Imaginarium 2

Secondary

Pearson

3

How Do You Imagine the Future?

Selections

Week

4

How can technology help doctors?
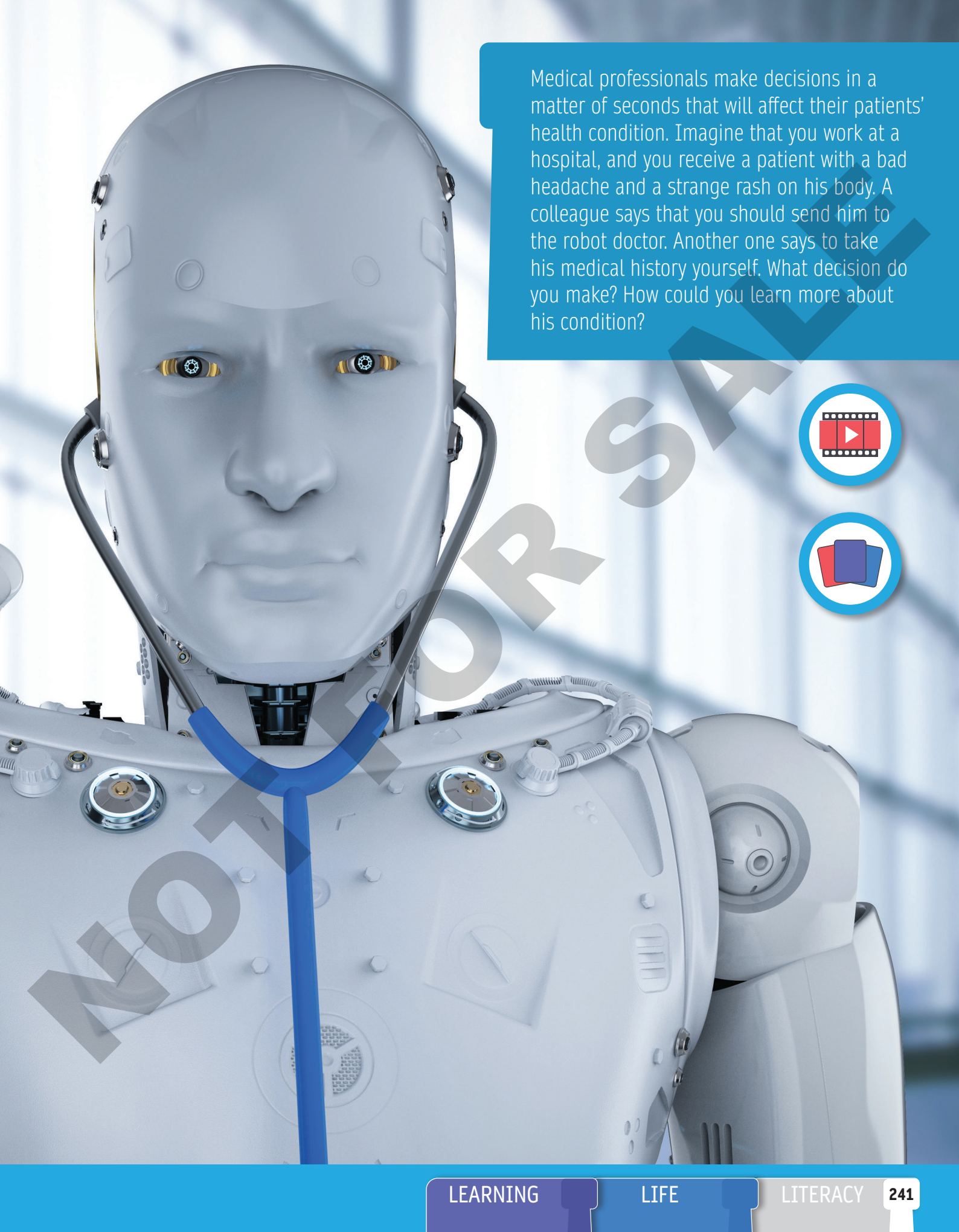
Medical professionals make decisions in a matter of seconds that will affect their patients' health condition. Imagine that you work at a hospital, and you receive a patient with a bad headache and a strange rash on his body. A colleague says that you should send him to the robot doctor. Another one says to take his medical history yourself. What decision do you make? How could you learn more about his condition?

Before Reading
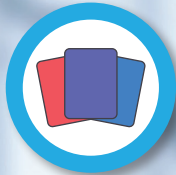
Vocabulary: Word Study

Learning to identify the origin of words can help us develop our vocabulary through the understanding of similar words.

Read the information about the word *neolithic*.

neolithic (adjective)

roots
- (Greek) **neo** *adj.* new
- (Greek) **lithos** *n*. stone

definitions

of, or related to, the New Stone Age

example

In Neolithic times, a shaman chanted and danced around people who were sick.

related words

Spanish: **neolítico/a**

Dutch: **neolithisch**

PRACTICE

Write a sentence using the word *neolithic*.

_____

Vocabulary: Academic Words

Write what you think these words mean. Then mark (✔) those you believe refer to medical procedures.
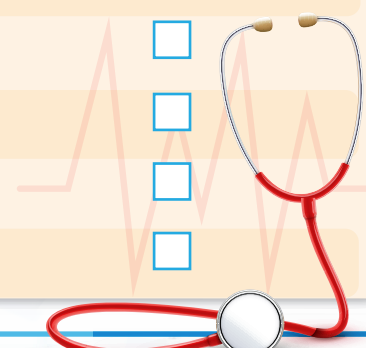
Word	Medical Procedure
waned:	☐
dissection:	☐
cauterized:	☐
vessels:	☐
chanting:	☐
cleanliness:	☐

Reading Strategy: Monitoring Comprehension

It is a good idea to check how well you comprehend a text. Distinguishing what you already know from what you learn and asking questions during reading are good ways to monitor your comprehension.

Monitoring comprehension can be divided into several strategies:

- making predictions
- making connections
- asking questions
- using text structures

Which strategies have you used before while reading a text? Which ones did you find the most useful?

PRACTICE

Look at the headings of the Reader. Predict what kind of information will appear in that section. Then complete the table.

Headings	What I already know about this	Questions I have
The Origins of Medicine		
Dissection		
Medicine in the 1800s		
Modern Medical Imaging		
Robotic Surgeries		

LITERACY
Print: Predict/Infer

Predicting or inferring information in a text means using what you already know to guess the content. For example, let's use the heading "Robotic Surgeries." We can infer that it involves a robot hand instead of a human one. The doctor might control it using something. Therefore, the kind of questions we can ask are: What does the doctor use to control it? Is the surgery different from when a doctor performs it?

Studying medicine can be rewarding and exciting. Imagine doing research that could help save lives or working directly with patients in an office or hospital. From shamans and barbers to robot doctors, explore the history of medicine and discover some of the most inspiring medical innovations!

LIFE
Skill: Flexible thinking

New problems require new solutions, or new ways of looking at an old problem. How do you think a doctor treated their patients in the Middle Ages? What about now? What kind of problems do you think both doctors have?
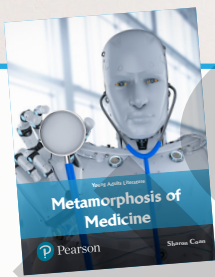
e-library

Read the whole *STEM Careers: Metamorphosis of Medicine* text in the online library.

STEM Careers: Metamorphosis of Medicine
by Sharon Coan

The Origins of Medicine

1   People have always experienced illness and injury, and there have always been healers to treat them. Those healers shared their knowledge orally and in writing. In Neolithic times, a shaman chanted and danced around people who were sick. He brewed teas and made ointments and salves out of plants. These special potions were thought to help ease pain and cure common ailments. Around 2630 BC, thousands of people worked to build the pyramids in ancient Egypt. Many workers suffered various injuries. Doctors **splinted** broken bones and prescribed medicines made from plants to those who had assorted complaints.

2   As the Egyptian civilization was fading, the Greeks began to look for new methods of healing. Hippocrates talked with patients about their symptoms and then decided how to treat them. He had a wide variety of crude instruments and plant-based medications to choose from.

Leaving the Middle Ages Behind

3   Europe entered a time known as the Middle Ages after the Roman Empire **waned**. Barber/surgeons offered much of the health care of this period. Around AD 1450, things began to change.

4   Andreas Vesalius began his study of medicine in 1533. During his career, he performed many dissections on human bodies. He even stole a cadaver from a body dump for executed criminals. Vesalius drew detailed pictures of what he saw as he worked on the bodies.

5   In 1854, Louis Pasteur had just gotten a new job in Lille, France, and had hoped to continue his work as a chemist, studying crystals. But local farmers begged him to find out what was souring their wine. Using his microscope, he discovered that living organisms were the cause. He developed a process called pasteurization, which used heat to kill germs.

6 In Germany, Robert Koch set up a laboratory to work with Pasteur's ideas. He collected blood from local farm animals. His microscope showed that blood from animals that died of anthrax contained bacteria which were not in the blood of healthy animals. This gave him an idea for how to prove the bacteria were causing the disease.

Medicine in the 1800s

7 In the 1800s, three major problems had to be overcome before complex internal surgeries could happen. First, cleanliness was a priority. Doctors began putting Pasteur's work with germs into practice. Before surgery, they washed their hands with disinfectant and put on surgical gloves. Because of these precautions, patients were less prone to infection. Second, surgeons had to find a way to stop pain during surgery. A screaming patient was not easy to work on! Ether was used for the first time in 1842. This was a chemical that put the patient to sleep so that no pain would be felt during surgery. Third, methods to stop bleeding during surgery were found. A small, heated tool cauterized, or burned closed, small blood **vessels**.

8 In 1895, Wilhelm Roentgen studied the electrical current in **cathode** ray tubes. When the currents were directed through the glass tubes, he noticed a fluorescence on a screen across the lab. That was not part of his current experiment. What was going on? This led him to discover new rays. He named them X-rays, the X standing for unknown.

Glossary

splinted
v. to protect and immobilize a broken body part using a hard device

waned
v. to decrease in size, extent, or degree

vessels
v. a tube or canal (such as an artery) in which a body fluid is circulated

cathode
v. the electrode of an electrochemical cell at which reduction occurs

LITERACY
Print: Identifying the main idea

The main idea of the text often appears in the first sentence of a paragraph. Identifying it will help you summarize the text better. To do so, try to underline key words or write them in the margins.

LEARNING
Tracking: Cause and effect

Just as you have read in the text, tracking cause and effect is one of the most important steps in scientific research, and indeed scientific discovery. Can you identify cause and effect in paragraph 11?

infirmity
n. the condition of being ill or frail

gallbladder
n. an organ in which bile from the liver is stored

HIDA scan
n. a medical procedure used to diagnose problems of the liver, gallbladder and bile ducts

Glossary

9   Marie Curie knew about Roentgen's work with X-rays. When World War I broke out, she put her time and resources into developing and personally distributing portable X-ray machines to medical personnel on the battlefields. These machines became known as "Little Curies." Curie commented, "The use of the X-rays during the war saved the lives of many wounded men; it also saved many from long-suffering and lasting **infirmity**."

10   Until 1900, most medicines were natural. They were made from herbs or other natural sources. Advances in research methods and the growth of factories during the 1800s changed that. Two medicines that evolved in this way are aspirin and antibiotics.

Modern Medical Imaging

11   A patient has been experiencing pain in the abdomen. The cause is unclear to the doctor, so he orders a digital X-ray. Compared to the original X-rays, digital X-rays produce clearer images and emit less radiation. The X-ray shows something in the area of the **gallbladder**, but it's still not clear exactly what it is. So, an ultrasound is done. Ultrasonic pressure waves echo off the gallbladder. A computer turns the waves into images on a screen. The doctor can now see that the patient has gallstones, but it's hard to tell if they are blocking the bile ducts. To discover this, the doctor orders a **HIDA scan**. This scan will show the liver and gallbladder working in real-time, as opposed to the still images provided by other scans.

Microrobotic Pills

12   A capsule, about the size of a vitamin, will contain a tiny magnet, a camera, a wireless transmission chip, and a set of mechanical "legs." It will travel where the doctor directs it and send images to the doctor's computer.

Robotic Surgery

13   The surgeon directs the robot to perform very precise tasks in a small area of the patient's body. Only a small incision has to be made. The patient will have a short, relatively comfortable recovery and the surgeon will not be tired from the long, physical labor that traditional surgery requires.

Vocabulary: Word Study

Match the words with their root's definition. Remember, *neo-* means new.

1. neolithic
2. neoclassic
3. neophyte
4. neophobia
5. neology

a. *logos* = word
b. *lithos* = stone
c. *phobia* = fear
d. *phytos* = grown, planted
e. *classic* = to be of high quality

Write the meaning of the words.

1. neolithic: _____
2. neoclassic: _____
3. neophyte: _____
4. neophobia: _____
5. neology: _____

LITERACY
Print: Learn words in context

After learning that the prefix *neo-* means new, we can use that information to discover the meaning of other words that start with the same prefix. This will help you when reading all types of texts.

Vocabulary: Academic Words

Complete the sentences with a word from the bank.

cauterize   chanting   cleanliness   dissections   vessels   wane

1. Instead of using medicine, some ancient physicians drove away pain by _____ spells.
2. Andreas Vesalius performed many _____ on cadavers.
3. After learning about bacterial infections, doctors made _____ a priority.
4. A small, heated tool was used to _____ small blood _____. This means doctors burned the injury closed and found a new way for the patient to stop bleeding during surgery.
5. Immunity from a vaccine can _____ over time, so a booster is often recommended.

LITERACY
Digital: Evaluate search results

Using online dictionaries is a quicker way to find the meanings of unknown words. However, remember to use trustworthy sources like academic dictionaries to avoid getting unwanted add-ons or incorrect definitions.

LITERACY
Print: Distinguish details

Ever read the expression "the devil is in the details"? It means that the most important pieces of information you can get are usually found in the smaller details of things. This is why it is important to note the main and supporting ideas of each paragraph when reading a text.

LITERACY
Print: Follow the text structure

Sequencers, or words like *first, then, next, after,* and *finally,* help us visually find the sequence of a text. They help us better understand the relationships between different ideas and can aid our comprehension of a text.

e-library

Read the whole *STEM Careers: Metamorphosis of Medicine* text in the online library.

Reading Strategy: Monitor Comprehension

Remember that there are many different strategies to monitor your comprehension of a text. Predicting, making connections, asking questions, using text structures and graphic organizers, like storyboards and cause/effect diagrams, can help you better understand a text.

Complete the table with information you understand or questions you have. Then, name strategies to help you find the answers to your questions.

Paragraphs	I understand…	I have a question about…	I can figure it out by…
1–3			
4–6			
7–9			
10–12			
13–15			

Close Reading: Sequence of Events and Evidence

The sequence of events shows the order in which things happened, while evidence helps lend credibility to the author's opinion of an event that happened in the text. If you are reading a text about medical advances, it is certain that they will appear in chronological order. *What kind of phrases does the author use to show that? What evidence can you find in the text to support the author's opinion?*

PRACTICE

Read paragraph 11 and complete the summary showing the sequence of events. Then answer the question.

> First, a patient has _____. The cause is unclear to the doctor. Next, he _____.
>
> The X-ray shows something near the gallbladder. Then, he orders an _____. The doctor can see the patient's gallstones, but he doesn't know if they are blocking the bile ducts. For that reason, the doctor finally orders a _____.

Which sentence shows evidence for the doctor's recommended use of the HIDA scan?

_____

Reading Comprehension

Reread *STEM Careers: Metamorphosis of Medicine* and answer the following questions.

1. How did Hippocrates treat his patients?

   _____.

2. What was Vesalius famous for?

   _____.

3. How did Pasteur help the development of vaccines?

   _____.

4. What's the difference between an X-ray and a HIDA scan?

   _____.

5. How do microrobotic pills work?

   _____.

Real-World Connection

Medicine is one branch of science in which a development can turn someone's life upside down. With the advancement of new technology, there are many new, less invasive medical treatments on offer. Therefore, being able to understand the pros and cons of a treatment becomes vital.

A good way of visualizing pros and cons is with a T-chart. It helps us organize information in two categories, and it is a great tool to compare and contrast two things.

Fill in the T-chart comparing traditional surgery and robotic surgery in pairs.

Best surgery model

Traditional	Robotic
Pros:	**Pros:**
Cons:	**Cons:**

LITERACY
Print: Locate information

Looking for certain information from a text is called scanning. To scan a text, read quickly, focusing on key words. This is helpful when answering questions.

LIFE
Citizenship: Social responsibility

Doctors have a great social responsibility. Sometimes, the treatment for a certain disease might be too harsh or have a downside. It is a doctor's duty to communicate this to their patients. How would you communicate a bad outcome to a person?

LEARNING
Critical thinking: Evaluating

A logical conclusion to assessing causes and consequences is evaluating. When making a comparison like the one you did about robotic surgery, you are evaluating the pros and cons of one thing over another.

Before Writing

LITERACY
Print: Summarize

A good summary shows the main ideas of a text, the causal relationships between them and your opinion after reading it.

LEARNING
Communication: Following conventions

Learning how to write about your or other people's opinions in an academic way will help you build stronger arguments based on evidence.

Language Conventions

Knowing how to express our opinions is key to successful communication. It provides us with a healthy way of developing our confidence and self-esteem by being assertive.

Steps to Express Opinions

1. State your preference. Express which option you prefer or agree with.

2. Support your opinion. Opinions do not need to based on facts, but it is helpful to explain your choice. Share the reasons why you chose one option over the rest.

3. Give examples or details to support your opinion.

4. Conclude by restating your opinion.

These are some phrases used to express opinions:

To state my personal opinion	To state others' opinion
I think… / I don't think … I believe… / I don't believe … In my opinion… For me…	Some people think… (This person) believes that… The majority of … claim that…
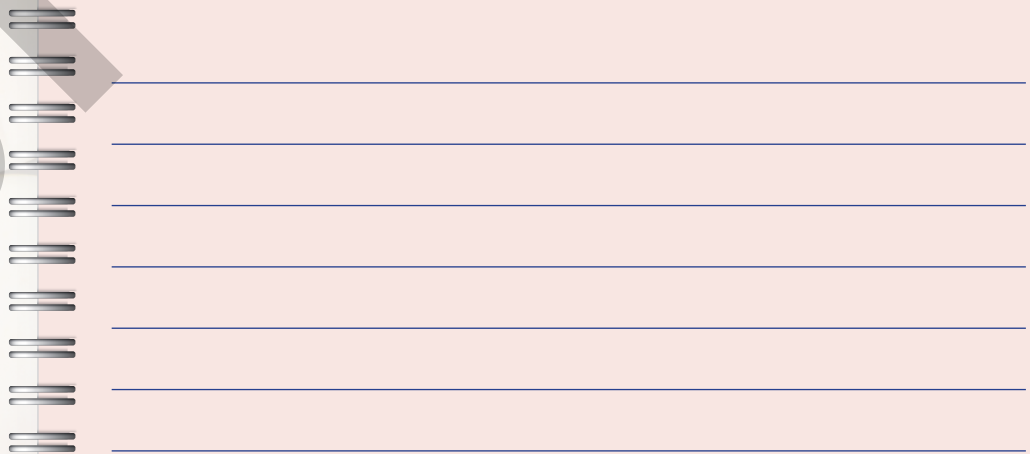
PRACTICE

Use two of the phrases above to write an opinion about the *STEM Careers: Metamorphosis of Medicine* text.

Writing Intro

Robotic Surgery: Life-changing or Life-threatening?

Medicine, as we have already discovered, is a field full of endless possibilities How can we quantify the importance of medical discoveries? One way to do so is to write an opinion essay in which you answer the question: "What is the most useful medical discovery?

How Do I Prepare to Write My Opinion Essay?

- Brainstorm the important points you want to include.
- Use sequencers to organize your text and follow a chronological order.
- Remember to use phrases to state your own or others' opinion.
- Check that your opinion is based on evidence.

LITERACY
Digital: Online research

When looking for information using a search engine, try to use nouns instead of full sentences: you will get better and more accurate results. Instead of searching for "How do I find the best medical discoveries?" try "most important medical discoveries."

Writing Steps

1. Prewriting

Brainstorm a list of medical discoveries and decide on the one you find the most important.

Collaborative Writing: You can work in small groups to write your lists.

2. Drafting

Write a first draft on a separate piece of paper where you can make mistakes and rearrange your information properly.

3. Revising and Editing

Read your draft aloud to detect mistakes or things that could sound better and polish your writing.

4. Publishing

Deliver the final version of your opinion essay.

LEARNING
Communication: Choosing how to deliver a message

Effective information is not only about what you say, but how you choose to say it. Essays, for instance, are a better option for trying to convince someone, or for arguing in favor of or against something, than shorter texts.

Plan Your Writing

Use the following graphic organizer to write your essay.

The Greatest Discovery

Introduction

Review Points and Evidence

Review point 1

Evidence

Review point 2

Evidence

Opinion

LITERACY
Print: Use graphic and semantic organizers

Graphic organizers, such as the T-chart you used earlier, allow you to visualize your thought process and better organize your ideas.

LEARNING
Communication: Problem solving

Using writing conventions can be a great way of overcoming a writer's block. If you are in doubt as to how to continue with an essay, for example, you can always resort to using writing conventions such as sequencers or linking phrases.

Writing

Mark (✔) the checklist to prepare your essay

Your essay should include:

- [ ] at least two examples of medical discoveries in the introduction
- [ ] at least two body paragraphs, each describing a medical discovery
- [ ] one sequencer per paragraph
- [ ] phrases to state your opinion

Social Language: Financial Habits

Science and technology should exist to make our lives better. Innovations in surgery and antibiotics have improved patients' recovery time and overall quality of life. However, medical access is still restricted to only certain groups of people.

← → ↻ **www.savingtips.com** ★ ☰

Tips to Save Money:

- Separate spending money from savings.
- Define how much money you will save every week or month.
- Choose a safe place to keep your money. It can be a savings account or a piggy bank.
- Keep track of your purchases.
- Wait at least 10 days before buying something. In that way you'll be sure you really need it.

Discuss with a partner how could you make a saving plan to cover basic medical expenses.

LIFE
Citizenship: Work with others

When working collaboratively in a group you will be exposed to different opinions, ideas and information that you might not have known. This will expand your knowledge base.

LEARNING
Communication: Communicate effectively

When working in a group or team, it is important that each member participates and their ideas are heard. This will enrich the work and your collaborative response.

Building Fluency

Medical Podcast

You are going to pretend to be a scientist who specializes in sharing groundbreaking scientific developments with the public. You will plan and record a 1-minute podcast in which you share with your audience the benefits of robotic surgery. Remember to follow the four steps of writing when working on the script for your podcast.

Make sure that:

- [ ] your podcast is based on factual information
- [ ] you communicate your opinions clearly
- [x] you record in a quiet space
- [ ] your diction is clear
- [ ] background music or sounds don't drown out your voice