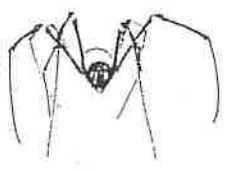
### Have you ever been bitten or stung?

I was once stung by a scorpion. It felt like getting pricked by a thumbtack. I was totally fine! •



## Mini Skills Worksheet

WHAT TO DO: Write your answers on the lines below.



1. How arachnids move is *alien* to us. What’s another word Lauren could have used? Write it here.

---

2. What are three traits a biologist needs?

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3. Find a sentence where Lauren explains what we can learn from arachnids. Write it here.

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# HCMS Journal

## Day 30

### **Complete your journal activity below.**

**8th grade students** : reflect on your 3 years at HCMS. Describe what you have loved, what you will miss, and your favorite HCMS memory. Write a 3.8 paragraph to describe your HCMS journey.

**6th and 7th grade students:** describe what you enjoy about HCMS and explain what future 6th grade students need to do in order to succeed at HCMS.



A Name:

## NTI Days 26 - 30 Math Assignments

Topic: General Review

Day 26: Analyzing Linear Functions (from an equation)

Day 27: Analyzing Linear Functions (from a graph)

Day 28: Pythagorean Theorem (finding missing side lengths)

Day 29: Geometric Transformations

Day 30: Comparing Linear Functions

A Name

Comments:

*All of these assignments were chosen based off of content that has already been covered in class this year. Notes have been included to help refresh your memory. Please show work where directed.*

If you have any questions, you can contact Ms. Herrington four different ways:

1. Message on Remind101 (Send @hbc3c8 to 81010 to join)
2. Text: (859) 749-6499
3. Email: [melody.herrington@harrison.kyschools.us](mailto:melody.herrington@harrison.kyschools.us)
4. Join Ms. Herrington on Zoom at 1:00 pm on Monday and Wednesday. This will be a joint meeting with Ms. Hanrahan. Make sure to join my Remind group so I can send you the meeting password for each session.

Use Personal Meeting ID: 582 581 2645

Mr. Persinger can be contacted two different ways:

1. Email: [Rodney.persinger@harrison.kyschools.us](mailto:Rodney.persinger@harrison.kyschools.us)
2. Phone: (859) 234-7123 (leave message with front desk)

Scratch paper

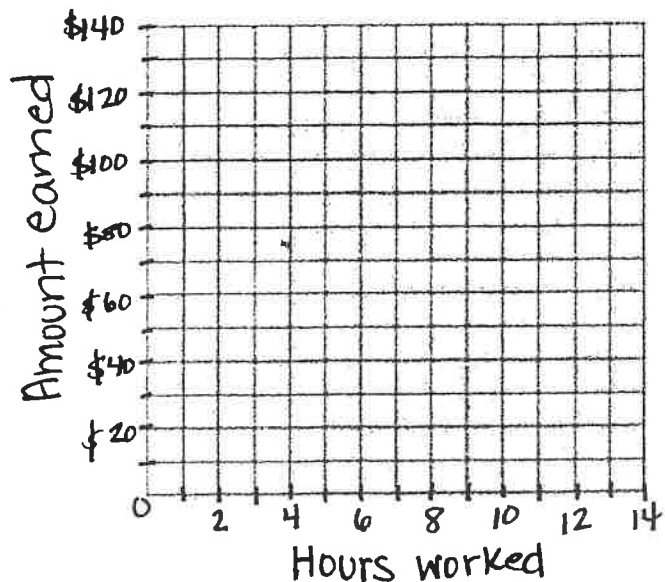
# Day 26

In the equation  $y = 9.50x$ ,  $y$  is the pay Mike gets for  $x$  hours of work.

1. What is Mike's rate of pay?
2. This week he has worked 17 hours. How much will he get paid? Show your work using the equation.

3. Graph the equation.
  - o title your graph
  - ✓ use appropriate scales
  - ✓ label the axes

Hint: Create a table to help

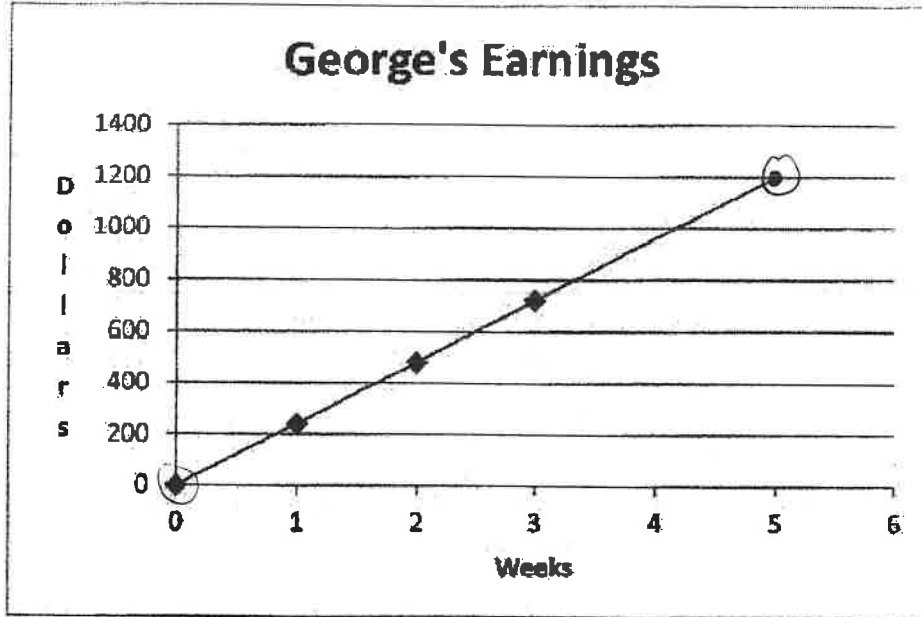


3. After a month, Mike's pay rate increased to \$11 per hour. Graph the new situation on the same graph.
5. How are the graphs of the lines similar? How are they different?
6. How can you tell from the graphs of the lines which one has a higher rate of pay?
7. Write an equation in slope-intercept form to model the situation where Mike gets paid \$11 per hour.

$$(y = mx + b)$$

# Day 27

The graph below represents the amount of money George earns.



a. What is the y-intercept?

a. Interpret the y-intercept.

b. What is the rate of change?  $\left(\frac{\text{rise}}{\text{run}}\right)$  Hint: easiest to use the two end points

c. Interpret the rate of change.

d. Create a table model using the data from the graph.

e. What is the independent variable? (x)

f. What is the dependent variable? (y)

g. Write an equation model of the data. ( $y = mx + b$ )

$m =$  rate of change  
 $b =$  y-intercept

h. If George had been offered \$20 to start his job what would the equation be?

Day 28

# \* Notes \*

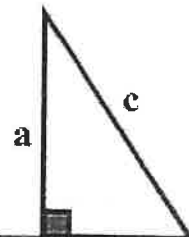
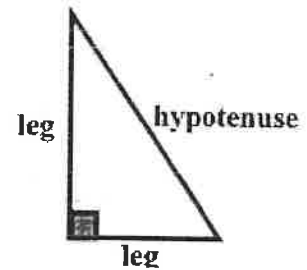
## Pythagorean Theorem

Pythagoras was a Greek philosopher and mathematician, born in Samos in the sixth century B.C. He and his followers tried to explain everything with numbers. One of Pythagoras's most popular ideas is known as The Pythagorean Theorem.

### Things you need to know:

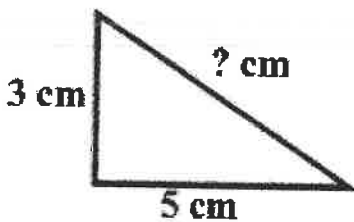
1. Right triangles have 2 legs and a hypotenuse.
  - The legs are the short side.
  - The hypotenuse is the long side that is opposite the right angle.
  
2. What is the Pythagorean Theorem
  - The Pythagorean Theorem says that the sum of the legs squares of a RIGHT triangle equal the square of the hypotenuse.  

$$a^2 + b^2 = c^2$$
  
3. You can find the missing parts of a right triangle.



### Examples

A. Find the hypotenuse.



$$a^2 + b^2 = c^2$$

$$3^2 + 5^2 = c^2$$

$$9 + 25 = c^2$$

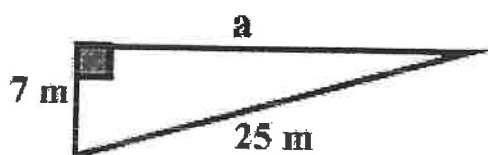
$$36 = c^2$$

$$\sqrt{36} = \sqrt{c^2}$$

$$c = 6 \text{ cm}$$

1. Write formula.
2. Show substitutions.
3. Solve.
4. Find the square root of  $c^2$ .
5. The hypotenuse equals 6 cm.

B. Find the missing side.



$$a^2 + b^2 = c^2$$

$$a^2 + 7^2 = 25^2$$

$$a^2 + 49 = 625$$

$$\begin{array}{r} -49 \\ -49 \end{array}$$

$$a^2 = 576$$

$$\sqrt{a^2} = \sqrt{576}$$

$$a = 24 \text{ m}$$

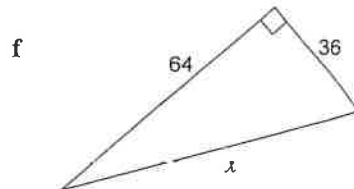
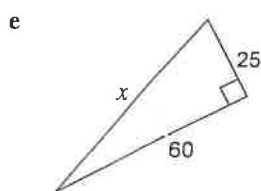
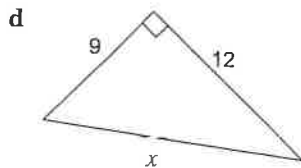
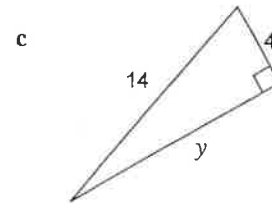
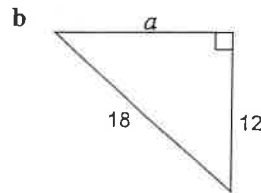
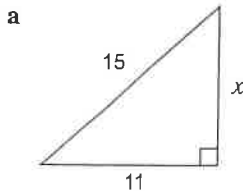
1. Write formula.
2. Look closely & then show substitutions.
3. Solve.
4. Subtract 49 from each side.
5. Find the square root of  $a^2$ .
6. The missing side is 24 m.

# Pythagoras' theorem <sup>\*</sup> Drawings on next page

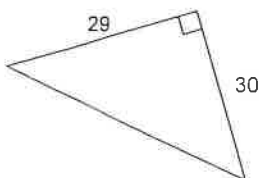
## Topic 8: Problem solving and Pythagoras' theorem

for #s 1-7

- Find the length of the diagonal of a square of side length 5 cm. \_\_\_\_\_
- Find the length of the diagonal of a rectangle of length 35 cm and width 12 cm.  
\_\_\_\_\_
- What is the altitude of an equilateral triangle whose sides are each 16 cm long?  
Give your answer correct to two decimal places. \_\_\_\_\_
- A 15 metre ladder rests against a wall and its foot is 4 metres away from the base of the wall. How high does it reach up the wall? Give your answer correct to two decimal places.  
\_\_\_\_\_
- The sides of a rectangle are 12 cm and 6 cm. Find the length of the diagonal.  
Give your answer correct to one decimal place.  
\_\_\_\_\_
- The hypotenuse of a right angled triangle is 30 cm. If one of the shorter sides is 18 cm, find the length of the other side.  
\_\_\_\_\_
- In a right angled triangle, the longest side is 39 cm and the shortest side is 15 cm. Find the length of the third side.  
\_\_\_\_\_
- Find the length of the unknown side in each of the following triangles, correct to two decimal places. (All measurements are in centimetres.)



- Find the <sup>\*</sup> perimeter of the triangle below (correct to one decimal place) by finding the hypotenuse first.



\_\_\_\_\_

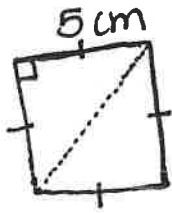
\_\_\_\_\_

\_\_\_\_\_

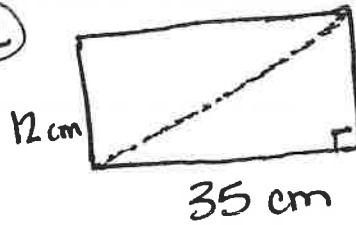
<sup>\*</sup> distance around the figure  
(add all side lengths)

Figures not drawn to scale.

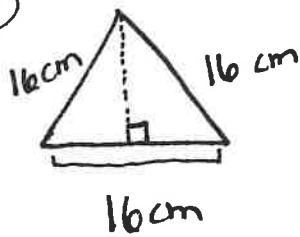
①



②

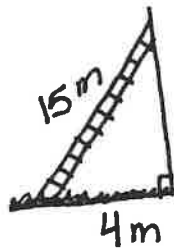


③

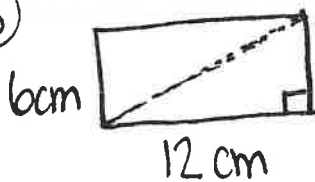


Find the length of the dotted line.

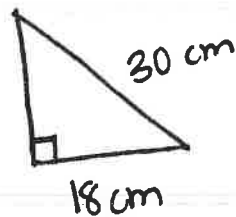
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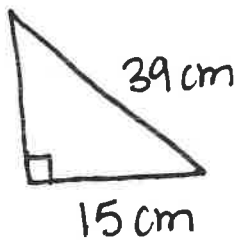
⑤



⑥



⑦





Day 29

# TRANSFORMATIONS CHEAT-SHEET!

## REFLECTIONS:

- ✓ Reflections are a flip.
- ✓ The flip is performed over the "line of reflection." Lines of symmetry are examples of lines of reflection.

### Coordinate plane rules:

Over the x-axis:  $(x, y) \rightarrow (x, -y)$

Over the y-axis:  $(x, y) \rightarrow (-x, y)$

## TRANSLATIONS:

- ✓ Translations are a slide or shift

	add	subtract
X	right	left
Y	up	down

Ex:  $(x+3, y-7)$

would move a figure to the right 3 units and down 7.

$A(2, -3) \rightarrow A'(5, -10)$

## DILATIONS:

- ✓ Dilations are an enlargement / shrinking.
- ✓ Dilations multiply the distance from the point of projection (point of dilation) by the scale factor.

### Coordinate plane rules:

From the origin dilated by a factor of "c":  $(x, y) \rightarrow (cx, cy)$

\* Multiply by scale factor

Scale factor of 0.5

$A(6, -2) \rightarrow A'(3, -1)$

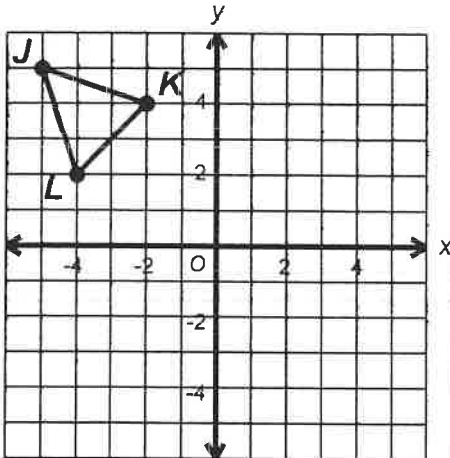
## ROTATIONS:

- ✓ Rotations are a turn.

### Coordinate plane rules:

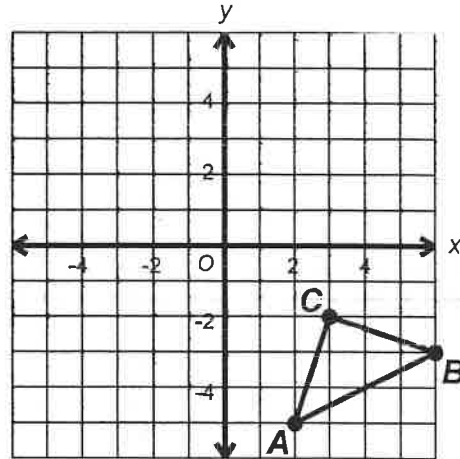
Counter-clockwise:	Clockwise:	Rule:
$90^\circ$	$270^\circ$	$(x, y) \rightarrow (-y, x)$
$180^\circ$	$180^\circ$	$(x, y) \rightarrow (-x, -y)$
$270^\circ$	$90^\circ$	$(x, y) \rightarrow (y, -x)$

Find the coordinates of  $J'$ ,  $K'$ , and  $L'$  after a reflection over the  $x$ -axis.



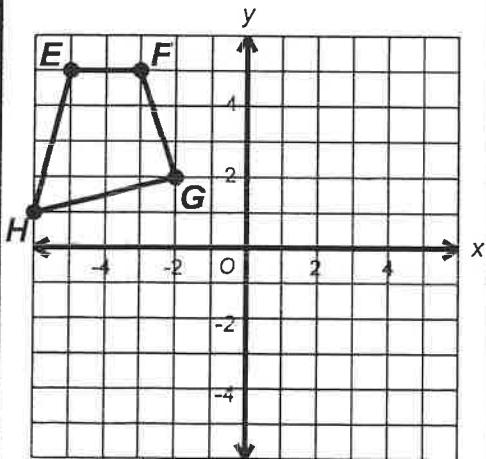
1

Find the coordinates of  $A'$ ,  $B'$ , and  $C'$  after a reflection over the  $y$ -axis.



2

$EFGH$  is transformed by the rule  $(x, y) \rightarrow (x + 2, y - 3)$ . Find the coordinates of  $E'$ ,  $F'$ ,  $G'$ , and  $H'$ .

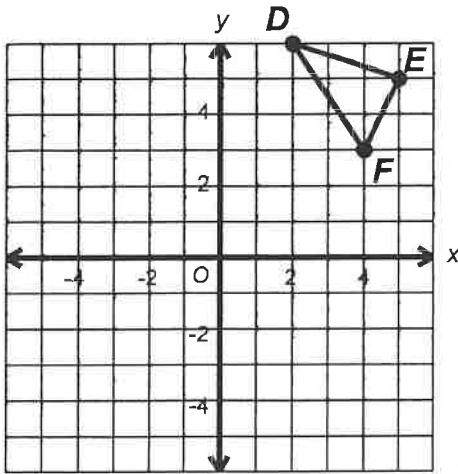


3

$V(-4, 6)$  is transformed by the rule  $(x, y) \rightarrow (x - 3, y + 5)$ , then reflected over the  $x$ -axis. Find the coordinates of  $V'$  and  $V''$ .

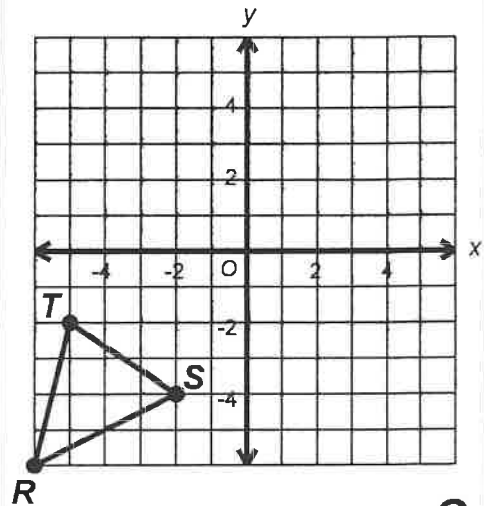
4

$\triangle DEF$  is rotated  $90^\circ$  about the origin. Find the coordinates of  $D'$ ,  $E'$ , and  $F'$ .



5

$\triangle RST$  is rotated  $180^\circ$  about the origin. Find the coordinates of  $R'$ ,  $S'$ , and  $T'$ .



6

$ABCD$  is transformed by the rule  $(x, y) \rightarrow (x - 3, y + 5)$ . Use the coordinates of  $A(-2, 4)$ ,  $B(0, 3)$ ,  $C(2, 2)$ , and  $D(4, -4)$  to find the coordinates of  $A'$ ,  $B'$ ,  $C'$ , and  $D'$ .

7

$E(-4, 6)$  is reflected over the  $x$ -axis and then rotated  $90^\circ$  clockwise about the origin. Find the coordinates of  $E'$  and  $E''$ .

8

Day 30

## Growth Rates

### Comparing Rate of Change in Non-Proportional Relationships

- 1) Students at Stony Brook Middle School grew plants in science class in order to observe the effects of sunlight on growth rates. Each group brought in seeds or a seedling. They cared for the plants over the course of six weeks. The results of 4 groups have been organized here:

<table border="1" style="margin: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">Group A's Plant Growth</th> </tr> <tr> <th>Time (weeks)</th> <th>Height (cm)</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>5</td> </tr> <tr> <td>4</td> <td>10</td> </tr> <tr> <td>6</td> <td>15</td> </tr> </tbody> </table>	Group A's Plant Growth		Time (weeks)	Height (cm)	2	5	4	10	6	15	<p>Group B described their plant's growth:</p> <p><i>We started with a seedling that was already 4 cm tall. Each day we watered the plant and checked on its progress. We noticed that the growth followed a linear pattern. After 3 weeks the plant was 10 cm tall. At the end of the 6 weeks the plant was about 16 cm tall.</i></p>
Group A's Plant Growth											
Time (weeks)	Height (cm)										
2	5										
4	10										
6	15										
	<p>Group D determined that their plant's growth could be modeled by the function</p> $y = 0.5x$ <p>where <math>x</math> = time (weeks) and <math>y</math> = height (cm)</p>										

- a) Show or explain how to find the rate of change for each group. (How much is each plant growing per week?)

Group A:

Group B:

Group C:

Group D:

- b) Which group had the plant with the greatest rate of change? Explain what this means in the context of the experiment.

- c) Based on the data, do you think that any of the groups had a plant without sunlight? Defend your answer.
- d) If a group ended up with a rate of change of zero, what would that mean in the context of the experiment?
- e) Could a group end up with a negative rate of change? Explain why or why not.



\*Name \_\_\_\_\_

## 8th Grade Days 26-30 Social Studies NTI Assignments

**This week will cover the Civil War and Reconstruction**

If you have any questions please contact

Mr. Case: [james.case@harrison.kyschools.us](mailto:james.case@harrison.kyschools.us) or by phone at 859-771-3945

Mr. McEwan [john.mcewan@harrison.kyschools.us](mailto:john.mcewan@harrison.kyschools.us) or by phone at 859-338-8438

Day 26: **Abraham Lincoln Crossword Puzzle**. Read the background information to help you solve the puzzle.

Day 27: Read "A Few Appropriate Remarks" and answer **Reading Check Questions 1-5**

Day 28: **Reconstruction Crossword Puzzle**. Read the background information to help you solve the puzzle.

Day 29-30: Reconstruction Reading "Events, Accounts, and Laws that Occured After the Civil War." Refer to the sources to answer the 2 Questions.

1. Describe 2 examples of how former slaves **gained new freedoms** at the end of the Civil War.
2. Describe 2 examples of how former slaves were **denied freedoms** at the end of the Civil War.

\*Name \_\_\_\_\_

\*





# ABRAHAM LINCOLN

Abraham Lincoln was born in 1809 in a Kentucky log cabin, then moved with his family to farms on the frontier in Indiana and in Illinois. He educated himself by reading, and in 1834, he became a legislator, helping make laws for the state of Illinois. In 1836, he became a lawyer. Lincoln married a Kentucky woman, Mary Todd, and in time they had four sons. Lincoln became nationally famous when he ran for U.S. Senate against Stephen Douglas. In a series of public arguments called the Lincoln-Douglas Debates, Lincoln declared the nation could not last “half slave and half free.”

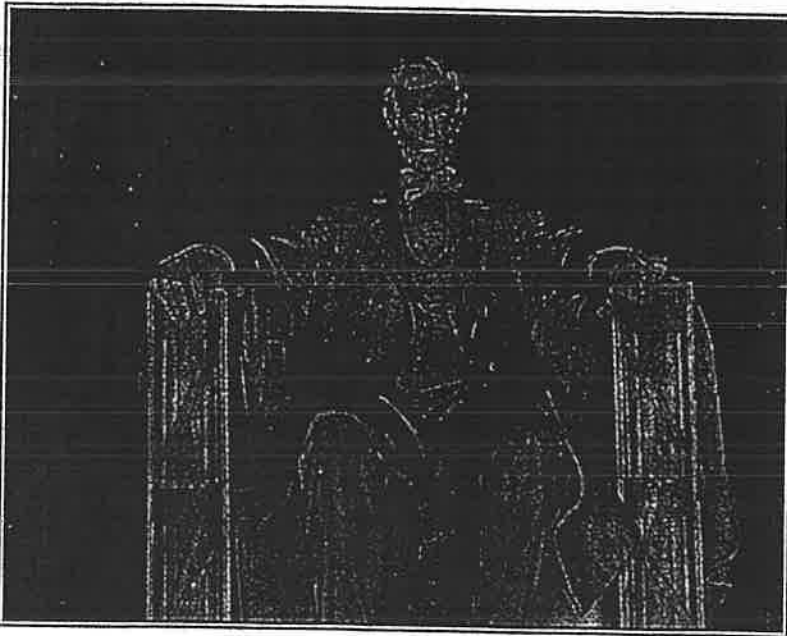
The Republican Party made Lincoln their candidate for president in 1860. He won, and only a month after his election, the rebel Confederate states were at war with the United States. On January 1, 1863, he freed the slaves in the rebelling states with the Emancipation Proclamation. His aim was to discourage the South with the proclamation. Lincoln always said he was personally against slavery, but he thought the union of the states was the most important issue. Midway through the war, Lincoln spoke at a battlefield near Gettysburg, Pennsylvania. He asked Americans to stick to the ideals of freedom and equality for which many men had died.

When he was reelected as president toward the end of the war, Lincoln promised that the government would act “with malice [meanness] toward none, with charity [kindness, generosity] for all.” However, Lincoln was shot while he sat in a theater shortly after the end of the war by John Wilkes Booth, a man still angry about the South’s loss. The assassin’s bullet did not stop the ideals Lincoln worked for: freedom, equality, and national unity.

## Across

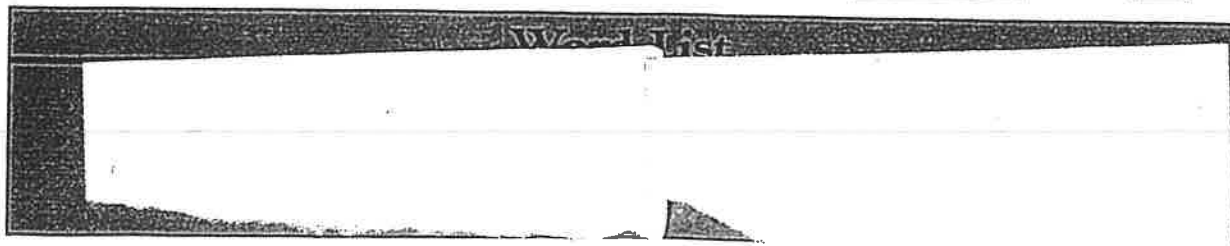
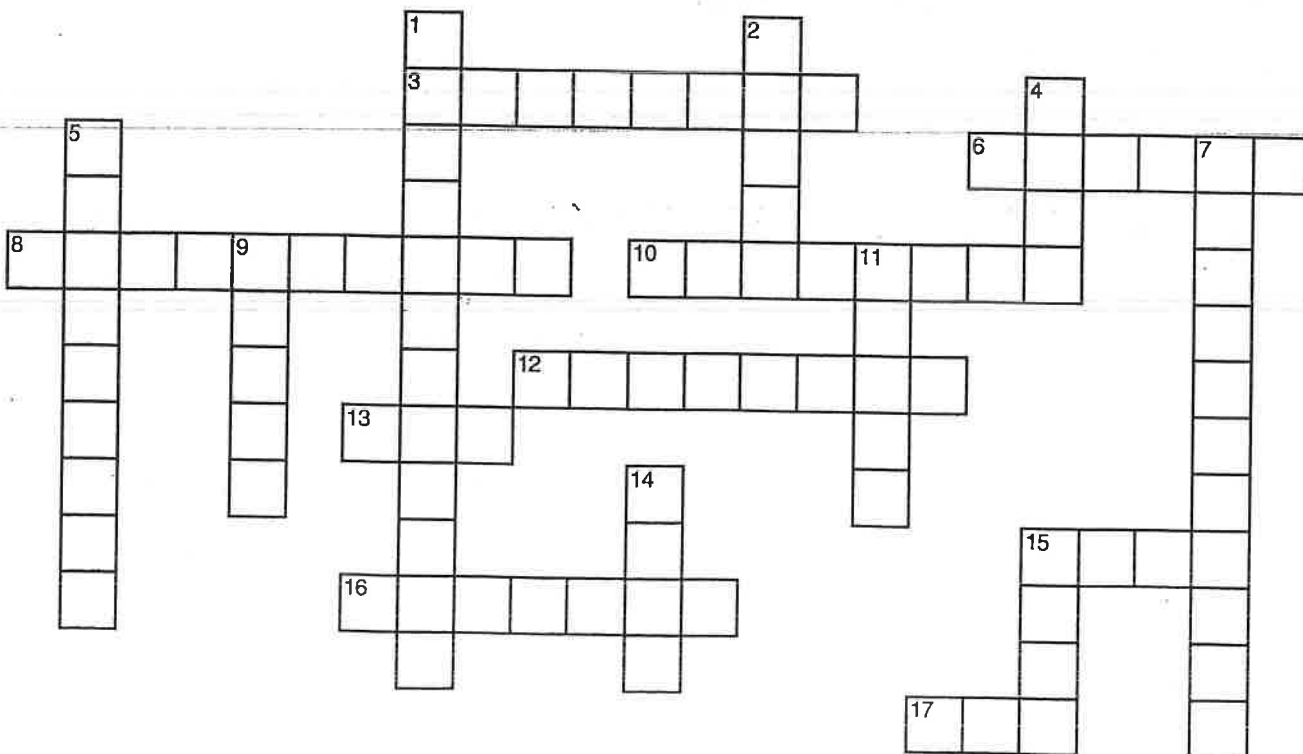
3. Lincoln’s statue in Washington, D.C., is called the Lincoln \_\_\_\_\_.
6. Lincoln sought to heal the nation “with \_\_\_\_\_ toward none.”
8. Lincoln’s political party
10. State where Lincoln was born
12. State where Lincoln first was elected to public office
13. Lincoln was president during the Civil \_\_\_\_.
15. Number of sons Lincoln had
16. Last name of person who debated with Lincoln in a Senate campaign
17. Lincoln’s nickname

Down



The Lincoln Memorial in Washington, D.C.

1. Term for freeing slaves; used in name of Lincoln's famous proclamation
2. Kind of building in which Lincoln was born
4. First name of Lincoln's wife
5. Lincoln was one of the greatest in this office.
7. Rebellng states called themselves \_\_\_\_\_ states.
9. Last name of the assassin who shot Lincoln
11. National \_\_\_\_\_ was one of Lincoln's greatest goals.
14. Lincoln did this to educate himself.
15. Lincoln said no nation could long exist "half slave and half \_\_\_\_\_."



MAGAZINE ARTICLE

HISTORY

SPEECH

The Gettysburg Address took only about two minutes to deliver and is a mere 271 words long. What makes it one of history's greatest speeches?

## “A Few Appropriate Remarks”

from *Highlights for Children*

by NANCY NORTON MATTILA

**dedication** (ded'i-kā'shən): setting apart for a special reason.

**proclaimed** (prō-klāmd'): stated or declared publicly.

**appropriate** (ə-prō'prē-it): suitable for a particular purpose.

### You Need to Know...

Abraham Lincoln's Gettysburg Address was given several months after the famous Battle of Gettysburg. This battle, fought from July 1 through July 3, 1863, marked the turning point in the war. Before Gettysburg, the Union had seemed to be losing and the death toll had been steadily mounting. In addition, the president had had a difficult time finding good generals to lead the Union troops. Even so, when the Union and Confederate armies met accidentally in Gettysburg, Pennsylvania, Union general George G. Meade managed to lead his troops to victory, pushing Robert E. Lee's Southern army back into Virginia. The cost was high for both sides. Over 7,000 lives were lost, and the total number of casualties—those killed, wounded, or captured—was over 50,000.

At the time, Lincoln's address hardly measured up to the spectacle of the battle. Today, however, the speech continues to remind Americans of the ideals for which the Civil War was fought—freedom, equality, and democracy.

Probably only a few of the fifteen thousand people who heard President Abraham Lincoln's speech at Gettysburg were impressed. He spoke so briefly that the photographer didn't even have time to take his picture.

President Lincoln was not the featured speaker for the dedication of the Soldiers' National Cemetery on

November 19, 1863, a little more than four months after the Battle of Gettysburg. Yet history has proclaimed his Gettysburg Address one of the greatest speeches ever made.

Two weeks before the ceremonies, Lincoln received a letter from Gettysburg attorney David Wills. "... I am authorized by the Governors of the different States to invite you to be present. . . . It is the desire that after the Oration, you . . . formally set apart these grounds to their sacred use by a few appropriate remarks."

Lincoln almost didn't attend the ceremonies. He had refused other invitations because of wartime business in Washington, D.C. Also, doctors were worried about the health of his son Tad, and Mrs. Lincoln did not want her husband to go.

But President Lincoln saw this as a chance to say something important about the meaning of the Civil War. Could he convince people to continue to fight in hopes of a Union victory that would bring national unity and freedom? In his mind and on paper Lincoln practiced ways to express his reverence for the sacrifices of all who had suffered at the Battle of Gettysburg.

Lincoln did not scribble his Gettysburg Address on the back of an envelope during the trip north to Pennsylvania, as many say. The Address was partly finished when Lincoln climbed aboard the special train full of Washington dignitaries<sup>1</sup> on Wednesday, November 18. He had hoped to do more work on the speech, but the train was too full of excitement and conversation to do so.

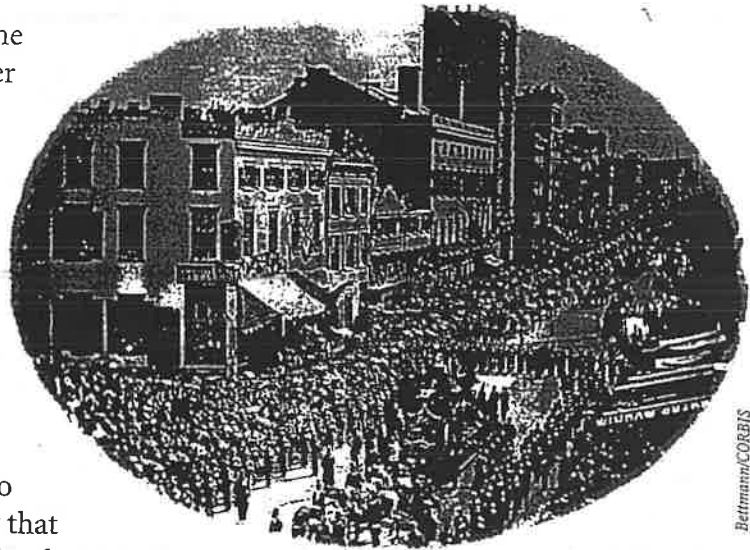
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**President Lincoln saw this as a chance  
to say something important about  
the meaning of the Civil War.**

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The presidential party arrived just after dark and made its way to the Wills house through crowded streets noisy with band music. An elegant dinner was given for the honored guests. There Lincoln met the featured speaker, Edward Everett, a widely known statesman<sup>2</sup> and orator. After

1. **dignitaries** (dig'nə-ter'ēz): high-ranking people.
2. **statesman** (stāts'mən): person skilled in carrying out government affairs.



Bettmann/CORBIS

▲ Lincoln's funeral procession.

**reverence** (rev'ə-rəns): high regard; respect.

**orator** (ōr'ət-ər): public speaker.

## The Final Act

President Lincoln died about a year and a half after his Gettysburg Address and only five days after the Civil War had ended. On April 14, 1865, John Wilkes Booth, an actor, shot Lincoln in the head during a play in Washington, D.C. Booth was a supporter of slavery and considered Lincoln responsible for causing the war. His first plan was to kidnap Lincoln, but after the Confederate army surrendered he decided on assassination instead. After shooting the president, Booth reportedly leaped down from Lincoln's private box onto the stage, breaking his leg in the process. Although he managed to escape to Virginia on horseback, he was soon found and shot.



Library of Congress

▲ Wanted poster for Lincoln's assassins.

dinner, Lincoln spoke briefly to a crowd outside the house, but protested that he had nothing of importance to say.

Later the President retired to his room to put the finishing touches on his speech. Lincoln's lifelong love of poetry, the Bible, and Shakespeare shaped his final choice of words.

Rain fell early the next day, but the sun came out

and shone on the people—some of them families of dead soldiers—gathered for the dedication. A band played and a prayer was offered before Everett spoke. Everett's two-hour oration contained exactly what people expected to hear, and it was greeted with much applause. It took two newspaper pages to reprint the entire speech.

At 2 P.M., President Lincoln put on his steel-rimmed glasses. (It is a matter of debate whether he wore his glasses and read, or recited his speech from memory.) Wearing white gloves, Lincoln pulled his two-page manuscript from the pocket of his black coat. He still wasn't sure if he had gotten it right as he unfolded his long legs, stepped forward, and paused before the crowd. When he started to speak, his high voice shrilled forth like the sound of a bugle.

"Four score<sup>3</sup> and seven years ago our fathers brought forth on this continent, a new nation," he began, with a reference to 1776, the year the United States declared its independence. The President's prayer-like speech lasted only about two minutes.

Lincoln had not expected people to clap much, but he was disappointed with the lukewarm<sup>4</sup> response to his "few appropriate remarks." He shook hundreds of hands before boarding the train back to Washington. During the trip,

3. score (skôr): twenty.

4. lukewarm (lûk'wôrm'): not excited.

he lay back with cold towels covering his eyes. Lincoln was coming down with a light case of smallpox and would be quarantined<sup>5</sup> in the White House for the next two weeks.

The President's spirits started to rise the next day when a letter from Everett was delivered to him. "I should be glad," wrote Everett, "if I could flatter myself that I came as near to the central idea of the occasion in two hours as you did in two minutes." Some American and European newspapers also liked the speech.

The official version of Lincoln's Gettysburg Address contains only 271 words. Though mostly short and simple, Lincoln's words hold deep meaning.

5. **quarantined** (kwŏr'ən-tēnd): isolated from other people.

### ✓ Reading Check

1. On what occasion did Abraham Lincoln deliver his Gettysburg Address?
2. Why did Lincoln decide to go to Gettysburg to give the speech?
3. How were Edward Everett's and Abraham Lincoln's speeches different?
4. What are three of the influences on Lincoln's choice of words in his address?
5. What was the audience's response to Lincoln's address?



▲ Abraham Lincoln.

Library of Congress

# RECONSTRUCTION

**R**econstruction means “rebuilding.” After the Civil War, the president and Congress struggled over the best way to rebuild the South. President Andrew Johnson put in place a plan of reconstruction that allowed states of the old Confederacy to rejoin the Union easily. Soon most Southern states had passed laws called the black codes, which kept freedmen (former slaves) from voting, assembling, or working at many jobs. Congress did establish a Freedmen’s Bureau to help the former slaves. The bureau founded over 4,000 schools in five years. Adults often attended these schools along with the children to learn how to read and write.

Congress grew angry over the way the new state governments were treating the freedmen. It passed amendments to the Constitution to guarantee citizens’ rights. When some states refused to accept the amendments, Congress sent the army back to the South to enforce them. Congress also passed Reconstruction Acts in 1867 that required real changes. Under the acts, new representatives were elected in the South, including the first African Americans in government. The new state governments raised taxes to pay for rebuilding, though some of the money went into the pockets of selfish politicians. Northerners came south to help with the reconstruction—or to make a profit. White Southerners named them all after the cheap suitcase of the day: carpetbaggers.

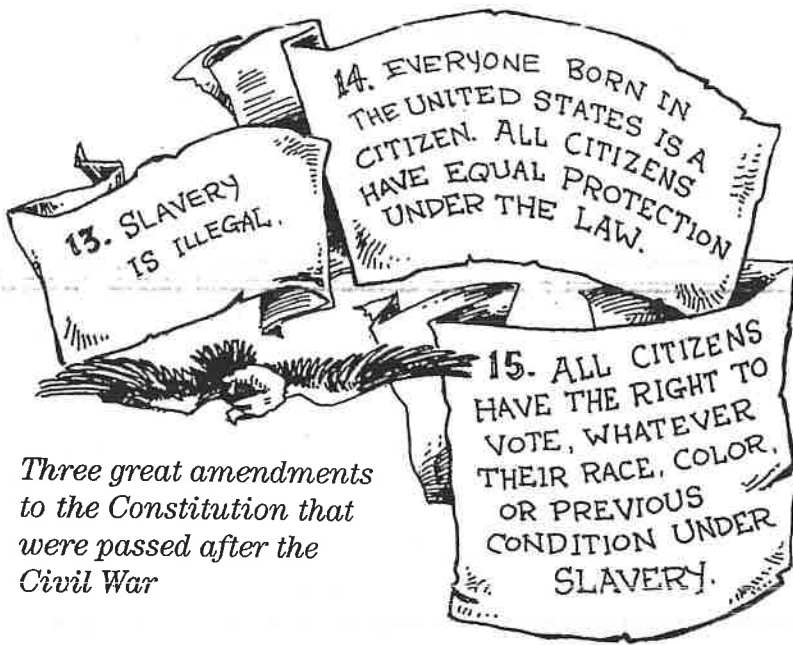
By 1877, Reconstruction had died out in the South. Why? White Southerners in general resented Reconstruction bitterly. Some people were making unfair profits from it. And Congress lost interest. Then, violence by secret groups like the Ku Klux Klan kept African Americans from voting or getting good jobs. Many black people lived in poverty as sharecroppers, working the land for a share of the crop. Most of them were always paying off debts—money borrowed so they could live until harvest time.

## Across

3. Name for rebuilding after the Civil War
6. Southern term for a Northerner in the South during Reconstruction
8. The Fifteenth Amendment guarantees the right of a citizen to \_\_\_\_.
9. The black \_\_\_\_ were laws keeping freed slaves from full rights.
10. The Fourteenth Amendment gives equal \_\_\_\_\_ of the laws to all citizens.
11. The Fourteenth Amendment says all people \_\_\_\_ in the U.S. are citizens.
15. Someone who farms for a part of the crop
16. Under Johnson’s plan, it was easy for one of these to reenter the Union.
17. Number of the constitutional amendment that ended slavery

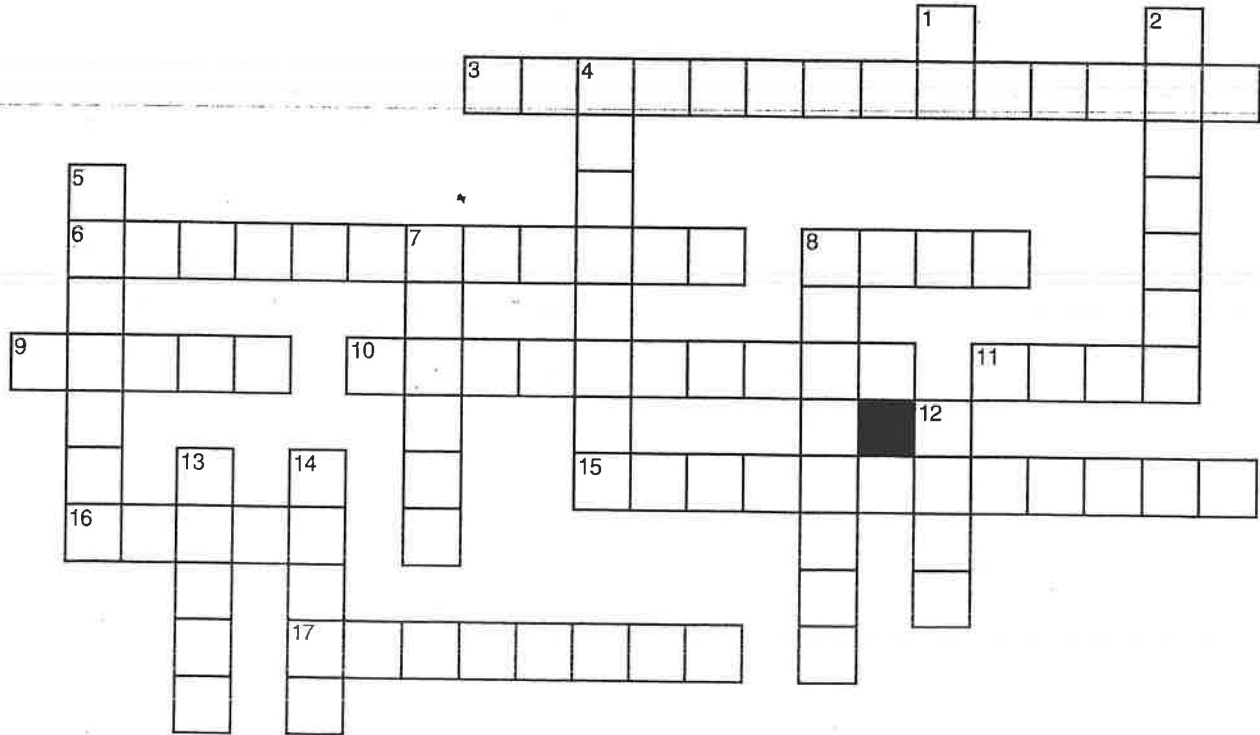
**Down**

1. First part of the name of a secret violent white group in the South
2. Last name of the U.S. president during Reconstruction



*Three great amendments to the Constitution that were passed after the Civil War*

4. The president struggled with this group over Reconstruction.
5. The Freedmen's Bureau established over 4,000 of these.
7. The Freedmen's \_\_\_\_\_ helped the recently freed slaves.
8. Used by secret white groups in the South to keep freedmen from power or success
12. Organization used by Congress to enforce Reconstruction
13. Money collected by government for Reconstruction
14. Sharecroppers' profits often went to pay these.





Listed below are Events, Accounts, and Laws that occurred after the Civil War

**13th Amendment: 1865 (Frees Slaves)**

Section 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States...

**14th Amendment: 1868 (Gives former slaves citizenship)**

Section 1. All persons born or naturalized in the United States ... are citizens of the United States and of the State wherein they reside.

**15th Amendment: 1870 (African American men can vote)**

Section 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude.

Picture show the First Black Members of the US Congress



The Conversation, *Exploiting black labor after the abolition of slavery*, February 6, 2017

"Black men - and sometimes women and children - were arrested and convicted for crimes enumerated in the Black Codes, state laws criminalizing petty offenses and aimed at keeping freed people tied to their former owners' plantations and farms. The most sinister crime was vagrancy - the "crime" of being unemployed - which brought a large fine that few blacks could afford to pay. Black convicts were leased to private companies..."

Former slave Henry Adams made this statement before the U.S. Senate in 1880

In September I asked the boss to let me go to Shreveport. He said, "All right, when will you come back?" I told him "next week." He said, "You had better carry a pass." I said, "I will see whether I am free by going without a pass."

I met four white men about six miles south of Keachie, De Soto Parish. One of them asked me who I belonged to. I told him no one. So him and two others struck me with a stick and told me they were going to kill me and every other Negro who told them that they did not belong to anyone... They left me and I then went on to Shreveport. I seen over twelve colored men and women, beat, shot and hung between there and Shreveport.

Sunday I went back home. The boss was not at home. I asked the madame, "where was the boss?" She says, "Now, the boss; now, the boss! You should say 'master' and 'mistress' -- and shall or leave. We will not have no one here on our place who cannot say 'mistress' and 'master.' You all are not free yet and will not be until Congress sits, and you shall call every white lady 'missus' and every white man 'master.'"

1. Describe 2 examples of how former slaves gained new freedoms at the end of the Civil War.

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2. Describe 2 examples of how slaves were denied freedom at the end of the Civil War.

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\*Name

## Ms. Hanrahan and Mrs. Klausman's Days 26-30

### Science NTI Assignments 8<sup>th</sup> Grade

This week we will continue talking about the history of the Earth or geologic time. Last week you learned about the creation of Earth during the Precambrian era. This week we will be working towards the present. You all will be learning about the Paleozoic, Mesozoic, and Cenozoic eras. Remember, geologic time is a theory about when and how our planet was created and how it has changed over time.

#### Day 26

1. Read section 1 "The Paleozoic Era" on pages 648-654.
2. Answer questions 1-4 in the "section 1 review" on page 654.

#### Day 27

\*Name

1. Read section 2 "The Mesozoic Era" on pages 655-659.
2. Answer questions 1-4 in the "section 2 review" on page 659.

#### Day 28

1. Read section 3 "The Cenozoic Era" on pages 660-665.
2. Answer questions 1-4 in the "section 3 review" on page 665.

#### Days 29 and 30

1. Review page 668.
2. Answer questions 1-21 on pages 669-670, "chapter 23 assessment."

### **\*\*\*Questions, Comments, or Concerns\*\*\***

#### **8<sup>th</sup> Gold**

1. Call the middle school at 859-234-7123
2. Email [emma.hanrahan@harrison.kyschools.us](mailto:emma.hanrahan@harrison.kyschools.us)
3. Message Ms. Hanrahan on the Remind App. Remind info: text: @7g6c8k to 81010
4. Ms. Hanrahan is on Zoom at 1pm on Monday, Wednesday, and Friday. This program allows students and parents to video conference with me. This can be used on either

computers, tablets, or smartphones. All you have to do is click on or type this link into the search bar if you are using a computer. <https://us04web.zoom.us/j/5825812645> You will want to run the extension. If you are using a tablet or smartphone, download the free Zoom app, click join a meeting, enter this code 5825812645, and click join.

5. Text or call 859-229-2394

### **8<sup>th</sup> Maroon**

1. Call the middle school at 859-234-7123
2. Email [shari.klausman@harrison.kyschools.us](mailto:shari.klausman@harrison.kyschools.us)
3. Text or call 606-298-9174

# The Paleozoic, Mesozoic, and Cenozoic Eras

**BIG IDEA** *organisms developed and diversified during the three eras of the Phanerozoic as the continents moved into their present positions.*

## SECTIONS

- 1 The Paleozoic Era
- 2 The Mesozoic Era
- 3 The Cenozoic Era

Lab Station

### How is oil stored in rocks?

Many sedimentary rocks contain oil and water. How are these materials stored in sedimentary rocks? Model how oil and water migrate through rocks in this lab.

### FOLDABLES

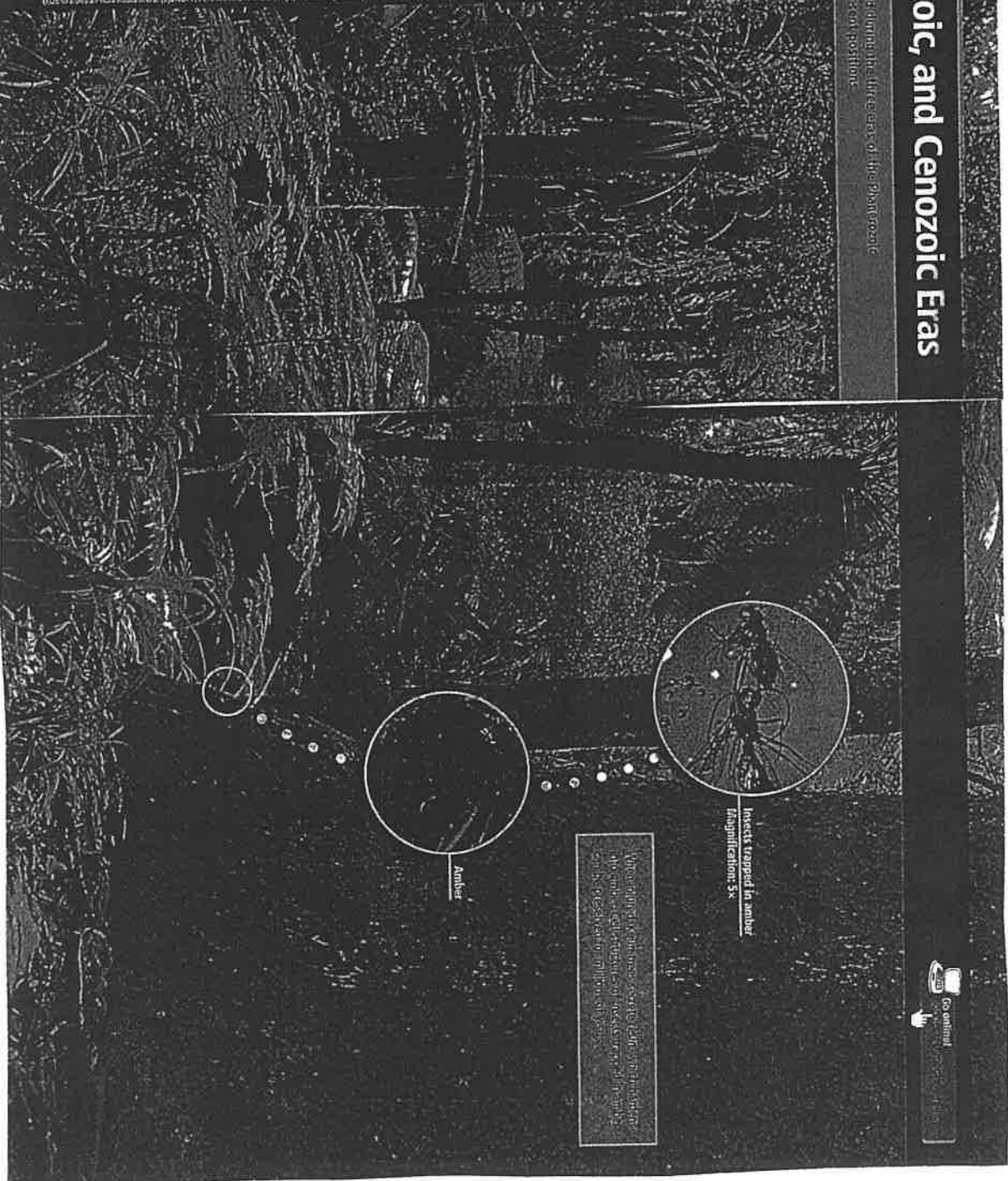
Study Organizer

### Paleozoic Life-forms

Make a three-tab book using the labels *Early, Middle, and Late Paleozoic*. Use it to organize your notes on the life-forms of the Paleozoic.



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Go online!

When trapped in amber, insects, plants, and other organisms are preserved for millions of years.

Insects trapped in amber  
Magnification: 5x

Amber

Essential Questions

- Why do paleogeographers use paleogeographic reconstructions?
- How do paleogeographers use paleogeographic reconstructions?
- What is the significance of paleogeographic reconstructions during the Paleozoic?
- How do paleogeographers use paleogeographic reconstructions during the Paleozoic?

Review Vocabulary

• **passive margin** A margin of a continent that is not tectonically active and is characterized by dissolved minerals.

New Vocabulary

- **paleogeography** The study of the Earth's past geography.
- **passive margin** A margin of a continent that is not tectonically active and is characterized by dissolved minerals.
- **transgression** The process of a sea level rise.
- **Cambrian explosion** A period of rapid diversification of life forms.

# The Paleozoic Era

MAIN IDEA Life increased in complexity during the Paleozoic while the continents collided to form Pangaea.

## EARTH SCIENCE 4 YOU

Have you noticed that some things seem to happen all at once? For instance, you might notice that everyone at school is suddenly talking about a certain music group that just yesterday was unknown. In a similar way, there suddenly appeared in the Paleozoic rock record an entire collection of new complex life-forms.

### Paleozoic Paleogeography

The geologic activity of the three eras of the Phanerozoic Eon are well represented in the rock record. By studying this record, geologists can reconstruct estimates of landscapes that have long since disappeared. The ancient geographic setting of an area is called its **paleogeography** (pay lee oh jee AH gree fee). The paleogeography of the Paleozoic Era—the first era of the Phanerozoic—is defined by the breakup of the supercontinent Rodinia. As this breakup proceeded, multicellular life evolved with increasing complexity, as illustrated in Figure 1.

**Passive margins** Recall that the ancient North American continent of Laurentia split off from Rodinia by the early Paleozoic. Laurentia was located near the equator and was surrounded by ocean. In addition, it was almost completely covered by a shallow tropical sea. Throughout the Cambrian, there was no tectonic activity on Laurentia so no mountain ranges formed. The edge of a continent is called a margin. When there is no tectonic activity along a margin, it is called a **passive margin**. During the Cambrian, Laurentia was completely surrounded by passive margins—there was no tectonic activity along its edges.

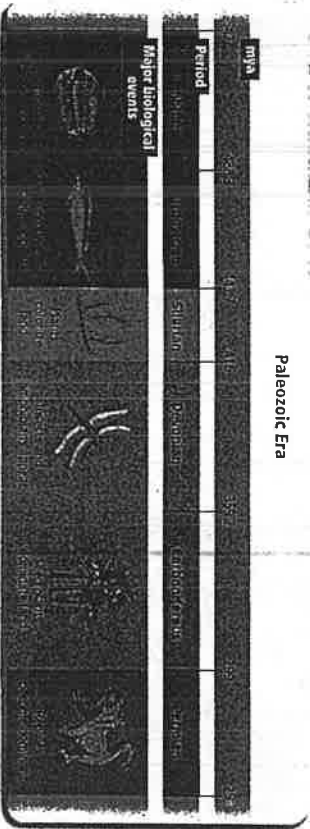


Figure 1 Life-forms became more complex during the six periods of the Paleozoic.

Page 648

Original shoreline position

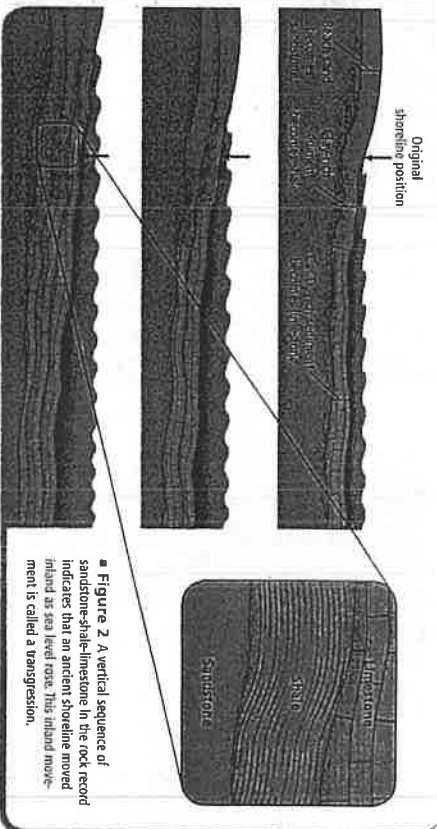


Figure 2 A vertical sequence of sandstone-shale-limestones in the rock record indicates that an ancient shoreline moved inland as sea level rose. This inland movement is called a transgression.

### Sea-Level Changes in the Rock Record

Rock sequences preserved in passive margins tell paleogeographers a great deal about ancient shorelines. These sequences are useful in charting the rise and fall of sea level. To understand this, it is first necessary to understand how sediment is deposited on a shoreline.

**Shoreline deposition** Ocean tides wash small grains of sand and sediment ashore to make beaches. Tides also deposit offshore sediment the size of clay particles (<0.002 mm). Calcium carbonate (CaCO<sub>3</sub>) sediment accumulates farther from shore as calcium muds form from sea water and organisms containing calcium carbonate die and fall to the seafloor. The sand deposited on the beaches eventually becomes sandstone. The offshore clay sediment compacts to form shale, and the calcium carbonate sediment farther offshore turns into limestone, as shown in Figure 2.

**Transgression** When sea levels rise or fall, the deposition of sediment shifts. As illustrated in Figure 2, a rise in sea level causes the water to move inland to an area that previously had been dry. The area where clay sediment was deposited also moves shoreward on top of the old beach. This movement is called a **transgression**. The result of the transgression is the formation of deep-water deposits overlying shallow-water deposits. This appears in the rock record as a vertical or stepwise sequence of sandstone-shale-limestone.

**Regression** When sea level falls, the shoreline moves seaward in a process called **regression**. This process results in shallow-water deposits overlying deep-water deposits. A stacked sequence of limestone-shale-sandstone is evidence of a regression.

VOCABULARY

SCIENCE USAGE v. COMMON USAGE

Transgression

Science usage: movement of a shoreline inland as sea level rises

Common usage: violation of a law or moral duty

Page 649



■ Figure 3 The white sand of New Mexico's White Sands National Park are made of gypsum from ancient evaporite deposits.

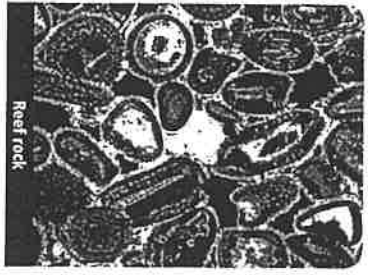
**Evaporites** Scientists also learn about fluctuating sea level by studying evaporite deposits. Recall that evaporite deposits are rocks that have crystallized out of water that is saturated with dissolved minerals. Some evaporite deposits can be associated with fossilized reefs.

Fossilized reefs are made of the carbonate skeletons of tiny organisms called corals. Reefs form in long, linear mounds parallel to a continent or island, where they absorb the energy of the waves that crash against them on their seaward side. The area behind the reef, called a lagoon, is protected from the wave's energy. In a tropical setting, water in the lagoons evaporates in the warm sunshine, and minerals such as halite and gypsum precipitate out. Over time, cycles of evaporite deposition mark changes in water level.

☑ **READING CHECK** Explain how evaporites and reefs are related.

**Mineral deposits** Huge amounts of gypsum and halite evaporites were deposited in Paleozoic lagoons. The white sands of White Sands National Park, shown in Figure 3, are the remains of one such evaporite deposit. Other deposits, such as those in the Great Lakes area of North America, are mined commercially. Halite is used as road salt. Gypsum is an ingredient in plaster and drywall.

**Impermeability** As shown in Figure 4, reef limestones tend to have large pore spaces, allowing oil and other liquids to move through them. Evaporite rocks, in contrast, are impermeable. This means that they contain very little connected pore space and liquid cannot move through them. When an evaporite deposit overlies a reef rock that contains oil, it seals in the oil and prevents the oil from migrating. A good example is the Permian Basin, home to the Great Permian Reef Complex in western Texas and southeastern New Mexico. The oil in this complex rarely leaks to Earth's surface because of its tight evaporite seal.



(l)B.S.P./CORBIS, (r)Kansas Geological Survey/tps.ku.edu, (B)Alfred Pastala/Photo Researchers



■ Figure 5 Baltica and Avalonia collided with the Taconic Island Arc during the Ordovician, this was one of the many Paleozoic tectonic events that transformed eastern Laurentia.

**Factors of sea-level change** Scientists have determined that sea levels transgressed and regressed as many as 50 times during the late Paleozoic. Geologists have found a number of reasons for relative sea level change—climate and glaciation cycles, crustal subsidence and uplift, varying sedimentation rates, and plate motions. These were all factors in the transgressive and regressive cycles of the Paleozoic.

☑ **READING CHECK** Infer how glaciation affects sea level.

### Mountain Building

Laurentia's margins were passive during the first period of the Paleozoic, and mountains were not forming. However, changes occurred during the Ordovician (or duh VII shun) Period. At that time, Laurentia collided with the Taconic Island Arc, and mountains began to rise in what is now northeastern North America. This event is called the Taconic Orogeny. The Taconic Orogeny added new land and established an active volcanic zone along Laurentia's eastern margin. Remnants of this event are present in New York's Taconic Mountains.

**Laurentia deformed** Laurentia was further transformed in the Silurian (si LUR ee uh) Period when Laurentia's eastern margin collided with Baltica and Avalonia. Baltica was a landmass that today is part of northern Europe and parts of Russia. Avalonia was an island ocean arc. You can see Baltica and Avalonia approaching Laurentia in Figure 5. The deformation caused by these collisions—called the Acadian Orogeny—added folds, faults, and igneous intrusions to the already deformed Taconic rocks.

**VOCABULARY** .....  
**ACADEMIC VOCABULARY**  
 Transform to change in a major way  
 The continent was transformed by a massive orogeny. ....

page 550

page 651

## CAREERS IN EARTH SCIENCE

**Paleoecologist** Paleoecologists study the ecology and climate of ancient environments using evidence from fossils and rocks. Some paleoecologists apply this knowledge to understand future global climate change.

**FOCUS** Incorporate information from this section into your Foldable.

## Data Analysis LAB

Based on Real Data  
**Interpret the Table**

Can you find the time? Paleoecologists study the shapes and compositions of fossil organisms to interpret how and in what types of environments they lived. Fossils are also used to interpret climatic changes and the passage of time.

Geologic Era	Hours Per Day	Day Per Year	Geologic Time (mya)
Cenozoic	23.5-24	365-377	0-65
Mesozoic	23.5-22.4	377-392	65-248
Paleozoic	22.4-20	392-430	248-543

- Analysis**
- Graph the time record data. Label the x-axis *Geologic time (mya)*, one y-axis *Hours per day*, and the second y-axis *Days per year*.
  - Think Critically** Determine the number of hours in a day 400 mya.
  - Determine the number of hours in a day 300 mya.
  - Determine the number of hours in a day 150 mya.
  - Predict when there will be 24.5 hours in a day.
- \*Data obtained from: Pridmore, M. and R. Scott, 2004. *Evolution of the Earth*. New York: McGraw-Hill.

**Ouachita Orogeny** Another Laurentian mountain-building event—the Ouachita (Wah shuh tay) Orogeny—occurred during the Carboniferous Period when southeastern Laurentia began to collide with Gondwana. Recall that Gondwana was the large landmass that eventually formed the southern continents, including Africa and South America. This collision formed the Ouachita Mountains of Arkansas and Oklahoma and was so intense that it caused the crust to uplift inland as far as present-day Colorado. Vertical faults raised rocks more than 2 km, forming a mountain range that geologists call the Ancestral Rockies.

**Alleghenian Orogeny** As Gondwana continued to push against Laurentia, the Appalachian Mountains began to form. This event, called the Alleghenian Orogeny, was the last of the Paleozoic mountain-building events to affect eastern North America. When it was completed at the end of the Paleozoic, the Appalachians were possibly higher than the Himalayas, and one giant supercontinent — *Gangaea* — had formed on Earth's surface.

### Paleozoic Life

The formation of *Pangaea* was the major geologic story of the Paleozoic, but Paleozoic rocks also tell another dramatic story. Fossils within these rocks show that multicellular animals went through extensive diversification at the beginning of this era. As you have learned, fossils help geologists correlate geologic landscapes and piece together geologic time. Fossils also help paleoecologists (pay lee oh in KAH jahn jiss) learn about the ecology of ancient environments. Ecology refers to the relationships between organisms and their environments. Changes within the environment drove changes within the ecologies of Paleozoic life.



Figure 6 The organisms shown in this artist's reconstruction are among the Cambrian organisms that had hard parts.

**Cambrian explosion** Nearly every major marine group living today appeared during the first period of the Paleozoic. The geologically rapid diversification of such a large collection of organisms in the Cambrian fossil record is known as the **Cambrian explosion**. Some of the best-preserved Cambrian organisms occur in the Burgess Shale in the Canadian Rocky Mountains, and in southern China. A spectacular array of fossil organisms with hard parts has been found in these locations, including fossils of creatures like those shown in Figure 6.

**Ordovician extinction** At the end of the Ordovician, more than half of the marine groups that appeared in the Cambrian became extinct. Those that survived suffered large losses in their numbers. What caused this extinction? Geologists have found evidence of glacial deposits in rocks of northern Africa, which at the time was situated at the South Pole. As you have learned, when water freezes in glaciers, sea level drops. Then, as now, most marine organisms lived in the relatively shallow waters of the continental shelves. When sea level is high, the shelves are flooded and marine animals have many places to live. During regression, however, continental shelves can become too narrow to support diverse animal habitats.

**Devonian extinction** Following the late Ordovician extinction, marine life recovered and new species evolved. There was a tremendous diversification of vertebrates, including fish and the first appearance of tetrapods on land. In the late Devonian (dih VOH nee un), another extinction event limited approximately 50 percent of the marine groups. Some scientists think that global cooling was again the cause and there is evidence that some continents had glaciers at this time.

## MiniLAB

Lab Station 1

### Model Continental Shelf Area

How does shelf area change when continents collide? Colliding continents decrease the habitat areas available to marine organisms that live along the shallow shelves surrounding the continents.

#### Procedure

- Read and complete the lab safety form.
- Using 250 g of modeling clay, make a sphere and flatten it into a disk that is 0.5 cm thick. This represents a continent.
- Divide another 250 g of clay into two equal spheres and flatten them as above.
- Roll another 250 g of clay into three cylinders, each with a diameter of about 0.5 cm. Wrap the cylinders around the edges of the clay disk. These represent continental shelves.
- Use the following formula to calculate the area of the large continent and the large continent plus the continental shelf.  
$$\text{area} = \pi r^2$$

Subtract the continent area from the total area. This equals the area of the continental shelf.

- Repeat Step 5 for both small models.

#### Analysis

- Assess which has more shelf area: two small continents or one large continent. Why?
- Conclude how the existence of a single large supercontinent limits the amount of habitat space for marine organisms.
- Explain the relationship between reduced habitat space and extinction.





Figure 7 The artist's reconstruction shows what a Carboniferous swamp might have looked like. Explain why Carboniferous swamps produced coal deposits.

**Terrestrial plants** The Ordovician and Devonian extinction events appear to have affected mainly marine life. They had little effect on life-forms living on land. Simple land plants began to appear on Earth in the Ordovician. During the Carboniferous, the first plants with seeds, called seed ferns, diversified. Because seeds contain their own moisture and food sources, they enabled terrestrial plants to survive in a variety of environments.

**Carboniferous swamps** Many Carboniferous plants lived in low-lying swamps, such as the one shown in Figure 7. As these plants died and sediment accumulated, they compacted to coal deposits. Swamps were also breeding grounds for insects. Fossils of the largest known insects have been found in Carboniferous sediment deposits, including dragonflies with 74-cm wingspans. Compare this to the largest known wingspan of a modern dragonfly — 18cm.

**Permian changes** At the end of the Permian, the largest mass extinction in the history of Earth occurred. The Permo-Triassic Extinction Event caused the extinction of nearly 95 percent of marine life-forms. Unlike the mass extinctions at the end of the Ordovician and Devonian, this extinction affected both marine and terrestrial organisms. More than 65 percent of the amphibians and almost one-third of all insects did not survive. What could have caused such a widespread catastrophe? It was probably a combination of causes. First, there was a dramatic drop in sea level from the coalescence of Pangaea closing and draining the shallow seas. A regression would have been particularly critical for organisms inhabiting the continental shelves when there was only one continent. Other contributing factors likely included extreme volcanism in Siberia, low atmospheric oxygen levels, and climate change.

## SECTION 1 REVIEW

### Section Summary

- Scientists study sediment and evaporite deposits to learn how sea levels fluctuated in the past.
- Eastern Laurentia was transformed by many mountain-building events during the Paleozoic.
- A great diversity of multicellular life appeared during the first period of the Paleozoic.
- The largest extinction event in Earth's history occurred at the end of the Paleozoic.

### Understand Main Ideas

- MAIN IDEA** Explain how the formation of Pangaea affected the evolution of life-forms.
- Compare transgression and regression.
- Discuss the relationship between oil deposits and evaporites.
- Assess the significance of the Cambrian explosion.

### Think Critically

- Infer what has happened to the Ancestral Rockies since their formation.
- Predict changes in the fossil and rock record that might indicate a marine extinction event.

### MATH IN Earth Science

- If 10 million species exist today and 5.5 species become extinct every day, calculate how many years it would take for 96 percent of today's species to become extinct.

## SECTION 2

### Essential Questions

- How did the breakup of Pangaea affect Earth's life-forming ability?
- How did sea movements of Western North America form?
- What are possible causes for the extinction of the non-avian dinosaurs?
- Why did the fossil record disappear?

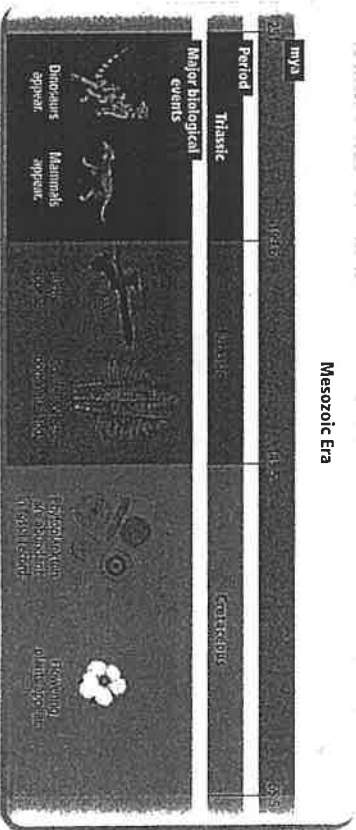
### Review Vocabulary

**subduction:** the process by which one tectonic plate descends beneath another

### New Vocabulary

**phytoplankton**  
**aminolite egg**  
**indium**

Figure 8 Although dinosaurs are the most famous of the Mesozoic life-forms, other organisms also appeared during this era.



Section 2 • The Mesozoic Era 655

# The Mesozoic Era

**MAIN IDEA** Reptiles became the dominant terrestrial animals during the Mesozoic while Pangaea broke apart.

## EARTH SCIENCE 4 YOU

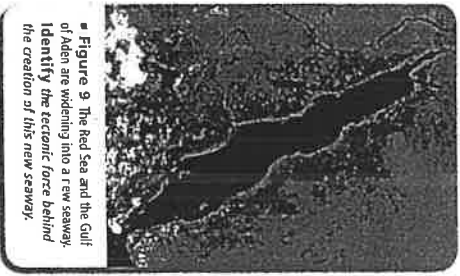
Do you like mystery novels? One of the biggest mysteries in the history of science is what caused the extinction of the non-avian dinosaurs.

### Mesozoic Paleogeography

The mass extinction event that ended the Paleozoic Era ushered in new opportunities for animals and plants of the Mesozoic Era. Earth's life-forms changed drastically as new kinds of organisms, shown in Figure 8, evolved to fill empty niches. While some groups of these organisms remain on Earth today, none of the giant reptiles that dominated the land, sea, and air, and typified the era, survived. The non-avian dinosaurs all became extinct at the end of the era.

**Breakup of Pangaea** When the Mesozoic Era began, a single global ocean and a single continent — Pangaea — defined Earth's paleogeography. During the late Triassic Period, Pangaea began to break apart. The heat beneath Pangaea caused the continent to expand, and Pangaea's brittle lithosphere began to crack. Some of the large cracks, called rifts, gradually widened, and the landmass began spreading apart. The ocean flooded the rift valleys to form seaways, and large blocks of crust collapsed to form deep valleys. The Mesozoic climate was warm and tropical, and it remained warm enough throughout the era that glaciers did not form.

### Mesozoic Era



■ **Figure 9** The Red Sea and the Gulf of Aden are widening into a new seaway. Identify the tectonic force behind the creation of this new seaway.

**Seaways** As the continents continued to split apart, mid-ocean rift systems developed at the junctures, and the widening seaways became oceans. The Atlantic Ocean began forming in the Triassic as North America rifted away from Europe and Africa. Some of the spreading areas at this juncture joined to form a long, continuous rift system called the Mid-Atlantic Ridge. As you have learned, this mid-ocean ridge system is still active today, erupting magma deep in the ocean as it widens. The Red Sea and Gulf of Aden, shown in **Figure 9**, are new seaways in East Africa that are today slowly widening by a few centimeters a year as a result of continental breakup.

☑ **READING CHECK** Explain how the Atlantic Ocean formed.

**Changing sea level** The formation of mid-ocean rift systems was partly responsible for a rise in sea level during the Mesozoic. The hot magma that erupted at the ridges displaced a considerable amount of seawater onto the continents. However, sea level dropped at the end of the Triassic, and desiccative conditions developed in western North America. The climate became arid and, as evidenced in ancient sand dunes, a thick blanket of sand covered some of the land. Sea level rose again during the Jurassic, and a shallow sea formed in North America's center. The ocean continued to rise during the Cretaceous (with TAY shus), covering much of North America's interior. **Figure 10** shows that nearly one-third of Earth's landmasses were covered with water.

### Mountain Building

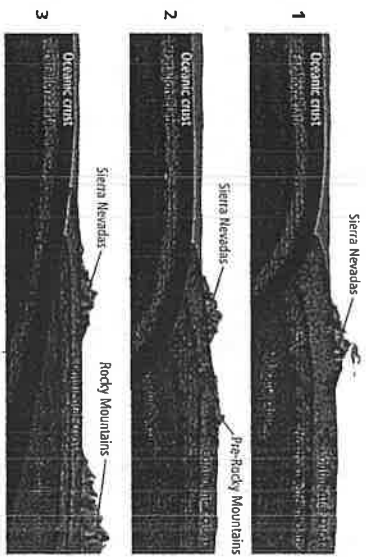
Recall that the collision of continents during the Paleozoic transformed the eastern margin of Laurentia, while the continent's western margin remained passive. During the Mesozoic and early Cenozoic, the reverse was true. As the breakup of Pangaea proceeded, multiple mountain-building episodes occurred along Laurentia's western margin, while little was happening along its eastern edge.



JH1 Schmitt/MODIS Rapid Response Team/ASA/USFSC

■ **Figure 10** Nearly one-third of Earth's land surface was covered with water during the late Cretaceous.

### Three Phases of the Cordilleran Orogeny



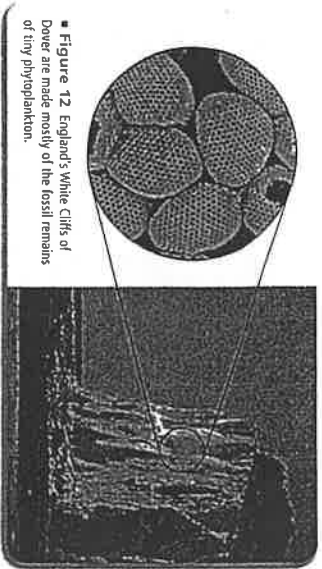
■ **Figure 11** During the three phases of the Cordilleran Orogeny, mountains formed farther inland as the angle of subduction became more shallow and the speed increased, causing massive faulting and uplift.

**Cordillera** Much of the mountain building that occurred in western Laurentia was caused by the subduction of the oceanic Parallon Plate beneath Laurentia's western margin. As the plate descended, many structural features of the present-day Rocky Mountains, Sierra Nevada, and other western mountain ranges were formed. Geologists call these ranges collectively the North American Cordillera (kor dee AYR uh). Cordillera means *mountain range* in Spanish. The Cordilleran Orogeny consisted of three distinct phases. As shown in **Figure 11**, each phase was characterized by a different rate and angle of subduction.

**First phase** The first phase occurred during the late Jurassic and early Cretaceous when subduction proceeded slowly and the oceanic plate descended at a steep angle, producing magma, which rose at the site of the emerging Sierra Nevada.

**Second phase** The second phase of the Cordilleran Orogeny occurred during the Cretaceous when subduction increased in speed but the oceanic plate descended at a shallow angle. As a result, there was less volcanism along Laurentia's margin and more tectonic activity inland with massive thrust faults occurring in the Rocky Mountain area.

**Third phase** During the third phase of the Cordilleran Orogeny, which began during the late Cretaceous and continued into the Cenozoic, subduction was even more shallow and rapid than it was during the second phase. The subduction rate was so fast that some scientists suggest the oceanic plate was pushed almost horizontally beneath the North American Plate. As a result, this phase was characterized by large, vertical uplifts which formed the Rocky Mountains, and a decrease in volcanism. This range now extends from northern Mexico into Canada.



■ Figure 12 England's White Cliffs of Dover are made mostly of the fossil remains of tiny phytoplankton.

### Mesozoic Life

As Pangaea broke apart during the early Mesozoic, much of the habitat on the continental shelves that was lost during Pangaea's formation once again became available. New marine organisms, ranging from large predatory reptiles to tiny photosynthetic phytoplankton, evolved to fill these niches. **Phytoplankton** are microscopic organisms at the base of the marine food chain. These organisms were abundant during the Cretaceous. The remains of their shell-like hard parts are seen in many chalk deposits around the world, including England's famous White Cliffs of Dover, shown in **Figure 12**.

**Plant life** As the cool climate that characterized the late Paleozoic came to an end during the Mesozoic, plant life changed sharply. The large, temperate swamps dried as the climate warmed. Tall cycad trees are seed plants without true flowers. These evolved during the Jurassic, along with ginkgos, pine trees, and other conifers. Flowering plants appeared during the Cretaceous.

**Terrrestrial animals** Mammals appeared during the late Triassic, around the same time as the dinosaurs. However, the dominant Mesozoic animals were the reptiles. Unlike amphibians, whose eggs need to be laid in water to prevent drying out, reptiles can lay their eggs on dry land. These eggs, called **amniotic** (am nee AH tikk) eggs, contain the food and water required by developing embryos inside. Amniotic eggs made it possible for reptiles, including dinosaurs, to roam widely.

**Dinosaurs** Archosaurs are a group of reptiles which includes dinosaurs and crocodilians. Archosaurs have a unique skeletal structure that allows for speed and flexibility of movement. While lizards and turtles walk with a sprawling posture, archosaurs have a hip structure that allows the legs to be held underneath the body. This enabled some dinosaurs to run with an upright posture, as shown in **Figure 13**.



■ Figure 13 Dinosaurs have a unique hip structure that enabled some, like this *Velociraptor*, to develop an erect posture and run on two legs. **Explain how a dinosaur's posture differed from that of other reptiles.**

Table 1 Major Extinctions in the Phanerozoic

Extinction event	End Ordovician	End Devonian	Permian-Triassic	End-Triassic	End Cretaceous
Approximate mya	440 mya	360 mya	250 mya	60 mya	65 mya
Percentage groups extinct	57 percent marine	48 percent marine	95 percent marine 70 percent land	48 percent marine	75 percent marine 50 percent land

Explore extinctions during the Phanerozoic with an interactive table.

**Mass extinction** At the end of the Mesozoic, an extinction event devastated terrestrial dinosaurs, most marine reptiles, plants, and many other organisms. Today, most scientists agree that the combination of massive volcanism, which stressed Earth's climate, and a large meteorite impact that occurred at the end of the Cretaceous is responsible for the extinction event. It is thought that the meteorite was at least 10 km in diameter. An impact of this size could have blown up to 25 trillion metric tons of rock into the atmosphere, causing long-lasting greenhouse warming. Evidence for this impact includes an impact site—Chicxulub Crater—on Mexico's Yucatan Peninsula, as well as a unique layer of clay that separates Cretaceous rocks from rocks of the first period of the Cenozoic. Found worldwide, this layer contains an unusually high amount of **iridium** (ih RYD ee um), a rare metal in Earth's rocks but a relatively common metal in asteroids. As shown in **Table 1**, the extinction event at the end of the Mesozoic was relatively mild compared with the Permian-Triassic Extinction Event at the end of the Paleozoic.

## SECTION 2 REVIEW

### Section Summary

- The breakup of Pangaea triggered a series of tectonic events that transformed western Laurentia.
- The Atlantic Ocean began to form during the Mesozoic as North America broke away from Europe.
- Dinosaurs and other new organisms evolved to fill niches left empty by the Permian-Triassic Extinction Event.
- All dinosaurs, except birds, along with many other organisms became extinct during a mass extinction event at the end of the Mesozoic.

### Understand Main Ideas

1. **MAIN IDEA** Discuss the significance of the Permian-Triassic Extinction Event for the animals that populated the Mesozoic.
2. **Explain** how rifts are related to the formation of oceans.
3. Compare the tectonic events that transformed Laurentia's western margin with the tectonic events that changed Laurentia's eastern margin.
4. Discuss the evidence that suggests a meteorite impact was responsible for the extinctions at the end of the Mesozoic Era.

### Think Critically

5. Deduce what happened to the oceanic plate that subducted beneath western North America during the Mesozoic.

### WRITING Earth Science

6. Prepare a report documenting the chain of events that might have occurred once the meteorite hit Earth. Include a discussion of the effect on climate, air quality, and plant and animal life.

## SECTION 3

### Essential Questions

- What was the origin of glaciation during the Cenozoic?
- How can tectonic activity in North America during the Cenozoic be described?
- How did climate change affect life during the Cenozoic?

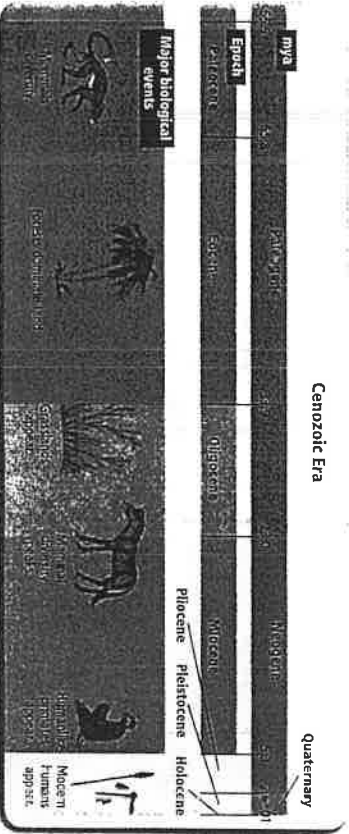
### Review Vocabulary

**San Andreas fault** A transform fault that separates the western edge of Southern California from the rest of the tectonic plate, specific for most of California's earthquakes.

### New Vocabulary

**Homo sapiens**  
bipedal

■ **Figure 14** Mammals diversified widely during the Cenozoic, but modern humans did not appear until the end of the era.



660 Chapter 23 • The Paleozoic, Mesozoic, and Cenozoic Eras

## The Cenozoic Era

**MAIN IDEA** Mammals became the dominant terrestrial animals during the Cenozoic while the continents assumed their present forms.

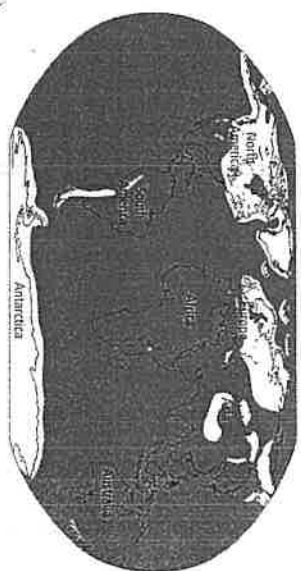
### EARTH SCIENCE 4 YOU

Have you ever been to a soccer game during which a player was injured? Usually another player fills in and the game goes on. The same can be true in nature. When organisms become extinct, new species often fill the empty niches.

### Cenozoic Paleogeography

The Cenozoic Era encompasses about 1.5 percent of Earth's total history—approximately the last 65 million years. Despite its relative shortness, scientists know more about this era than any other. Humans evolved during the Cenozoic, appearing in their present-day form during the Pleistocene Epoch. **Figure 14** shows that you live in the Holocene, the current epoch of the Cenozoic.

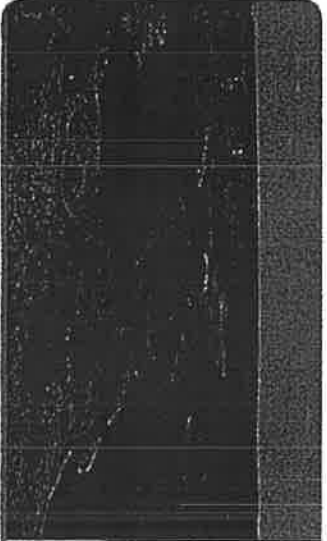
**Cooling trend** You learned in Section 2 that the Mesozoic Era was relatively warm. Earth remained warm during the earliest epoch of the Cenozoic. However, as Australia was splitting apart from Antarctica during the Eocene (Ee uh seen) Epoch, the worldwide climate began to cool. Scientists think that the cooling climate was caused, in part, by a change in ocean currents. When Antarctica and Australia were connected, a current of warm water flowing from the Pacific, Atlantic, and Indian Oceans moderated Antarctica's temperature. After Antarctica and Australia split apart, Antarctica was isolated over the South pole. A cold current began to flow around it, and a permanent ice cap began to grow during the Oligocene (Oh luh gon seen).



■ **Figure 15** At the peak of Pleistocene glaciation, glaciers covered nearly one-third of Earth's land surfaces. Inter-why patches of glaciation existed near the equator.

**Miocene warming** In the early Miocene Epoch, the climate warmed again. The ice cap on Antarctica began to melt, and the ocean flooded the margins of North America. This trend reversed during the middle and late Miocene. Antarctica's ice cap stopped melting and the Arctic Ocean began to freeze, resulting in the formation of the arctic ice cap. This set the stage for the ice ages.

**Ice ages** Throughout the Pleistocene, ice covered much of Earth's northern hemisphere. Glaciers advanced and retreated in at least four stages over North America and the northern latitudes. During the peak of these ice ages, glaciers up to 3 km thick covered nearly one-third of Earth's land surfaces, as shown in **Figure 15**. In North America, the paths of the Ohio and Missouri Rivers roughly mark the southernmost point of glacier coverage. Glaciers carved out lakes and valleys, dropped huge boulders, and left behind abundant deposits of clay, sand, and gravel. In northeastern Washington State, glacial melting caused such a rush of water at the end of the last ice age that it created the largest waterfall recorded on Earth's surface. The remnants are shown in **Figure 16**.



■ **Figure 16** This photo shows the remnants of Earth's largest waterfall in what is now Washington State. The waterfall, more than 5 km long and 120 km high, once flowed with water from glacial melting.



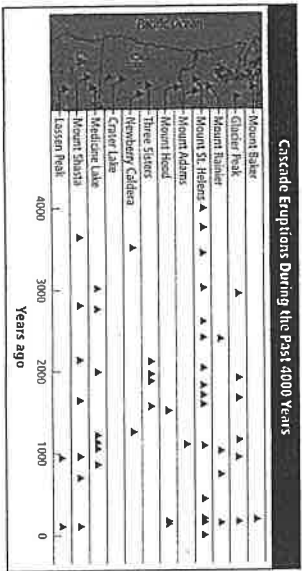
■ **Figure 17** This 38-million-year-old fossil bird was found in Wyoming's Green River Formation. The fossil is about 25 cm long.

**Cenozoic Mountain Building**  
 The mountain-building events of the Mesozoic uplifted massive blocks of crust to form the Rocky Mountains. During the Cenozoic, erosion wore down the Rockies but uplift continued. Eroded sediment filled large basins adjacent to the mountains. Today, this sediment is mined for coal. It also contains well-preserved fossils of fish, insects, plants, and birds. A fossil bird from one of the most famous of these deposits—Wyoming's Green River Formation—is shown in Figure 17.

**Subduction in the West** Volcanism returned to the western coast of North America at the end of the Eocene Epoch when the oceanic Farallon Plate began a steep subduction beneath the Pacific Northwest. As a result, the Cascade Mountains began to rise. Volcanoes in the Cascade range remain active today, as shown in Figure 18.

While subduction continued in northwestern North America, the Farallon Plate disappeared under what is now California. The North American Plate came into contact with another oceanic plate—the Pacific Plate—that was moving in a different direction. As a result, the San Andreas Fault formed. The San Andreas Fault is a transform boundary between the two plates. Recall that in a transform boundary, two plates slide against each other and there is no subduction. Because there is little to no subduction beneath central and Southern California today, there is little volcanic activity there.

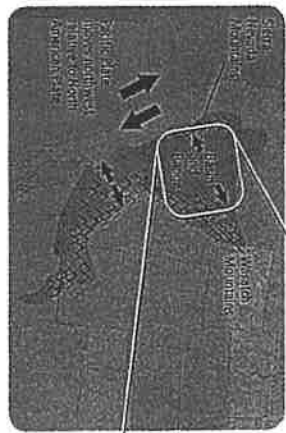
**Basin and Range Province** The beginning of the interaction between the North American Plate and the Pacific Plate coincided with the formation of the Basin and Range Province in the southwestern United States and northern Mexico. Recall that the Basin and Range Province consists of hundreds of nearly parallel mountains. These mountains were formed when stresses in Earth's crust—called **extension**—pulled it apart. This process, illustrated in Figure 19, continues today.



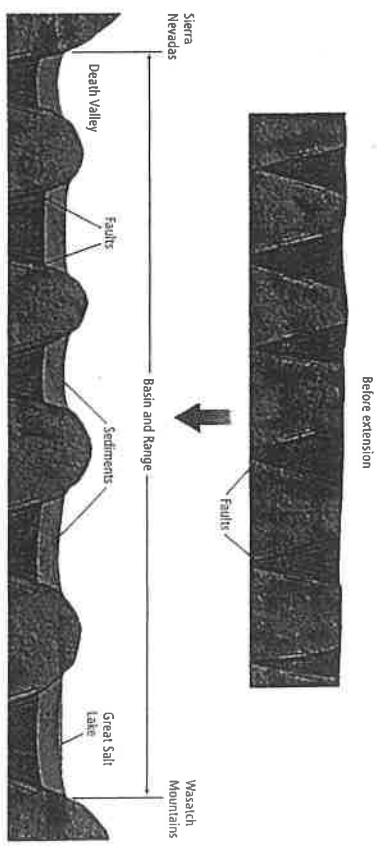
Layne Kennedy/CORBIS

# VISUALIZING Basin and Range Province

**Figure 19** The Basin and Range Province is a series of mountains and basins that is bordered on the west by California's Sierra Nevada and on the east by Utah's Wasatch Mountains. During the past 25 million years, crustal stretching has increased the distance between these two points by over 250 km.

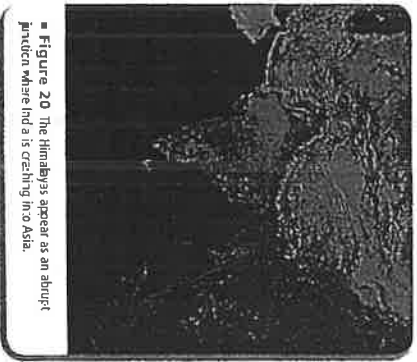


The stretching underneath the Basin and Range Province is caused, in part, by the steady movement of the Pacific Plate relative to the North American Plate. The North American Plate is being stretched to the northwest, and the Basin and Range Province is being stretched in an east-west direction.



To compensate for crustal stretching, the rocks broke up into hundreds of blocks along normal fault lines. Some blocks rose to form mountains, while adjacent areas dropped to form basins. The mountains are still being pushed upward, rising as quickly as they erode, and the basins are still dropping and filling with eroded debris. The crust underneath the Basin and Range Province has stretched so much that it is one of the thinnest parts of Earth's crust today.

**Concepts in Motion** View an animation of the formation of the Basin and Range Province.



■ Figure 20 The Himalayas appear as an abrupt junction where India is crashing into Asia.

### Continental collisions

The final breakup of Pangaea during the early Cenozoic resulted in several separate continents. It also brought some continents together. During the Paleocene, Africa began to collide with Eurasia, creating the Alps and narrowing the ancient Tethys (Tethys) Ocean, which once separated Eurasia and Gondwana. The remnants of this ocean now exist as four bodies of water in Europe and central Asia—the Black, Caspian, Aral, and Mediterranean Seas.

Also during the Paleocene, India began crashing into the southern margin of Asia to form the Himalayas, a mountain range that is still rising today. Figure 20 shows the Himalayas as an abrupt junction where India joined Asia. The rocks on the top of Mount Everest are Ordovician marine limestone. Tectonic forces have pushed what was the Ordovician seafloor to the highest elevation on Earth.

☑ **READING CHECK** Explain why marine fossils are present on top of Mount Everest.

**Tectonic forces continue** Many scientists think that Earth is now in a relatively warm phase and that in the future the climate will again become cooler. No one can predict when or if this will happen. What is clear is that the tectonic forces that have shaped Earth over the past 4.6 billion years continue today. Some scientists think that in 250 million years, those forces will have largely eliminated the Atlantic Ocean and pushed the continents together into another supercontinent, as shown in Figure 21.

### Future Continents (+250 million years)



Planetary Visions Ltd/Photo Researchers

■ Figure 21 The Atlantic Ocean has nearly disappeared in this hypothetical map of 250 million years in the future.

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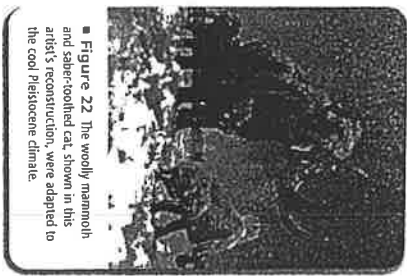
### Cenozoic Life

Many marine organisms, including clams, sea urchins, and sharks, survived the mass extinction at the end of the Cretaceous and populated the oceans during the Cenozoic. On land, forests dominated the early Cenozoic landscapes. As the climate cooled during the late Eocene, forests gave way to open land, and grasses appeared. By the late Oligocene, grassy savannas, like those in east Africa today, were common worldwide. The rise of grasslands led to the diversification of many new mammal groups. Because mammals are the dominant terrestrial animals, many scientists call the Cenozoic the Age of Mammals.

**Ice age mammals** As the ice ages began, the climate began to cool and new animals evolved in northern latitudes. Two of the most famous mammals of the late Pleistocene are the woolly mammoth and the saber-toothed cat, shown in Figure 22. By the time these animals roamed Earth, modern humans—called *Homo sapiens*—were well established.

**Humans** The defining characteristic of humans is their upright, or bipedal, locomotion. The fossil record, while incomplete, shows that the first bipedal humanlike primates appeared about 6 mya during the late Miocene. The fossil remains of the earliest modern humans—found in Africa—are about 195,000 years old.

**Migrations** The migrations of early humans were undoubtedly influenced by the ice ages of the late Pleistocene. For example, scientists think that the Bering Strait, which now separates Russia and Alaska, was exposed during the late Pleistocene because much of Earth's water was frozen in glaciers. It is likely that the humans who walked across the strait were North America's first inhabitants.



■ Figure 22 The woolly mammoth and saber-toothed cat, shown in this artist's reconstruction, were adapted to the cool Pleistocene climate.

## SECTION 3 REVIEW

### Section Summary

- Ice covered nearly one-third of Earth's land surface at the peak of the Cenozoic ice ages.
- The Cascade Mountains began to rise and the San Andreas Fault formed during the Cenozoic.
- The Cenozoic is known as the Age of Mammals.
- Fossil evidence suggests that modern humans appeared during the Pleistocene.

### Understand Main Ideas

1. MAIN IDEA Describe why the Cenozoic is called the Age of Mammals.
2. Assess the extent of glaciation in North America.
3. Discuss how the Basin and Range Province and the San Andreas Fault are tectonically related.
4. Explain how the positions of the continents contributed to Cenozoic climate change.

### Think Critically

5. Propose Why do you think early humans migrated?

### MAATHIN Earth Science

6. If the glacial ice on Earth were to melt, sea level would rise about 50 m above its current level. If sea level rose at an average rate of 2 mm per year, how long would it take for all the ice on Earth to melt? Use the following relationship: distance = rate × time

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Vocabulary Practice

- VOCABULARY**
- paleogeography
  - passive margin
  - transgression
  - regression
  - Cambrian explosion

SECTION 1 The Paleozoic Era

- MAIN IDEA** Life increased in complexity during the Paleozoic while the continents collided to form Pangaea.
- Scientists study sediment and evaporite deposits to learn how sea levels fluctuated in the past.
  - Eastern Laurentia was transformed by many mountain-building events during the Paleozoic.
  - A great diversity of multicellular life appeared during the first period of the Paleozoic.
  - The largest extinction event in Earth's history occurred at the end of the Paleozoic.

SECTION 2 The Mesozoic Era

- MAIN IDEA** Reptiles became the dominant terrestrial animals during the Mesozoic while Pangaea broke apart.
- The breakup of Pangaea triggered a series of tectonic events that transformed western Laurentia.
  - The Atlantic Ocean began to form during the Mesozoic as North America broke away from Europe.
  - Dinosaurs and other new organisms evolved to fill niches left empty by the Permo-Triassic Extinction Event.
  - All dinosaurs, except birds, along with many other organisms became extinct during a mass extinction event at the end of the Mesozoic.

SECTION 3 The Cenozoic Era

- MAIN IDEA** Mammals became the dominant terrestrial animals during the Cenozoic while the continents assumed their present forms.
- Ice covered nearly one-third of Earth's land surface at the peak of the Cenozoic ice ages.
  - The Cascade Mountains began to rise and the San Andreas Fault formed during the Cenozoic.
  - The Cenozoic is known as the Age of Mammals.
  - Fossil evidence suggests that modern humans appeared during the Pleistocene.

- VOCABULARY**
- Homo sapiens
  - bipedal

VOCABULARY REVIEW

Match the definitions below with the correct vocabulary term from the Study Guide.

1. the ancient geographic setting of an area
2. the organisms at the base of the marine food chain
3. the increase in diversity and abundance of marine life-forms at the beginning of the Paleozoic Era
4. the movement of a shoreline seaward as sea level falls

Use a vocabulary term from the Study Guide to answer each of the following.

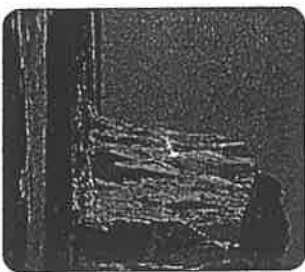
5. Which term is used to describe upright locomotion on two legs?
6. What metal is rare on Earth's surface but relatively common in asteroids?

Fill in the blanks with the correct vocabulary terms from the Study Guide.

7. The movement of a shoreline inland as sea level rises is called \_\_\_\_\_.
8. \_\_\_\_\_ are primates with bipedal locomotion.
9. The \_\_\_\_\_ was a reproductive feature that allowed reptiles to migrate widely on land.

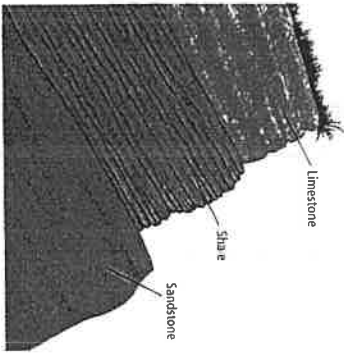
UNDERSTAND KEY CONCEPTS

10. Which was the dominant terrestrial life form during the Mesozoic Era?
  - A. mammals
  - B. dinosaurs
  - C. birds
  - D. fish
11. Which term describes a shoreline that is experiencing no tectonic activity?
  - A. active margin
  - B. passive margin
  - C. trench
  - D. regression
12. During which geologic time period did the Atlantic Ocean begin to form?
  - A. Triassic
  - B. Cretaceous
  - C. Jurassic
  - D. Devonian
13. What formed the deposits in the photo above?
  - A. asteroid residue
  - B. evaporation of seawater
  - C. faciation
  - D. phytoplankton
14. Where would these deposits most likely have formed?
  - A. ocean floor
  - B. shoreline
  - C. lagoon
  - D. coral reef
15. Which item could be made from this deposit?
  - A. laundry detergent
  - B. talcum powder
  - C. chalk
  - D. sponge
16. How much of Earth's land surface did glaciers cover at the height of the ice ages?
  - A. 10 percent
  - B. 60 percent
  - C. 30 percent
  - D. 90 percent
17. Which metal that is rare in Earth's rocks but relatively common in asteroids is used as evidence that there was an asteroid impact at the end of the Cretaceous?
  - A. iron
  - B. iridium
  - C. uranium oxide
  - D. zircon
18. Which supercontinent formed at the end of the Paleozoic?
  - A. Rodinia
  - B. Gondwana
  - C. Laurasia
  - D. Pangaea



Use the figure below to answer Questions 13 to 15.

Use the figure below to answer Questions 19 and 20.



19. What does the succession of rocks in the figure above indicate?
- a transgressive sequence where sea level rose
  - a regressive sequence where sea level fell
  - sea level fluctuated widely
  - an evaporitic deposit

20. Which is a likely origin of the limestone?
- compacted clay sediment
  - beach sand
  - remains of skeletons from phytoplankton
  - plant deposits
21. What is evidence of an arid climate in North America at the end of the Triassic?
- formation of a seaway
  - presence of ancient coral reefs
  - presence of ancient sand dunes
  - presence of a passive margin along the eastern edge

**CONSTRUCTED RESPONSE**

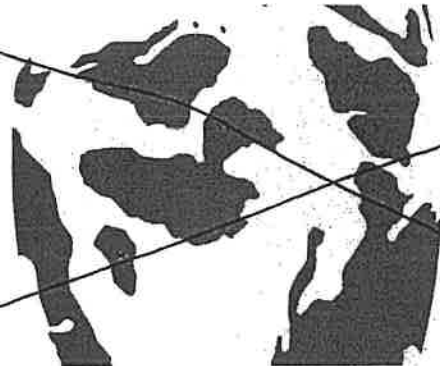
22. Explain how sea level changes changed the landscape after they evolved during the Carboniferous.
23. Explain why skeletal features distinguished dinosaurs from other reptiles.
24. Summarize why ancient coral reefs are good places to explore for oil.

25. Explain why there are few active volcanoes in Southern California but there is frequent earthquake activity.

26. Create a drawing that shows evidence of a regression.
27. Compare the subduction rates and angles of the three phases of the Cordilleran Orogeny.
28. Describe how sea-level change and glaciation are related.
29. Explain why volcanic ash deposits can be used as evidence of an ancient orogeny.

**THINK CRITICALLY**

Use the figure below to answer Questions 30 and 31.



30. Explain how and where India, the continent labeled X in this diagram of Earth during the Mesozoic, is moving.
31. Generalize. Elephants today are present naturally only in Africa and Asia. Discuss how the theory of plate tectonics might explain this.
32. Discuss how the breakup of a supercontinent might lead to the formation of a new ocean.

33. Summarize how the Appalachian Mountains near the east coast of North America, are evidence that this coast was once an active margin.

Use the figure below to answer Question 34.



34. Explain how a major regression might stress the organisms pictured above.

35. **CAREERS IN EARTH SCIENCE** Explain why the discovery of the remains of an ancient coral reef would be exciting news to a petroleum geologist.
36. Propose what Earth might be like today if a meteorite had not struck it at the end of the Cretaceous.
37. Evaluate the relationship between extinction events and the evolution of life. Give an example.
38. Evaluate how Earth would be different if Antarctica were not over the south pole but were at a latitude similar to that of Australia.
39. Evaluate Use Figure 10 to evaluate and explain sea level during the late Cretaceous.

**CONCEPT MAPPING**

40. Create a concept map of the three eras of the Phanerozoic with examples of the different organisms that evolved in each era.

**CHALLENGE QUESTION**

41. Explain how heat generated in Earth's interior can cause continents to rift apart.

**WRITING IN Earth Science**

42. Write a report that summarizes and illustrates how too much dust in the atmosphere could ultimately cause the death of a minimal population.

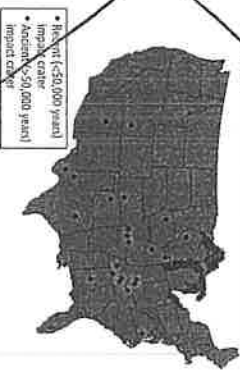
**DBQ Document-Based Questions**

Data obtained from: Evans, K.R. et al. 2005. The sedimentary record of meteorite impacts: an SFPA research conference. *The Sedimentary Record* 3:4-8.

You learned in this chapter that a meteorite impact can affect life on Earth. How common are meteorite impacts? Recent work shows that there are more impact sites preserved on Earth than you might expect.

Use the data to answer the questions below.

**Impact Craters in the Continental U.S.**



43. What percentage of impacts have occurred within the past 50,000 years?
44. Describe how the impact sites are distributed.
45. Hypothesize a reason for the distribution pattern.

**CUMULATIVE REVIEW**

46. Where are most earthquake epicenters? What is the depth of most earthquakes? Explain your answers. (Chapter 19)
47. Give examples of coarse-grained, medium-grained, and fine-grained classic sedimentary rocks. (Chapter 6)



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Remind 101 codes: Text the appropriate code to 81010  
6th grade: @hill6hcm  
7th grade: @hill7hcm  
8th grade: @hill8hcm

*Log in on your School Google Account To get To The Google Classroom Page.*

*First - last@stu.harrison.kyschools.us*

Welcome to 6th, 7th, and 8th grade

## Explore

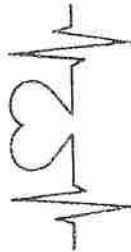
Fine dining restaurant for a well-rounded mind.

NTI 26-30

**Choose 1** of the following activities to complete during the week of April 20th - April 24th.

Each student in the school must complete this assignment!

Appetizer	Main Course	Dessert
Phys. Ed. Explore the thrill of creation through designing your own cardiovascular workout regimen!	Agriculture Travel through time and explore how agriculture has changed over the years!	Music Explore the power of music to underscore and express life events and personal characteristics by creating a soundtrack to your life!



Contact information for each teacher found on the next page!

*\*Name*

# PE NTI Days 26-30: Day 4

## FITNESS HOMEWORK – WHY?

So why are we going to have fitness homework for NTI?

- To make sure you are getting your 30-60 mins a day
- To learn how to train to reach our fitness goals
- To reinforce concepts learned in class

### *Did you know????*

1. As many as **676,000 deaths** per year can be attributed to the lack of physical activity.
2. The average child middle school students gets 5-8 hours screen time a day.
3. Excess body weight during adolescence may lead to low self esteem and poor social health.
4. Children are more likely to exercise when their parents exercise.
5. Each hour of exercise adds two hours to your life expectancy.

A healthy lifestyle must be reinforced at home as well as at school. That is why it is so important to start positive exercise habits at a young age.

### Assignment – Physical – 30 min. cardiovascular workout of your choice.

Activity: \_\_\_\_\_

Parent Signature(Required): \_\_\_\_\_

I participated with my child: Yes \_\_\_\_\_ No \_\_\_\_\_

### Assignment – Written

1. Which fitness fact from above stood out to you? And why? (parent or child may answer)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. What physical activity do you enjoy the most?

Student: \_\_\_\_\_

Parent: \_\_\_\_\_

3. Why is a parent signature required for each homework assignment?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PE NTI Days 26-30: Day 2

Fitness Homework - Math connection

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

In PE, you would be learning how to calculate a target heart rate range. For homework, your assignment is to use YOUR AGE, and YOUR RESTING HEART RATE to calculate a PERSONAL target heart rate range. Then answer the questions and have your parent/guardian sign your work. Remember to keep your decimal points lined up.

**Calculating YOUR Target Heart Rate Range**

Purpose: To identify a PERSONAL target heart rate zone; which is a safe and comfortable level at which to perform physical activities.

Procedure: Study the example provided before completing this activity

	EXAMPLE	FOR YOU	
		LOWER LIMIT	UPPER LIMIT
Start with 220	220	220	220
Subtract <b>your</b> age	-20	= _____	= _____
Equals Maximum Heart Rate (MHR) Maximum times heart should beat/min.	200	= _____	= _____
Subtract <b>YOUR</b> Resting Heart Rate	-70	= _____	= _____
Multiply by: 60% - Lower Limit 80% - Upper Limit	130 x .60	= _____ x .60	= _____ x .80
Add Resting Heart Rate	78.00 + 70.00	= _____ +	= _____ +
Equals Target Heart Rate (THR)	158 Beats per minute	Beats per minute	Beats per minute
		<b>YOUR THR</b>	

1. What does it mean if your heart rate is not within your target heart rate range when you are done exercising or participating in a physical activity?

\_\_\_\_\_

2. What should you do if you take your pulse (heart rate) during activity and it is above your target heart rate range? **WHY?**

\_\_\_\_\_

3. What should you do if you take your pulse (heart rate) during activity and it is below your target heart rate range? **WHY?**

\_\_\_\_\_

Parent/Guardian Signature Required: \_\_\_\_\_

# PE NTI Days 26-30: Day 1

Cardio Graph Worksheet - Follow the directions below, placing a dot on the line above each category to represent your score. At the end, you will connect the dots to form a line graph.

Name: \_\_\_\_\_ Parent Signature: \_\_\_\_\_

Bpm	Activities											
	Resting Heart Rate	Walk Backwards	Brisk Walk Forward	Grapevine	Jog	Skip	Jump Rope	Jumping Jacks	Squat Jumps	Lunges	Mountain Climbers	Run in Place
200												
190												
180												
170												
160												
150												
140												
130												
120												
110												
100												
90												
<80												

## Activities

Before participating in the activities, record your resting heart rate: \_\_\_\_\_. You will now participate in each of the activities listed on the graph for 1 minute. After each activity, quickly locate your pulse and count your beats for 10 seconds. Multiply the number of heart beats you counted by 6. This is your BPM on the graph. After the cool down walk, your heart rate was \_\_\_\_\_. Look at the pattern that developed on your personal Cardio Graph as you charted your heart rate for each activity.

How does the exercise affect your heart rate? \_\_\_\_\_

What could you have done to increase your heart rate? \_\_\_\_\_

What could you have done to decrease your heart rate? \_\_\_\_\_

Did you give your best effort? Why or Why not? \_\_\_\_\_

# PE NTI Days 26-30: Day 3

## FITNESS HOMEWORK : Cardiovascular Exercise

### Types of Cardiovascular Exercise

There many **types of cardiovascular exercise**. Cardiovascular exercise is something that involves using the larger muscles like your legs. So as you can imagine there are many different way to do this. They can be divided up into a number of different categories. Indoors and outdoors exercise and with or without special exercise equipment.

### Outdoor Cardiovascular Exercise

This includes running, walking, jogging, bicycling, jump-roping, swimming and some types of skiing

### Indoor Cardiovascular Exercise

The indoor types of cardiovascular exercise include using treadmills, stationary bicycles, stair climbers, rowing machines, elliptical trainers and ladder climbers.

You may have noticed from the list above that for the most part the types of cardiovascular exercises you can do outside tend to be the ones that do not need any kind of special equipment. That is true for the most part. However, even when running or walking you should make sure that you wear the right kind of shoes - or you may injure your feet. Also, when bicycling you should wear a helmet. And of course, you need a jump rope to be able to go jump-roping!

For the most part though the indoor equipment is kind of expensive stuff. You may want to try some yard sales to see if you can find some of that equipment cheaper there first.

But, overall there are still many different types of cardiovascular exercise. What is best for one person may not be for another, depending upon your needs.

### Assignment – Physical – 30 min. cardiovascular workout of your choice.

Activity: \_\_\_\_\_

Parent Signature (Required): \_\_\_\_\_

I participated with my child: Yes \_\_\_\_\_ No \_\_\_\_\_

1) What makes an exercise a cardiovascular exercise?

2) List three indoor cardiovascular exercises.

3) List three outdoor cardiovascular exercises.

# PE NTI Days 26-30: Day 5

## FITNESS HOMEWORK : Cardiovascular Exercise

### Benefits of Cardiovascular Exercise

There are many health **benefits of cardiovascular exercise**. It can also have a number of psychological benefits - it can help you feel stronger and more capable, happier, more energetic, etc.

#### ***It can burn a lot of calories***

One of the benefits of cardiovascular exercise is that it is a good way to burn calories. Still, to lose weight with cardiovascular exercise - you need to do it for longer periods of time and more frequently to lose weight. It is best to try and both decrease your caloric intake and start a cardiovascular exercise program at the same time.

#### ***Can raise you metabolic rate***

Some studies have shown that with regular cardiovascular exercise your resting metabolic level will increase. This is one way in which it can help you to lose weight.

#### ***Decreases Risk of cardiovascular disease***

Some research suggests that even just walking 20 minutes, three times a week and can lower your risk of heart diseases

Assignment – Physical – 30 min. cardiovascular workout of your choice.

Activity: \_\_\_\_\_

Parent Signature (Required): \_\_\_\_\_

I participated with my child: Yes \_\_\_\_\_ No \_\_\_\_\_

1) What lowers your risk of heart disease?

2) How does a cardiovascular workout help you lose weight?

3) List three benefits of cardiovascular exercise.

# Agriculture

**(Part 1):** Read through the provided documents that discuss how agriculture has changed over the years. After reading these, answer the questions on the pages titled History of Agriculture Production and Name the Equipment. After you have finished part one, you will move on to part two.

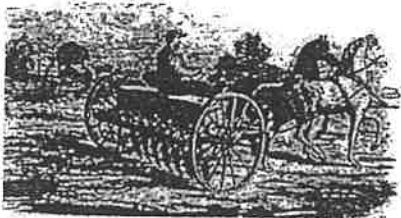
## Time Travel: The History of American Agriculture

**1493:** Christopher Columbus brings calves, goats, sheep, pigs, chickens, melons and many vegetables to America.

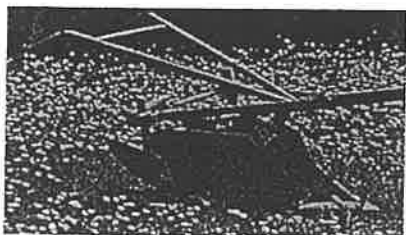
**1607:** English Colonists in Jamestown, Virginia plant grain potatoes, pumpkins, melons, cotton and oranges.

**1609:** Indians teach the Jamestown settlers how to grow corn.

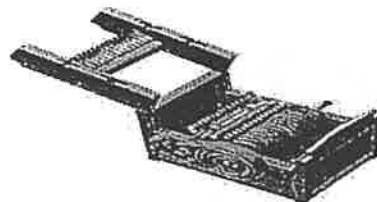
**1731:** Jethro Tull introduced the horse-drawn cultivator and seed drill into English farming which allowed people to plant seeds much quicker than by hand.



**1784:** James Small invents the iron plow in England to help break up the soil.



**1793:** Eli Whitney invents the cotton gin which helps separate the cotton from the seeds saving a lot of time and human labor.



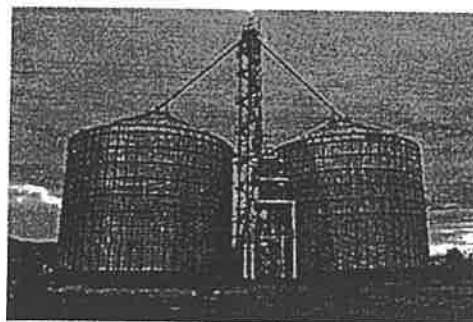
< Cotton Gin

**1798:** John Chapman (Johnny Appleseed) plants his first apple nursery in western Pennsylvania.

**1831:** Cyrus McCormick invents the reaper that helps to cut crops.

**1837:** John Deere begins to manufacture steel plows.

**1842:** The first grain elevator is used in New York to move and store grains.



**1847:** Irrigation methods begin to help water crops during dry periods.

**1850:** S.S. Rembert and J. Prescott develop a mechanical cotton picking machine.

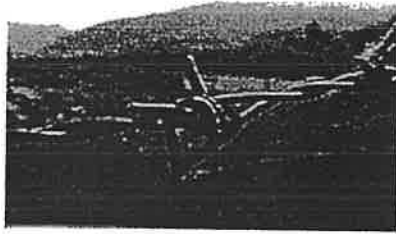
**1855:** Michigan and Pennsylvania establish the first state agriculture colleges.

**1858:** Mason jars are invented and are commonly used to help store canned goods.

**\*\* For additional agriculture assignments, feel free to visit Mrs. Farrow NTI Google Classrooms. (The code can be found on the front of the Explore NTI Packet.)**

**1862:** President Abraham Lincoln signs legislation creating the first Department of Agriculture.

**1867:** Barbed wire used for fencing is invented to help keep in animals.



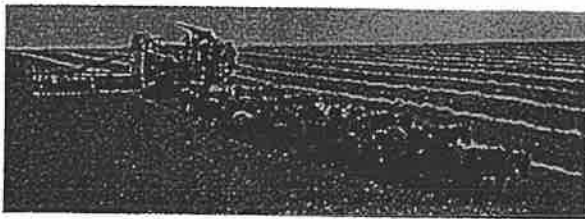
**1868:** Steam tractors are tested.



**1869:** Transcontinental railroad was finished allowing quicker movement of goods from East to West.

**1875:** The first silos are built for grain storage.

**1884:** Horse drawn combines are used.



**1888:** The first long-haul shipment of a refrigerated freight (train) car goes from California to New York.

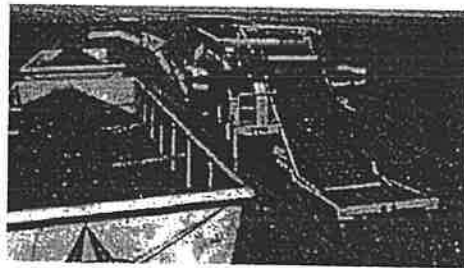
**1890:** Cream separators are used to separate the cream from whole milk. This gives us cream for things like butter.

**1892:** John Froelich builds first gasoline tractor.

**1927:** All-purpose, rubber tired tractor with machinery is used.

**1936:** A hay baler with a self-tie system was invented.

**1959:** The mechanical tomato harvester is developed.



**1970-80s:** Minimum tillage agriculture is popularized to help reduce the risk of soil erosion (soil getting washed/blown away).

**1994:** Farmers begin using GPS to track and plan their farming.

**2000:** Ethanol (a renewable fuel made from plants like corn) use increases with 1.63 billion gallons produced.

**2000-Present:** Many previous inventions have been updated throughout the years and have made farming easier. (See some examples of these in the current equipment section of the notes.) New technologies like self-driving tractors, new crop varieties, new planting techniques, and many more things are continuing to be developed daily which will change the future of agriculture.



**Objective 1:** Describe agriculture's role in developing civilizations.

**Anticipated Problem:** How does agriculture develop civilizations?

- I. A *civilization* is a group of people who settle in one place. In order for a civilization to survive in that place they must have food.
  - A. One way to obtain food is by hunting and gathering. If a civilization depends on this method of obtaining food, it must designate members of the group to be *hunters and gatherers*, people who go out and find food for everyone. Eventually, the group will use up all local sources of food or the population will outgrow the supply.
  - B. Another way to obtain food is to plant, care for, and harvest crops.
    1. Early civilizations found that for them to establish a community and remain in the same place, it was necessary to plant food and to tame animals. This was the beginning of agriculture science.
    2. As people began planting food and raising animals, they immediately began looking for better ways to care for plants and animals. Through scientific experimentation they began improving the science of agriculture.
    3. As people became more dependent on land and animals, they began to practice *stewardship*. *Stewardship* is the practice of taking care of land and animal resources so they can benefit future generations.

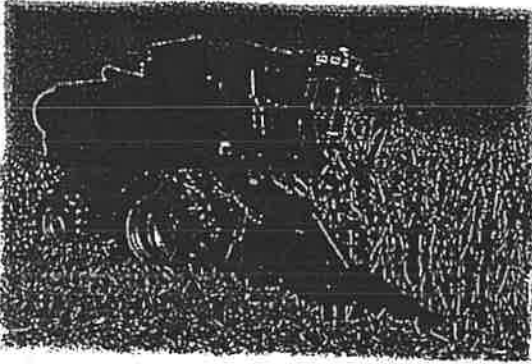
**Objective 2:** Identify some of the inventions that changed the agriculture industry.

**Anticipated Problem:** What are some of the major inventions that changed the agriculture industry?

- II. In early agricultural practices, seeds were planted and harvested by hand. Over time a number of inventions and innovations have advanced farming practices to their current state.
  - A. In 1831, Cyrus McCormick invented a mechanical reaper that made harvesting crops more efficient. The *reaper* was a machine pulled by horses that was used to cut wheat at the base of the stem. Prior to the invention, plants had to be cut by hand and bundled into shocks and stacked.
  - B. In 1837, John Deere began manufacturing a plow with a steel cutting edge, called a *steel plow*. This steel plow was light enough that horses could pull it through the ground, while at the same time it was strong enough to break up heavy prairie soil.
  - C. Soon after McCormick's reaper was invented, a thresher was invented. A *thresher* separates the grain from the stem of the plant. Farmers would pick up the stalks cut by the reaper and then hand-feed them through the thresher. After the invention of the internal combustion engine, these two machines were combined to make a combine.
  - D. An *internal combustion engine* is a device that uses fuel to create energy which is then used to do work. The invention of this engine led to the invention of tractors and combines. Work that once took days to do by hand could now be done in minutes.

## COMBINE

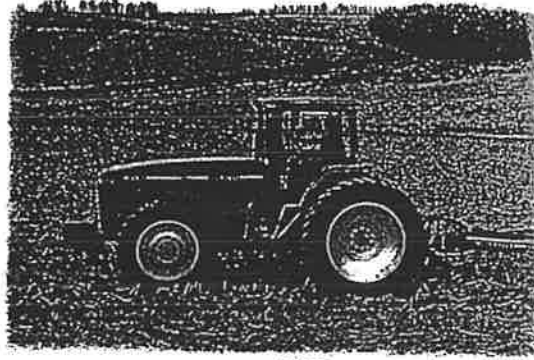
A combine is a machine that picks crops from the field and separates the grain from the stems, cobs, or pods. The grain is then stored in a large bin behind the cab. When the bin is full, the auger, or arm, on the side of the combine moves the grain from the combine into a grain truck or wagon.



(Courtesy, Case Corporation)

## TRACTOR

Tractors do many jobs on a farm. Because of their powerful engines, they are mostly used to pull heavy machines like plows and planters. Their large tires provide traction.



(Courtesy, Deere and Company)

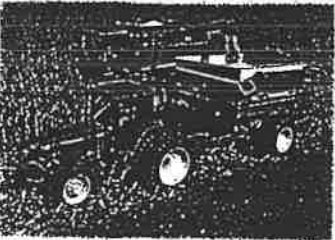
# Current Agriculture Equipment

## GRAIN TRUCK AND WAGON

Farmers use grain trucks and wagons to move grain from the field to grain bins or the grain elevator.



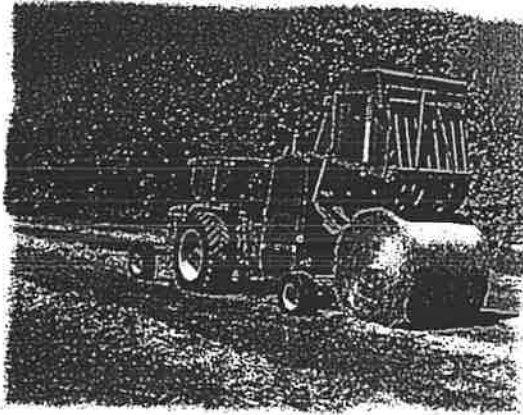
(Courtesy, U.S. Department of Agriculture)



(Courtesy, Deere and Company)

## BALER

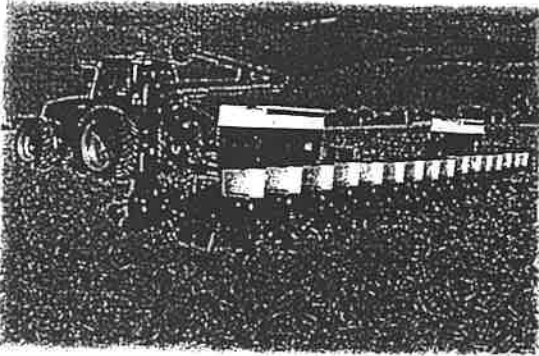
A baler is used to wrap hay or straw into round or rectangular bales. The baler packs the hay or straw tightly and ties it together with wire or twine.



(Courtesy, Deere and Company)

## PLANTER

The planter places seeds into the ground as a tractor pulls it through the field. The seeds are loaded into tanks on the planter. The machine creates a row and drops the seed in the row. The seed is then covered with a layer of soil.



*(Courtesy, Case Corporation)*

## TRACTOR WITH LOADER

The loader is a scoop or bucket located on the front of a tractor that is used like a large shovel. It helps farmers move hay, straw, gravel, dirt, and manure around the farm.

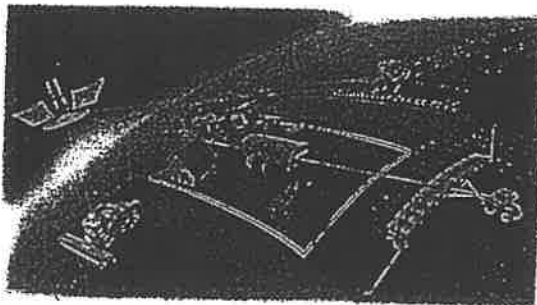


*(Courtesy, Deere and Company)*

# Current Agriculture Equipment

## GLOBAL POSITIONING SYSTEM AND GEOGRAPHIC INFORMATION SYSTEM

GPS works through satellites and computers in the tractor to pinpoint exact location. GIS is then used to make a grid for each field to tell farmers how to prepare and maintain the soil and crops in that field.



*(Courtesy, Deere and Company)*



Name \_\_\_\_\_

## HISTORY OF PRODUCTION AGRICULTURE

### ▶ Matching

Instructions: Match the word with the correct definition.

- a. combine
- b. thresher
- c. reaper
- d. loader
- e. tractor

1. Powerful machine used to pull other farm implements.
2. A machine that separates grain from the stalk.
3. This machine is a combination of a reaper and a thresher.
4. A machine invented in 1831 by Cyrus McCormick.
5. Large bucket on the front of a tractor.

### ▶ Fill-in-the-Blank

Instructions: Complete the following statements.

1. \_\_\_\_\_ was the first person to manufacture the steel plow.
2. A \_\_\_\_\_ packs hay or straw into tight bales.
3. Global Positioning Systems use \_\_\_\_\_ and \_\_\_\_\_ to pinpoint locations within a field.

### ▶ Short Answer

Instructions: Answer the following question.

What are two major inventions that changed the agriculture industry? Explain how they changed ag.

Name \_\_\_\_\_

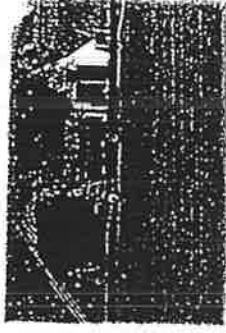
## NAME THE EQUIPMENT

### ▶ Directions

Write the name of the piece of equipment on the line under its photo.



1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_

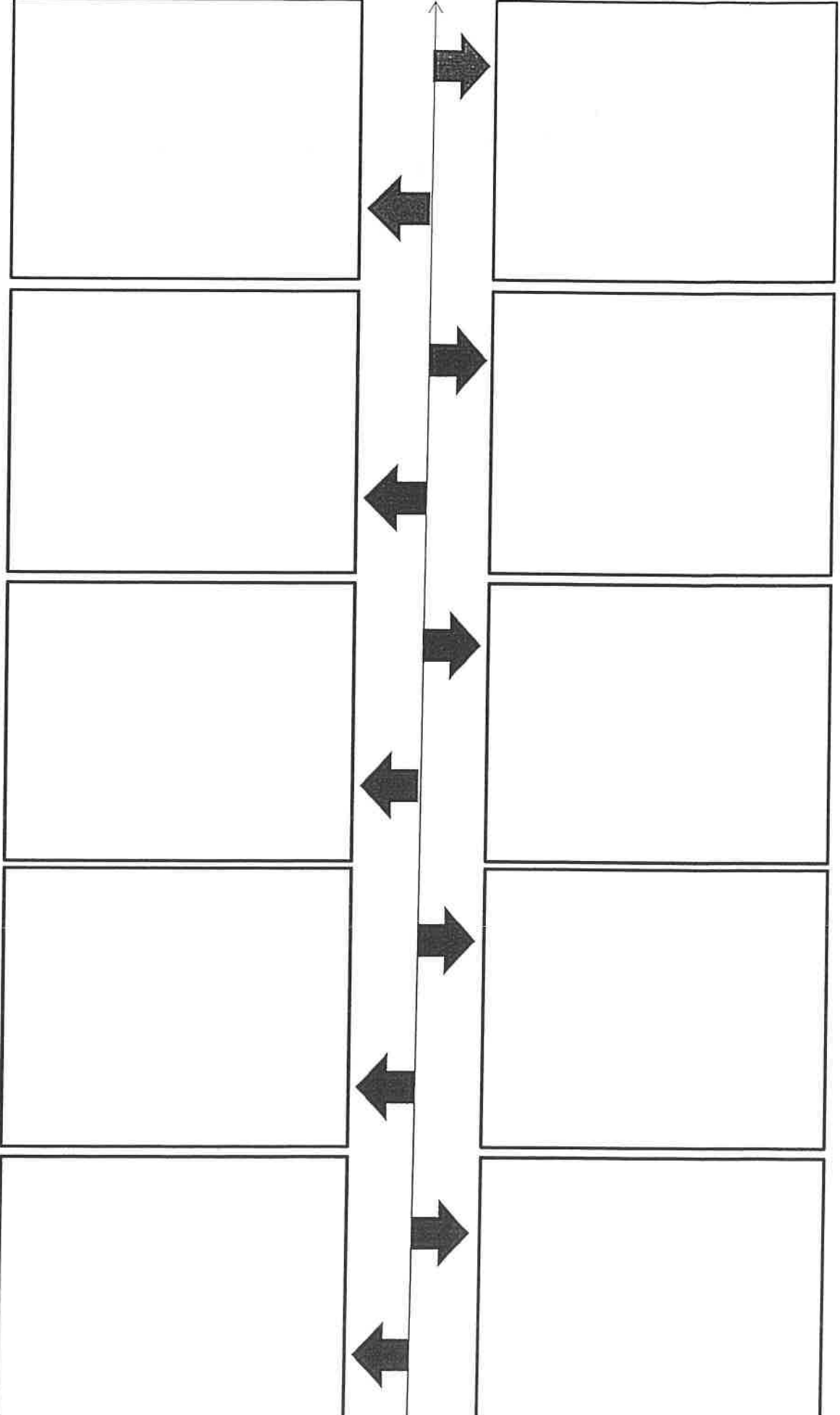


6. \_\_\_\_\_

**(Part 2):** For this part of the assignment, you will be creating a timeline to show how agriculture has changed over the years. You will use the timeline template provided below to do this. For your timeline, complete the following:

- You need to choose at least 10 historical agriculture related events that you feel were important.
- Make sure you list the **year the event occurred**. **Then** briefly describe **what happened and why it was important / how it helped agriculture**.
- In addition to the written information, **draw a small image that relates to what happened during this year**. You may color these if you wish.

*You must use the notes provided to you in Part 1 to help you complete this part of the assignment. You are also encouraged to research and find out more information about the history of agriculture to help you with this part of the assignment if you can.*



**(Part 3):** Based on what you have learned during this lesson, summarize how agriculture has changed over the years in one paragraph (5-8 sentences). *Hint: Think about how things were done before technology / machinery was used and how things have changed since then. You may also include discussions of how specific inventions changed agriculture.* Use the space below to complete this part of the assignment.

# THE SOUNDTRACK OF MY LIFE

*Lesson Plan for Middle School Music*

*Prepared by Mrs. Eastman*

## PROMPT

In every great movie, there is a soundtrack that underscores the drama of what happens in the plot. The composer John Williams wrote musical themes for each of the main characters in the Star Wars movies. If a movie were to be made about you, what type of music would be in the soundtrack? Create an imaginary music album that shows who you really are. You may use existing songs or create original songs to describe events in your life or your personality. Finally, design an artistic cover for your album.

## THE PLAYLIST

1. Choose *at least* five songs to include for your playlist. Remember, you can use existing songs or come up with your own.
2. Write down your song list on a separate sheet of paper. Put the playlist in the order you like best.
3. For each song, write liner notes that include the following: musical genre of the song, the tempo, the time signature, type of musical ensemble performing the song, the mood of the song, and why it is relevant to your life.

## COVER ART

Create an album cover for the Playlist of Your Life. You can title the album whatever you like. Include that on the cover.

