

8 Maroon NTI Packets Days 11-20

Teachers:

Mrs. Lemons: Reading

Mr. Persinger: Math

Mr. McEwan: Social Studies

Ms. Klausman: Science

Attached you will find work for each day 11- 20. You will have a reading, math, social studies, and science assignment for EACH DAY! In addition, there is an Explore Team packet 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). On the back of this paper you will find the emails for each of your teachers, WE WILL

BE CHECKING EMAILS OFTEN THROUGHOUT EACH DAY. PLEASE, PLEASE EMAIL US FOR HELP.

Also, if you want to just check-in with us, say "hello", or if you need something, then please email us. We ARE NOT deserting you. We want to hear from you. So, please email us!

In addition, your parents/adults will be receiving phone calls from your teachers throughout this time away from school. We will be checking in and seeing if there is something you need from us, especially NTI packets or food. Most importantly, however, we will be checking on YOU!!! So, feel free to ask if you can talk with us when we call. We are rotating calls, so if you do not hear from everyone one of your core teachers, it is only because of the rotation and NOT because we didn't want to talk to you :) . We are hoping to talk to all of you! Be safe, wash your hands! We miss you!

John McEwan: Social Studies, john.mcewan@harrison.kyschools.us

Shari Klausman: Science, shari.klausman@harrison.kyschools.us

Carol Doyle: Resource, carol.doyle@harrison.kyschools.us

Rodney Persinger: Math, Rodney.persinger@harrison.kyschools.us

Stacy Lemons: Language Arts/ Team Leader, stacy.lemons2@harrison.kyschools.us



**NATIONAL ASSOCIATION OF
School Psychologists**



*National
Association of
School Nurses*

February 29, 2020

Talking to Children About COVID-19 (Coronavirus) A Parent Resource

A new type of coronavirus, abbreviated COVID-19, is causing an outbreak of respiratory (lung) disease. It was first detected in China and has now been detected internationally. While the immediate health risk in the United States is low, it is important to plan for any possible outbreaks if the risk level increases in the future.

Concern over this new virus can make children and families anxious. While we don't know where and to what extent the disease may spread here in the United States, we do know that it is contagious, that the severity of illness can vary from individual to individual, and that there are steps we can take to prevent the spread of infection. Acknowledging some level of concern, without panicking, is appropriate and can result in taking actions that reduce the risk of illness. Helping children cope with anxiety requires providing accurate prevention information and facts without causing undue alarm.

It is very important to remember that children look to adults for guidance on how to react to stressful events. If parents seem overly worried, children's anxiety may rise. Parents should reassure children that health and school officials are working hard to ensure that people throughout the country stay healthy. However, children also need factual, age appropriate information about the potential seriousness of disease risk and concrete instruction about how to avoid infections and spread of disease. Teaching children positive preventive measures, talking with them about their fears, and giving them a sense of some control over their risk of infection can help reduce anxiety.

Specific Guidelines

Remain calm and reassuring.

- Children will react to and follow your verbal and nonverbal reactions.
- What you say and do about COVID-19, current prevention efforts, and related events can either increase or decrease your children's anxiety.
- If true, emphasize to your children that they and your family are fine.
- Remind them that you and the adults at their school are there to keep them safe and healthy.
- Let your children talk about their feelings and help reframe their concerns into the appropriate perspective.

Make yourself available.

- Children may need extra attention from you and may want to talk about their concerns, fears, and questions.
- It is important that they know they have someone who will listen to them; make time for them.
- Tell them you love them and give them plenty of affection.

Avoid excessive blaming.

- When tensions are high, sometimes we try to blame someone.
- It is important to avoid stereotyping any one group of people as responsible for the virus.
- Bullying or negative comments made toward others should be stopped and reported to the school.
- Be aware of any comments that other adults are having around your family. You may have to explain what comments mean if they are different than the values that you have at home.

Monitor television viewing and social media.

- Limit television viewing or access to information on the Internet and through social media. Try to avoid watching or listening to information that might be upsetting when your children are present.
- Speak to your child about how many stories about COVID-19 on the Internet may be based on rumors and inaccurate information.
- Talk to your child about factual information of this disease—this can help reduce anxiety.
- Constantly watching updates on the status of COVID-19 can increase anxiety—avoid this.
- Be aware that developmentally inappropriate information (i.e., information designed for adults) can cause anxiety or confusion, particularly in young children.
- Engage your child in games or other interesting activities instead.

Maintain a normal routine to the extent possible.

- Keep to a regular schedule, as this can be reassuring and promotes physical health.
- Encourage your children to keep up with their schoolwork and extracurricular activities, but don't push them if they seem overwhelmed.

Be honest and accurate.

- In the absence of factual information, children often imagine situations far worse than reality.
- Don't ignore their concerns, but rather explain that at the present moment very few people in this country are sick with COVID-19.
- Children can be told this disease is thought to be spread between people who are in close contact with one another—when an infected person coughs or sneezes.
- It is also thought it can be spread when you touch an infected surface or object, which is why it is so important to protect yourself.
- For additional factual information contact your school nurse, ask your doctor, or check the <https://www.cdc.gov/coronavirus/2019-ncov/index.html> website.

Know the symptoms of COVID-19.

- The CDC believes these symptoms appear in a few days after being exposed to someone with the disease or as long as 14 days after exposure:
 - Fever
 - Cough
 - Shortness for breath
- For some people the symptoms are like having a cold; for others they are quite severe or even life threatening. In either case it is important to check with your child's healthcare provider (or yours) and follow instructions about staying home or away from public spaces to prevent the spread of the virus.

Review and model basic hygiene and healthy lifestyle practices for protection.

- Encourage your child to practice every day good hygiene—simple steps to prevent spread of illness:
 - Wash hands multiple times a day for at least 20 seconds (singing Twinkle, Twinkle Little Star slowly takes about 20 seconds).
 - Cover their mouths with a tissue when they sneeze or cough and throw away the tissue immediately, or sneeze or cough into the bend of their elbow. Do not share food or drinks.

- Practice giving fist or elbow bumps instead of handshakes. Fewer germs are spread this way.
- Giving children guidance on what they can do to prevent infection gives them a greater sense of control over disease spread and will help to reduce their anxiety.
- Encourage your child to eat a balanced diet, get enough sleep, and exercise regularly; this will help them develop a strong immune system to fight off illness.

Discuss new rules or practices at school.

- Many schools already enforce illness prevention habits, including frequent hand washing or use of alcohol-based hand cleansers.
- Your school nurse or principal will send information home about any new rules or practices.
- Be sure to discuss this with your child.
- Contact your school nurse with any specific questions.

Communicate with your school.

- Let your school know if your child is sick and keep them home. Your school may ask if your child has a fever or not. This information will help the school to know why your child was kept home. If your child is diagnosed with COVID-19, let the school know so they can communicate with and get guidance from local health authorities.
- Talk to your school nurse, school psychologist, school counselor, or school social worker if your child is having difficulties as a result of anxiety or stress related to COVID-19. They can give guidance and support to your child at school.
- *Make sure to follow all instructions from your school.*

Take Time to Talk

You know your children best. Let their questions be your guide as to how much information to provide. However, don't avoid giving them the information that health experts identify as critical to ensuring your children's health. Be patient; children and youth do not always talk about their concerns readily. Watch for clues that they may want to talk, such as hovering around while you do the dishes or yard work. It is very typical for younger children to ask a few questions, return to playing, then come back to ask more questions.

When sharing information, it is important make sure to provide facts without promoting a high level of stress, remind children that adults are working to address this concern, and give children actions they can take to protect themselves.

Information is rapidly changing about this new virus—to have the most correct information stay informed by accessing <https://www.cdc.gov/coronavirus/2019-ncov/index.html>.

Keep Explanations Age Appropriate

- Early elementary school children need brief, simple information that should balance COVID-19 facts with appropriate reassurances that their schools and homes are safe and that adults are there to help keep them healthy and to take care of them if they do get sick. Give simple examples of the steps people take every day to stop germs and stay healthy, such as washing hands. Use language such as "adults are working hard to keep you safe."
- Upper elementary and early middle school children will be more vocal in asking questions about whether they truly are safe and what will happen if COVID-19 comes to their school or community. They may need assistance separating reality from rumor and fantasy. Discuss efforts of school and

community leaders to prevent germs from spreading.

- Upper middle school and high school students are able to discuss the issue in a more in-depth (adult-like) fashion and can be referred directly to appropriate sources of COVID-19 facts. Provide honest, accurate, and factual information about the current status of COVID-19. Having such knowledge can help them feel a sense of control.

Suggested Points to Emphasize When Talking to Children

- Adults at home and school are taking care of your health and safety. If you have concerns, please talk to an adult you trust.
- Not everyone will get the coronavirus (COVID-19) disease. School and health officials are being especially careful to make sure as few people as possible get sick.
- It is important that all students treat each other with respect and not jump to conclusions about who may or may not have COVID-19.
- There are things you can do to stay healthy and avoid spreading the disease:
 - Avoid close contact with people who are sick.
 - Stay home when you are sick.
 - Cover your cough or sneeze into your elbow or a tissue, then throw the tissue in the trash.
 - Avoid touching your eyes, nose, and mouth.
 - Wash hands often with soap and water (20 seconds).
 - If you don't have soap, use hand sanitizer (60–95% alcohol based).
 - Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe.

Additional Resources

Talking With Children: Tips for Caregivers, Parents, and Teachers During Infectious Disease Outbreaks, <https://store.samhsa.gov/product/Talking-With-Children-Tips-for-Caregivers-Parents-and-Teachers-During-Infectious-Disease-Outbreaks/SMA14-4886>

Coping With Stress During Infectious Disease Outbreaks, <https://store.samhsa.gov/product/Coping-with-Stress-During-Infectious-Disease-Outbreaks/sma14-4885>

Centers for Disease Control and Prevention, Coronavirus Disease 2019 (COVID-19), <https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html>

Handwashing and Hand Sanitizer Use at Home, at Play, and Out and About, <https://www.cdc.gov/handwashing/pdf/hand-sanitizer-factsheet.pdf>

For more information related to schools and physical and mental health, visit www.nasponline.org and www.nasn.org.

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Days 11-20
NTI Assignments
English/Language Arts
(All Koch and Lemons Classes)

8th Grade Gold and Maroon

Days 11-15

You will be reading the short story “Charles” by Shirley Jackson. As we have done with our other literature, you will learn about the author, study vocabulary from the story, review parts of the plot, quiz for comprehension, and do an extension activity.

Day 11: Read the Shirley Jackson biographies and answer questions.

Day 12: Read “Charles”. You have been given a copy and here is the audio link if you would like to listen. <https://www.youtube.com/watch?v=gisDfJJ7N9g> Then complete the vocabulary assignment. The definitions and parts of speech are located in the story’s sidebars and footnotes. To complete the last column of your vocabulary paper, find the sentence in the story that contains the word. Then copy that sentence into the box.

Day 13: Review/Reread “Charles”. Answer questions 1-8 and complete the chart on the back using information from the plot of “Charles”. Answer questions on any white space on the page.

Day 14: Review the story “Charles” and make your own graphic novel version of the story. Use the comic strip template and create 6 scenes from “Charles” that capture the plot. Feel free to use dialogue bubbles, thought bubbles, and short captions to help retell the story. Need some inspiration, watch the video link <https://www.youtube.com/watch?v=xLcko89cjQc> of our friend, graphic novelist, Nathan Hale as he tells/illustrates the story of The Mayflower.

Day 15: Complete the 25 question quiz over “Charles”. You may use the story to help you on the quiz.

Days 16-20

Read paired texts and consider how they work together and share ideas. This week you will also review word choice through connotations and denotations and figurative language. Finally you will be able to do some independent reading and writing practices.

Day 16: Read and answer questions to “The Battle Picnic” and “Pandora’s Box”. For additional info regarding “The Battle Picnic” view the following video

<https://www.youtube.com/watch?v=i2UleKAxli0> . Here’s a video you may view for more information regarding the myth of “Pandora’s Box”.

<https://www.youtube.com/watch?v=pMdJxVjZMRI>

Day 17: Read and answer questions regarding Connotations, Denotations, and Figurative Language.

Day 18: Writing Wednesday- Read the 3.8 writing prompt and complete the 3.8 paragraph template with your thoughts regarding the content of your paragraph. Finally on the lined page write your 3.8 paragraph about COVID-19.

Day 19: Independent Reading Day- Read for at least 20 minutes and keep track of your progress. Tell what you read and 5 write questions about the reading or a summary of what you read. You may read anything of your choice. Refer to the “Independent Reading” page for more ideas for reading materials and links to additional reading materials.

Day 20: Journal Write- Complete the Persuasive Journal to save a pig’s life!

******The video links listed for Lesson 11-20 are not required. They are just additional resources.******

If you have any questions, you can contact us three different ways:

1. Call the school 234-7123
2. Email katie.koch@harrison.kyschools.us or stacy.lemons2@harrison.kyschools.us
3. Text Mrs. Koch (859) 519-6506 or Mrs. Lemons (859) 298-4048

BIOGRAPHY



NAME

Shirley Jackson

OCCUPATION

Author

Read both
articles and
answer the
questions on the
back of this
worksheet.

Shirley Jackson Biography

Author (1916–1965)

Shirley Jackson was an acclaimed American writer known for the story "The Lottery," as well as longer works like 'We Have Always Lived in the Castle.'

Synopsis

Writer Shirley Jackson was born in 1916 in San Francisco, California. Among her early works was "The Lottery," the highly controversial and famous tale about a village that partakes in an annual death ritual. Jackson, who also wrote such novels as *The Haunting of Hill House* and *We Have Always Lived in the Castle*, died of heart failure in 1965.

Early Years and Career

Shirley Jackson was born on December 14, 1916, in San Francisco, California, and grew up nearby in Burlingame. She attended the University of Rochester and then Syracuse University, where she became fiction editor of the campus humor magazine.

After graduating in 1940, Jackson moved to New York City. She began to write professionally, her works appearing in such publications as *The New Yorker*, *Redbook*, *The Saturday Evening Post* and *The Ladies' Home Journal*. Her first novel, *The Road Through The Wall*, was published in 1948.

'The Lottery'

Also in 1948, *The New Yorker* published Jackson's short story, "The Lottery." The tale, which starts as a seemingly benign account of an annual event in smalltown America, takes a dark turn when the event is revealed to be a gruesome sacrifice. "The Lottery" generated the most mail in the history of *The New Yorker*, with many readers expressing confusion about underlying

meanings and anger over its disturbing ending.

Despite the backlash, "The Lottery" became one of the most significant short stories of its era. It was eventually translated into dozens of languages, and adapted for radio, television and the stage.

Later Works

Jackson also wrote novels like *The Haunting of Hill House* and *We Have Always Lived in the Castle* as well as the witty, embellished memoir *Life Among the Savages*, about her domestic experiences. Often relying on supernatural themes, she was known for tackling provocative, chilling subject matter that was culturally incisive and held metaphors for how people dealt with differences. She was married to critic Stanley Edgar Hyman, with the couple having four children.

Shirley Jackson died on August 8, 1965, from heart failure. Decades later, two of her children, Laurence Jackson Hyman and Sarah Hyman Dewitt, have become editors for a collection of her unpublished works, *Let Me Tell You: New Stories, Essays, and Other Writings*. The compilation, released in August 2015, helps to mark the 50th anniversary of Jackson's death.

Citation Information

Article Title

Shirley Jackson Biography

Author

Biography.com Editors

Website Name

The Biography.com website

URL

<https://www.biography.com/people/shirley-jackson-9351425>

Access Date

January 7, 2019

Publisher

A&E Television Networks

Last Updated

November 17, 2016

Original Published Date

April 2, 2014

Questions:

1. Who was the author of this biography (on this page) of Jackson?

2. What website published this article?

3. Who was the publisher?

4. What was the original publication date?

Questions:

- List 3 text structures used in the article:
- What novels did Jackson write (list 2)?
- What two types of writing is Jackson famous for?
- List 3 additional facts about Shirley Jackson.
- Why did the author include the "Citation Information" above?

*
*
*
answer the questions

Short Story

Background

Early Learning The first day of kindergarten is an event that is both scary and exciting for most children. At ages four and five, children are still learning lessons about getting along with others. Suddenly going from home to a school environment can be a difficult change for children like Laurie, a character in "Charles."

Review

For Reading Skills, Literary Analysis, and Vocabulary Builder, see page 308.

What do you remember about Kindergarten? List 4 things you remember or think you recall about Kindergarten.

Meet the Author

Shirley Jackson (1916–1965)



As the mother of four energetic children, Shirley Jackson once said that she wrote because "It's the only chance get to sit down." As a writer, she is famous for two types of stories—spine-tingling tales and hilarious stories about daily life.

The Real-Life Charles Like many other writers, Jackson borrowed characters and events from her own life and wove them into her fictional stories. The main character in "Charles" is based on Jackson's own son.

Fast Facts

- ▶ Shirley Jackson was born in San Francisco and spent most of her childhood writing poetry rather than playing with neighborhood children.
- ▶ Her chilling story "The Lottery" gained her fame when it was published in *The New Yorker* in 1948.
- ▶ Jackson's collections of stories about family life often have humorous titles such as *Life Among the Savages* (1953) and *Raising Demons* (1957).

Go Online Author Link

For: More about the author
Visit: www.PHSchool.com
Web Code: ene-9209

Connecting to the Literature

Reading/Writing Connection In "Charles," a boy brings home some startling stories during his first weeks at school. Using complete sentences, list three things you would tell a child starting kindergarten. Use at least three of the following words: adapt, participate, cooperate, focus.

Complete below ↓

1.

2.

3.

Define -

adapt:

participate:

cooperate:

focus:

Day 12

Charles

Shirley Jackson



The day my son Laurie started kindergarten he renounced corduroy overalls with bibs and began wearing blue jeans with a belt; I watched him go off the first morning with the older girl next door, seeing clearly that an era of my life was ended, my sweet-voiced nursery-school tot replaced by a long-trousered, swaggering¹ character who forgot to stop at the corner and wave good-bye to me.

He came home the same way, the front door slamming open, his cap on the floor, and the voice suddenly become raucous² shouting, "Isn't anybody *here*?"

At lunch he spoke insolently to his father, spilled his baby sister's milk, and remarked that his teacher said we were not to take the name of the Lord in vain.

"How *was* school today?" I asked, elaborately casual.

"All right," he said.

"Did you learn anything?" his father asked.

Laurie regarded his father coldly. "I didn't learn nothing," he said.

"Anything," I said. "Didn't learn anything."

"The teacher spanked a boy, though," Laurie said, addressing his bread and butter. "For being fresh," he added, with his mouth full.

"What did he do?" I asked. "Who was it?"

Laurie thought: "It was Charles," he said. "He was fresh. The teacher spanked him and made him stand in a corner. He was awfully fresh."

"What did he do?" I asked again, but Laurie slid off his chair, took a cookie, and left, while his father was still saying,

"See here, young man."

Vocabulary Builder

renounced (ri nouns'd)

v. gave up

✓ Reading Check

According to Laurie, how does Charles get into trouble at school?

1. swaggering (swag' ger in) v. strutting; walking with a bold step.

2. raucous (rô' kəs) adj. harsh; rough-sounding.

Excerpt from Prentice Hall Literature *Charles* ■ 345
Purchased by Harrison County Middle School

The next day Laurie remarked at lunch, as soon as he sat down, "Well, Charles was bad again today." He grinned enormously and said, "Today Charles hit the teacher."

"Good heavens," I said, mindful of the Lord's name, "I suppose he got spanked again?"

"He sure did," Laurie said. "Look up," he said to his father. "What?" his father said, looking up.

"Look down," Laurie said. "Look at my thumb. Gee, you're dumb." He began to laugh insanely.

"Why did Charles hit the teacher?" I asked quickly.

"Because she tried to make him color with red crayons," Laurie said. "Charles wanted to color with green crayons so he hit the teacher and she spanked him and said nobody play with Charles but everybody did."

The third day—it was Wednesday of the first week—Charles bounced a see-saw on to the head of a little girl and made her bleed, and the teacher made him stay inside all during recess. Thursday Charles had to stand in a corner during story-time because he kept pounding his feet on the floor. Friday Charles was deprived of blackboard privileges because he threw chalk.

On Saturday I remarked to my husband, "Do you think kindergarten is too unsettling for Laurie? All this toughness, and bad grammar, and this Charles boy sounds like such a bad influence."

"It'll be all right," my husband said reassuringly. "Bound to be people like Charles in the world. Might as well meet them now as later."

On Monday Laurie came home late, full of news. "Charles," he shouted as he came up the hill; I was waiting anxiously on the front steps. "Charles," Laurie yelled all the way up the hill, "Charles was bad again."

"Come right in," I said, as soon as he came close enough. "Lunch is waiting."

"You know what Charles did?" he demanded, following me

► **Critical Viewing** Which of these children might have a personality like that of Charles? Explain.

[Connect]

Excerpt from Prentice Hall
Literature by Harrison
346 ■ Short Stories
County Middle School

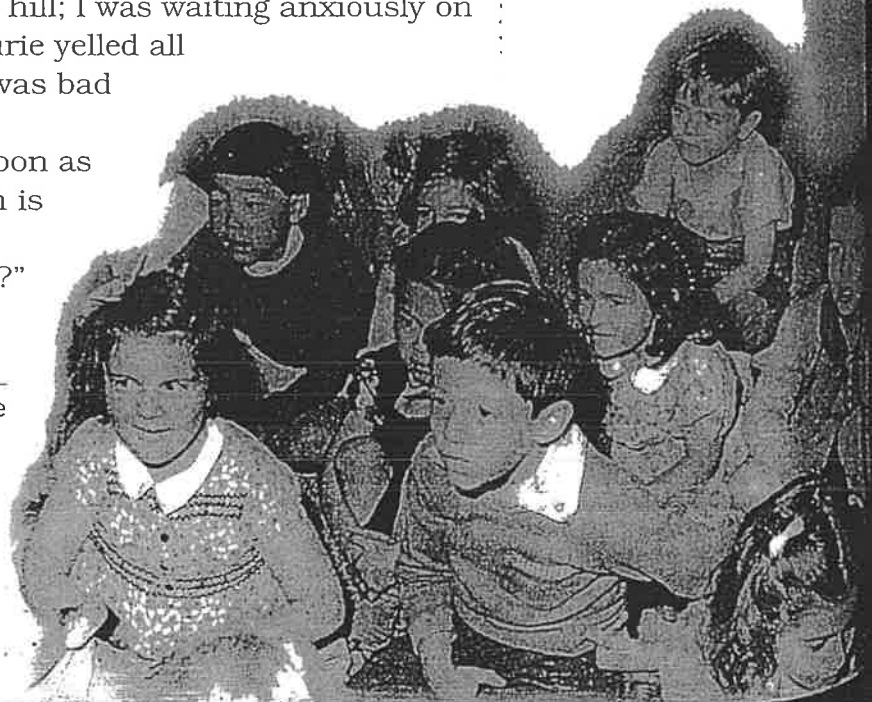
Reading Skill

Make Inferences

What details show that Laurie admires Charles's rude behavior?

Literary Analysis

Point of View What clues indicate that this story is told by a first-person narrator?



through the door. "Charles yelled so in school they sent a boy in from first grade to tell the teacher she had to make Charles keep quiet, and so Charles had to stay after school. And so all the children stayed to watch him."

"What did he do?" I asked.

"He just sat there," Laurie said, climbing into his chair at the table. "Hi, Pop, y'old dust mop."

"Charles had to stay after school today," I told my husband. "Everyone stayed with him."

"What does this Charles look like?" my husband asked Laurie. "What's his other name?"

"He's bigger than me," Laurie said. "And he doesn't have any rubbers and he doesn't ever wear a jacket."

Monday night was the first Parent-Teachers meeting, and only the fact that the baby had a cold kept me from going; I wanted passionately to meet Charles's mother. On Tuesday Laurie remarked suddenly, "Our teacher had a friend come to see her in school today."

"Charles's mother?" my husband and I asked simultaneously.

"Naaah," Laurie said scornfully. "It was a man who came and made us do exercises, we had to touch our toes. Look." He climbed down from his chair and squatted down and touched his toes. "Like this," he said. He got solemnly back into his chair and said, picking up his fork, "Charles didn't even do exercises."

"That's fine," I said heartily. "Didn't Charles want to do exercises?"

"Naaah," Laurie said. "Charles was so fresh to the teacher's friend he wasn't let do exercises."

"Fresh again?" I said.

"He kicked the teacher's friend," Laurie said. "The teacher's friend told Charles to touch his toes like I just did and Charles kicked him."

"What are they going to do about Charles, do you suppose?" Laurie's father asked him.

Laurie shrugged elaborately. "Throw him out of school, I guess," he said.

Wednesday and Thursday were routine; Charles yelled during story hour and hit a boy in the stomach and made him cry. On Friday Charles stayed after school again and so did all the other children.

Reading Skill

Make Inferences

What actions show that Charles's behavior is having a negative effect on Laurie?

Vocabulary Builder

simultaneously (sī məl tǎ' nē əs lē) *adv.*
at the same time

✓ Reading Check

What did Charles do to his teacher's friend?

Excerpt from Prentice Hall Literature
Purchased by Harrison County Middle School

With the third week of kindergarten Charles was an institution in our family; the baby was being a Charles when she cried all afternoon; Laurie did a Charles when he filled his wagon full of mud and pulled it through the kitchen; even my husband, when he caught his elbow in the telephone cord and pulled the telephone, ashtray, and a bowl of flowers off the table, said, after the first minute, "Looks like Charles."

During the third and fourth weeks it looked like a reformation in Charles; Laurie reported grimly at lunch on Thursday of the third week, "Charles was so good today the teacher gave him an apple."

"What?" I said, and my husband added warily, "You mean Charles?"

"Charles," Laurie said. "He gave the crayons around and he picked up the books afterward and the teacher said he was her helper."

"What happened?" I asked incredulously.

"He was her helper, that's all," Laurie said, and shrugged.

"Can this be true, about Charles?" I asked my husband that night. "Can something like this happen?"

"Wait and see," my husband said cynically.³ "When you've got a Charles to deal with, this may mean he's only plotting."

He seemed to be wrong. For over a week Charles was the teacher's helper; each day he handed things out and he picked things up; no one had to stay after school.

"The PTA meeting's next week again," I told my husband one evening. "I'm going to find Charles's mother there."

"Ask her what happened to Charles," my husband said. "I'd like to know."

"I'd like to know myself," I said.

On Friday of that week things were back to normal. "You know what Charles did today?" Laurie demanded at the lunch table, in a voice slightly awed. "He told a little girl to say a word and she said it and the teacher washed her mouth out with soap and Charles laughed."

"What word?" his father asked unwisely, and Laurie said, "I'll have to whisper it to you, it's so bad." He got down off his chair and went around to his father. His father bent his head down and Laurie whispered joyfully. His father's eyes widened.

"Did Charles tell the little girl to say *that*?" he asked respectfully.

Vocabulary Builder

incredulously (in krej' ə ləs lē) adv. with doubt or disbelief

Literary Analysis

Point of View How does the narrator respond to each item of news about Charles?

3. cynically (sin' i kə lē) adv. with disbelief about the honesty of people's intentions or actions.

twice."

"What happened to Charles?" my husband asked.

"Nothing," Laurie said. "He was passing out the crayons."

Monday morning Charles abandoned the little girl and said the evil word himself three or four times, getting his mouth washed out with soap each time. He also threw chalk.

My husband came to the door with me that evening as I set out for the PTA meeting. "Invite her over for a cup of tea after the meeting," he said. "I want to get a look at her."

"If only she's there," I said prayerfully.

"She'll be there," my husband said. "I don't see how they could hold a PTA meeting without Charles's mother."

At the meeting I sat restlessly, scanning each comfortable matronly face, trying to determine which one hid the secret of Charles. None of them looked to me haggard enough. No one stood up in the meeting and apologized for the way her son had been acting. No one mentioned Charles.

After the meeting I identified and sought out Laurie's kindergarten teacher. She had a plate with a cup of tea and a piece of chocolate cake; I had a plate with a cup of tea and a piece of marshmallow cake. We maneuvered up to one another cautiously, and smiled.

"I've been so anxious to meet you," I said. "I'm Laurie's mother."

"We're all so interested in Laurie," she said.

"Well, he certainly likes kindergarten," I said. "He talks about it all the time."

"We had a little trouble adjusting, the first week or so," she said primly, "but now he's a fine little helper. With occasional lapses, of course."

"Laurie usually adjusts very quickly," I said. "I suppose this time it's Charles's influence."

"Charles?"

"Yes," I said, laughing, "you must have your hands full in that kindergarten, with Charles."

"Charles?" she said. "We don't have any Charles in the kindergarten."

Day 12

Reading Skill

Make Inferences

What does Charles's behavior on Monday suggest about his good behavior in the previous weeks?

Literary Analysis

Point of View How does the first-person point of view contribute to the humor in this conversation?

Excerpt from Prentice Hall Literature
Purchased by Harrison County Middle School

"CHARLES" by Shirley Jackson Name:

| Vocabulary Word: | Denotative Meaning: Dictionary, Google, etc. | Part of speech: | Sentence from story: complete when reading the story. |
|------------------|-------------------------------------------------|-----------------|-------------------------------------------------------|
| Renounced | | | |
| Swaggering | | | |
| Raucous | | | |
| Simultaneously | | | |
| Incredulously | | | |
| Cynically | | | |

Charles

Answer questions on any space left in pocket or on your own paper.

Thinking About the Selection

1. **Respond:** Were you surprised to learn about Charles's true identity? Why or why not?
2. (a) **Recall:** Describe the change in Laurie's clothing on the day he starts school. (b) **Draw Conclusions:** How does this signal a change in Laurie's behavior?
3. (a) **Recall:** Give three examples of Charles's behavior at school and three examples of Laurie's behavior at home. (b) **Compare and Contrast:** How is Charles's behavior in both these places similar and different?
4. (a) **Make a Judgment:** What should Laurie's mother say to him after she meets his teacher and learns the truth? (b) **Discuss:** Share your ideas with a small group. Then, discuss the reasons for your responses.

QuickReview

Story at a Glance
A little boy tells incredible stories about how a classmate misbehaves.

Go Online Assessment

For: Self-test
Visit: www.PHSchool.com
Web Code: ena-6208

Reading Skill

5. (a) List four details that his mother has observed about Laurie's new behavior at home. (b) Use these details to **make an inference** about what the changes mean.
6. What inferences can you make about the teacher by the way she speaks to Laurie's mother? In your answer, consider her attitude toward her students and her level of patience.

Inferences: Logical assumptions about what is not stated

Literary Analysis

7. This first-person story is told from the **point of view** of Laurie's mother. Complete a chart like the one shown here to decide how the story would be different if it were told from Laurie's point of view.

| Mother | Laurie |
|-----------------------------------------------------------|--------|
| Mother thinks Laurie has a classmate named Charles. | |
| Mother worries that Charles is a bad influence on Laurie. | |

Point of View: The perspective from which a story is told. A story can be told in the *first-person* or the *third-person point of view*.

8. How does the first-person point of view help to make the ending a surprise for readers?

Identify the following elements for "Charles" :

Setting:

Plot:

Conflict:

Characters:

Point of View:

Theme:

Day 14

Characters Graphic Novel Page

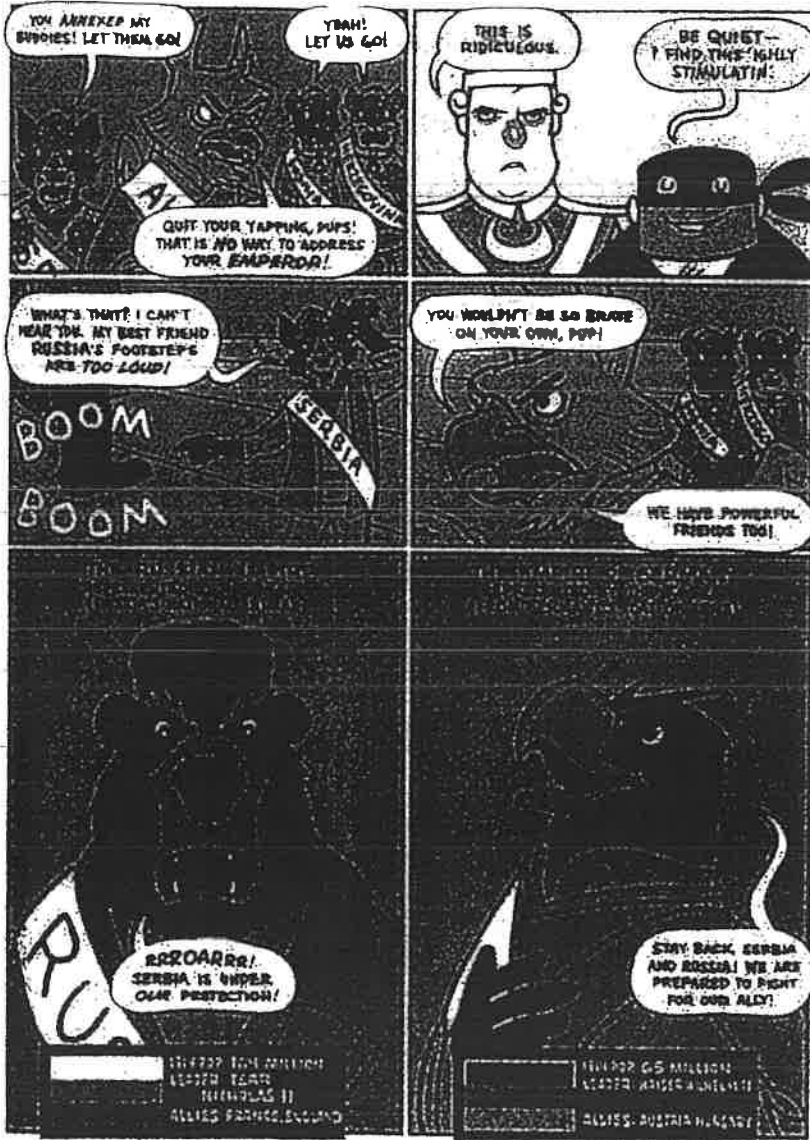
*Graphic novel example on back.

The page is a template for a graphic novel page, featuring five empty rectangular panels. The panels are arranged as follows: a large panel on the top left; a smaller panel on the top right; a medium panel on the middle left; a large panel on the middle right; and a small panel on the bottom right. The panels are defined by simple black outlines.

Day 14

Graphic Novel

Example only



By Nathan Hale
Example

Day 15

NAME : _____

CLASS : _____

DATE : _____

"Charles"

25 Multiple Choice Questions

1. Laurie reports that Charles...

- a) hit the teacher b) is the smallest child in the class
 c) stole his chocolate cake d) does not know how to color

2. Which word best completes the following sentence? She looked haggard because she had not _____ for a long time.

- a) tried b) slept
 c) worried d) worked

3. The ending of this story ...

- a) is a tragedy b) makes no sense
 c) contains a surprise d) is meant to be sad

4. Which aspect of this story is an important part of the plot?

- a) The teacher gives Charles an apple for being good. b) There is not boy named Charles in Laurie's kindergarten class
 c) Laurie's father accidentally knocks a bowl of flowers off the table d) Laurie wears corduroy overalls with bibs until the day her starts kindergarten.

5. In the beginning of the story, the narrator's attitude toward Charles's behavior could best be described as...

- a) Angry but hopeful b) alarmed but forgiving
 c) amused but suspicious d) shocked but fascinated

6. Laurie's behavior at home could best be described as...

- a) funny b) troubling
 c) appropriate d) understandable

Although this story ends with a twist, ...

7.

a) it ultimately is not very realistic

b) there is really no conflict in the story

c) the author does plant clues throughout the story

d) the ending contains a sense of hope for the future

8. In the passage given to you, the narrator reveals her belief that Charles's mother is

a) proud of her son

b) a woman without any friends

c) aware of what a difficult child she has

d) too embarrassed to speak to the teacher

9. Which word best complete the following sentence? He spoke insolently to his parents and recieved a/an_____.

a) amused look from them

b) spanking

c) prize

d) his favorite ice cream

10. What is the best definition for the vocab word elaborately?

a) insultingly

b) having many details

c) aware

d) motherhood

11. Which word best completes the following sentence? She was _____ of his low self-esteem and tried to make him feel better.

a) mindful

b) insolent

c) matronly

d) haggard

12. The climax of this story would be

a) when Charles hits a little girl with the see-saw.

b) when Charles kicked the teacher's friend.

c) when Charles's mother goes to the parent-teacher conference

d) when Charles's mother finds out there is no "Charles" in class.

13. This story suggests that parents don't always...

a) see their children clearly.

b) like their children's friends.

c) love their children.

d) treat their children fairly.

Day 15

14. One clue that Laurie and Charles may be the same person is that...

- a) Laurie tells his parents that Charles hit a boy in the stomach. b) Laurie whispers to his father the bad word that Charles told the girl to say.
- c) Laurie describes Charles as "bad". d) Laurie comes home late on the days that Charles has to stay after school.

15. In the passage given to you, the narrator is NOT feeling at all...

- a) intrigued b) defensive
- c) curious d) social

16. Who is the author of "Charles"?

- a) Shirley Jackson b) O. Henry
- c) Walter Dean Myers d) Toni Cade Bambara

17. Which of the following best describes the SETTING of "Charles"?

- a) a city apartment and subway terminal b) a country farm and general store
- c) a park in the springtime d) a family home and school classroom

18. Who is the narrator of "Charles"?

- a) Charles b) Laurie
- c) Laurie's mom d) Laurie's dad

19. Who is the protagonist of the story "Charles"?

- a) Charles b) Laurie
- c) Laurie's mom d) Laurie's dad

20. Which of the following best describes the central conflict of the story "Charles"?

- a) Laurie's mother is dealing with the mixed emotions of watching her son grow up. b) Laurie is being picked on by a bully in his kindergarten class.
- c) Charles is wreaking havoc at school, and Laurie is amused. d) Laurie's parents are going through a separation.

21. Which of the following best describes the CLIMAX of the story "Charles"?

- a) when Charles hits his teacher b) when Charles kicks the teacher's guest
- c) when Laurie's mom goes to the PTA meeting d) when Laurie's dad confronts the teacher

22 Which of the following best describes the RESOLUTION of the story "Charles"?

- a) Charles is expelled from school. b) Laurie confronts Charles about his bad behavior.
- c) The reader realizes that Laurie IS Charles. d) Laurie's mother decides to withdraw her son from school.

23 Which of the following is an example of ALLUSION in the story "Charles"?

- a) "I watched him go off the first morning, my sweet-voiced nursery-school tot replaced by a long-trousered, swaggering character..." b) "Charles wanted to color with green crayons so he hit the teacher and she spanked him and said nobody play with Charles but everybody did."
- c) "It'll be all right," my husband said reassuringly. "Bound to be people like Charles in the world. Might as well meet them now as later." d) "At lunch he spoke insolently to his father, spilled his baby sister's milk, and remarked that his teacher said we were not to take the name of the Lord in vain."

24 From which POINT OF VIEW is the story "Charles" written?

- a) first person b) second person
- c) third person limited d) third person omniscient

25 Which of the following describes a possible THEME of the story "Charles"?

- a) Parents often overlook negative traits in their own children. b) Children will often do anything for attention.
- c) The truth will always come out in the end. d) all of the above

Read the passage. Then answer the questions that follow.

The Battle Picnic

by Jonas Sellers

- 1 [Scene: a well-furnished drawing room in a fancy Washington D.C. home, July 16, 1861.]
- 2 MANFRED [Excitedly.] Well, the war with the Confederates has finally begun! We are determined to march to Richmond, and we will certainly overcome those rebels before the month has ended. Our victory will be swift, and the rebels will learn that they should not have unleashed Pandora's box with their traitorous ways.
- 3 JENNY [Distressed.] I believed that the war had already started in April, when the Confederate soldiers fired boldly on Fort Sumter. Surely that was an easy victory for them, and thankfully no one was killed on either side. But with all the volunteers President Lincoln gathered, why would the Confederate forces try to attack us now? I have heard officials say that our display of strength would frighten the Confederates into submission. [Pausing briefly in thought.] I am anxious about beginning a war; surely, many people will be harmed by such a serious act.
- 4 MANFRED [With a knowing smile.] I believe, sister, that you are less worried about war in general than about the safety of your own dear brother. Do not waste a moment worrying on my account; we will reward those Southern soldiers with a hearty beating, bring the black sheep back into the Union, and be at restful, even boring, peace again before you notice I am gone. By fighting, we will show our strength and our well-deserved confidence because we are battling on the proper side.
- 5 JENNY When must you leave?
- 6 MANFRED I came to say farewell, dear sister, as we march as soon as we are gathered. [Manfred walks over to the window and looks out.] Look at all the fine and fancy carriages filled with townspeople, determined to travel the road with our troops. What a stirring show of public support!
- 7 JENNY [Joining him at the window.] What can they be thinking of, to so merrily follow troops into battle?
- 8 MANFRED They are thinking that the battle will offer rewarding entertainment. They are thinking they will see our troops easily march to victory, just as I am thinking.
- 9 [Scene: July 21, 1861, along the Bull Run River, near Manassas Junction; there is a mass of confusion, with sightseers grabbing baskets and jumping into carriages; soldiers running toward the road heading back to Washington, and many soldiers dead and dying on the battlefield.]
- 10 JENNY [Totally distraught, staring toward the field.] Father, where is Manfred? Can you see Manfred anywhere on the battlefield?
- 11 MR. BENJAMIN [Demandingly.] Manfred will have to take care of himself. Sit down and get settled now, quickly as you can. The road is already filled to overflowing with panicky people.
- 12 JENNY Father, this is the most horrifying experience of my life. Why did we come? Why did so many people come, to picnic at a battle?

Go On

- 13 MR. BENJAMIN [Squarely facing Jenny.] Look at the growing hoards of Confederate soldiers, advancing so quickly. Our troops are fleeing off the field like bats from hell, hurrying back toward Washington, dropping their goods and guns so that they can run even faster.
- 14 JENNY I do not think they are cowards, Father. Who would stand at such a show of force?
- 15 MR. BENJAMIN We must go. We can talk later. Before long, the Confederates will be chasing us back to Washington, and who could imagine what might happen if they were to apprehend us?
- 16 JENNY I knew we should not have come!
- 17 MR. BENJAMIN Yes, I see that now.
- 18 JENNY [Solemnly.] I hope that Manfred makes it home safely. I hope . . . but I am not at all certain.

6

This question has two parts. First, answer part A. Then, answer part B.

Part A

What is one central theme of "The Battle Picnic"?

- A It is unrealistic to believe that wars are not deadly.
- B Believing you can win is more important than actually winning.
- C One's attitude toward an event will affect the outcome of that event.
- D It is important to stay calm during times of crisis.

Part B

Select three pieces of evidence that support the answer to part A.

- A "I believed that the war had already started in April, when the Confederate soldiers fired boldly on Fort Sumter."
- B "I came to say farewell, dear sister, as we march as soon as we are gathered."
- C "What can they be thinking of, to so merrily follow troops into battle?"
- D "Manfred will have to take care of himself. Sit down and get settled now, quickly as you can. "
- E ". . . there is a mass of confusion, with sightseers grabbing baskets and jumping into carriages; soldiers running toward the road heading back to Washington, . . . "
- F "Father, this is the most horrifying experience of my life. Why did we come? Why did so many people come, to picnic at a battle?"
- G "We must go. We can talk later."

7

Which details from "The Battle Picnic" **best** support the inference that the characters do not fully understand their situation? Select all that apply.

- A Almost everyone is excited about a picnic on the battlefield.
- B The Union soldiers are preparing to march on the Confederate capital of Richmond.
- C Manfred says he and the other Union soldiers will overcome the Confederates before the month has ended.
- D People decide to leave the battle region as quickly as possible once the Confederates take control.
- E The people fleeing the battle are afraid they will be attacked by the advancing Confederate soldiers.

8

Read these sentences from "The Battle Picnic."

Do not waste a moment worrying on my account; we will reward those Southern soldiers with a hearty beating, bring the black sheep back into the Union, and be at restful, even boring, peace again before you notice I am gone. By fighting, we will show our strength and our well-deserved confidence because we are battling on the proper side.

What do you learn about Manfred's character by what he says?

- A He believes battle is more exciting than daily life.
- B He cares for his sister so much that he does not want to frighten her.
- C He does not want to fight but he feels he must do so for his country.
- D He does not care that his sister is concerned for his safety.

9

When Manfred states in "The Battle Picnic" that he is battling on the "proper side," what does the word "proper" suggest?

- A Manfred is certain that his side will win.
- B Manfred believes he is the only person able to behave in a correct manner.
- C Manfred views the war as necessary.
- D Manfred believes his side is supported by the forces of justice.

Go On



What is the effect of Manfred's comment in "The Battle Picnic" that he will be back before Jenny notices he is gone?

- A It creates a break in the tension of the passage because the audience knows that Manfred is using humor in his response to Jenny.
- B It creates a sense of dread since the audience knows that Manfred's prediction of a quick and easy victory is incorrect.
- C It causes the audience to share Jenny's sense of fear because the audience can tell Manfred is lying on purpose.
- D It causes the audience to share Jenny's anger because the audience knows that Jenny has begged Manfred not to go to war.



At the beginning of the play, Manfred says, "Our victory will be swift, and the rebels will learn that they should not have unleashed Pandora's box with their traitorous ways." Read this telling of the Greek myth "Pandora's Box."

Pandora's Box

Long ago, the god Zeus was angry with two brothers named Epimetheus and Prometheus. Zeus, who was the most powerful of all the gods, had a plan to get even. He ordered another god, Hephaestus, to make a very beautiful woman out of clay. This woman, Pandora, was sent to Earth by Zeus to marry Epimetheus. As a wedding gift, Zeus gave Pandora a box but made her promise never to open it.

Pandora was very curious by nature, and after resisting for as long as she could, she finally opened the box. Out flew all the horrors and evils of the world—hate, disease, misery, poverty, envy, and more—which Zeus had hidden away in the box. Frightened by all the evil rushing out, Pandora quickly closed the lid, not realizing that there was one thing still trapped inside. That thing was hope.

What does Manfred suggest through his reference to Pandora's box? Use details from both "The Battle Picnic" and "Pandora's Box" in your answer.

Lesson 19

Denotation and Connotation

Introduction Words can have two kinds of meanings that convey very different ideas or images. A word's **denotation** is its basic meaning, or dictionary definition. A word's **connotation** is the feeling or impression that people associate with the word.

- A word can have a **positive**, **negative**, or **neutral** connotation. When you write, think about the connotations of the words you choose and the effect they will have on your readers.

| Positive Connotation | Neutral Connotation | Negative Connotation |
|----------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------|
| Several people <u>lingered</u> in the theater after auditions. | Several people <u>stayed</u> in the theater after auditions. | Several people <u>loitered</u> in the theater after auditions. |
| My aunt picked me up in her <u>compact</u> two-door car. | My aunt picked me up in her <u>small</u> two-door car. | My aunt picked me up in her <u>cramped</u> two-door car. |

- To say that a car is **small** is a neutral statement about the car. A car that is **compact**, however, can fit everything you need into just a small space. This word has a positive connotation. A **cramped** car, on the other hand, conjures images of tightly squeezed passengers and belongings. The connotation is negative.

Guided Practice Read each sentence. Each underlined word has a neutral or a positive connotation. Write a word that has a negative connotation to replace each underlined word.

Hint

Words that have the same, or a similar, denotation are synonyms. You can use a thesaurus to find the synonyms for each underlined word. Then choose and write the synonym that has a negative connotation.

- 1 It was adventurous of me to try out for the role of villain. _____
- 2 I'm quiet and shy, and the character is powerful. _____
- 3 My best friend was surprised that I was so firm in my decision. _____
- 4 I nervously held the script as I read my first lines. _____
- 5 My right leg shook as I faced the hero. _____
- 6 When offered the part, I deliberated for a while. _____
- 7 But then I decided that I had spent too much time being shy. _____
- 8 Sometimes, I wonder what kind of silliness I'll try next. _____



Independent Practice

For numbers 1–3, which word has the same denotation as the underlined word but has a more negative connotation?

1

The director was unpredictable in his reactions to the actors and scenes.

- A changeable
- B volatile
- C whimsical
- D variable

2

The actors felt that the director's comments were sometimes clever.

- A perceptive
- B insightful
- C keen
- D shrewd

3

The director's feedback excited the actors.

- A agitated
- B inspired
- C invigorated
- D energized

Answer Form

- 1 A B C D
- 2 A B C D
- 3 A B C D
- 4 A B C D
- 5 A B C D

Number
Correct

5

For numbers 4 and 5, which word has the same denotation as the underlined word but has a more positive connotation?

4

The director's great arrogance made it difficult for him to compromise in his way of doing things.

- A conceit
- B smugness
- C confidence
- D haughtiness

5

At the end of the rehearsals, the actors admitted that this director brought out the best in them.

- A declared
- B confessed
- C gossiped
- D vented

Analyzing Word Meanings


Theme: *Animal Survival*

What's the difference between saying "He doesn't eat very much" and saying "He eats like a bird"? The two phrases mean the same thing, but the first sentence is literal, and the second is figurative. **Literal meaning** refers to the dictionary definition of a word or phrase. Words or phrases with a **figurative meaning** express ideas in unusual or creative ways.

Words may also have positive, neutral, or negative **connotations**, which are the feelings or ideas associated with a word. And, some words have **technical meanings** specific to a certain subject area. When you read, be aware of these different types of meaning. It will improve your understanding of an author's message.

Read the magazine article below. Circle an example of figurative language, underline words with strong connotations, and put a box around any technical words or phrases.

Bald eagles



Bald eagles are majestic creatures. They sail and dive through the air like trained acrobats. They also have wingspans of up to 90 inches. That's more than seven feet long!

Read the chart to analyze some of the words you may have marked in the article.

| Type of Language | Example | Effect on Meaning |
|------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Connotative | "majestic" | <i>Majestic</i> encourages readers to think that the birds are more than ordinarily beautiful. |
| Technical | "wingspan" | <i>Wingspan</i> is a specific term used to explain one of the eagle's characteristics. |
| Figurative | "They sail and dive through the air like trained acrobats." | The simile <i>They sail and dive through the air like trained acrobats</i> compares an eagle's movement to an acrobat's. |

Authors choose words and phrases carefully to convey meaning and feeling. Determining word meanings can help you understand how an author's specific word choice affects the text.



Read the beginning of the scientific account about mollusks.

Genre: Scientific Account

The Mollusk Family *By Deshawn Miller*

Did you ever imagine that a tiny snail and a giant octopus might be part of the same family tree? Most people don't realize that snails, mussels, squid, and even octopods belong to the same category of creatures known as mollusks. These amazing creatures are invertebrates, which means they do not have spines.

Mollusks share three basic body parts: a foot, a body, and a mantle. The foot is a fleshy part of the mollusk's body, made up mostly of muscle tissue. In a snail, the foot is the part of the mollusk that meets the ground and gently rolls the body forward. From this slow, measured motion comes the phrase "a snail's pace." A mollusk's soft body is like a fragile bag that holds the heart, the guts, and various internal organs. The mantle, which is often a shell or a tough, sturdy covering, functions like a suit of armor to protect the body.

(continued)

Explore how to answer this question: "How do the word choices in the scientific account help you understand the author's intended meaning?"

Reread the account. Circle an example of figurative language, underline words with strong connotations, and put a box around any technical words or phrases.

In the account, find an example of each type of language named in the first column. Add it to the chart. Then, in the last column, explain the effect the word or phrase has on meaning.

| Type of Language | Example | Effect on Meaning |
|------------------|---------|-------------------|
| Figurative | | |
| Connotative | | |
| Technical | | |

With a partner, discuss your completed charts. Then identify one more example for each type of language.



Close Reading

Circle two phrases in the first paragraph that help you understand the technical term *defense mechanisms*.

Continue reading the account. Use the Close Reading and the Hint to help you answer the question.

(continued from page 96)

Because many mollusks creep along slowly, they need defense mechanisms. Mollusks with shells simply retreat into their body armor to protect themselves from predators. But the Blue-Ringed Octopus, a mollusk found in the South Pacific, defends itself with a bite so fierce it is almost always fatal to humans.

Overall, mollusks are peaceful inhabitants of our planet. Whether they live on land or in the sea, they are not aggressive. Our taste for cooked mussels, clams, and oysters, in fact, makes us far more dangerous to mollusks than they are to us.

Hint

Think about the connotations, or feelings, that the words suggest. How do those feelings differ?

Circle the correct answer.

Which statement best explains why the author has used the words *retreat*, *fierce*, and *fatal* in the first paragraph above?

- A to warn readers that mollusks are often aggressive and dangerous
- B to emphasize the contrast between different mollusk defenses
- C to explain the mystery behind a mollusks' defense system
- D to call attention to the unusual shells grown by the mollusk family

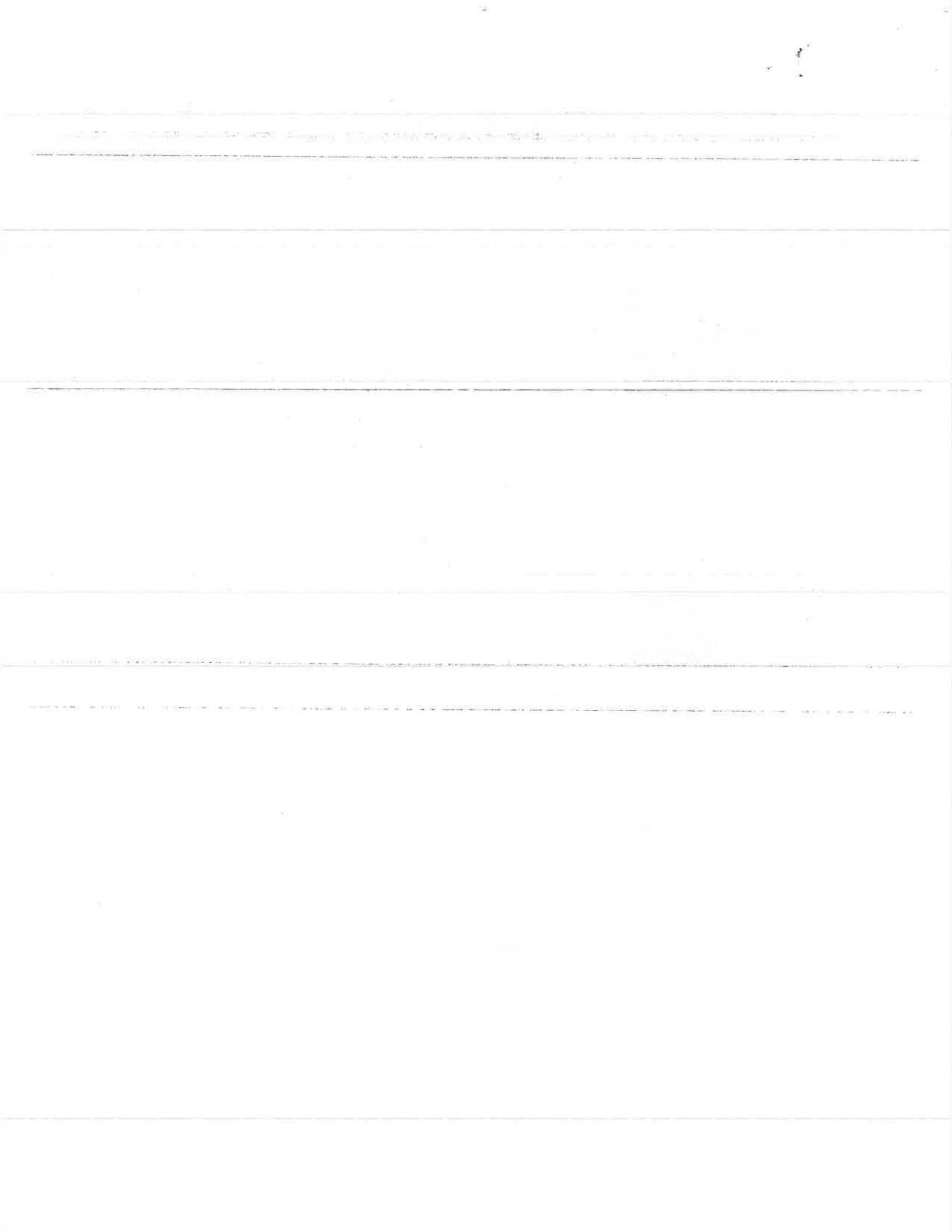


Show Your Thinking

Look at the answer you chose above. Explain how the connotations of the words helped you to understand the ideas about mollusk defense mechanisms that the author wants to convey.



With a partner, discuss how the use of figurative, connotative, and technical language in the account gives you a clearer picture of the characteristics of the mollusk family.



Day 18

Writing Wednesday: 3.8 Paragraph

Writing Directions: Write a 3.8 paragraph that explains how the coronavirus has impacted your life so far. What has changed? How are you doing? How has your schedule changed? Etc.

Use the 3.8 template on the back to organize your paragraph. Then write the 3.8 paragraph below.

3.8 Paragraph

Topic Sentence: (This is the one idea, the one topic that your paragraph is discussing)

First reason or point

Example of first reason

Second reason or point

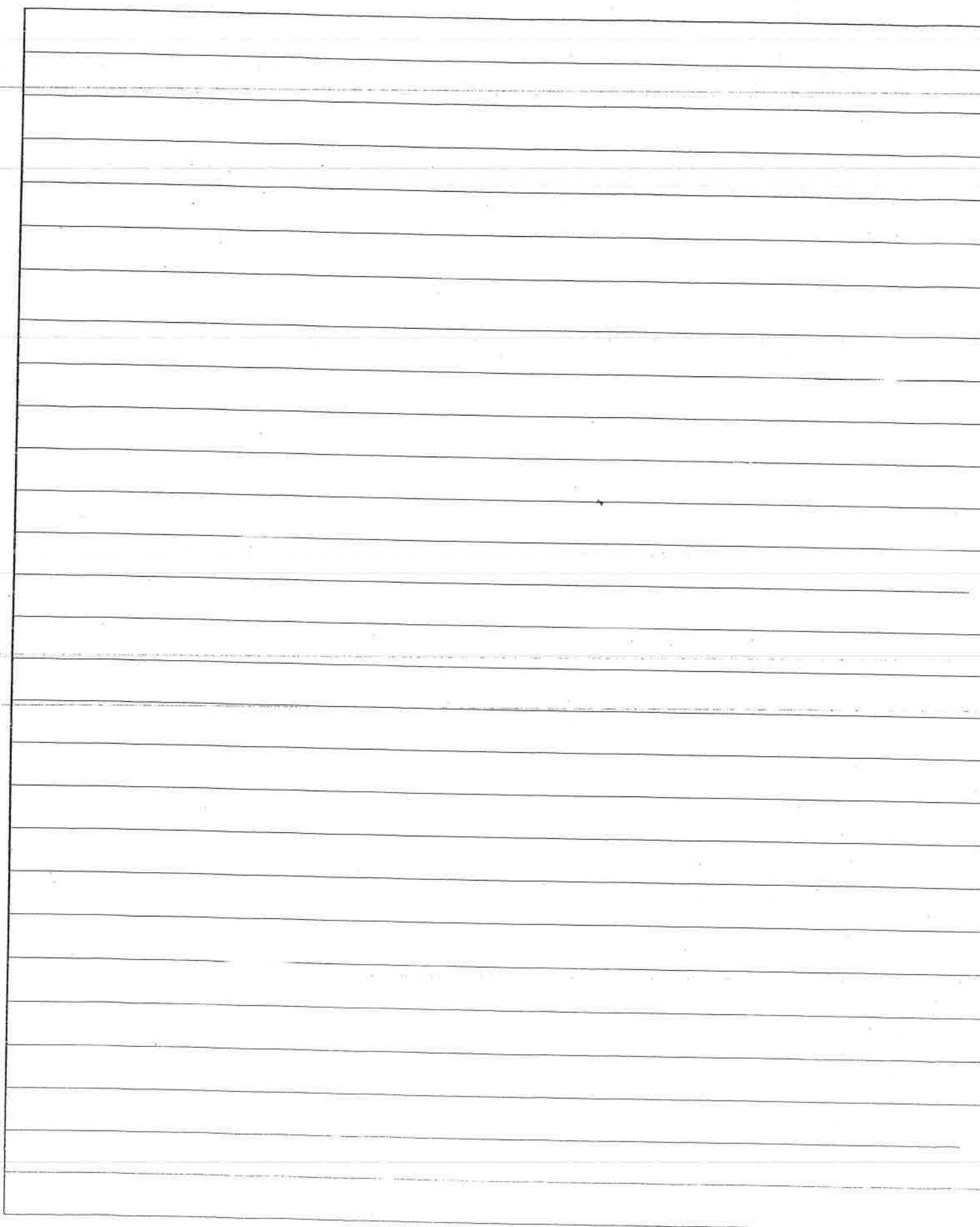
Example of second reason

Third reason or point

Example of third reason

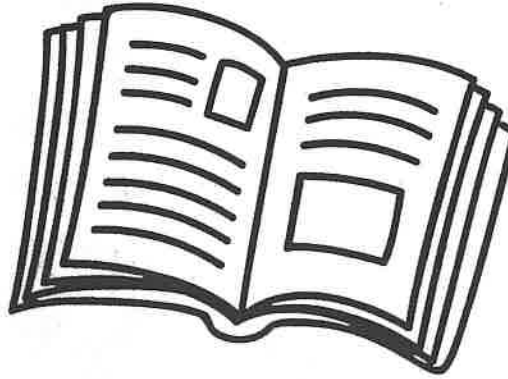
Conclusion or ending sentence





Day 19

Independent Reading!



See pages 61 and 62 of this packet.



Use the questions/ prompts on the Discourse Card resource to start a conversation about something the student has read. You may talk about a text the student read in one of the lessons above, or anything else the student is reading.

Encourage daily reading. And remember, reading isn't just about the books on the shelves—it's about anything around you with letters! Turn on the closed captioning feature on your TV or read catalogs that come in the mail. The backs of cereal boxes work, too, as do directions to board games!

Running out of stuff to read? **Grab some sticky notes, and label household objects, or make up new, silly names for things!** Communicating with sticky notes, instead of talking, is fun, too—start with a half hour and see if you can go all afternoon. Reading is everywhere!

Don't worry about right/wrong answers when you talk about text—the important thing is that you and your student share a reading experience and have fun!

Here are some websites that offer fun, free, high-quality ^{reading} material for kids:

www.starfall.com

www.storyplace.org

www.uniteforliteracy.com

www.storynory.com

www.freekidsbooks.org

en.childrenslibrary.org

newsela.com

www.scholastic.com/learnathome

Reading Discourse Cards

UNDERSTANDING LITERATURE

How does a character change in the story?

First, the character _____.

Then, the character _____.

UNDERSTANDING LITERATURE

If the story were told by a different character, which details might be different?

UNDERSTANDING LITERATURE

How do the illustrations help you understand the characters, setting, or events in the story?

UNDERSTANDING INFORMATIONAL TEXTS

What is the main topic of this text? How do you know?

KNOWLEDGE BUILDING

What does this text help you understand?

Now I know _____.

KNOWLEDGE BUILDING

What does this part of the text make you want to learn more about?

The text makes me want to know _____.

KNOWLEDGE BUILDING

What do you already know about this topic? Where have you learned about this topic?

I already know _____ from _____.

KNOWLEDGE BUILDING

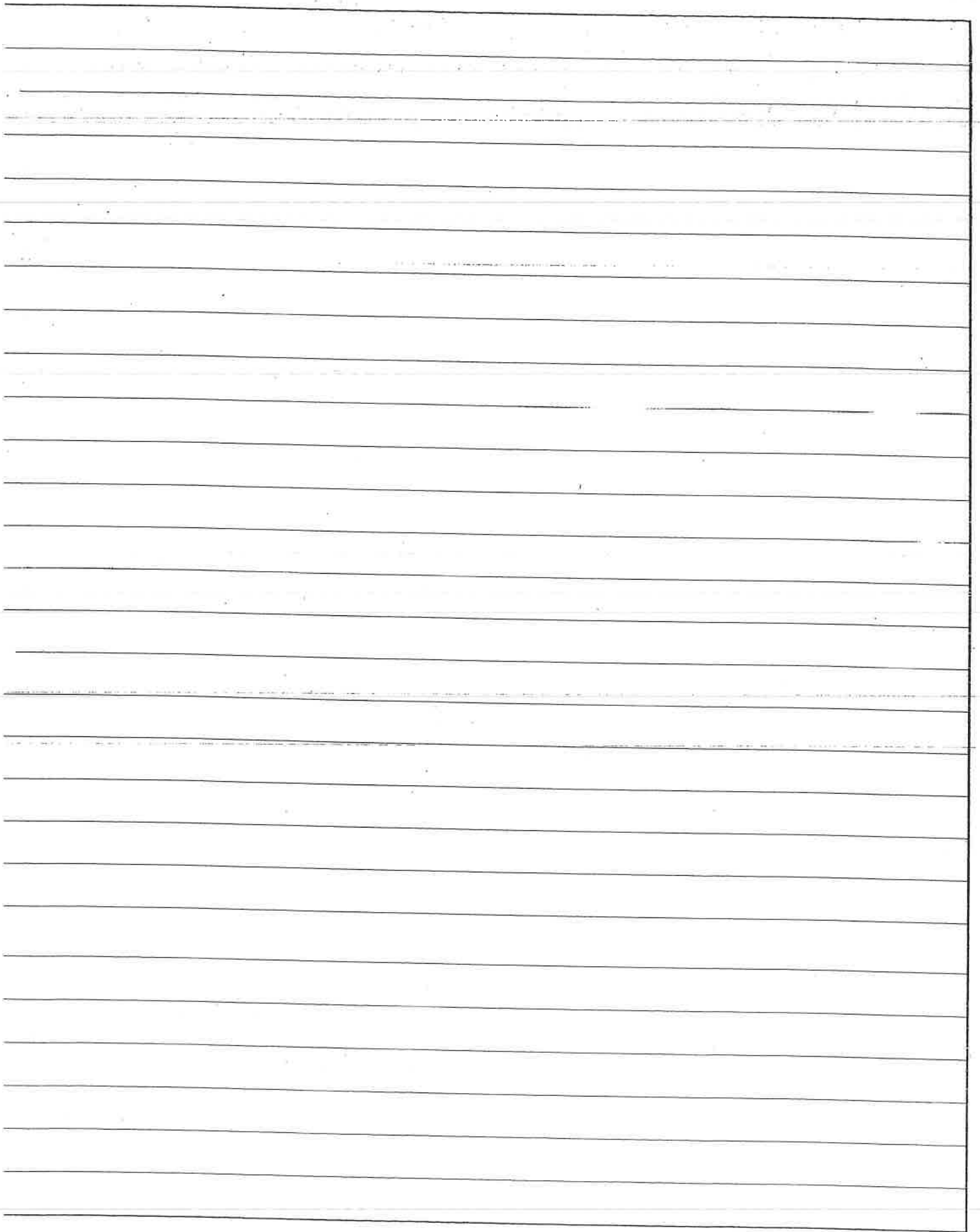
What were you surprised to learn from the text?

ACADEMIC TALK

I'm curious about _____.

ACADEMIC TALK

Can you tell me more about _____?



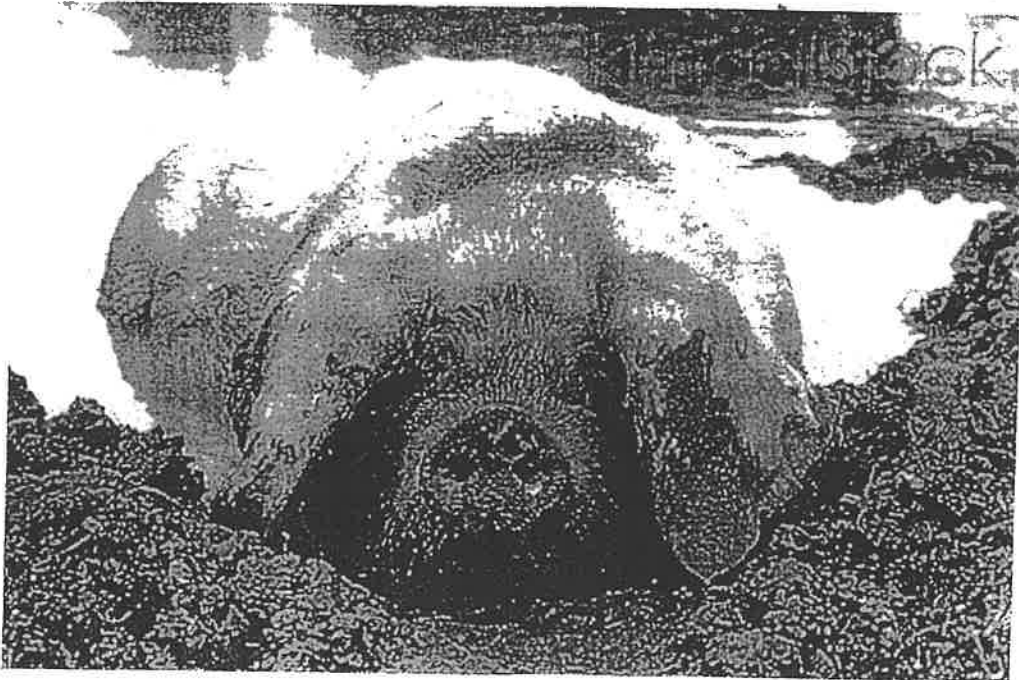
Journal:
Friday, Day #20

Journal details: today's journal writing includes 2 options for completion. Please choose one response option below.

1. Write a 3.8 paragraph. Use the 3.8 template from day 18 to guide you.
2. Write freely on the topic below BUT you must have at least a half-sheet response.

Please write your journal on the back of this sheet.

Journal:



Pigs stink! The only thing this pig is good for is bacon. Convince me that I'm wrong! Write a persuasive response to save this pig's life.

Harrison County Middle School
NTI Assignments 11-20 R.Persinger 8th Grade maroon math

I hope this finds you doing well and with good health. Take care of yourself !!
To make it easy on you, your parents and me, all assignments below are for BOTH advanced and regular students. I tried not to make this complicated for you and your family. I know many other things are on your minds as we adventure thru these tough times. If you are an advanced student that has Ms. Herrington go ahead and do my assignments. Her and I got together while looking at the assignments and agreed upon this. And you will get credit for it.
When school was interrupted, we were almost finished with new content so work below is review. Assignments are numbered/lettered at the bottom. Ex- A-14 would be assignment 14 and so forth.

I know many of you will text, video and talk to each other about some problems which is ok. However, don't just give the answers to your friends. Help them but don't make it easy. Packet 11-20 will be laid out and look differently than the NTI's you are familiar with. It will be more like a school day. Ex; Assignment 11 will be something from every class as if you are in school and represents a day. Assignment 12 will be the next day.

All packets are found online from the school website, or you can pick them up at the school.

Have a good attitude and approach about the work you are getting from NTI packets 1-5 , 6-10 and 11-20. This beats having to make up days and getting out of school mid June.

Assignment 11- A-11 System of Equations by graphing. (this is what we did before you left)

Assignment 12- A-12 Unit Pricing-Read the examples in the gray box at the top.

Assignment 13- A-13 Finding Area $a = l \times w$

Assignment 14- A-14 Finding slope and using the Pythagorean Theorem

Assignment 15- A-15 Finding slope and using the Pythagorean Theorem

Assignment 16- A-16 Functions - greater slope, greater y-intercept

Assignment 17- A-17 Functions continued

Assignment 18- A-18 Graphing lines in slope intercept form (front/back)

Assignment 19- A-19 Geometry parallel lines with transversal - (selfmade) (back are equations)

Assignment 20- A-20 Geometry - Finding Volume- (use the reference sheet)

Take care,

Mr. Rodney Persinger - 8th grade math

KENTUCKY MATHEMATICS REFERENCE SHEET

Grades 7 and 8

FORMULAS FOR PLANE FIGURES

Parallelogram: $A = bh$

Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$

Triangle: $A = \frac{1}{2}bh$

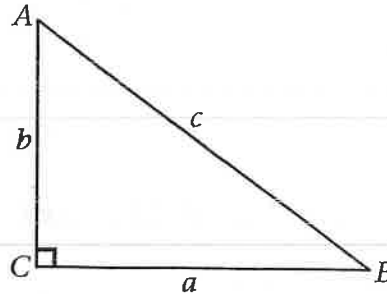
Circle: $C = 2\pi r$

$$A = \pi r^2$$

Right Triangle:

The Pythagorean Formula

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



$$(x_1, y_1) (x_2, y_2)$$

$$\frac{y_2 - y_1}{x_2 - x_1} \text{ - slope}$$

FORMULAS FOR SOLID FIGURES

Right Prism: $V = Bh$ (B is the area of the base.)

Right Cylinder: $V = \pi r^2 h$

Regular Pyramid: $V = \frac{1}{3}Bh$

Cube: $V = e^3$ $v = l \cdot w \cdot h$

$$SA = 6e^2$$

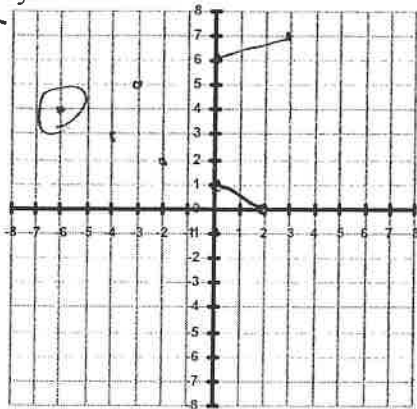
Cone: $V = \frac{1}{3}\pi r^2 h$

Sphere: $V = \frac{4}{3}\pi r^3$

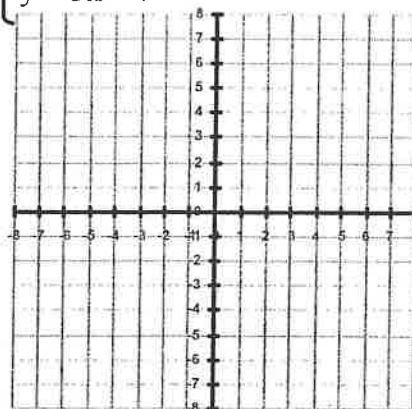
GRAPHING SYSTEMS OF EQUATIONS #1

Directions: Find the solution for each system of equations by graphing the system. The solution is where the graphs intersect. Write the solution as an ordered pair in the space provided.

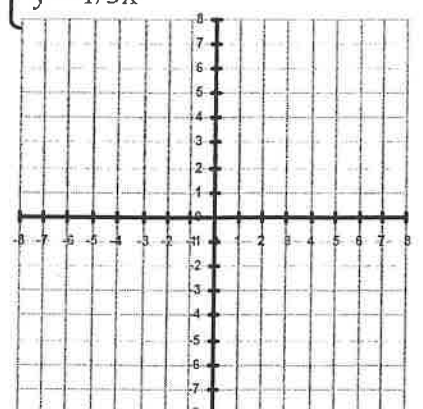
1) $\begin{cases} y = -1/2x + 1 \\ y = 1/3x + 6 \end{cases}$ **Solution** (-6, 4)



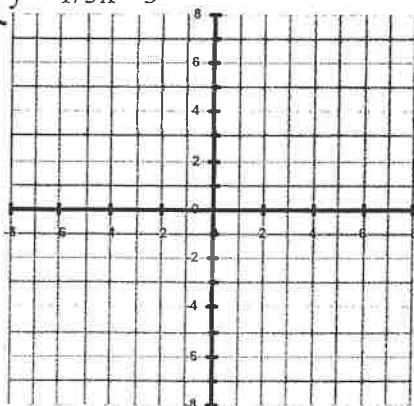
2) $\begin{cases} y = -2x - 3 \\ y = 3x + 7 \end{cases}$ **Solution** ()



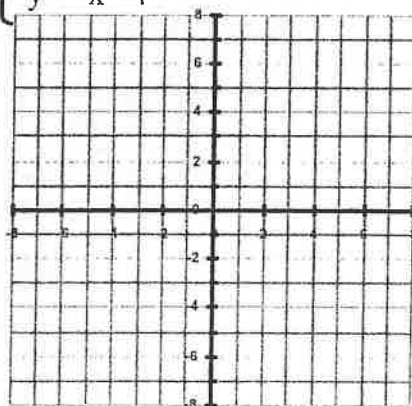
3) $\begin{cases} y = x - 4 \\ y = 1/5x \end{cases}$ **Solution** ()



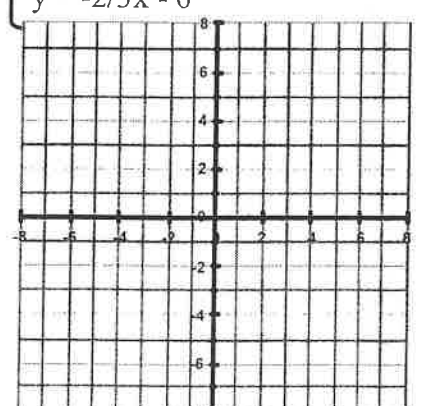
4) $\begin{cases} y = x - 7 \\ y = 1/3x - 3 \end{cases}$ **Solution** ()



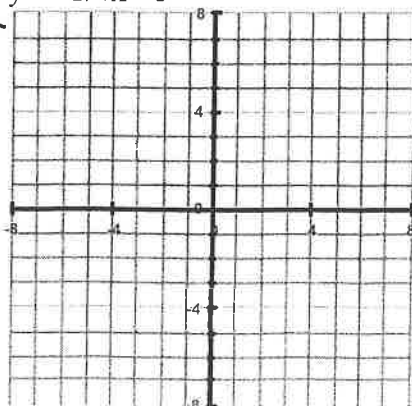
5) $\begin{cases} y = x + 4 \\ y = -x - 4 \end{cases}$ **Solution** ()



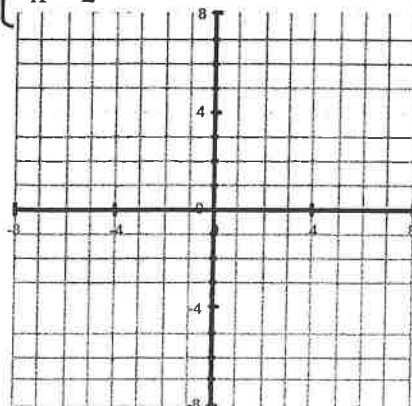
6) $\begin{cases} y = 1/3x - 3 \\ y = -2/3x - 6 \end{cases}$ **Solution** ()



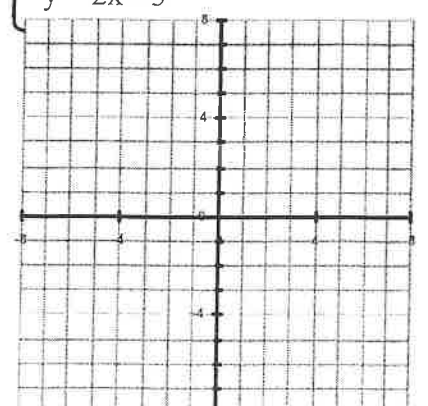
7) $\begin{cases} y = -2x + 2 \\ y = -1/4x - 5 \end{cases}$ **Solution** ()



8) $\begin{cases} y = 3 \\ x = 2 \end{cases}$ **Solution** ()



9) $\begin{cases} y = 2x + 3 \\ y = 2x - 3 \end{cases}$ **Solution** ()



Consumer, Beware!

Example

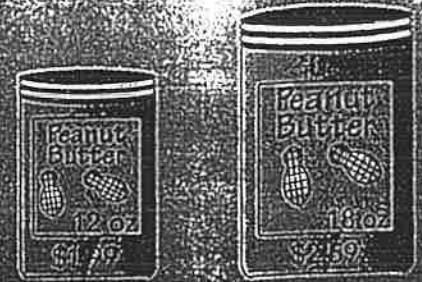
Find the unit price of the better buy.

The unit price of the smaller jar (\$1.99/12 oz) is
\$0.17 per ounce rounded to the nearest cent.

The unit price of the larger jar (\$2.59/18 oz) is
\$0.14 per ounce rounded to the nearest cent.

The larger jar has a lower unit price. It is the better buy.

So, \$0.14/oz is the unit price of the better buy.



Find the unit price of the better buy. Round to the nearest cent.

- 1 detergent
- 2 potato chips
- 3 toothpaste
- 4 strawberries
- 5 tomato sauce
- 6 noodles
- 7 ketchup
- 8 cereal
- 9 snack chips
- 10 waffles
- 11 ice cream
- 12 crackers

| | | |
|------------------|----|------------------|
| \$3.99 for 32 oz | or | \$5.19 for 48 oz |
| \$0.89 for 32 oz | or | \$1.49 for 64 oz |
| \$1.79 for 6 oz | or | \$2.49 for 8 oz |
| \$1.79 for 32 oz | or | \$3.09 for 64 oz |
| \$1.19 for 28 oz | or | \$1.99 for 35 oz |
| \$0.59 for 8 oz | or | \$0.79 for 14 oz |
| \$1.09 for 12 oz | or | \$1.59 for 16 oz |
| \$1.19 for 32 oz | or | \$2.19 for 64 oz |
| \$1.19 for 6 oz | or | \$1.79 for 10 oz |
| \$2.99 for 22 oz | or | \$3.99 for 32 oz |
| \$1.09 for 8 oz | or | \$1.59 for 16 oz |
| \$0.59 for 8 oz | or | \$1.99 for 25 oz |

Answer Box

| | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|
| A | B | C | D | E | F |
| \$0.10/oz | \$0.04/oz | \$0.12/oz | \$0.09/oz | \$0.03/oz | \$0.07/oz |
| G | H | I | J | K | L |
| \$0.30/oz | \$0.18/oz | \$0.05/oz | \$0.11/oz | \$0.06/oz | \$0.02/oz |

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
| | | | | | |

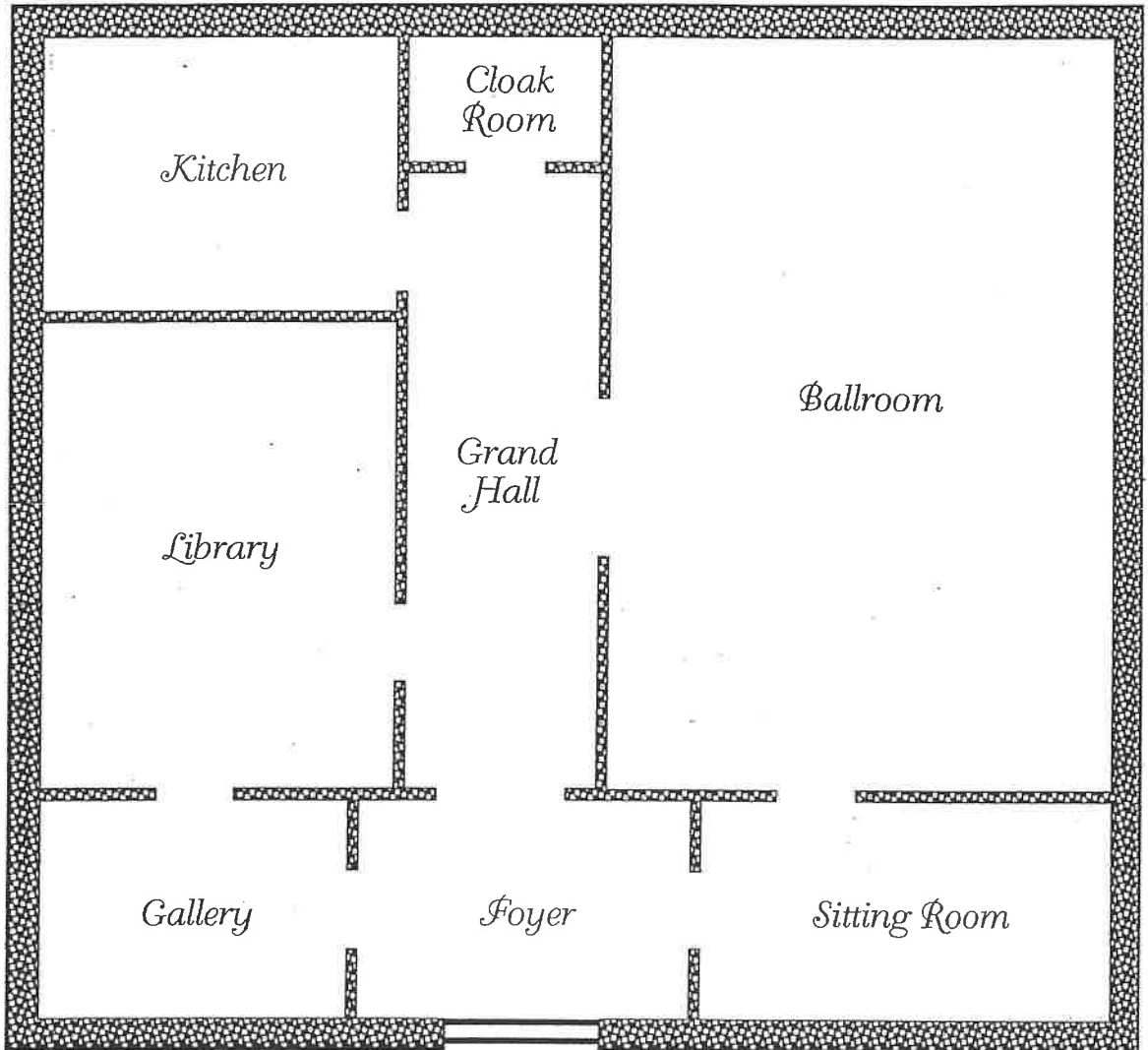
Objective: Compare prices

determine the better buy.

What Sort of Monkeys Make the Best Wine?

- Measure the length and width of each room in centimeters to the nearest 0.1 cm. (Check to be sure that each of your measurements is in the "Measure Checker" below.)
- Convert each measurement to meters. The scale is 3 cm = 5 m. Round to the nearest 0.1 m.
- Use your rounded measurements to find the area of the room. Round your answer to the nearest 0.1 m². Find your answer at the bottom of the page and cross out the letters above it.

HOGWARTS CASTLE • Ground Level Floor Plan • Scale 3 cm = 5 m



A-l-w

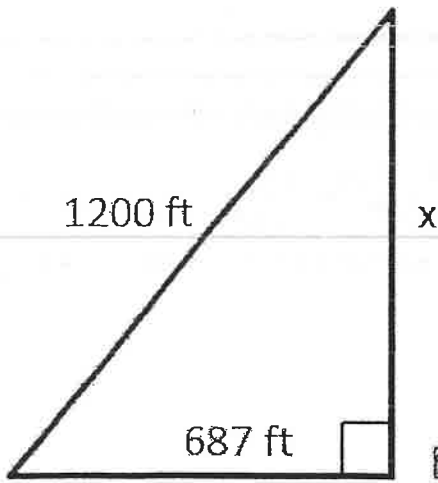
| | | | | | | | | | | | | |
|---------|---------------------|----------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|----------------------|---------------------|
| Measure | 1.5 cm | 3.0 cm | 4.2 cm | 5.2 cm | 6.6 cm | 8.1 cm | 10.8 cm | | | | | |
| Checker | 1.9 cm | 3.4 cm | 4.8 cm | 5.5 cm | 7.3 cm | 9.6 cm | 11.7 cm | | | | | |
| | BI | GR | AB | IG | AY | ES | AP | ET | AW | IN | ES | IT |
| | 49.6 m ² | 115.6 m ² | 80.0 m ² | 263.3 m ² | 55.4 m ² | 62.7 m ² | 18.3 m ² | 64.4 m ² | 112.2 m ² | 45.6 m ² | 247.5 m ² | 16.0 m ² |

A-13
7.2

①

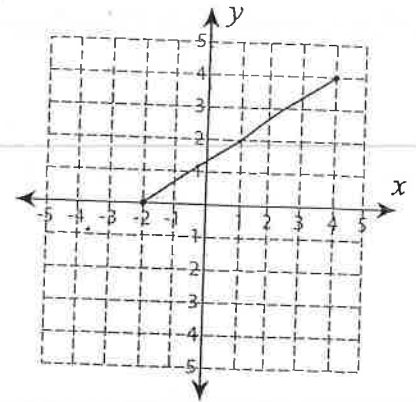
$a + b = c$

SLOPE $\frac{Rise}{Run}$



Find the slope of the line.

②



Find the height of the Eiffel Tower to the nearest foot.

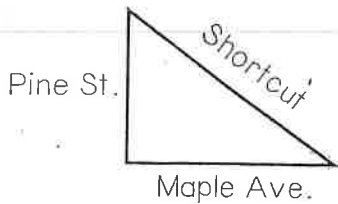
- a. 883 ft.
- b. 743 ft.
- c. 1113 ft.

- d. 1254 ft.
- e. 984 ft.

- a) 7.2
- b) 10
- c) $\frac{2}{3}$
- d) $\frac{3}{2}$

③

Quinton typically walks 28 yards south on Pine Street and 45 yards east on Maple Avenue in order to get to school. How much shorter would his walk be if he took the shortcut shown below?



A. 73 yards

B. 20 yards

C. 53 yards

D. 126 yards

④

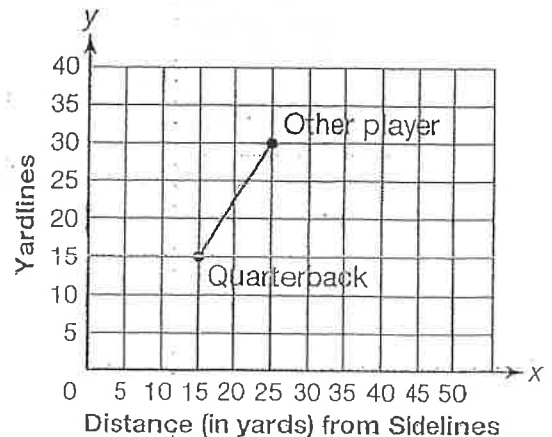
Which of the following could not be the side lengths of a right triangle?

↑
NOT!!!

- A. 7.5, 10 and 12.5
- B. 85, 13 and 84
- C. 37, 35 and 12
- D. 24, 22 and 40

⑤

A quarterback throws a pass to another player.



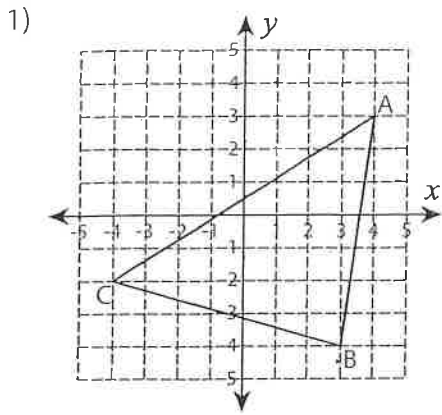
To the nearest yard, what distance was the pass thrown?

- A. 5 yards
- B. 15 yards
- C. 18 yards
- D. 33 yards

A-14

Finding Slopes: Shapes

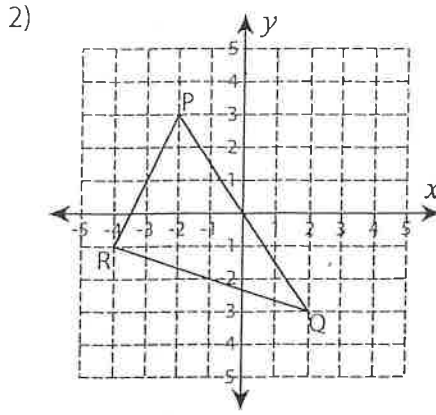
Identify the slope of each line segment, joined to form a triangle.



length of \overline{AB} = _____

Slope of \overline{BC} = _____

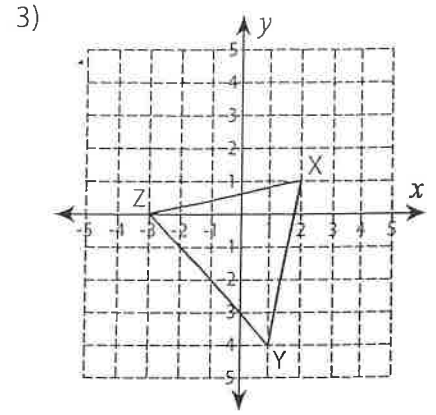
Slope of \overline{CA} = _____



length of \overline{PQ} = _____

Slope of \overline{QR} = _____

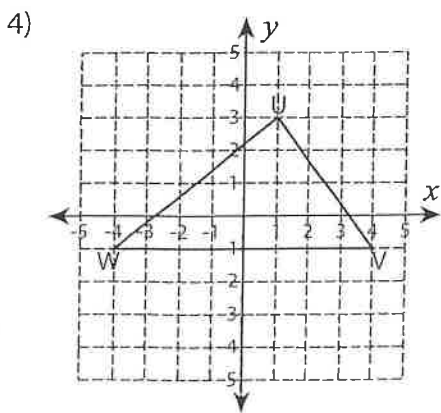
Slope of \overline{RP} = _____



Slope of \overline{XY} = _____

Slope of \overline{YZ} = _____

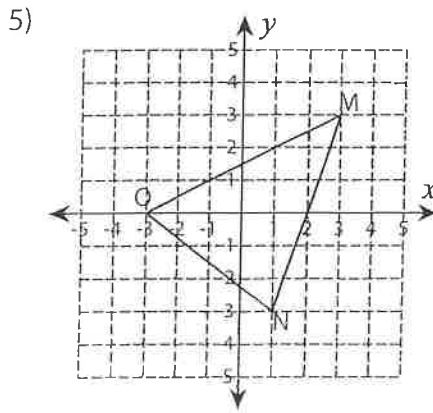
length of \overline{ZX} = _____



length of \overline{UV} = _____

Slope of \overline{VW} = _____

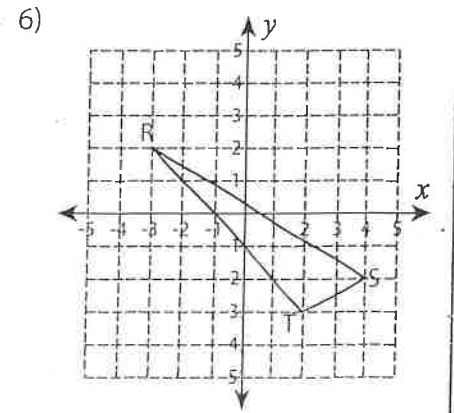
Slope of \overline{WU} = _____



Slope of \overline{MN} = _____

length of \overline{NO} = _____

Slope of \overline{OM} = _____



Slope of \overline{RS} = _____

Slope of \overline{ST} = _____

length of \overline{TR} = _____

Function 1

| | | | | |
|---|---|---|----|----|
| x | 0 | 2 | 4 | 6 |
| y | 1 | 0 | -1 | -2 |

IDENTIFY CHARACTERISTICS

| | | |
|----------|-------|-------------|
| Function | Slope | y-intercept |
| 1 | | |
| 2 | | |

Function 2

$$y = \frac{3}{4}x + 4$$

COMPARE FUNCTIONS

1. The function with a greater y-intercept is _____.
2. The function with a greater slope is _____.
3. Which functions have negative slope?

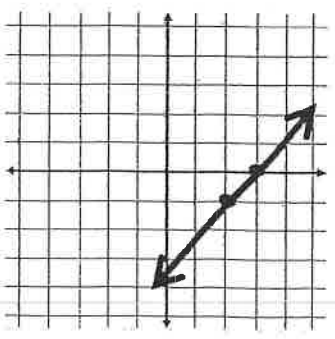
Function 1

| | | | | |
|---|----|---|---|----|
| x | -5 | 0 | 5 | 10 |
| y | 1 | 5 | 9 | 13 |

COMPARE FUNCTIONS

1. The function with a greater y-intercept is _____.
2. The function with a greater slope is _____.
3. Which functions have negative slope?

Function 2



IDENTIFY CHARACTERISTICS

| | | |
|----------|-------|-------------|
| Function | Slope | y-intercept |
| 1 | | |
| 2 | | |

Function 1

| | | | | |
|---|---|----|----|----|
| x | 8 | 10 | 12 | 14 |
| y | 1 | 2 | 3 | 4 |

IDENTIFY CHARACTERISTICS

| | | |
|----------|-------|-------------|
| Function | Slope | y-intercept |
| 1 | | |
| 2 | | |

Function 2

$$y = 6x - 1$$

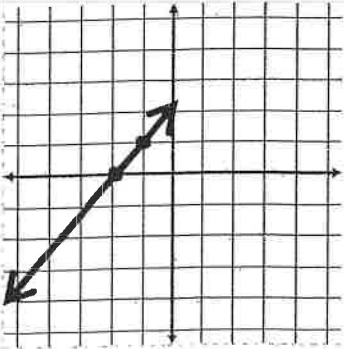
COMPARE FUNCTIONS

1. The function with a greater y-intercept is _____.
2. The function with a greater slope is _____.
3. Which functions have negative slope?

Function 1

| | | | | |
|---|-----|----|---|---|
| x | -2 | 0 | 2 | 4 |
| y | -10 | -5 | 0 | 5 |

Function 2



COMPARE FUNCTIONS

1. The function with a greater y-intercept is _____.
2. The function with a greater slope is _____.
3. Which functions have negative slope?

IDENTIFY CHARACTERISTICS

| | | |
|----------|-------|-------------|
| Function | Slope | y-intercept |
| 1 | | |
| 2 | | |

CARD #9:

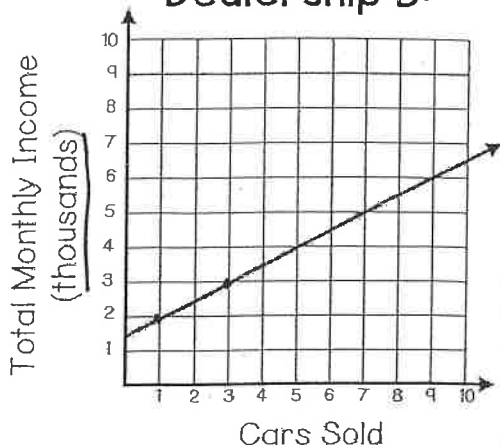
A-17

Two car dealerships pay their employees a monthly salary plus a commission on cars that they sell.

Dealership A:

| X Cars Sold | Monthly Y Income |
|----------------|---------------------|
| 1 | \$1900 |
| 4 | \$3850 |
| 7 | \$5800 |
| 10 | \$7750 |

Dealership B:



$\frac{\text{Change in } y}{\text{Change in } x}$

① Calculate the commission for each dealership.

A:

B:

② Calculate the monthly salary for each dealership. A:
B:

CARD #10:

Two friends are saving money to take a vacation over Spring Break.

Jim's account can be represented by $y = 250 + 120x$ where x is the number of weeks and y is the total amount in his savings account. Josh's savings account balance is shown in the table below:

| Number of X Weeks | Total Amount in Y Savings |
|----------------------|------------------------------|
| 2 | \$520 |
| 4 | \$740 |
| 6 | \$960 |
| 8 | \$1180 |

③ How much does each person save per week?

Jim:

Josh:

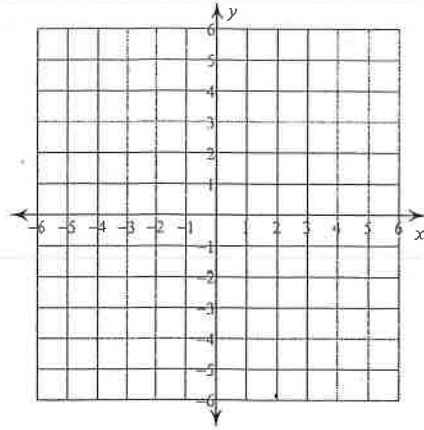
④ How much did each person have in their savings account to begin?

Jim:
Josh:

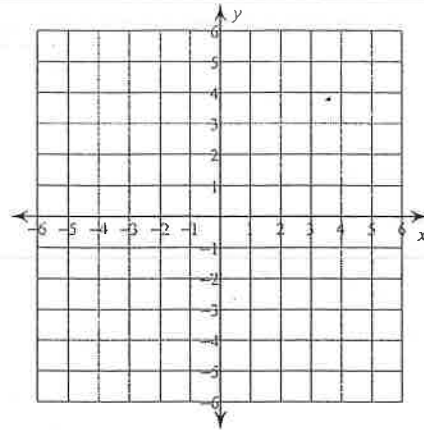
Graphing Lines

Sketch the graph of each line.

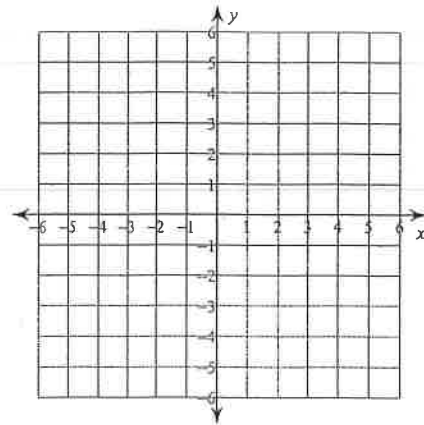
1) $7x + y = 5$



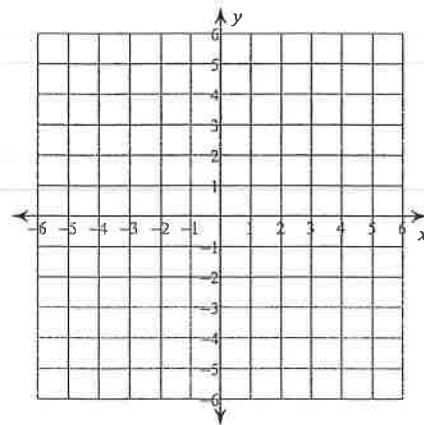
2) $3x + 5y = -5$



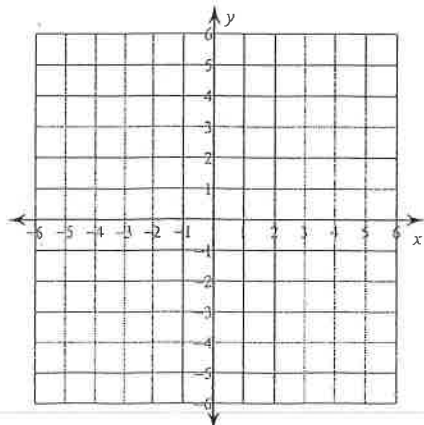
3) $y = 4$



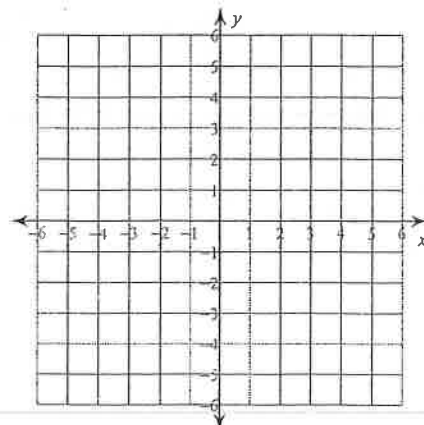
4) $6x + 5y = 20$



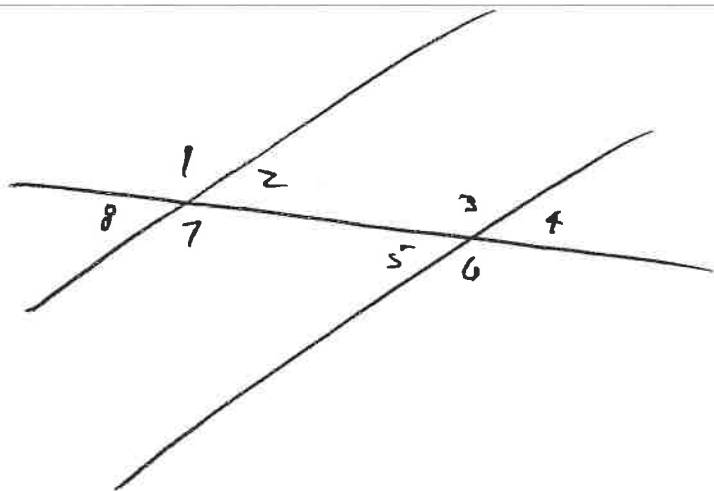
5) $x = -3$



6) $2x + y = 4$



NAME _____



PAIR OF:

ALT INT L's _____

ALT EXT L's _____

VERTICAL L's _____

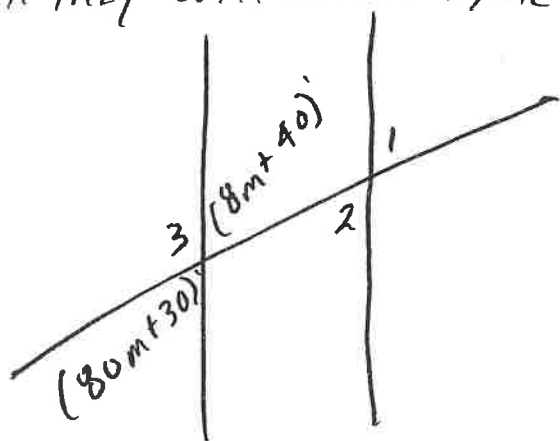
CORRESPONDING L's _____

IF $\angle 8$ IS 45° , WRITE IN ALL OTHER ANGLES

_____ PAIR OF SUPPLEMENTARY L's

_____ PAIR OF COMPLEMENTARY L's

* THEY WILL EITHER EQUAL EACH OTHER OR TOGETHER THEY EQUAL 180

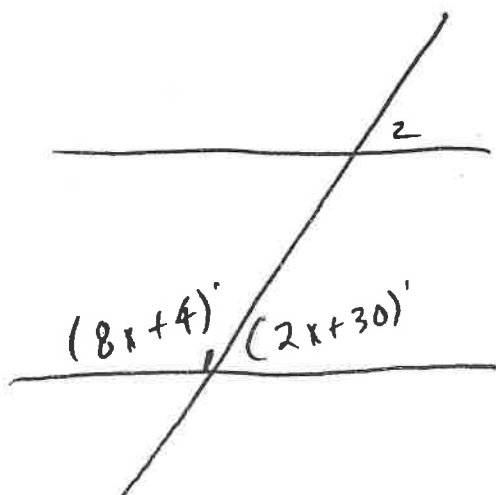


Find m _____

Find $\angle 1$ _____

$\angle 2$ _____

$\angle 3$ _____



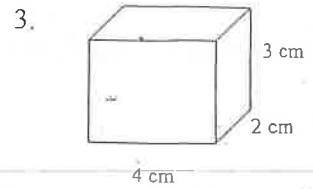
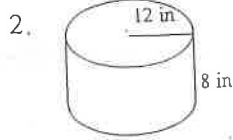
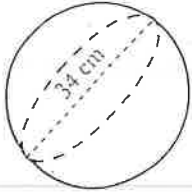
Find x _____

Find $\angle 1$ _____

Find $\angle 2$ _____

Name _____ period _____

VOLUME—show your work , round to the nearest tenths digit and use 3.14 for π .

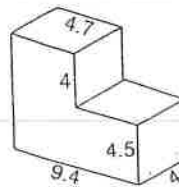


The volume of the cylinder is 456 cm^3 while the radius is 4 cm. The height is _____

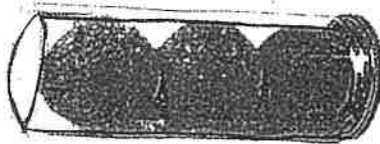
5. The volume of the sphere is 294 cm^3 . The radius is _____ The circumference is _____

The volume of the cube is 343 cm^3 The lengths of the sides are _____

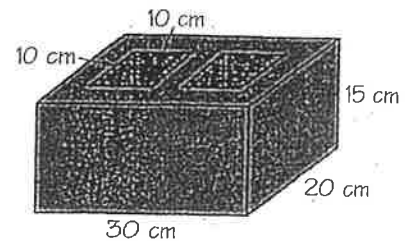
7. Find the volume of the figure below. Show work _____



Three tennis balls fit snugly into the cylinder container. One ball is 7cm in diameter. Which is greater , the volume of the three tennis balls or the volume around the balls? Explain your answer and show work.



9. Find the volume of the actual concrete _____



Which is greater ? _____
explain _____

Social Studies NTI Days 11-20

NTI Days 11-20 will cover the end of our Economics Unit and the Civil War.

Days 11-12 **Assignment 1:** Create an Economic pict poster. Back side notes, front side pictures

Days 13-14 **Assignment 2:** Create a Civil War picture poster. Back side notes, front side pictures
(Use 2 white sheets of paper included in packet or use paper from home to make picture posters)

Days 15-16 **Assignment 3:** Use the chart to describe why resources would play a big part in deciding who would win the Civil War. (Keep answer to lined response part)

Days 17-20 are posted in Google Classroom: This is for DOJO points, not a grade.

Day 17 John Brown's Raid Movie Breakout: Worth 10 DOJO

Day 18 Causes of the Civil War Movie Breakout: Worth 10 DOJO

Day 19 Civil War Movie Breakout: Worth 10 DOJO

Day 20 Civil War Breakout Worth 10 DOJO

1. Create an Economics Picture Poster: Cottage Industry vs. Factory Assembly Lines

A. Write information on one side

B. Create a picture for each **Pro** on the back

A. Cottage industry is where you make everything by **hand**

Pros for Cottage industry:

Customize (suited) products to meet customer demands

Handcrafted quality

B. Industrial revolution mass production on **assembly line**.

Pros for working in a factory:

Produce **more products**

Can make things **Faster**

Can make things **Cheaper**

Simple tasks can be learned in hours

2. Create a Civil War Picture Poster: Events that led to a Civil War

A. Write this information on one side

B. Create a picture for each **Event** on the back

1. **UNCLE TOM'S CABIN** was a novel about the horrors of slavery. Because of the book, many in the urban north became abolitionists and helped in the underground railroad.

2. **BLEEDING KANSAS:** The state of Kansas would decide on slavery through popular sovereignty. Abolitionist and enslavers fought and killed each other over control of Kansas.

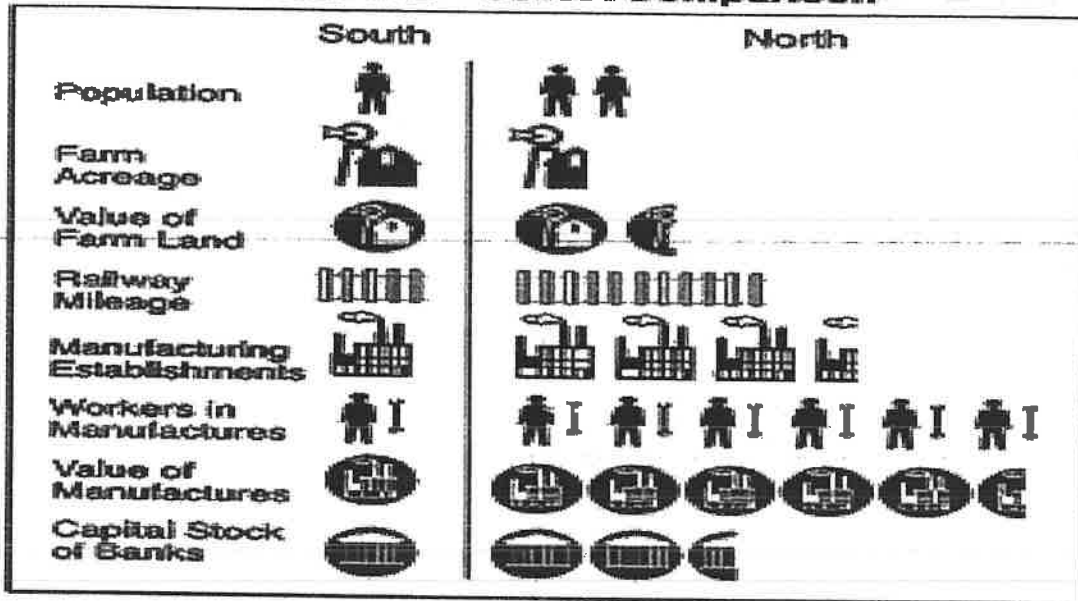
3. In the **DRED SCOTT CASE**, the Supreme Court supported the slave owner. Abolitionists in the north were furious.

4. **JOHN BROWN RAIDED** Harper's Ferry to arm and free the slaves. He was a hero to the north. The south saw him as a traitor, even a terrorist.

3. Use the chart below to describe why resources would play a big part in deciding who would win the Civil War between the north and south. Consider how a larger population, more rail, manufacturing, banks, and money would help you in a war.

Chart comparing resources between north and south

The Year 1860: A Comparison



Write your Answer Here:





Name _____

Date _____

Hour _____

Mrs. Klausman, Days 11-20
SCIENCE
NTI Assignments
8 MAROON

OVERVIEW

You will be studying several methods scientists use to learn about the history of the Earth. You will learn about;

1. How do scientists organize the history of the Earth (the Geologic Time Scale)?
2. How do scientists interpret the age of rock/ fossils? (relative and absolute age).
3. How do fossils form?

You will be asked to do work from every subject every day, so it is suggested that you follow the schedule below to develop a routine.

Days 11 and 12;

- Read pages 588 to 594.
- On the attached answer sheet at the end of the packet, answer the questions on page 594 in complete sentences.
- Underline where you found the answer in the text and write the number of the answer next to the section you underlined.

Days 13 and 14:

- Read pages 595 to 597.
- Answer the attached worksheet at the end of this packet.

Days 15 to 16;

- Read pages 597 to 600.
- On the attached answer sheet at the end of the packet, answer the questions on page 600 in complete sentences.
- Underline where you found the answer in the text and write the number of the answer next to the section you underlined.

Days 17 to 18;

- Read pages 601 to 605
- On the attached answer sheet at the end of the packet, answer the questions on page 605 in complete sentences.
- Underline where you found the answer in the text and write the number of the answer next to the section you underlined.

Days 19 to 20;

-Read pages 606 to 609

-On the attached answer sheet at the end of the packet, answer the questions on page 606 in complete sentences.

-Underline where you found the answer in the text and write the number of the answer next to the section you underlined.

If you have any questions, you can contact me three different ways:

1. Call the school 234-7123
2. Email me at shari.klausman@harrison.kyschools.us
3. Text me at 606-842-1373

Please keep this assignment until we return to school.
I miss you! Be careful and stay safe – Mrs. Klausman

SECTION 1

The Rock Record

MAIN IDEA Scientists organize geologic time to help them communicate about Earth's history.

Essential Questions

- Why do scientists need a geologic time scale?
- How are eons, eras, periods, and epochs defined?
- What are the groups of plants and animals that dominated the eras of Earth's history?

Review Vocabulary

fossil: the remains, trace, or imprint of a once-living plant or animal

New Vocabulary

geologic time scale
eon
Precambrian
era
period
epoch
mass extinction

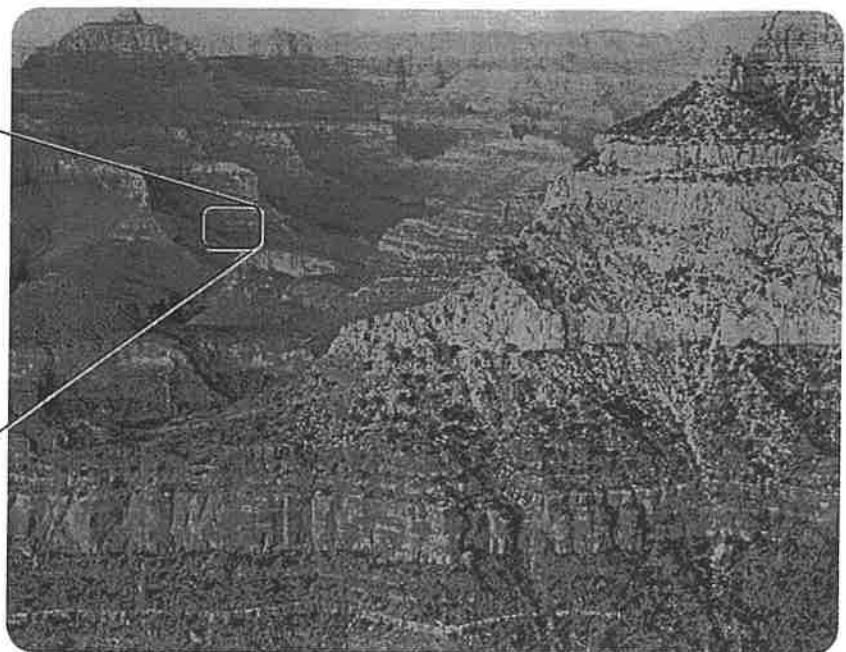
EARTH SCIENCE 4 YOU

Imagine how difficult it would be to plan a meeting with a friend if time were not divided into units of months, weeks, days, hours, and minutes. By organizing geologic time into time units, scientists can communicate more effectively about events in Earth's history.

Organizing Time

A hike down the Grand Canyon reveals the multicolored layers of rock, called strata, that make up the canyon walls, as shown in **Figure 1**. Some of the layers contain fossils, which are the remains, traces, or imprints of ancient organisms. By studying rock layers and the fossils within them, geologists can reconstruct aspects of Earth's history and interpret ancient environments.

To help in the analysis of Earth's rocks, geologists have divided the history of Earth into time units. These time units are based largely on the fossils contained within the rocks. The time units are part of the **geologic time scale**, a record of Earth's history from its origin 4.6 billion years ago (bya) to the present. Since the naming of the Jurassic time period (juh RA sihk) in 1795, development of the time scale has continued to the present day. Some of the units have remained unchanged for centuries, while others have been reorganized as scientists have gained new knowledge. The geologic time scale is shown in **Figure 2**.

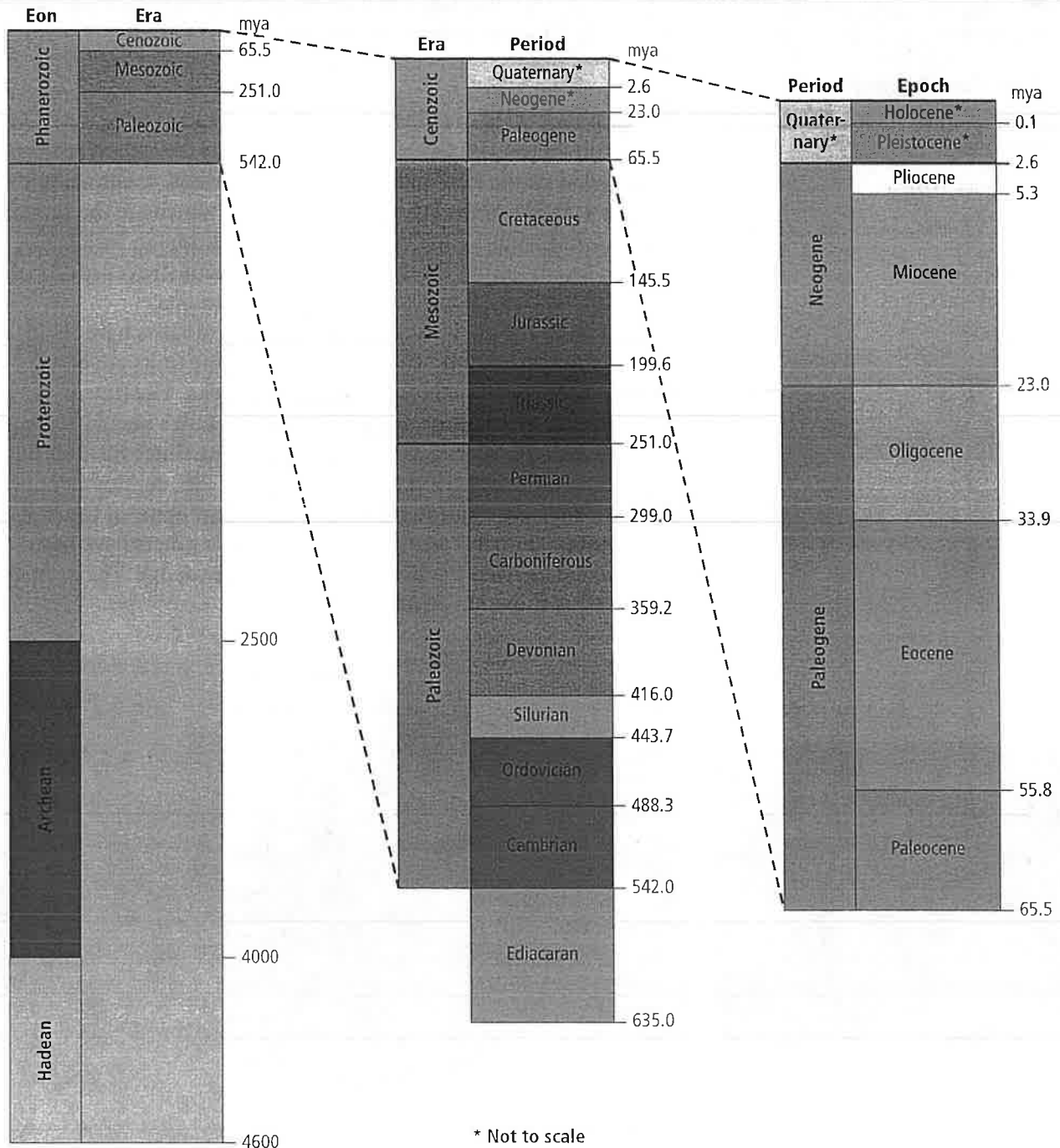


■ **Figure 1** The rock layers of the Grand Canyon represent geologic events spanning nearly 2 billion years. Geologists study the rocks and fossils in each layer to learn about Earth's history during different units of time.

(l)Richard Hamilton Smith/CORBIS, (r)Shubroto Chattopadhyay/CORBIS

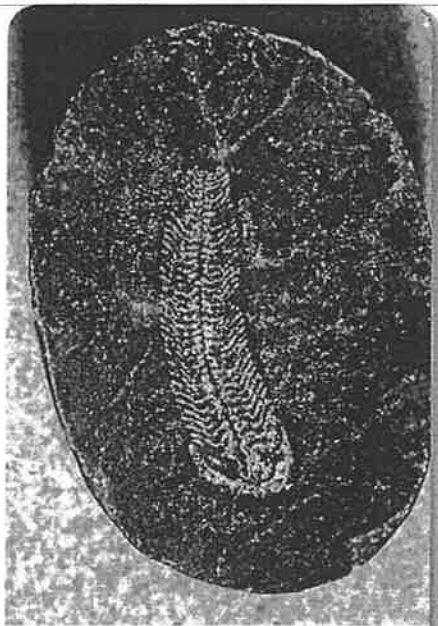
VISUALIZING VISUALIZING the Geologic Time Scale

Figure 2 The geologic time scale begins with Earth's formation 4.6 billion years ago (bya). Geologists organize Earth's history according to groupings called eons. Each eon contains eras, which in turn contain periods. Each period in the geologic time scale contains epochs. The current geologic epoch is called the Holocene Epoch. Each unit on the scale is labeled with its range of time in millions of years ago (mya). Identify the period, era, and eon representing the most modern unit of time.



Concepts In Motion

View an animation of the geologic time scale.



■ **Figure 3** This is a well-preserved fossil of an arthropod-like organism, found in a sedimentary rock of the late Precambrian. It represents one of the first complex life-forms on Earth.

Infer how this organism might have moved.

The Geologic Time Scale

The geologic time scale enables scientists to find relationships among the geological events, environmental conditions, and fossilized life-forms that are preserved in the rock record. The oldest division of time is at the bottom of the scale, shown in **Figure 2**. Moving upward, each division is more recent, just as the rock layers in the rock record are generally younger toward the surface.

✓ **READING CHECK Explain** why scientists need a geologic time scale.

Eons The time scale is divided into units called eons, eras, periods, and epochs. An **eon** is the largest of these time units and encompasses the others. From oldest to youngest, they consist of the Hadean (HAY dee un), Archean (ar KEE un), Proterozoic (pro tuh ruh ZOH ihk), and Phanerozoic (fa nuh ruh ZOH ihk) eons.

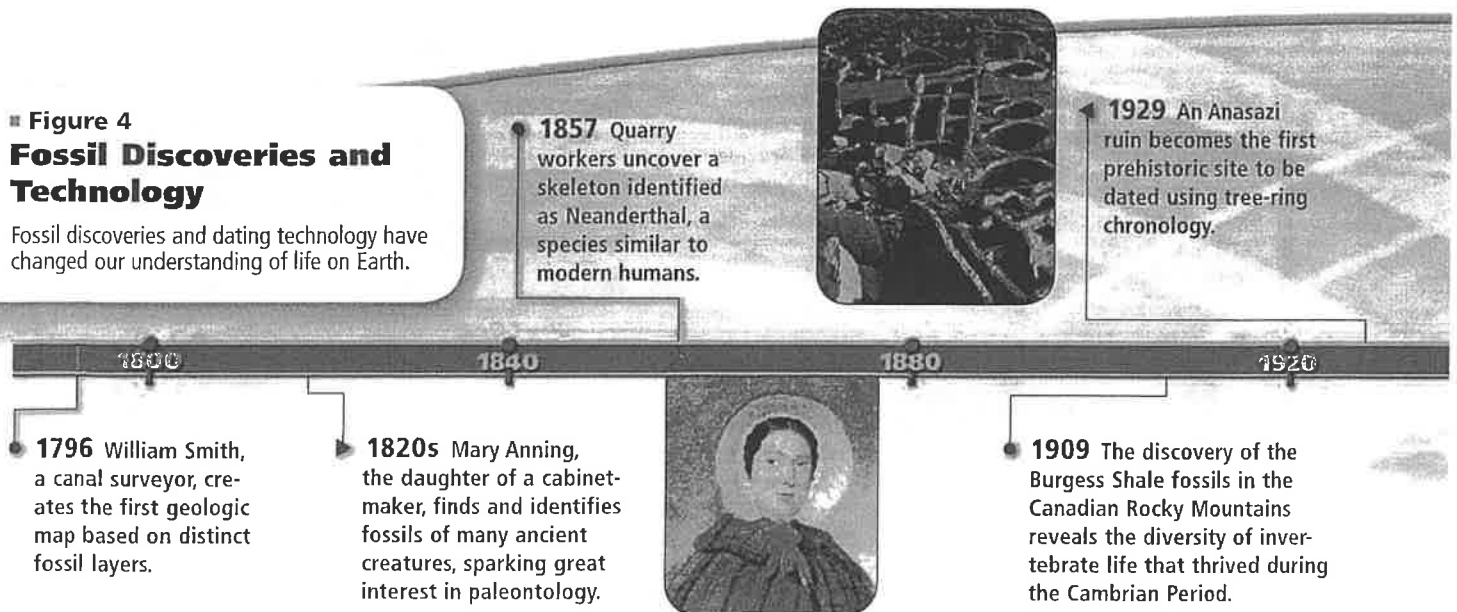
The three earliest eons make up 90 percent of geologic time, known informally as the **Precambrian** (pree KAM bree un). During the Precambrian, Earth was formed and became hospitable to life. Fossil evidence suggests that simple life-forms began in the Archean Eon and that by the end of the Proterozoic Eon, life had evolved to the point that some organisms might have been able to move in complex ways. Most of these fossils were soft-bodied organisms, many of which resembled modern animals. Others had bodies with rigid parts, such as the one shown in **Figure 3**. All life-forms until then had soft bodies without shells or skeletons.

Fossils dating from the most recent eon, the Phanerozoic, are the best-preserved, not only because they are younger than those from the Precambrian, but because many of them represent organisms with hard parts, which are more easily preserved. The time line in **Figure 4** shows some important fossil and age-dating discoveries.

©Ken Lucas/Visuals Unlimited, ©George H. H. Huey/CORBIS, (b)SPL/Photo Researchers

■ Figure 4 Fossil Discoveries and Technology

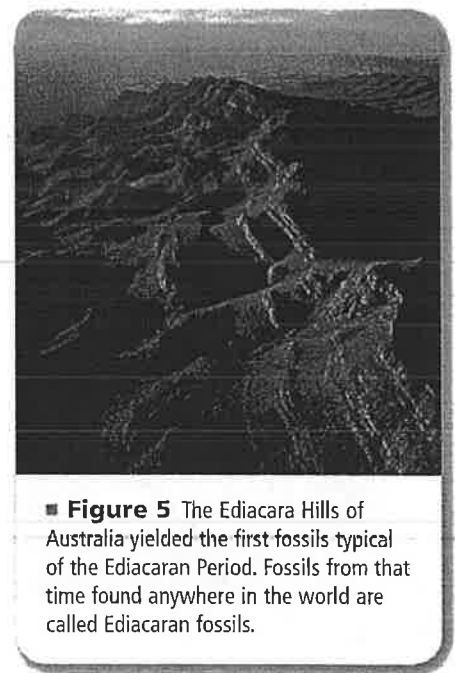
Fossil discoveries and dating technology have changed our understanding of life on Earth.



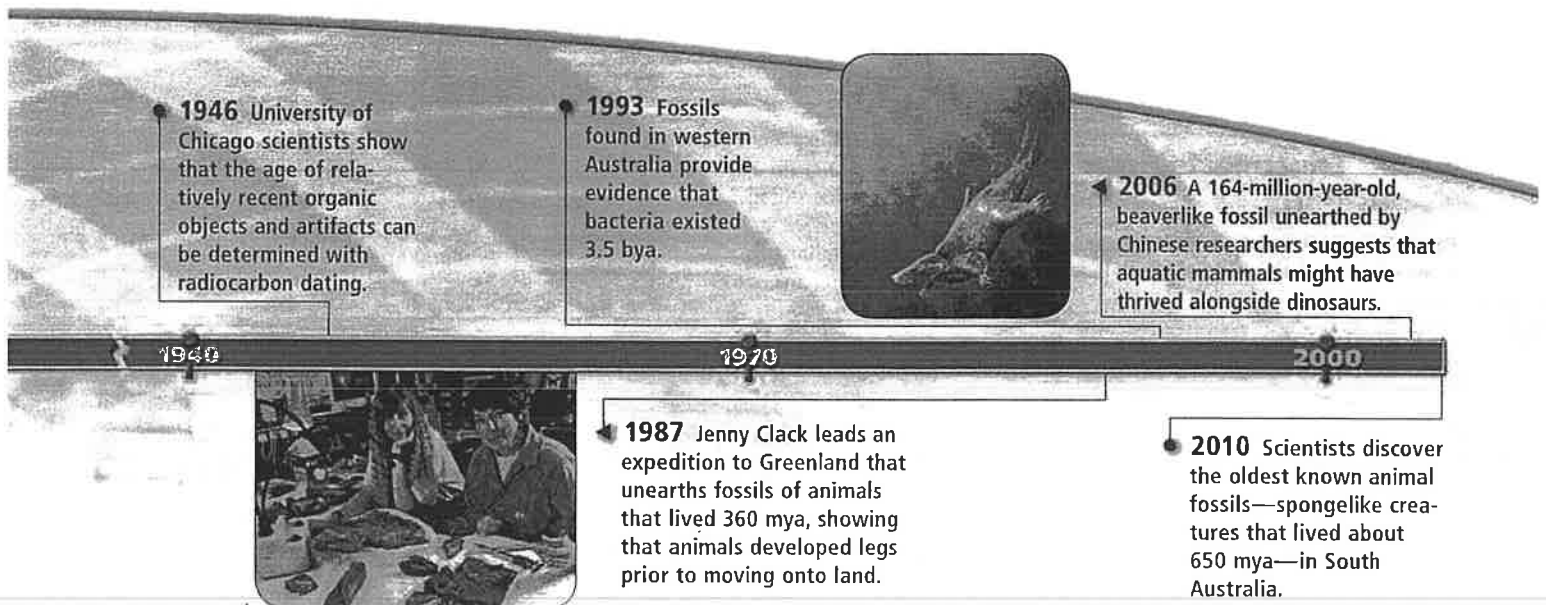
Eras All eons are made up of eras, the next-largest unit of time. **Eras** are usually tens to hundreds of millions of years in duration. Like all other time units, they are defined by the different life-forms found in the rocks. The names of the three eras of the Phanerozoic Eon are named for the relative ages of the life forms that lived during those times. For example, in Greek, *paleo* means “old,” *meso* means “middle,” and *ceno* means “recent.” *Zoic* means “of life” in Greek; thus, *Paleozoic* means “old life,” *Mesozoic* means “middle life,” and *Cenozoic* means “recent life.”

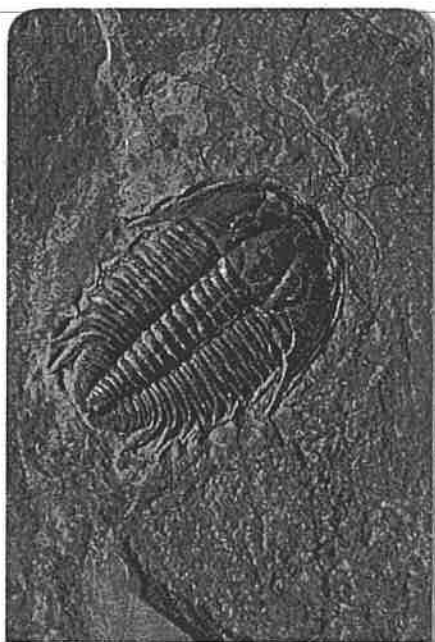
Periods All eras are divided into periods. **Periods** are generally tens of millions of years in duration, though some periods of the Precambrian are considerably longer. Some periods are named for the geographic region in which the rocks or fossils characterizing the age were first observed and described. Consider, for example, the Ediacaran (ee dee A kuh run) Period at the end of the Proterozoic Era. It is named for the Ediacara Hills in Australia, shown in **Figure 5**. It was here that fossils typical of the period were first found. The Ediacaran Period was added to the geologic time scale in 2004.

Epochs Epochs (EE pahks) are even smaller divisions of geologic time. Although the time scale in **Figure 2** shows epochs only for periods of the Cenozoic Era, all periods of geologic time are divided into epochs. **Epochs** are generally hundreds of thousands to millions of years in duration. Rocks and sediments from the epochs of the Cenozoic Era are the most complete because there has been less time for weathering and erosion to remove evidence of this part of Earth’s history. For this reason, the epochs of the Cenozoic are relatively short in duration. For example, the Holocene (HOH luh seen) Epoch, which includes modern time, began only about 12,000 years ago.



■ **Figure 5** The Ediacara Hills of Australia yielded the first fossils typical of the Ediacaran Period. Fossils from that time found anywhere in the world are called Ediacaran fossils.





■ **Figure 6** Trilobites are Paleozoic arthropod fossils found all over the world. Like 95 percent of marine life-forms of that era, they perished during a mass extinction event.

Succession of Life-Forms

During the Phanerozoic Eon, multicellular life diversified. Fossils from the Phanerozoic are abundant, while those from the Precambrian are relatively few. The word *Phanerozoic* means “visible life” in Greek. During the first era of the Phanerozoic, the Paleozoic (pay lee uh ZOH ihk), the oceans were home to many different kinds of organisms. Small, segmented animals called trilobites, like the one shown in **Figure 6**, were among the first hard-shelled life-forms. Trilobites dominated the oceans in the early part of the Paleozoic Era; land plants appeared later, followed by land animals. Swamps of the Carboniferous (kar buh NIH fuh rus) Period provided the plant material that developed into the coal deposits of today. The end of the Paleozoic is marked by the largest mass extinction event in Earth’s history. In a **mass extinction**, many groups of organisms disappear from the rock record at about the same time. At the end of the Paleozoic, 95 percent of all marine organisms became extinct.

The age of dinosaurs The era following the Paleozoic—the Mesozoic (mez uh ZOH ihk)—is known for the emergence of dinosaurs, but many other organisms also appeared during the Mesozoic. Large predatory reptiles ruled the oceans, and corals closely related to today’s corals built huge reef systems. Water-dwelling amphibians began adapting to terrestrial environments. Insects, some as large as birds, thrived. Mammals evolved and began to diversify. Flowering plants and trees emerged. The end of the Mesozoic is marked by a large extinction event. Many groups of organisms became extinct, including the non-avian dinosaurs and large marine reptiles.

The rise of mammals During the era that followed—the Cenozoic (sen uh ZOH ihk)—mammals began to dominate the land, and increased both in number and diversity. Human ancestors, the first primates, emerged in the epoch called the Paleocene, and modern humans appeared in the Pleistocene (PLYS tuh seen) Epoch.

SECTION 1 REVIEW

Section Self-Check

Section Summary

- Scientists organize geologic time into eons, eras, periods, and epochs.
- Scientists divide time into units based largely on fossils of plants and animals.
- The Precambrian makes up nearly 90 percent of geologic time.
- The geologic time scale changes as scientists learn more about Earth.

Understand Main Ideas

1. **MAIN IDEA** Explain the purpose of the geologic time scale.
2. **Distinguish** among eons, eras, periods, and epochs, using specific examples.
3. **Describe** the importance of extinction events to geologists.
4. **Explain** why scientists know more about the Cenozoic than they do about other eras.

Think Critically

5. **Discuss** why scientists know so little about Precambrian Earth.

MATH IN Earth Science

6. **Make a bar graph** that shows the relative percentage of time spanned by each era of the Phanerozoic Eon. For more help, refer to the *Skillbuilder Handbook*.

SECTION 2

Relative-Age Dating

MAIN IDEA Scientists use geologic principles to learn the sequence in which geologic events occurred.

Essential Questions

- How is uniformitarianism defined and what is its importance to geology?
- What geologic principles are used to interpret rock sequences and determine relative ages?
- What are the different types of unconformities and how do they differ?
- How do scientists use correlation to understand the history of a region?

Review Vocabulary

granite: a coarse-grained, intrusive igneous rock

New Vocabulary

uniformitarianism
relative-age dating
original horizontality
superposition
cross-cutting relationship
principle of inclusions
unconformity
correlation
key bed

EARTH SCIENCE 4 YOU

If you were to put the following events into a time sequence of first to last, how would you do it? Go to school. Wake up. Put on your clothes. Eat lunch. You would probably rely on your past experiences. Scientists also use information from the past to place events into a likely time sequence.

Interpreting Geology

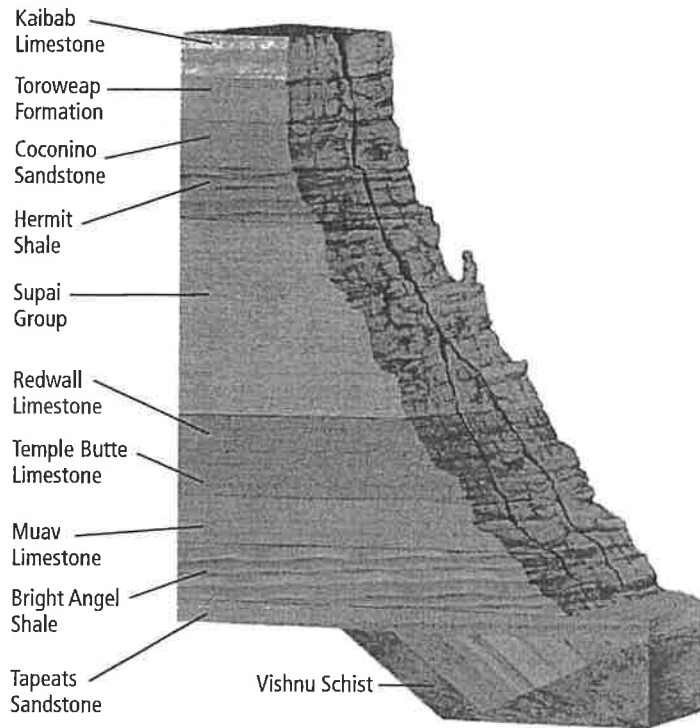
Recall that Earth's history stretches back billions of years. Scientists have not always thought that Earth was this old. Early ideas about Earth's age were generally placed in the context of time spans that a person could understand relative to his or her own life. This changed as people began to explore Earth and Earth processes in scientific ways. James Hutton, a Scottish geologist who lived in the late 1700s, was one of the first scientists to think of Earth as very old. He attempted to explain Earth's history in terms of geologic forces, such as erosion and sea-level changes, that operate over long stretches of time. His work helped set the stage for the development of the geologic time scale.

Uniformitarianism Hutton's work lies at the foundation of **uniformitarianism**, which states that geologic processes occurring today have been occurring since Earth formed. For example, if you stand on the shore of an ocean and watch the waves come in, you are observing a process that has not changed since the oceans were formed. The waves crashing on a shore in the Jurassic Period were much like the waves crashing on a shore today. The photo in **Figure 7** was taken recently on a beach in Oregon, but a beach in the Jurassic Period probably looked very similar.

■ **Figure 7** An ancient Jurassic beach probably looked much like this beach in Oregon. The geologic processes that formed it are unchanged.



■ **Figure 8** The horizontal layers of the Grand Canyon were formed by deposition of sediment over millions of years. The principle of original horizontality states that the tilted strata at the bottom were deposited horizontally and later tilted by geologic forces.



FOLDABLES

Incorporate information from this section into your Foldable.

Principles for Determining Relative Age

Scientists are able to learn about the past by studying the present. One way to do this is by studying the order in which geologic events occurred using a process called **relative-age dating**. This does not allow scientists to determine exactly how many years ago an event occurred, but it gives scientists a clearer understanding about geologic events in Earth's history. Scientists use several methods, or principles, to determine relative ages. These principles include original horizontality, superposition, cross-cutting relationships, and inclusions.

Original horizontality **Original horizontality** is the principle that sedimentary rocks are deposited in horizontal or nearly horizontal layers. This can be seen in the walls of the Grand Canyon, illustrated in **Figure 8**. Sediment is deposited in horizontal layers for the same reason that layers of sand on a beach are mostly flat; that is, gravity combined with wind and water spreads them evenly.

Superposition Geologists cannot determine the numeric ages of most rock layers in the Grand Canyon using relative-age dating methods. However, they can assume that the oldest rocks are at the bottom and that each successive layer above is younger. Thus, they can infer that the Kaibab Limestone at the top of the canyon is much younger than the Vishnu Schist, which is at the bottom. This is an application of **superposition**, the principle that in an undisturbed rock sequence, the oldest rocks are at the bottom and each consecutive layer is younger than the layer beneath it.

VOCABULARY

ACADEMIC VOCABULARY

Principle

a general hypothesis that has been tested repeatedly; sometimes also called a law

The geologic principle was illustrated in the rock layers the students observed.

Cross-cutting relationships Rocks exposed in the deepest part of the Grand Canyon are mostly igneous and metamorphic. Within the metamorphic schist of the Vishnu Group in the bottom sequence are intrusions—also called dikes—of granite, as shown in **Figure 9**. You have learned that intrusions are rocks that form when magma intrudes and solidifies in existing rock. The principle of **cross-cutting relationships** states that an intrusion is younger than the rock it cuts across. Therefore, the granite intrusion in the Grand Canyon is younger than the schist because the granite cuts across the schist.

The principle of cross-cutting relationships also applies to faults. Recall that a fault is a fracture in Earth’s crust along which movement takes place. Many faults exist in earthquake-prone areas, such as California, and in ancient, mountainous regions, such as the Adirondacks of New York. A fault is younger than the strata and surrounding geologic features because the fault cuts across them.

Inclusions Relative age can also be determined where one rock layer contains pieces of rock from the layer next to it. This might occur after an exposed layer has eroded and the loose material on the surface has become incorporated into the layer deposited on top of it. The **principle of inclusions** states that the fragments, called inclusions, in a rock layer must be older than the rock layer that contains them.

As you have learned, once a rock has eroded, the resulting sediment might be transported and redeposited many kilometers away. In this way, a rock formed in the Triassic Period might contain inclusions from a Cambrian rock. Inclusions can also form from pieces of rock that are trapped within a lava flow.



■ **Figure 9** According to the principle of cross-cutting relationships, this igneous intrusion is younger than the green-colored schist it cuts across. **Infer how the igneous intrusion was formed.**

MiniLAB

iLab Station 

Determine Relative Age

How is relative age determined? Scientists use geologic principles to determine the relative ages of rock layers.

Procedure

1. Read and complete the lab safety form.
2. Draw a diagram showing four horizontal layers of rock. Starting from the bottom, label the layers 1 through 4.
3. Draw a vertical intrusion from Layer 1 through Layer 3.
4. Label a point at the bottom left corner of the diagram X and a point at the top right corner Y.
5. Cut the paper in a diagonal line from X to Y. Move the top-left piece 1.5 cm along the cut.

Analysis

1. **Describe** what principles you would use to determine the relative ages of the layers in your diagram.
2. **Explain** how the principle of cross-cutting relationships can help you determine the relative age of the vertical intrusion.
3. **Infer** what the XY cut represents. Is the XY cut older or younger than the surrounding layers?

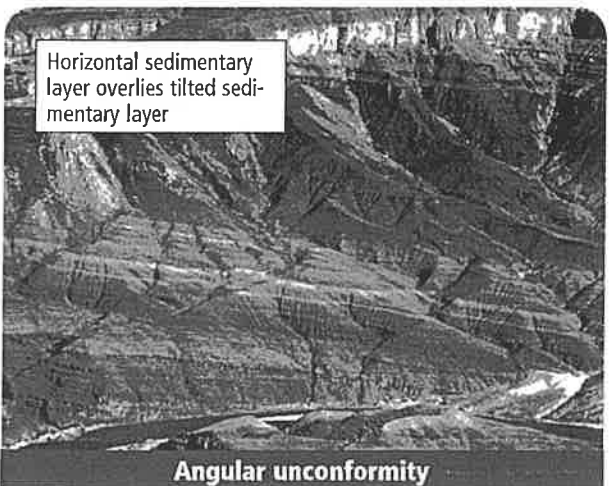
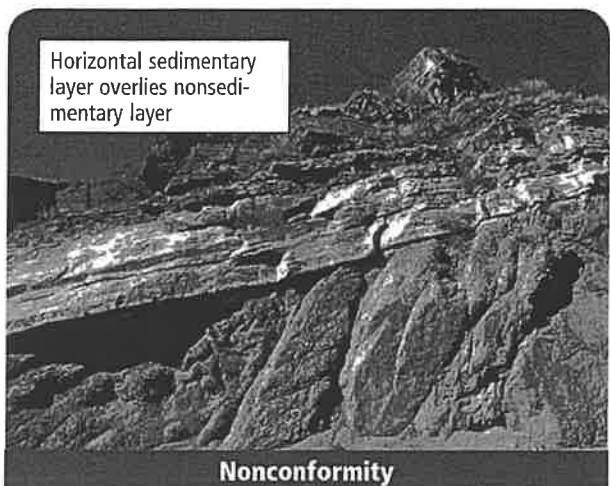
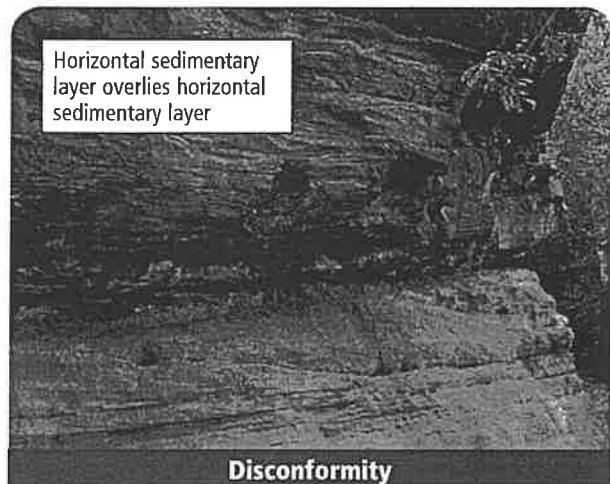


ANSWER ATTACHED WORKSHEET QUESTION 15

View an animation of an angular unconformity.

Concepts In Motion 

■ **Figure 10** An unconformity is any erosional surface separating two layers of rock that have been deposited at different times. The three types of unconformities are illustrated below.



Unconformities Earth's surface is constantly changing as a result of weathering, erosion, earthquakes, volcanism, and other processes. This makes it difficult to find a sequence of rock layers in the geologic record in which a layer has not been disturbed. Sometimes, the record of a past event or time period is missing entirely. For example, if rocks from a volcanic eruption erode, the record of that eruption is lost. If an eroded area is covered at a later time by a new layer of sediment, the eroded surface represents a gap in the rock record. Buried surfaces of erosion are called **unconformities**. The rock immediately above an unconformity is sometimes considerably younger than the rock immediately below it. Scientists recognize three different types of unconformities, which are illustrated in **Figure 10**.

Disconformity When a horizontal layer of sedimentary rock overlies another horizontal layer of sedimentary rock that has been eroded, the eroded surface is called a disconformity. Disconformities can be easy to identify when the eroded surface is uneven. When the eroded surface is smooth, disconformities are often hard to see.

Nonconformity When a layer of sedimentary rock overlies a layer of igneous or metamorphic rock, such as granite or marble, the eroded surface is easier to identify. This kind of eroded surface is called a nonconformity. Both granite and marble form deep in Earth. A nonconformity indicates a gap in the rock record during which rock layers were uplifted, eroded at Earth's surface, and new layers of sedimentary rock formed on top.

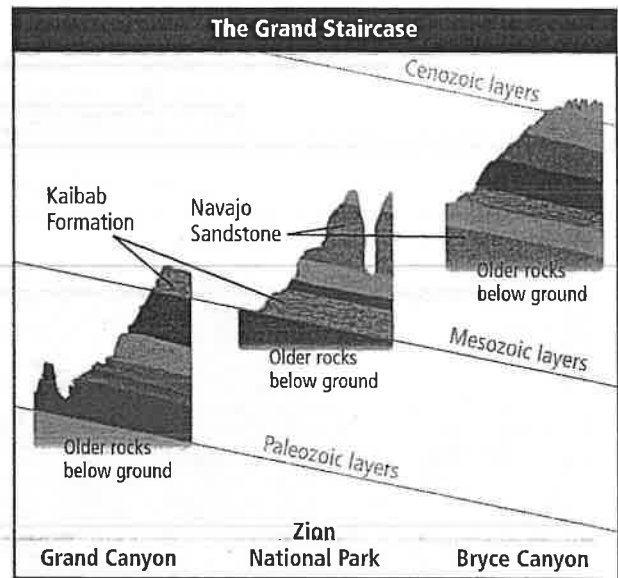
✓ **READING CHECK** Distinguish between a disconformity and a nonconformity.

Angular unconformity When horizontal layers of sedimentary rock are deformed during mountain building or other geologic events involving compressional forces, they are usually uplifted and tilted. During this process, the layers are exposed to weathering and erosion. If horizontal layers of sedimentary rock are later laid down on top of the tilted, eroded layers, the resulting unconformity is called an angular unconformity. Angular unconformities indicate the complex history of compression and erosion.

(1)David Turner (Craven & Pendle Geological Society), (c)Albert Copley/Visuals Unlimited, (b)USGS

Correlation The Kaibab Limestone layer rims the top of the Grand Canyon in Arizona, but it is also found more than 100 km away at the bottom of Zion National Park in Utah. How do geologists know that these layers, which are far apart from each other, formed at the same time? One method is by correlation (kor uh LAY shun). **Correlation** is the matching of rock outcrops or fossils exposed in one geographic region to similar outcrops or fossils exposed in other geographic regions. Through correlation of many different layers of rocks, geologists have determined that Zion National Park, Bryce Canyon, and the Grand Canyon are all part of one layered sequence called the Grand Staircase, as illustrated in **Figure 11**.

Key beds Distinctive rock layers are sometimes deposited over wide geographic areas as a result of a large meteorite strike, volcanic eruption, or other brief event. For example, the key-bed ash layer that marks the 1980 eruption of Mount St. Helens can be found in many states in the U.S. and in parts of Canada. Because these types of layers are easy to recognize, they help geologists correlate rock formations in different geographic areas where the layers are exposed. A rock or sediment layer used as a marker in this way is called a **key bed**. Using the principle of superposition, geologists know that the layers above a key bed are younger than the layers below it.



■ **Figure 11** The top layers of rocks at the Grand Canyon are identical to the bottom layers at Zion National Park, and the top layers at Zion are the same as the bottom layers at Bryce Canyon. **Infer the makeup of the buried layer below Zion's Kaibab layer.**

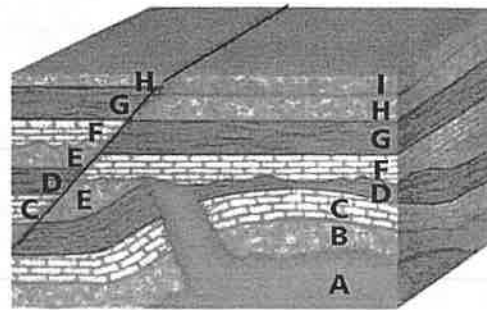
Problem-Solving LAB

Interpret the Diagram

How do you interpret the relative ages of rock layers? The diagram at right illustrates a sequence of rock layers. Geologists use the principles of relative-age dating to determine the order in which layers such as these were formed.

Analysis

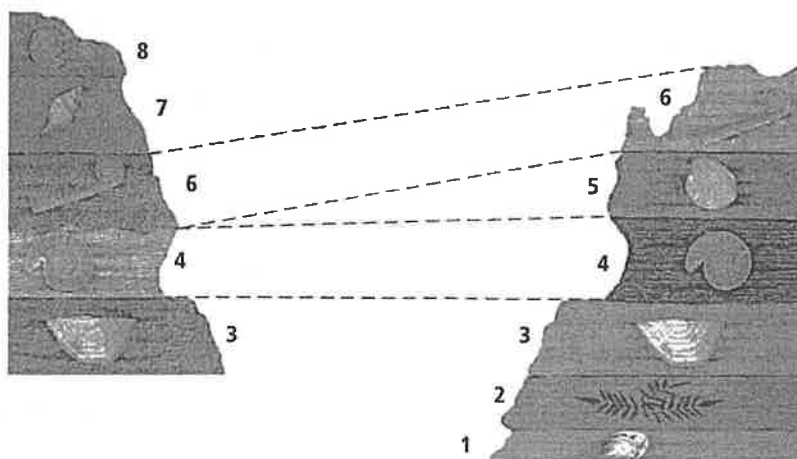
1. **Identify** a type of unconformity between any two layers of rock. Justify your answer.
2. **Interpret** which rock layer is oldest.
3. **Infer** where inclusions might be found. Explain.
4. **Compare and contrast** the rock layers on the right and left sides of the diagram. Why do they not match?



Think Critically

5. **Apply** Which feature is younger, the dike or the folded strata? What geologic principle did you use to determine your answer?
6. **Propose** why there is no layer labeled I on the left side of the diagram.

■ **Figure 12** Correlating fossils from rock layers in one location to fossils from rock layers in another location shows that the layers were deposited during roughly the same time period.



CAREERS IN EARTH SCIENCE

Petroleum Geologist Petroleum geologists use geologic principles to identify petroleum and natural gas reserves in the rock record.

WebQuest

Fossil correlation Geologists also use fossils to correlate rock formations in locations that are geographically distant. As shown in **Figure 12**, fossils of organisms that lived at the same time can be correlated across large regions. Fossils can indicate similar times of deposition even though the sediments in which they were deposited, and resulting rocks, might be entirely different.

The correlation of fossils and rock layers aids in the relative dating of rock sequences and helps geologists understand the history of larger geographic regions. Petroleum geologists also use correlation to help them locate reserves of oil and gas. For example, if a sandstone layer in one area contains oil, it is possible that the same layer in other areas also contains oil. It is largely through correlation that geologists have constructed the geologic time scale.

SECTION 2 REVIEW

Section Self-Check

Section Summary

- The principle of uniformitarianism states that processes occurring today have been occurring since Earth formed.
- Scientists use geologic principles to determine the relative ages of rock sequences.
- An unconformity represents a gap of time in the rock record.
- Geologists use correlation to compare rock layers in different geographic areas.

Understand Main Ideas

1. **MAIN IDEA Summarize** the principles that geologists use to determine relative ages of rocks.
2. **Make a diagram** to compare and contrast the three types of unconformities.
3. **Explain** how geologists use fossils to determine the relative ages of rock layers within a large region.
4. **Discuss** how a coal seam might be used as a key bed.
5. **Apply** Explain how the principle of uniformitarianism would help geologists determine the source of a layer of particular igneous rock.

Think Critically

6. ~~**Propose** how a scientist might support a hypothesis that rocks from one quarry were formed at the same time as rocks from another quarry 50 km away.~~

WRITING IN Earth Science

7. ~~Write a paragraph that explains how an event, such as a large hurricane, might result in a key bed. Use a specific example in your paragraph.~~

SECTION 3

Absolute-Age Dating

MAIN IDEA Radioactive decay and certain kinds of sediments help scientists determine the numeric ages of many rocks.

Essential Questions

- What are the differences between absolute-age dating and relative-age dating?
- How are radioactive elements used to date rocks and other objects?
- How can scientists use certain non-radioactive material to date geologic events?

Review Vocabulary

isotope: one of two or more forms of an element with differing numbers of neutrons

New Vocabulary

absolute-age dating

radioactive decay

radiometric dating

half-life

radiocarbon dating

dendrochronology

varve

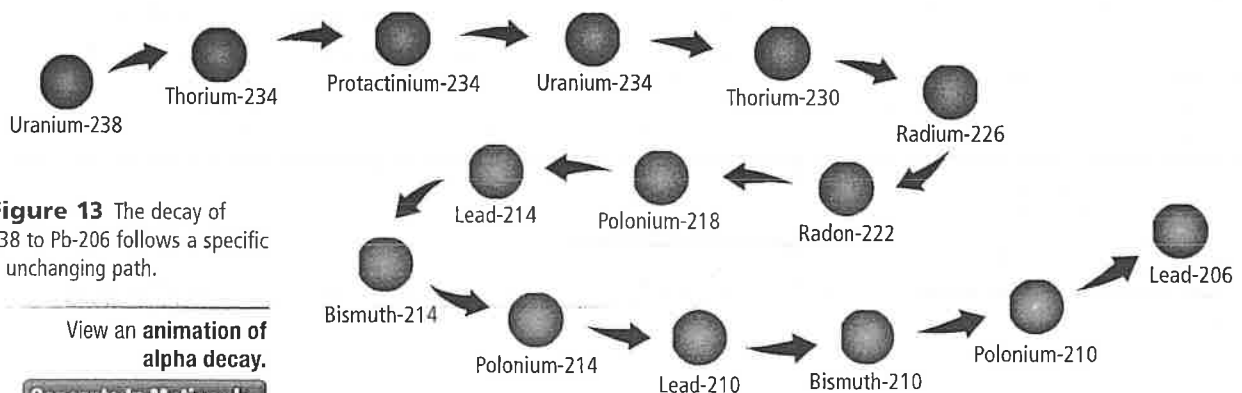
EARTH SCIENCE 4 YOU

If a TV programming guide listed only the order of TV shows but not the times they aired, you would not know when to watch a program. Scientists, too, find it helpful to know exactly when events occurred.

Radioactive Isotopes

As you have learned, relative-age dating is a method of comparing past geologic events based on the order of strata in the rock record. In contrast, **absolute-age dating** enables scientists to determine the numerical age of rocks and other objects. In one type of absolute-age dating method, scientists measure the decay of the radioactive isotopes in igneous and metamorphic rocks, and of the remains of some organisms preserved in sediments.

Radioactive decay Radioactive isotopes emit nuclear particles at a constant rate. Recall that an element is defined by the number of protons it contains. As the number of protons changes with each emission, the original radioactive isotope, called the parent, is gradually converted to a different element, called the daughter. For example, a radioactive isotope of uranium, U-238, will decay into the daughter isotope lead-206 (Pb-206) over a specific span of time, as illustrated in **Figure 13**. Eventually, enough of the parent decays that traces of it are undetectable, and only the daughter product is measurable. The emission of radioactive particles and the resulting change into other isotopes over time is called **radioactive decay**. Because the rate of radioactive decay is constant regardless of pressure, temperature, or any other physical changes, scientists use it to determine the absolute age of a rock or a geologic event.



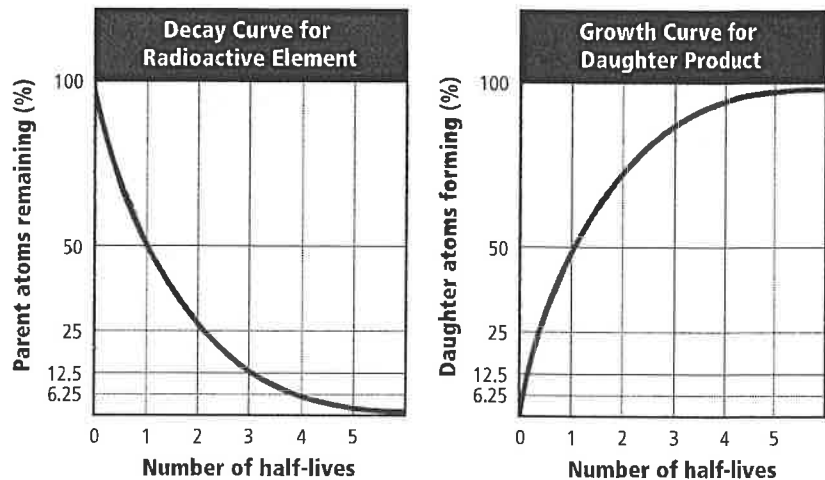
■ **Figure 13** The decay of U-238 to Pb-206 follows a specific and unchanging path.

View an **animation of alpha decay**.

Concepts In Motion

■ **Figure 14** As the number of parent atoms decreases during radioactive decay, the number of daughter atoms increases by the same amount.

Interpret What percentage of daughter isotope would exist in a sample containing 50 percent parent isotope?



Radiometric Dating

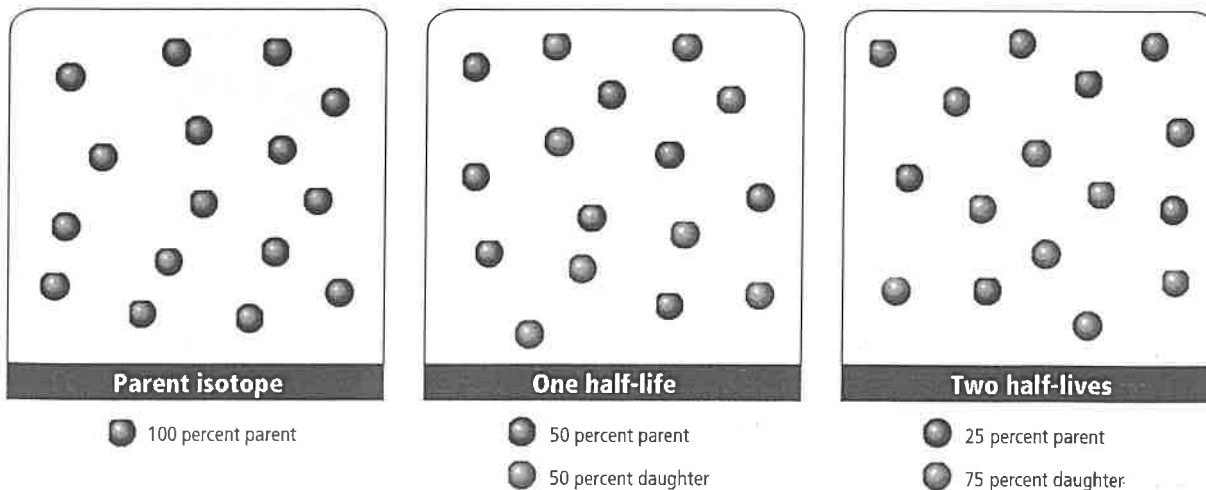
As the number of parent atoms decreases during radioactive decay, the number of daughter atoms increases, shown in **Figure 14**. The ratio of parent isotope to daughter product in a mineral indicates the amount of time that has passed since the object formed. For example, by measuring this ratio in the minerals of an igneous rock, geologists pinpoint when the minerals first crystallized from magma. When scientists date an object using radioactive isotopes, they are using a method called **radiometric dating**.

Half-life Scientists measure the length of time it takes for one-half of the original parent isotope to decay, called its **half-life**. After one half-life, 50 percent of the parent remains, resulting in a 1:1 ratio of parent-to-daughter product. After two half-lives, one-half of the remaining 50 percent of the parent decays. The result is 25:75 percent ratio of the original parent to the daughter product—a 1:3 ratio. This process is shown in **Figure 15**.

View an **animation of half-lives**.

Concepts In Motion 

■ **Figure 15** After one half-life, a sample contains 50 percent parent and 50 percent daughter. After two half-lives, the sample contains 25 percent parent and 75 percent daughter.



| Radioactive Parent Isotope | Approximate Half-life | Daughter Product |
|----------------------------|-----------------------|----------------------|
| Rubidium-87 (Rb-87) | 48.8 billion years | strontium-87 (Sr-87) |
| Thorium-232 (Th-232) | 14.0 billion years | lead-208 (Pb-208) |
| Uranium-238 (U-238) | 4.5 billion years | lead-206 (Pb-206) |
| Potassium-40 (K-40) | 1.3 billion years | argon-40 (Ar-40) |
| Uranium-235 (U-235) | 0.7 billion years | lead-207 (Pb-207) |
| Carbon-14 (C-14) | 5730 years | nitrogen-14 (N-14) |

Dating rocks To date an igneous or metamorphic rock using radiometric dating, scientists examine the parent-daughter ratios of the radioactive isotopes in the minerals that comprise the rock. **Table 1** lists some of the radioactive isotopes they might use. The best isotope to use for dating depends on the approximate age of the rock being dated. For example, scientists might use uranium-235 (U-235), which has a half-life of 700 million years, to date a rock that is a few tens of millions of years old. Conversely, to date a rock that is hundreds of millions of years old, scientists might use U-238, which has a longer half life. If an isotope with a shorter half-life is used for an ancient rock, there might be a point when the parent-daughter ratio becomes too small to measure.

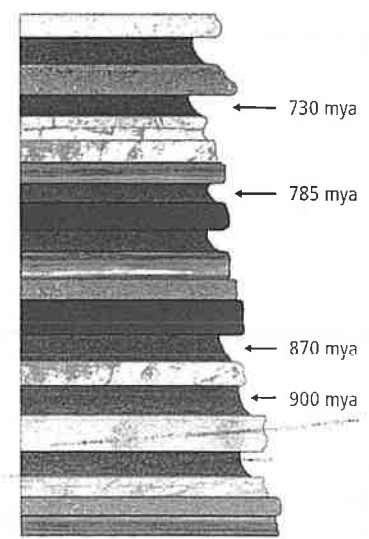
Radiometric dating is not useful for dating sedimentary rocks because, as you have learned, the minerals in most sedimentary rocks were formed from pre-existing rocks. **Figure 16** shows how geologists can learn the approximate age of sedimentary layers by dating layers of igneous rock that lie between them.

READING CHECK Explain why radiometric dating is not useful for sedimentary rocks.

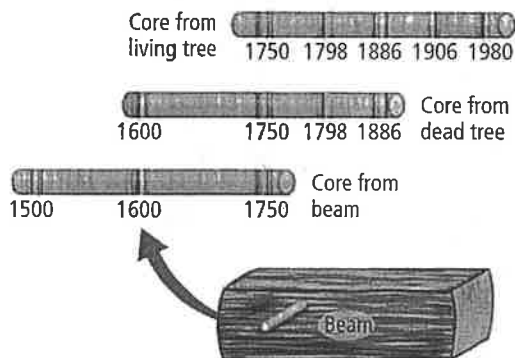
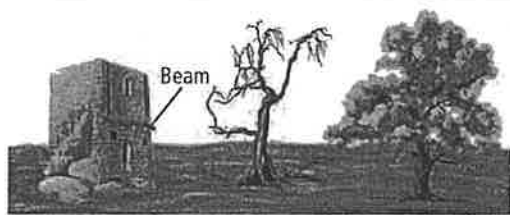
Radiocarbon dating Notice in **Table 1** that the half-life of carbon-14 (C-14) is much shorter than the half-lives of other isotopes. Scientists use C-14 to determine the age of organic materials, which contain abundant carbon, in a process called **radiocarbon dating**. Organic materials used in radiocarbon dating include plant and animal material such as bones, charcoal, and amber.

The tissues of all living organisms, including humans, contain small amounts of C-14. During an organism's life the C-14 decays, but is continually replenished by the process of respiration. When the organism dies, it no longer takes in C-14, so over time, the amount of C-14 decreases. Scientists can measure the amount of C-14 in organic material to determine how much time has passed since the organism's death. This method is only used for dating recent geologic events within the last 60,000 years.

Figure 16 To help them determine the age of sedimentary rocks, scientists date layers of igneous rock or volcanic ash above and below the sedimentary layers.



Radiometric Dating of Volcanic Ash



■ **Figure 17** Tree-ring chronologies can be established by matching tree rings from different wood samples, both living and dead. The science of using tree rings to determine absolute age is called dendrochronology. **Calculate the number of years represented in this tree-ring chronology.**

Other Ways to Determine Absolute Age

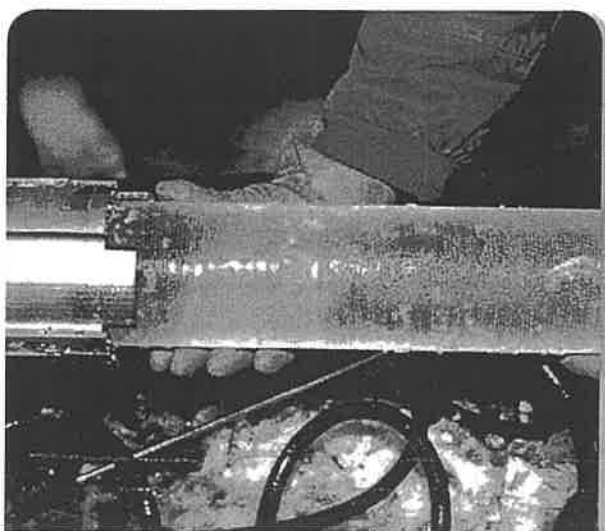
Radiometric dating is one of the most common ways for geologists to date geologic material, but other dating methods are available. Geologists also use tree rings, ice cores, and lake-bottom and ocean-bottom sediments, to help determine the ages of objects or events.

Tree rings Many trees contain a record of time in the growth rings of their trunks. These rings are called annual tree rings. Each annual tree ring consists of a pair of early-season and late-season growth rings. The width of the rings depends on certain conditions in the environment. For example, when rain is plentiful, trees grow fast and rings are wide. The harsh conditions of drought result in narrow rings. Trees from the same geographic region tend to have the same patterns of ring widths for a given time span. By matching the rings in these trees, as shown in **Figure 17**, scientists have established tree-ring chronologies that can span time periods up to 10,000 years.

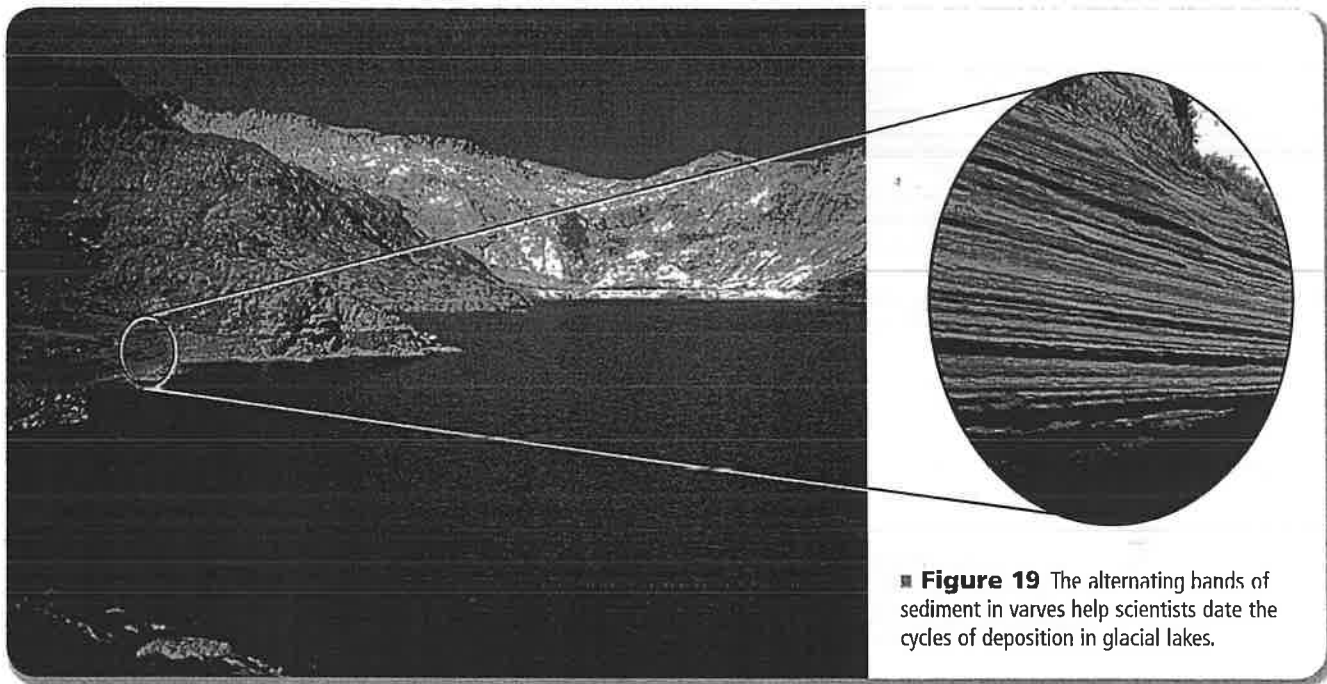
✓ **READING CHECK Describe** how tree rings can show past environmental conditions.

The science of using tree rings to determine absolute age is called **dendrochronology** and has helped geologists date relatively recent geologic events that toppled trees, such as volcanic eruptions, earthquakes, and glaciation. Dendrochronology is also useful in archaeological studies. In Mesa Verde National Park in Colorado, archaeologists used dendrochronology to determine the age of the wooden rafters in the pueblos of the Anasazi, an ancient group of Native Americans. Also, dendrochronology provides a reliable way for geologists to confirm the results from radiocarbon dating.

Ice cores Ice cores are analogous to tree rings. Like tree rings, they contain a record of past environmental conditions such as temperature and atmospheric composition in annual layers of snow deposition. Summer ice tends to have more bubbles and larger crystals than winter ice. Geologists use ice-core chronologies to study glacial cycles through geologic history. The National Ice Core Facility in Colorado is one of several facilities around the world that store thousands of meters of ice cores from ice sheets, such as the core shown in **Figure 18**. Because ice cores contain information about past environmental conditions, scientists also use them to study climate change.



■ **Figure 18** Ice cores are stored in facilities such as the one in Denver, Colorado. Scientists use ice cores to date glacier deposits and to learn about ancient climates.



■ **Figure 19** The alternating bands of sediment in varves help scientists date the cycles of deposition in glacial lakes.

Varves Bands of alternating light- and dark-colored sediments of sand, clay, and silt are called **varves**. Varves represent the seasonal deposition of sediments, usually in lakes. Summer deposits are generally sand-sized particles with traces of organic matter. These bands are usually lighter and thicker than the dark, fine-grained sediments that represent the winter. Varves, shown in **Figure 19**, are typical of lake deposits near glaciers, where summer meltwaters actively carry sand into the lake, and little to no sedimentation occurs in the winter. Using varved cores, scientists can date cycles of glacial sedimentation over periods as long as 120,000 years.

SECTION 3 REVIEW

Section Self-Check 

Section Summary

- Techniques of absolute-age dating help identify numeric dates of geologic events.
- The decay rate of certain radioactive elements can be used as a kind of geologic clock.
- Annual tree rings, ice cores, and sediment deposits can be used to date recent geologic events.

Understand Main Ideas

1. **MAIN IDEA** **Point out** the differences between relative-age dating and absolute-age dating.
2. **Explain** how the process of radioactive decay can provide more accurate measurements of age compared to relative-age dating methods.
3. **Compare and contrast** the use of U-238 and C-14 in absolute-age dating.
4. **Describe** the usefulness of varves to geologists who study glacial lake deposits.
5. **Discuss** the link between uniformitarianism and absolute-age dating.

Think Critically

6. ~~**Infer** why scientists might choose to use two different methods to date a tree felled by an advancing glacier. What methods might the scientists use?~~

MATH IN Earth Science

7. ~~A rock sample contains 25 percent K-40 and 75 percent daughter product Ar-40. If K-40 has a half life of 1.3 billion years, how old is the rock?~~

SECTION 4

Fossil Remains

MAIN IDEA Fossils provide scientists with a record of the history of life on Earth.

Essential Questions

- What are the methods by which fossils are preserved?
- How do scientists use index fossils?
- How are fossils used to interpret Earth's past physical and biological history?

Review Vocabulary

groundwater: water beneath Earth's surface

New Vocabulary

evolution
original preservation
altered hard part
mineral replacement
mold
cast
trace fossil
index fossil

EARTH SCIENCE 4 YOU

Think about the last time you bought souvenirs while on a vacation or at an event. You might have brought back pictures of the places you saw or the people you visited, or you might have brought back objects with inscribed names and dates. Like souvenirs, fossils are a record of the past.

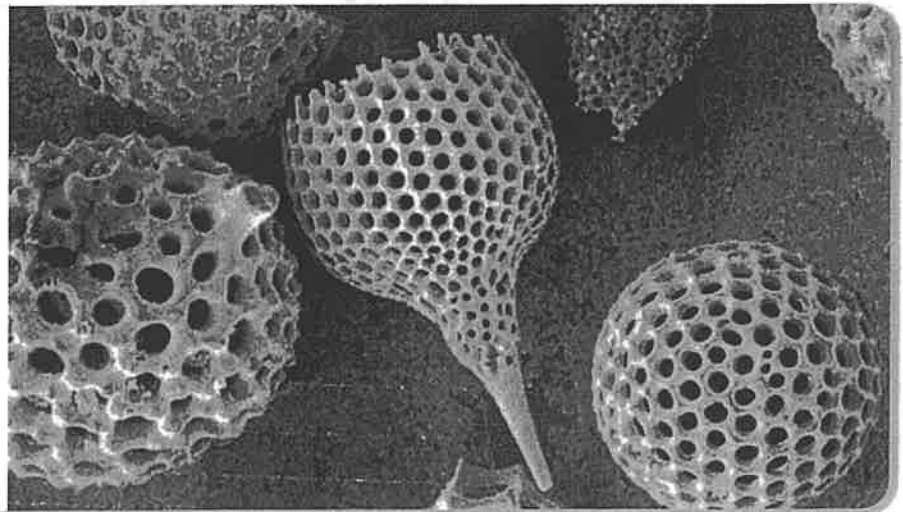
The Fossil Record

Fossils are the preserved remains or traces of once-living organisms. They provide evidence of the past existence of a wide variety of life-forms, most of which are now extinct. The diverse fossil record also provides evidence that species—groups of closely related organisms—have evolved. **Evolution** (eh vuh LEW shun) is the change in species over time.

When geologists find fossils in rocks, they know that the rocks are about the same age as the fossils, and they can infer that the same fossils found elsewhere are also of the same age. Some fossils, such as the radiolarian microfossils shown in **Figure 20**, also provide information about past climates and environments. Radiolarians are unicellular organisms with hard shells that have populated the oceans since the Cambrian Period. When they die, their shells can be deposited in large quantities and can form an ocean sediment called radiolarian ooze.

Petroleum geologists use radiolarians and other microfossils to determine the ages and types of rocks where oil might be found. Microfossils can also indicate whether the rocks had ever been subjected to the temperatures and pressures necessary to form oil or gas.

■ **Figure 20** These tiny radiolarian microfossils—each no bigger than 1 mm in diameter—provide clues to geologists about ancient marine environments. This photograph is a color-enhanced SEM magnification at 80 \times .



Dennis Kunkel Microscopy, Inc.

Original preservation Fossils with **original preservation** are the remains of plants and animals that have been altered very little since the organisms' deaths. Such fossils are uncommon because their preservation requires extraordinary circumstances, such as either freezing, arid, or oxygen-free environments. For example, soft parts of mammoths are preserved in the sticky ooze of California's La Brea Tar Pit. Original woody parts of plants are embedded in the permafrost of 10,000-year-old Alaskan bogs. Tree sap from prehistoric trees has entrapped insects and then hardened into amber, as illustrated in **Figure 21**. Soft parts may also be preserved when plants or animals are dried and their remains are mummified.

Original preservation fossils can be surprisingly old. For example, in 2005, a scientist from North Carolina discovered soft tissue in a 70-million-year-old dinosaur bone excavated in Montana. Scientists have since found preserved tissue in other dinosaur bones.

READING CHECK Explain why fossils with original preservation are rare.

Altered hard parts Under most circumstances, the soft organic material of plants and animals decays quickly. However, over time, the remaining hard parts, such as shells, bones, or cell walls, can become fossils with **altered hard parts**. These fossils are the most common type of fossil, and can form from two processes.

Mineral replacement In the process of **mineral replacement**, the pore spaces of an organism's buried hard parts are filled in with minerals from groundwater. The groundwater comes in contact with the hard part and gradually replaces the hard part's original mineral material with a different mineral. A shell's calcite (CaCO_3), for example, might be replaced by silica (SiO_2). Mineral replacement can occur in trees that are buried by volcanic ash. Over time, minerals dissolved from the ash solidify into microscopic spaces within the wood. The result is a fossil called petrified wood, shown in **Figure 22**.

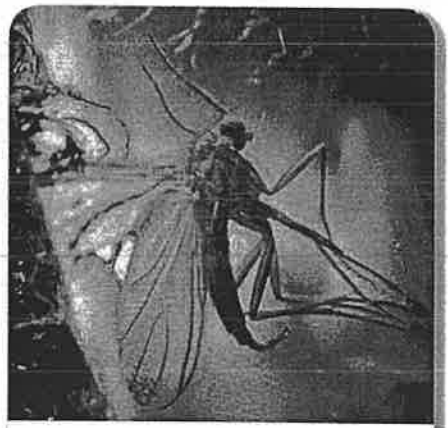


Figure 21 This insect was trapped in tree sap millions of years ago.

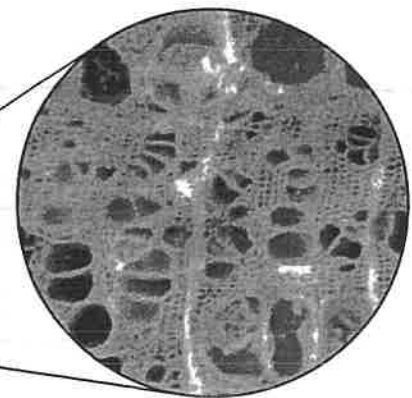
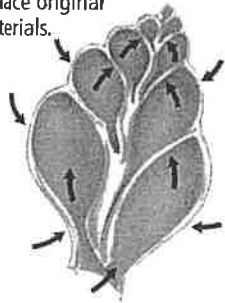


Figure 22 Petrified wood is an example of mineral replacement in fossils. The blowout shows that tree rings and cell walls are still evident at 100 \times magnification with a light microscope.

Describe from where the minerals in the petrified wood came.

Minerals in water replace original materials.



Mineral replacement

Shell mineral replaced by different form of same material



Recrystallization

■ **Figure 23** During mineral replacement, the minerals in a buried hard part are replaced by other minerals in groundwater. During recrystallization, temperature and pressure change the crystal structure of the hard part's original material.

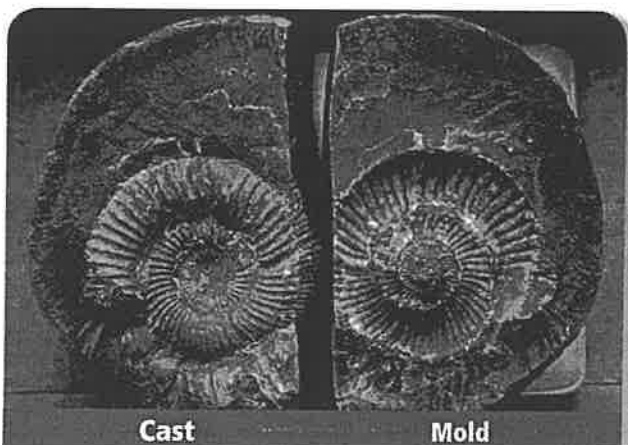
Explain why the internal structure of the shell changes during recrystallization.

Recrystallization Another way in which hard parts can be altered and preserved is the process of recrystallization (ree krihs tuh luh ZAY shun). Recrystallization can occur when a buried hard part is subjected to changes in temperature and pressure over time. The process of recrystallization is similar to that of mineral replacement, although in mineral replacement the original mineral is replaced by a different mineral from the water, whereas in recrystallization the original mineral is transformed into a new mineral. A snail shell, for example, is composed of aragonite (CaCO_3). Through recrystallization, the aragonite undergoes a change in internal structure to become calcite, the basic material of limestone or chalk. Though calcite has the same composition (CaCO_3) as aragonite, it has a crystal structure that is more stable than aragonite over long periods of time. **Figure 23** shows how mineral replacement and recrystallization differ.

✓ **READING CHECK** Compare and contrast recrystallization and mineral replacement.

Molds and casts Some fossils do not contain any original or altered material of the original organism. These fossils might instead be molds or casts. A **mold** forms when sediments cover the original hard part of an organism, such as a shell, and the hard part is later removed by erosion or weathering. A hollowed-out impression of the shell, called the mold, is left in its place. A mold might later become filled with material to create a **cast** of the shell. A mold and a cast of a distinctive animal called an ammonite are shown in **Figure 24**.

Trace fossils Sometimes the only fossil evidence of an organism is indirect. Indirect fossils, called **trace fossils**, include traces of worm trails, footprints, and tunneling burrows. Trace fossils can provide information about how an organism lived, moved, and obtained food. For example, dinosaur tracks provide scientists with clues about dinosaur size and walking characteristics. Other trace fossils include gastroliths (GAS truh lihths) and coprolites (KAH pruh lites). Gastroliths are smooth, rounded rocks once present in the stomachs of dinosaurs to help them grind and digest food. Coprolites are the fossilized solid waste materials of animals. By analyzing coprolites, scientists learn about animal eating habits.



■ **Figure 24** A mold of this ammonite was formed when the dead animal's shell eroded. The cavity was later filled with minerals to create a cast.

Trilobites of the Paleozoic Era

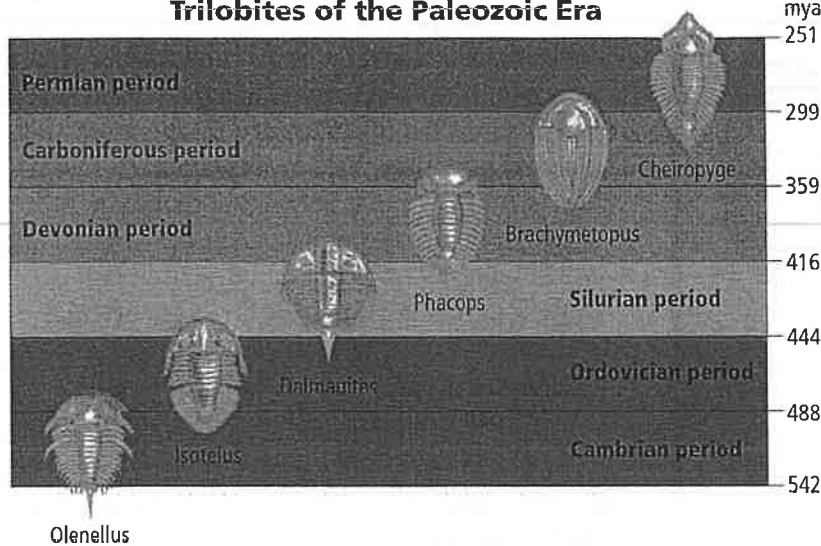


Figure 25 These trilobite species make excellent index fossils because each species lived for a relatively short period of time before becoming extinct, and were abundant and widespread.

Index Fossils

As you learned in the previous sections, fossils can help scientists determine the relative ages of rock sequences through the process of correlation. Some fossils are more useful than others for relative-age dating. **Index fossils** are fossils that are easily recognized, abundant, and widely distributed geographically. They also represent species that existed for relatively short periods of geologic time. The different species of trilobites shown in **Figure 25** make excellent index fossils for the Paleozoic Era because each was distinct, abundant, and existed for a certain range of time.

Ammonites, extinct marine organisms related to nautiloids and squids, are excellent index fossils for the Mesozoic. If a geologist finds one in a rock layer, he or she can immediately determine an approximate age of the layer.

SECTION 4 REVIEW

Section Self-Check

Section Summary

- Fossils provide evidence that species have evolved.
- Fossils help scientists date rocks and locate reserves of oil and gas.
- Fossils can be preserved in several different ways.
- Index fossils help scientists correlate rock layers in the geologic record.

Understand Main Ideas

1. **MAIN IDEA Describe** how the fossil record helps scientists understand Earth's history.
2. **List** ways in which fossils can form, and give an example of each.
3. **Explain** how scientists might be able to determine the relative age of a layer of sediment if they find a fossilized trilobite in the layer.
4. **Compare and contrast** a mold and a cast.

Think Critically

5. **Evaluate** Why are the best index fossils widespread?

WRITING IN Earth Science

6. Imagine that you have just visited a petrified forest. Write a letter to a friend describing the forest. Explain what the forest looks like and how it was fossilized.

Name _____

Date _____

Hour _____

NTI Days 11 to 20

THE ROCK RECORD

PAGES 594 (Don't forget to underline/ number the answers in the text)

1. _____

2. _____

3. _____

4. _____

PAGE 597 See worksheet at the end of the packet. No underlining required.

PAGE 600 (Don't forget to underline/ number the answers in the text)

1. _____

2. _____

3. _____

4. _____

5. _____

1. _____

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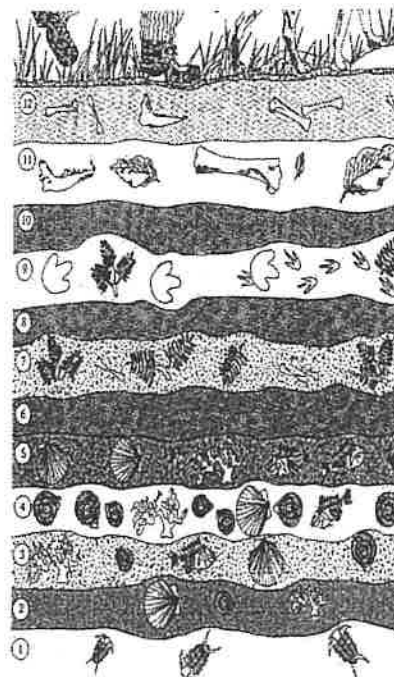
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Fossil Worksheet

The Rock Record

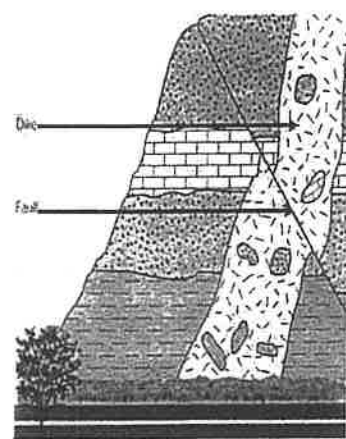
1. Describe the law of superposition: _____

2. Using the law of superposition, which rock layer in this picture is the oldest? _____ Youngest? _____
3. What happened to the climate in this area over time? (Look at the fossils as the layers get younger and think about where these fossils might have lived)



4. Describe the law of cross-cutting relationships: _____

5. Look at the picture to the right. Using what you know about the law of cross-cutting relationships, put the following steps in order as they likely happened based on what you can tell in this picture
 - _____ A pluton of lava (a "dike") pushed through the layers
 - _____ The layers were all flat
 - _____ An Earthquake happened and a fault appeared that "offset" the layers



What is an unconformity? _____

THE FOSSIL RECORD

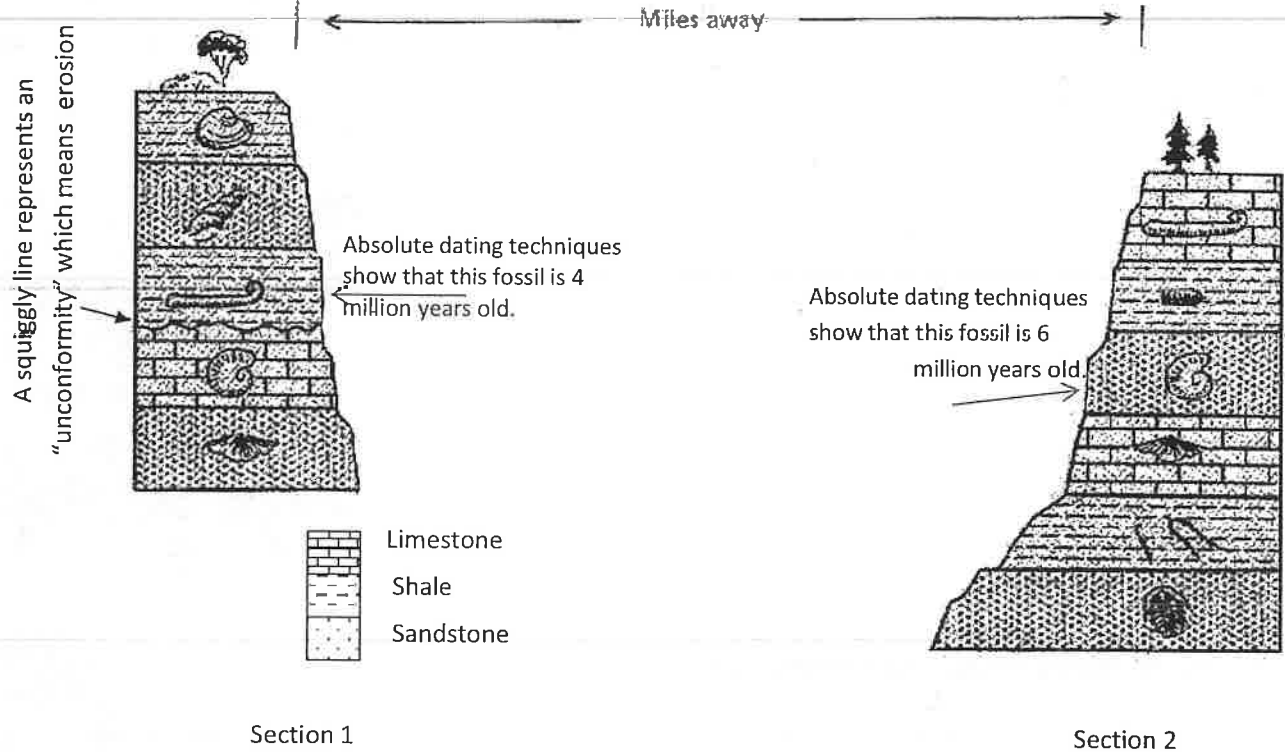
What is a fossil? _____

What is an index fossil? _____

Define correlation. _____

Correlating Rock Layers using Index Fossils

Geologists try to match similar rock layers in different locations to see if they formed at the same time or under the same conditions. This process is called rock "correlation." **Sometimes the rock type will match but not always.** Remember that *sometimes erosion can remove layers that used to be there and then more layers can be deposited on top of the eroded layer.*



1. Draw arrows to connect the matching rock layers by their fossils. (not-all layers will have a match)
2. Which section is older? _____
3. An "unconformity" exists between two layers in the first section. What is one possible reason that the unconformity appears only in the first section and not the second section? _____
4. How old do you think the fossil that is shaped like a bullet in the 2nd layer of the 2nd section is based on the age of the rocks around it? _____
5. The fossil that is a wing-shaped clam (on the bottom layer of the first section) is found in sandstone in the first layer and limestone in the second layer. What is one possible explanation for why they are not found in the same type of rock. _____