The Life Cycle of a Star
<textbook entry>

What is a life cycle? Every human being goes through one: birth, then life involving growth and change, and finally death. These stages also comprise the life cycle of stars. In fact, as strange as it may seem, it’s a bond we share.

Unlike humans, however, the life of a star is extremely long. The result is that, clearly, it’s not possible for an astronomer to monitor the entire life cycle of any one star. Therefore, scientists base their understanding of a particular star on the information they piece together from viewing many stars at different stages in their life cycles. It is surprising but true that, overall, the bigger the star, the shorter its life span. A massive star “lives” for millions of years, while a smaller one may “live” for billions. The stages that stars go through from their birth to their death also depend upon their size.

Birth of a Star: In space there are huge clouds of dust and gas called nebulae. Sometimes gravity causes some gases to compress and clump together into a ball. These events coincide with the ball of gas becoming hotter and hotter, which triggers a nuclear reaction. A star is born!

Life of a Star: The continuing combustion in the star creates both heat and light, and as long as there are gases inside, the star will continue to burn brightly. However, over a very long period of time, the gases will begin to burn out, and the star becomes less luminous.

Death of a Star: Eventually, all the gas burns away and the nuclear reaction stops. For the majority of stars—the smaller ones—the core collapses. Their outer layers drift off into space, leaving an even smaller core behind. This small star, called a white dwarf, gradually cools and then fades away into nothing. For a massive star, however, the end is different. It “dies” in an enormous explosion known as a supernova, sending pieces of itself out into space. When these bits compound with the hydrogen in space, new stars are born.
VOCABULARY

comprise  coincide
bond      reaction
monitor   combustion
overall   luminous
compress  compound

TALK ABOUT IT

With a partner, answer the questions below. Use as many of the highlighted words in the selection as you can.

1. **Overall**, what aspect of the life of a star did you find most interesting or surprising? Why?

2. What are some other **luminous** objects you are familiar with?

Left page: Astronomers gather important information about stars at observatories such as this one.

Background: Stars trail through the sky.

Insets: A look inside space dust and gas shows how stars are born.
Word Meanings

For each highlighted word on pages 12–13, the meaning is given below. For practice with other meanings, see pages 17–19. For synonyms and antonyms, see page 32.

1. **comprise**
   (kuhm-PRIZE)
   (v.) Several smaller parts **comprise** a larger or greater thing.

2. **bond**
   (bond)
   (n.) A **bond** is a strong tie, unifying force, or binding element, such as the feelings that are the basis of friendships.
   (v.) When people **bond**, they form a close relationship, often because they see each other or interact frequently.

3. **monitor**
   (MO-nuh-tur)
   (v.) When you **monitor** a situation, you watch it over time and keep track of what is happening.
   (n.) A **monitor** is a person who watches or keeps track of a situation, such as a **monitor** who observes students who are taking a test.

4. **overall**
   (oh-vur-AWL)
   (adv.) Something that is true **overall** is true when all circumstances or possibilities are taken into account.

5. **compress**
   v. (kuhm-PRESS)
   n. (KOM-press)
   (v.) When things **compress**, they press or squeeze together and are reduced in size.
   (n.) A **compress** is placed on an injured body part to aid in healing.

6. **coincide**
   (koh-in-SIDE)
   (v.) When two or more events **coincide**, they happen at the same time.

7. **reaction**
   (ree-AK-shuhn)
   (n.) A **reaction** is a change, such as a chemical **reaction**, that involves a chemical transformation.
   (n.) A response to an event or situation is a **reaction**.

8. **combustion**
   (kuhm-BUSS-chuhn)
   (n.) When **combustion** occurs, something bursts into flame and burns.

9. **luminous**
   (LOO-muh-nuhs)
   (adj.) Something that is **luminous** is shining or glowing—giving off light or reflecting light.

10. **compound**
    v. (kom-POUND)
        n. (KOM-pound)
    (v.) When things **compound**, they combine or come together to form a whole.
    (n.) A **compound** is something formed by combining or uniting multiple parts.
Each lesson word is listed here. With a partner, take turns drawing a picture to illustrate the meaning of six of the words. As one partner draws, the other partner identifies the vocabulary word.

- bond (n.)
- coincide
- combustion
- compound (v.)
- compress (v.)
- comprise
- luminous
- monitor (v.)
- overall
- reaction
Word Associations

Use what you know about the lesson word in italics to answer each question. Circle the letter next to the phrase that best answers the question. Be prepared to explain your answers.

1. Which kind of remark would most likely get a negative reaction?
   a. compliment
   b. insult
   c. praise

2. What sort of overall impression might you have of a movie you wouldn’t see again?
   a. mostly liked
   b. no opinion
   c. mostly disliked

3. Which of these people does NOT serve as a monitor?
   a. writer
   b. security guard
   c. referee

4. You might use a compress to relieve which problem?
   a. a chipped cup
   b. a swollen lip
   c. a leaking pipe

5. Which two people might feel the strongest bond?
   a. two people who just met
   b. a customer and cashier
   c. twin brothers

6. In which grouping do all the elements comprise a car?
   a. driving, bumper, door
   b. seats, passengers, hood
   c. headlights, steering wheel, horn

7. Which holiday might coincide with summer break?
   a. Fourth of July
   b. Presidents Day
   c. Thanksgiving

8. Which kitchen tool requires combustion?
   a. kitchen sink
   b. stove
   c. dishwasher

9. Which is least likely to be described as luminous?
   a. the moon
   b. an oven
   c. a flashlight

10. Which might compound to make a miserable day?
    a. rain and stinging wind
    b. sunshine and gentle breezes
    c. snowflakes and bright sun
Check Again

Use what you know about the lesson word in italics to complete each sentence. Be sure your sentences make sense.

1. People form a bond when they ____________________________

2. If you compress a balloon, it ____________________________

3. Combustion occurs when ____________________________

4. Parents monitor their children’s activities because ____________________________

5. I love it when school holidays coincide with ____________________________

6. We didn’t win the championship, but overall ____________________________

7. The activities that comprise a typical weekday for me are ____________________________

8. When there is a reaction between wood and a spark, ____________________________

9. They thought the luminous object in the sky was a UFO, but it turned out to be ____________________________

10. You will compound the problem of having a cold if you ____________________________

Challenge Yourself

Follow the directions to write sentences with the lesson words in italics. Be sure your sentences make sense both grammatically and in meaning.

1. Write a sentence using the word coincide.

   ____________________________

2. Write a sentence using compress in the third position.

   ____________________________

3. Write an eight-word sentence using bond in the third position.

   ____________________________
Word-Solving Strategies: Prefixes

The prefixes co-, com-: "together," "with"

A prefix is added to the beginning of a word. The meaning of a word's prefix can often help you figure out the meaning of the word.

The prefix co- has the meaning "together." You can see how the meaning of the prefix works in words like coauthor and coworker. Coauthors write something together; coworkers work together. Although the lesson word coincide is not formed by adding co- to a familiar English word, the meaning "together" is clear in the word. Events that coincide occur together.

The prefix com- has a similar meaning. Com- means "together" or "with." Four lesson words have the prefix com-: compound, compress, comprise, and combustion. Think about how the meaning "together" or "with" is part of the meaning of each of these words. When circumstances compound, they come together. When objects compress, they squeeze together. When parts comprise something, they group together to create it. In combustion, heat or a spark comes together with a substance to create fire.

Examples
Look at these examples of words with co- or com-. Think about how "together" or "with" is part of each word's meaning.

co- + host ➔ cohost
col- + exist ➔ coexist
col- + operate ➔ cooperate
col- + pose ➔ compose
col- + pile ➔ compile
col- + plete ➔ complete
col- + rade ➔ comrade

Practice
Use what you've learned about the prefixes co- and com- to write a definition for each of these words. Include "with" or "together" in each definition. You may use a dictionary if you wish.

1. cowrite ___________________________
2. collect __________________________
3. communicate ______________________
4. compatible ________________________
5. concur ___________________________
6. combine ___________________________
7. coeducation _______________________
8. collaborate ________________________
9. compare __________________________
10. cocaptains ________________________

BE CAREFUL!
Not all words that begin with co- or com- contain the prefixes co- or com-. Knowing the meaning of the prefixes will not help you figure out the meanings of these words. For example, the word come means "to move toward a place," and comic means "having to do with laughter."
Practice for Tests
Fill in the bubble next to the answer that best completes the sentence or answers the question.

1. Read this sentence.
   He tried to compress all his research into a three-page essay.
    Compress means:
    ○ A state
    ○ B explain
    ○ C squeeze
    ○ D summarize

2. A synonym for compound is:
    ○ A create
    ○ B compose
    ○ C contract
    ○ D combine

3. Two activities coincide if they happen:
    ○ A at the same time
    ○ B in sequence
    ○ C without any problems
    ○ D without notice

4. A word closely associated with reaction is:
    ○ A remain
    ○ B change
    ○ C connect
    ○ D repetition

5. Combustion does NOT produce:
    ○ A heat
    ○ B light
    ○ C oxygen
    ○ D ashes

6. Read this sentence.
   Our team did well overall, since we lost only two of the twelve games.
    Overall means:
    ○ A luckily
    ○ B because of
    ○ C against all odds
    ○ D in almost all ways

7. When you monitor a process, you:
    ○ A cause a change
    ○ B watch and note what happens
    ○ C listen to advice and comments
    ○ D watch an expert on TV

8. A synonym for comprise is:
    ○ A make up
    ○ B confuse
    ○ C settle for
    ○ D squeeze

9. Something that is luminous would be:
    ○ A difficult to see
    ○ B hidden in shadow
    ○ C visible in the dark
    ○ D invisible

10. There is often a bond between people who:
    ○ A are forced to be together
    ○ B share the same interests
    ○ C dislike each other
    ○ D have few advantages