LESSON PLAN | HIGH SCHOOL

WHEN MUSIC MEETS SCIENCE

EXPLORING THE RESILIENCY OF OSCAR PETERSON

BY JOANNE WEATHERBY AND LUKIS KIND

GRADES	SUBJECTS	DURATION
11-12	Anatomy and Physiology	5 classes

KEY CONCEPTS AND THEMES

Cardiovascular system, Nervous system, Respiratory system, Resiliency

EXPECTATIONS AND OUTCOMES

Students will:

- Build an understanding of the causes, prognosis, and challenges of having a stroke;
- Learn about the life and resilience of Oscar Peterson;
- Hypothesize and attempt to diagnose issues within the human body;
- Use a variety of research techniques, prior knowledge, and questions to improve their comprehension;
- Through the inquiry process, develop a connection to community and self.

MATERIALS REQUIRED

- Internet and computer access for students
- Prepared **Worksheets #1-6**, **Case Study**, and **Rubric**
- Optional: *When Freedom Sings: The Music and Melodies of Oscar Peterson* graphic novel

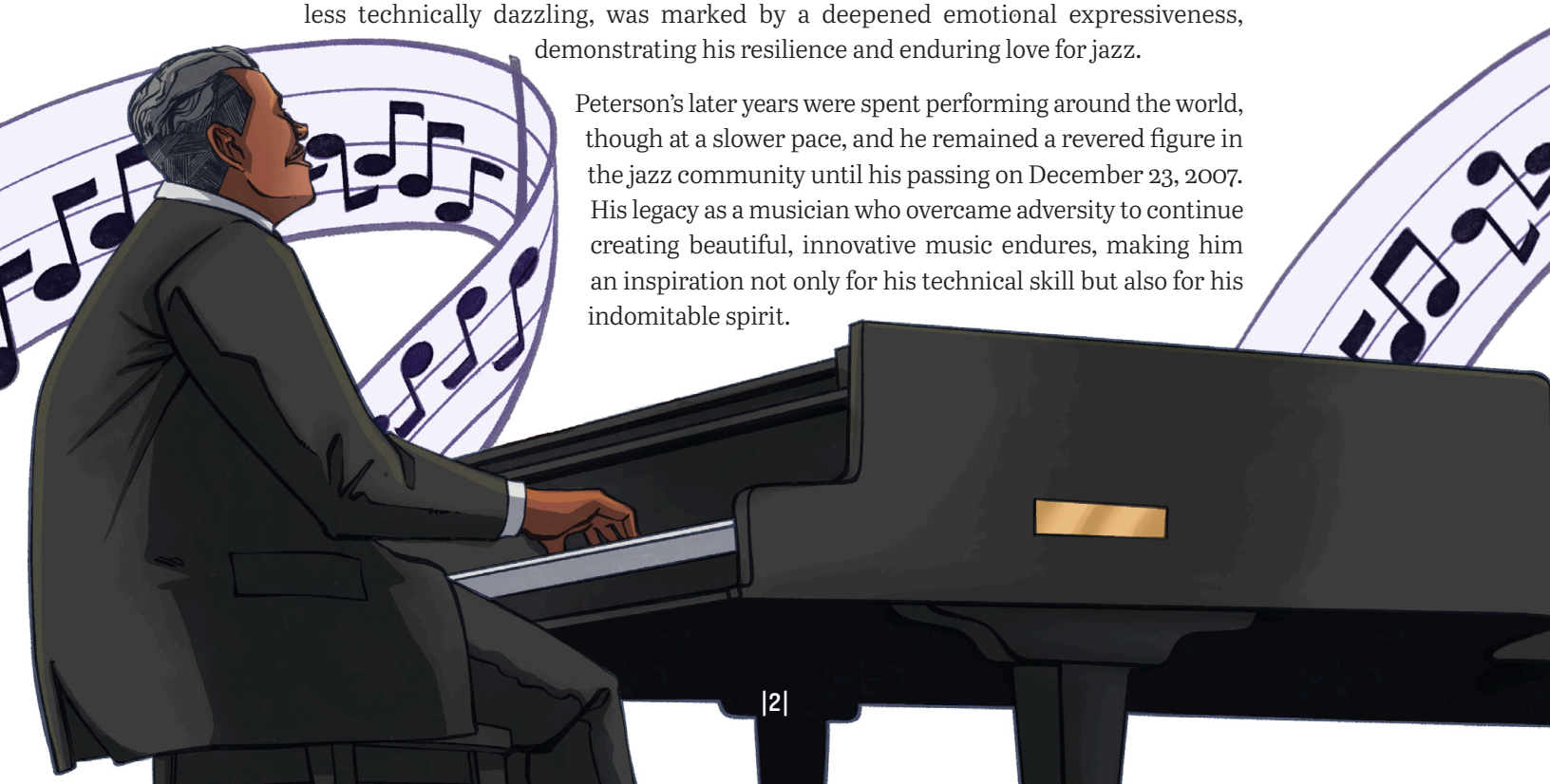
Note that these lessons are designed for, but not exclusive to, an Anatomy and Physiology 12 course over a five-day period. Activities on each day can be paired down to custom fit your class time allowance or the number of days can be extended to accommodate more of the complex content.

BACKGROUND

Oscar Peterson, born on August 15, 1925, in Montreal, Quebec, was one of the most celebrated jazz pianists of the 20th century. From a young age, Peterson demonstrated exceptional musical talent, initially focusing on the trumpet before a bout of tuberculosis led him to switch to the piano. He quickly rose to prominence in the 1940s, known for his virtuosic technique, speed, and the richness of his improvisations. By the 1950s, Peterson had gained international acclaim, working with jazz legends like Ella Fitzgerald, Louis Armstrong, and Stan Getz, and leading the Oscar Peterson Trio, which became one of the most influential ensembles in jazz.

In 1993, Peterson suffered a severe stroke that temporarily paralyzed his left side, posing a significant threat to his career. Despite the physical challenges, he embarked on an arduous path to recovery, determined to return to the piano. Though his left hand never fully regained its former agility, Peterson adapted his playing style to emphasize his right hand, becoming more adept with his one hand than most pianists with two. He continued to perform and record music, and his post-stroke work, though less technically dazzling, was marked by a deepened emotional expressiveness, demonstrating his resilience and enduring love for jazz.

Peterson's later years were spent performing around the world, though at a slower pace, and he remained a revered figure in the jazz community until his passing on December 23, 2007. His legacy as a musician who overcame adversity to continue creating beautiful, innovative music endures, making him an inspiration not only for his technical skill but also for his indomitable spirit.



DAY ONE

BUILDING EMPATHY AND CONNECTION

Introduce students to the class inquiry question:

How can the personality and/or the passion of Oscar Peterson be a model for resiliency?

Share information about Oscar Peterson's biography and background, in order to help students gain a historical perspective of the world that existed within his lifetime. (Alternatively, students can read through *When Freedom Sings: The Music and Melodies of Oscar Peterson* prior to this lesson.) Have students complete **Worksheet #1**, **Part A** to get them thinking about how this shaped his identity and his passion for music. They made need to conduct additional research to do so.

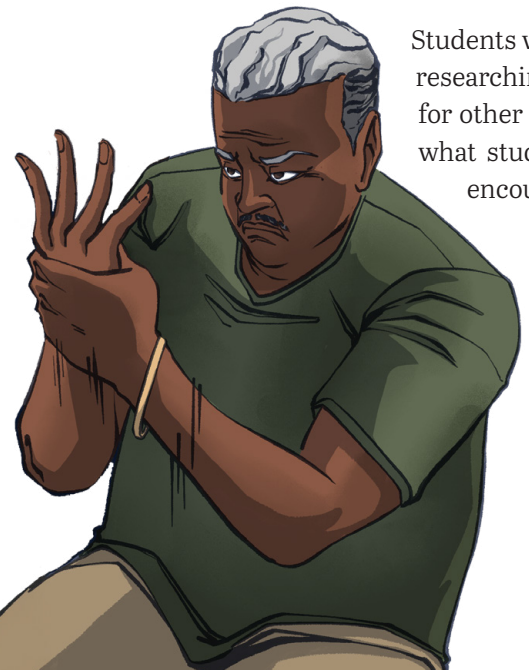
Students will then fill out **Part B**, which allows them to build empathy and connection by exploring their own personal identities and passions. This can be done in class, or at home if they require a more private space.

Distribute the **Rubric** and have students self-evaluate their completion of Worksheet #1 using the rubric's "Evidence" section.

DAY TWO

UNDERSTANDING ANATOMY AND PHYSIOLOGY

Begin by facilitating a guided discussion on students' current knowledge of physical and cognitive impairments. Do they know of any celebrities who have physical and/or cognitive impairments (e.g. Billie Eilish's Tourette's, Michael J. Fox's Parkinson's)?



Students will then fill out the 4-square activity in **Part A** of **Worksheet #2** by researching general information about strokes. This will act as a foundation for other activities on the worksheet. Afterwards, lead a class discussion on what students have discovered during their 4-square activity, in order to encourage new learning and connections.

Part B of the worksheet asks students to review the **Case Study**, which presents the symptoms of a hypothetical African American man who suffered a stroke. Students will read through the study and respond to the questions at the end, conducting additional research as necessary. (Note that the case study can also be found at: https://www.nsta.org/ncss-case-study/case-cerebrovascular-accident.)

Next for **Part C**, students will read an article from the *Los Angeles Times* that explains what the signs and symptoms of Oscar Peterson's stroke were.

Lastly, students will use the information gathered in Parts A-C of this worksheet to hypothesize what type of stroke Oscar Peterson suffered from. They will record their answer and provide evidence to support it using the space provided in **Part D**.

All four parts of Worksheet #2 can be peer group evaluated using the "Questioning and Hypothesizing" section of the **Rubric**.

DAY THREE

FOUNDATIONS OF RESILIENCY

The activities in **Worksheet #3** lead students to understand how Oscar Peterson's stroke impacted him emotionally and physically. Through this day's lesson, students will learn that Oscar Peterson was resilient and kept following his passion and playing his music, despite the challenges he faced.

Part A provides video examples of Oscar Peterson's abilities pre- and post-stroke. This puts into perspective the motivation and determination it took for Oscar Peterson to continue his passion. Watch a few minutes from each video as a class, with students recording their observations on the worksheet. Then lead a discussion on what students notice, think, and know about Oscar Peterson's piano playing pre- and post-stroke.

Part B offers a deeper dive into the concept of resiliency, by having students consider their own resilience abilities and skills.

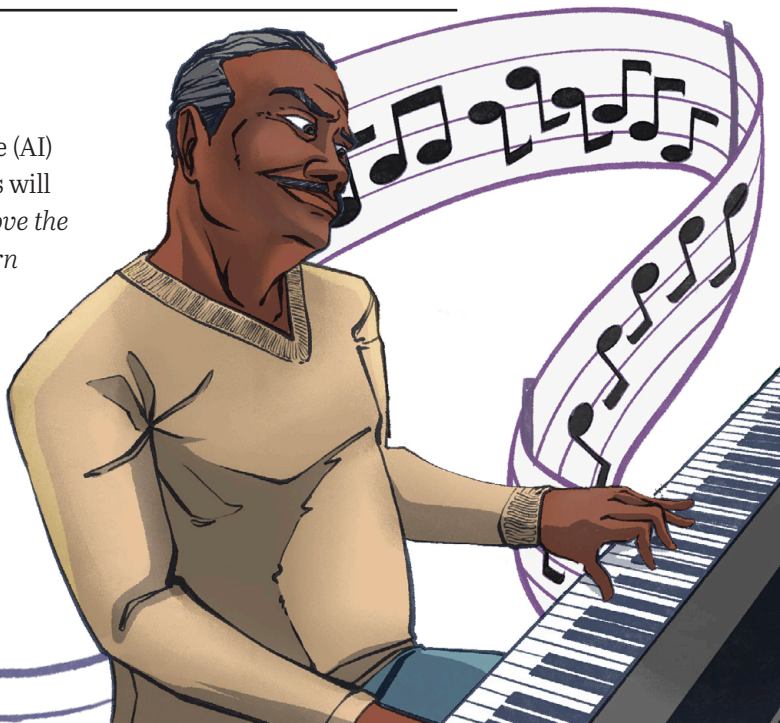
After completing the worksheet, it can be peer evaluated using the "Analysis" section of the **Rubric**.

DAY FOUR

MOVING FORWARD

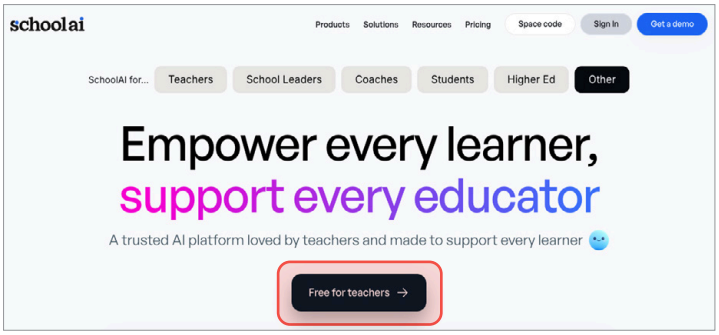
Worksheet #4 is a look at Artificial Intelligence (AI) and its uses in stroke care. For **Part A**, students will scan through the research article *How to Improve the Management of Acute Ischemic Stroke by Modern Technologies, Artificial Intelligence, and New Treatment Methods* and answer the questions on their worksheet.

In **Part B**, students will have the opportunity to ask a science chatbot any questions they may have about strokes.

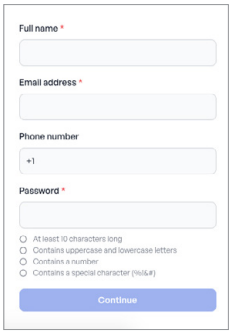


In order to access this chatbot, teachers will need to go to schoolai.com, then complete the following steps:

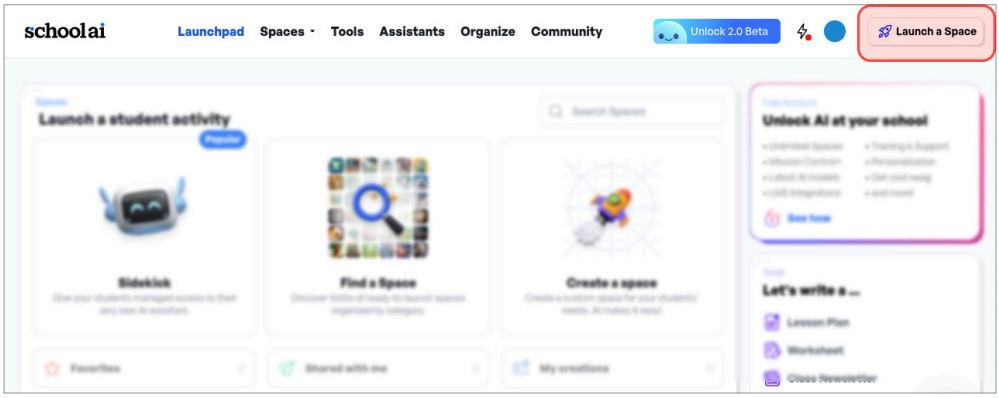
1. Click on "Free for teachers."



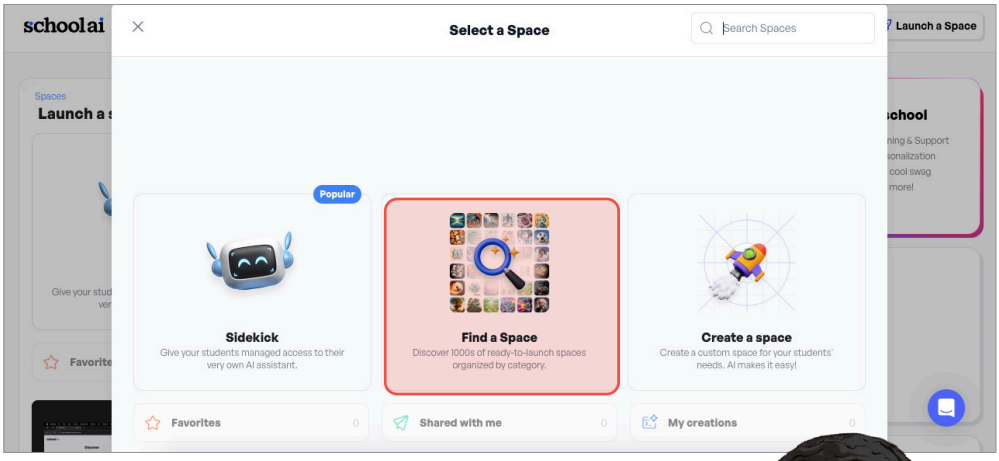
2. Create an account.



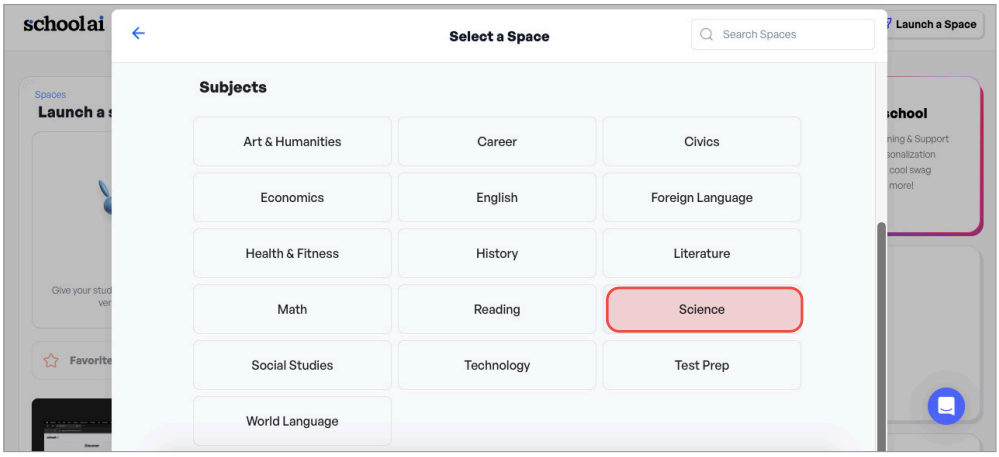
3. Go to "Launch a Space" on the top right of page.



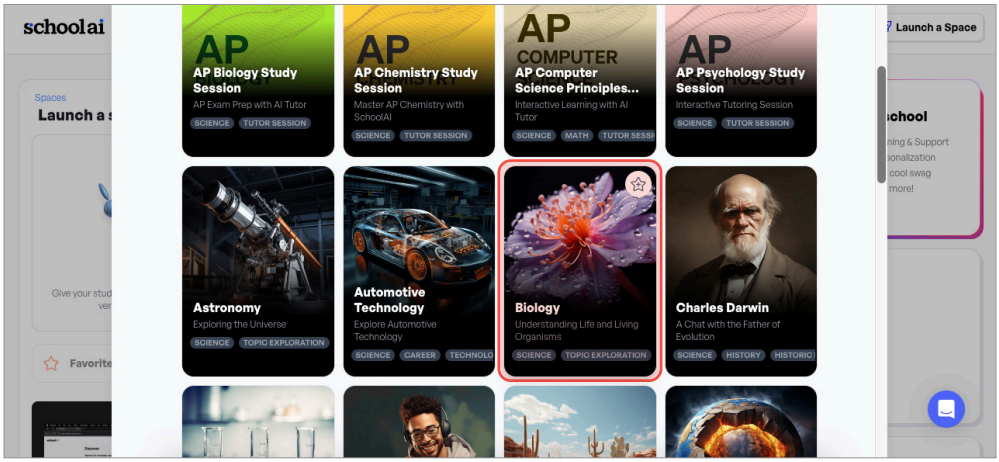
4. Click on "Find a Space."



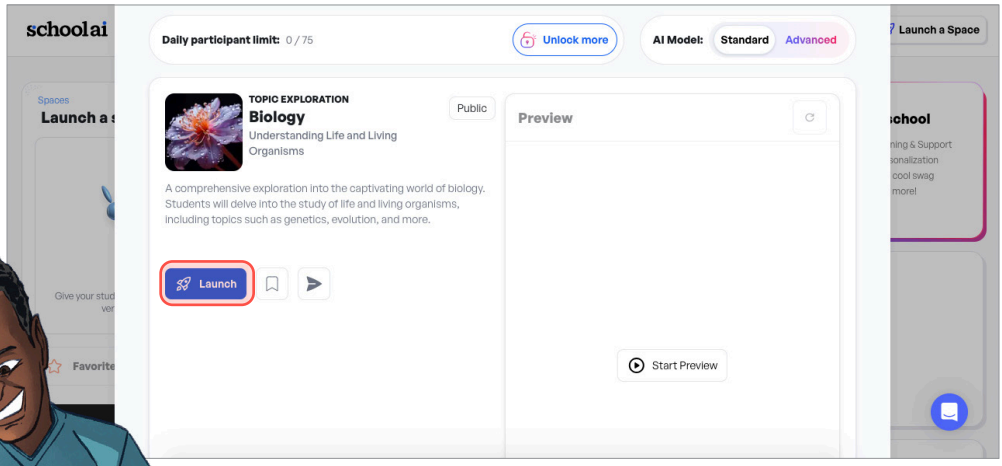
5. Find and click on "Science."

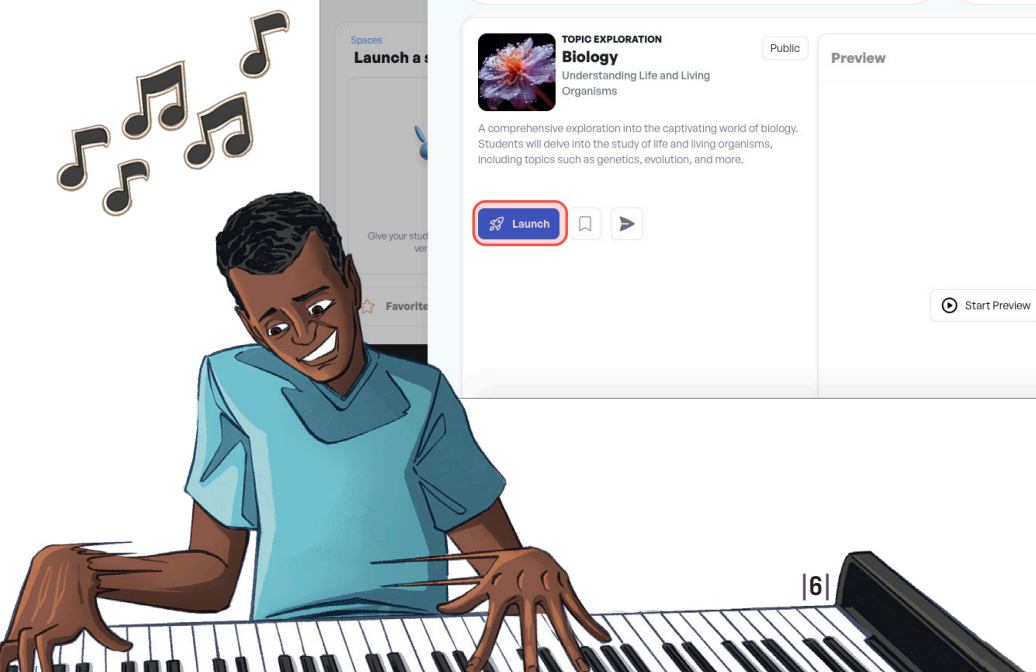


6. Scroll down to "Biology" and click on it.

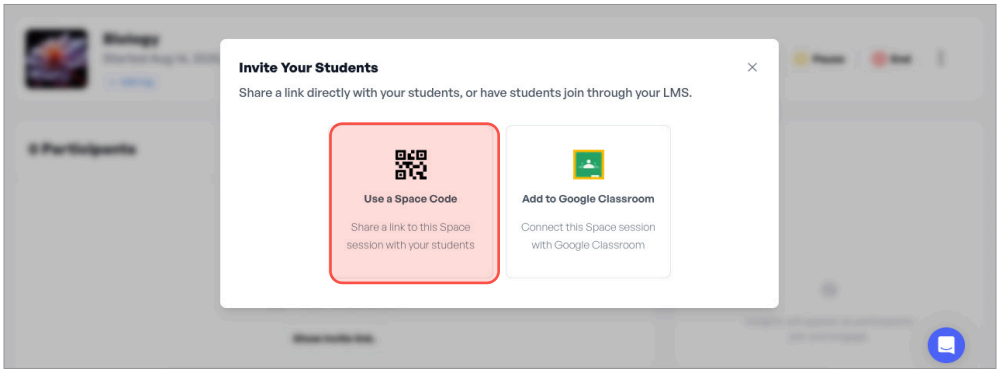


7. Click "Launch."

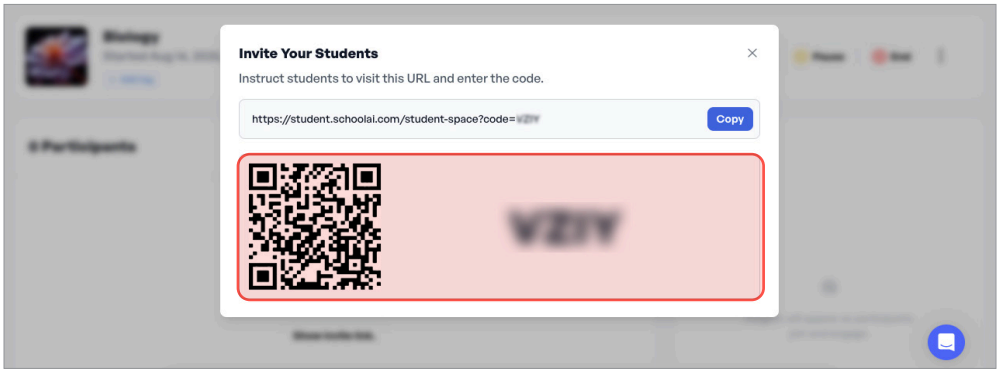




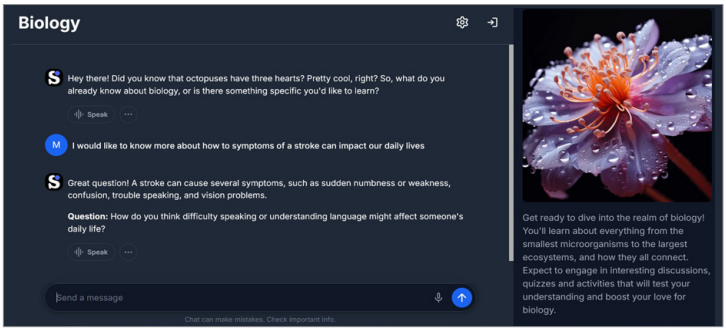
8. A pop-up window will open. Click on "Use a Space Code."



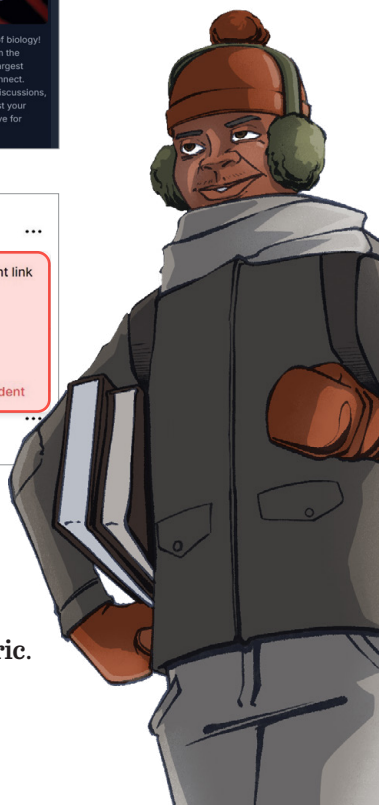
9. Share the code with your students so they can access the chatbot.



10. Students can then start typing or use voice commands to communicate with the chatbot.



11. You can manage students, monitor their conversations, and add/delete students from the chat as needed.



After students have finished their conversations with the chatbot, they will reflect on what they've learned. Next, students can get into groups to discuss the ethical implications of using AI in a medical context.

Worksheet #4 can then be self-evaluated using the "Application" section of the **Rubric**.

DAY FIVE

DEMONSTRATION OF LEARNING

Initiate a whole-group discussion of the class inquiry question: "How can the personality and/or the passion of Oscar Peterson be a model for resiliency?" Students will then record their own personal response to the question in **Part A** of **Worksheet #5**. Encourage them to draw on information they have learned from the previous worksheets to support their answers.

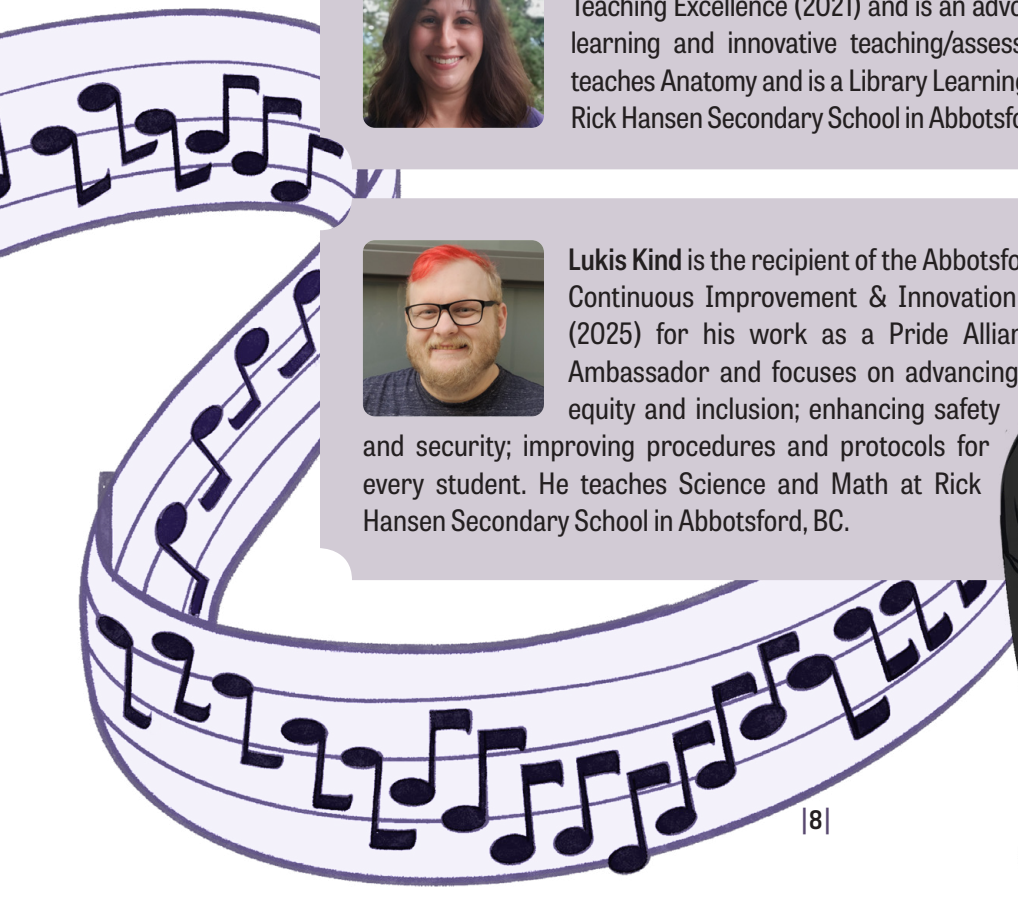
Part B asks students to demonstrate their learning by responding to the following individual inquiry question: "How can I use my learning of Oscar Peterson to better understand myself, become a more resilient person, and thrive in my community?" Students have a choice of framing their answer around:

- Lyrics to a song that represents their own life journey
- Artwork/picture that encapsulates their identity and learning
- Musician/artist/leader who emulates characteristics they strive to achieve
- Medical/technological advancement that helps overcome personal barriers
- Other

This final worksheet will be teacher evaluated using the "Communication" section of the **Rubric**.

Joanne Weatherby received the Prime Minister's Award in Teaching Excellence (2021) and is an advocate for inquiry-based learning and innovative teaching/assessment strategies. She teaches Anatomy and is a Library Learning Commons Teacher at Rick Hansen Secondary School in Abbotsford, BC.

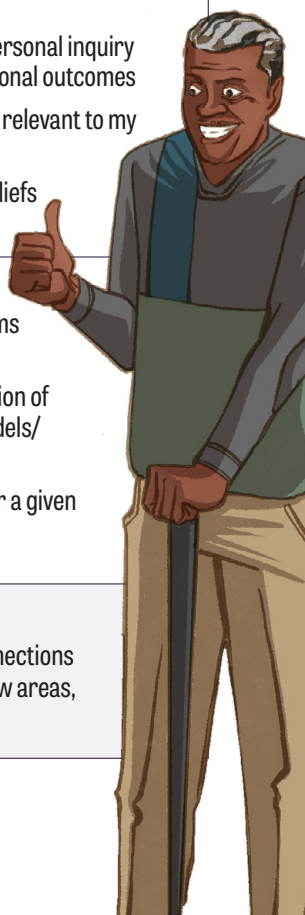
Lukis Kind is the recipient of the Abbotsford District Continuous Improvement & Innovation Award (2025) for his work as a Pride Alliance Ambassador and focuses on advancing equity and inclusion; enhancing safety and security; improving procedures and protocols for every student. He teaches Science and Math at Rick Hansen Secondary School in Abbotsford, BC.



RUBRIC: SCIENCE LEARNING MAP

Competencies	Proficient	Extending
Evidence Building Empathy and Connection (Self-Evaluation)	I can: • Use appropriately collected data to individually or collaboratively help answer a scientific question directly or indirectly • Ensure that the evidence collected and the sources are valid (accurate/precise) • Use qualitative and quantitative data to support my conclusion • Recognize sources of error during the collection of data or information and suggest improvements in experimental design	I can also: • Recognize bias (implicit and explicit) in the sources used in research • Evaluate evidence outside the core instructional outcomes • Connect evidence from different disciplines and different historical perspectives
Questioning and Hypothesizing Understanding Anatomy and Physiology (Peer Group Evaluation)	I can: • Self-generate open-ended questions to investigate a driving question • Make hypotheses using scientific knowledge • Reflect critically on hypotheses and generate questions	I can also: • Promote deeper learning through complex, thought-provoking, and purposeful questions and hypotheses • Create ongoing questioning/hypotheses leading to further investigation
Analysis Foundations of Resiliency (Peer Evaluation)	I can: • Provide relevant justification of experimental results, or thought process involved in said activity • Recognize patterns and connections between multiple scientific concepts (i.e. cause/effect, historical change, compare/contrast, form/function, interactions in systems, patterns and trends, model breaking, First People Principles of Learning, classify/categorize, perform calculations, etc.)	I can also: • Extend the experimental results outside the scope of the initial activity • Draw intercurricular connections to the subject matter • Recognize less obvious connections between ideas • Consolidate existing knowledge to solve more complex problems
Application Moving Forward (Self-Evaluation)	I can: • Use scientific knowledge to solve both theoretical and practical problems • Identify ethical issues related to scientific knowledge • Recognize limitations of scientific design and ideas (i.e. models, design, process)	I can also: • Use scientific knowledge to solve personal inquiry problems beyond the core instructional outcomes • Provide a potential source of action relevant to my conclusion • Reflect on the impact of bias and beliefs on society
Communication Demonstration of Learning (Teacher Evaluation)	The student can: • Use models (visual, mathematic, graphic, or symbolic) to demonstrate understanding of scientific ideas • Communicate with proper scientific language in the right context • Demonstrate understanding using visual, written, digital, artistic, verbal, or other methods • Listen actively and respond respectfully to promote collaboration and dialogue	The student can also: • Use a variety of methods or platforms to communicate • Display understanding and application of more complex terminology and models/representations • Use language that is appropriate for a given audience

Extending Performance Indicators
Students can create, synthesize, and/or innovate with their newly acquired skills and knowledge. This might include making connections across course units or between different disciplines. This could be described as also taking their learning "deeper," exploring new areas, but finding meaningful connections and innovative applications of this learning as well.



WORKSHEET #1: BUILDING EMPATHY AND CONNECTION

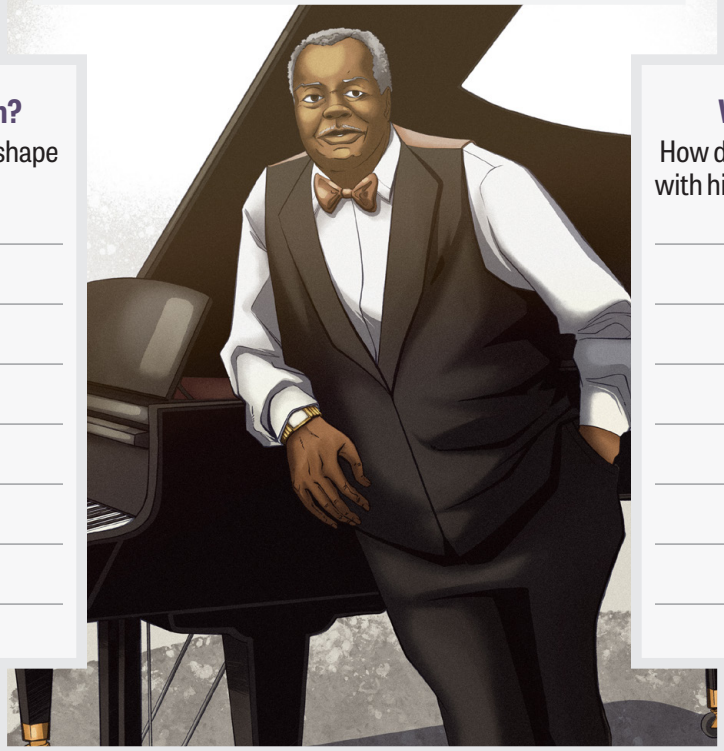
NAME: _____

PART A

Using what you have learned about Oscar Peterson, complete the graphic organizer below. You may conduct additional research as necessary. A good resource to start with is this article from CBC: "Canadian jazz great Oscar Peterson dies" (https://www.cbc.ca/news/entertainment/canadian-jazz-great-oscar-peterson-dies-1.646844).

Oscar Peterson

1925 (Montreal, Quebec) – 2007 (Mississauga, Ontario)



Who was Oscar Peterson?

How did the world around him shape him as a person?

What was his passion?

How did the world around him, along with his personality, shape his music?

This period in history

What was the world around Oscar Peterson like during his lifetime?

PART B

After completing the graphic organizer about Oscar Peterson, you will fill out the organizer below about yourself. Are there any similarities between how your world shapes you and how Oscar's world shaped him?

Name: _____

Born 20_____ – Present

Who are you?

How does the world around you shape you as a person?

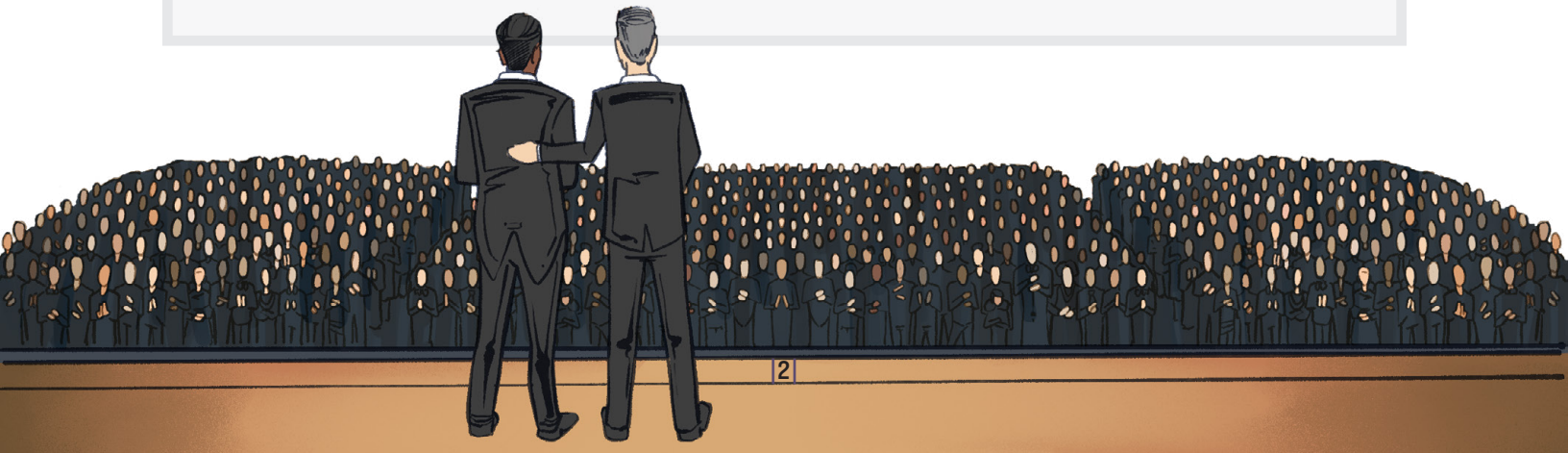
A picture of you

What is your passion?

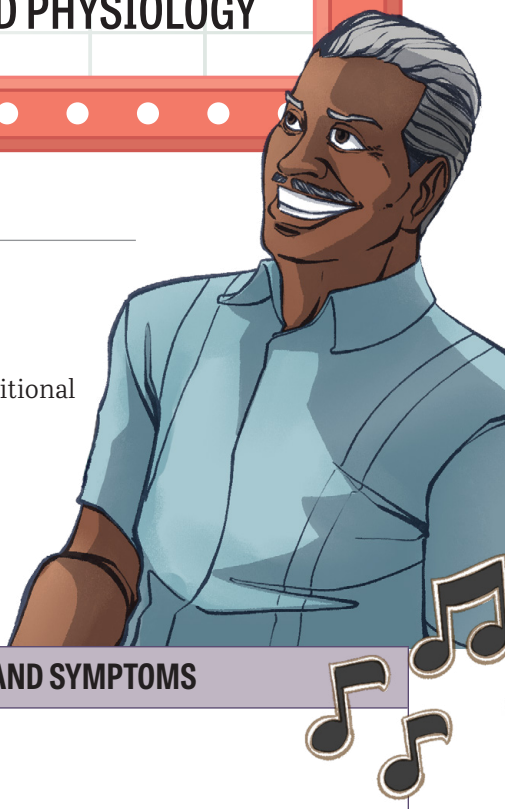
How does the world around you, along with your personality, shape your passion?

This period in history

What has the world around you been like during your lifetime?



WORKSHEET #2: UNDERSTANDING ANATOMY AND PHYSIOLOGY



NAME: _____

PART A

Complete the table below. Use the following links to help you get started, and refer to additional resources as necessary.

- TED-Ed YouTube Video: "What happens during a stroke?" (https://www.youtube.com/watch?v=-NJm4TJ2ito)
- The Mayo Clinic: Stroke symptoms and causes (https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113)

DEFINITION OF "STROKE"	SIGNS AND SYMPTOMS
CAUSES AND RISK FACTORS	**PREVENTATIVE MEASURES**

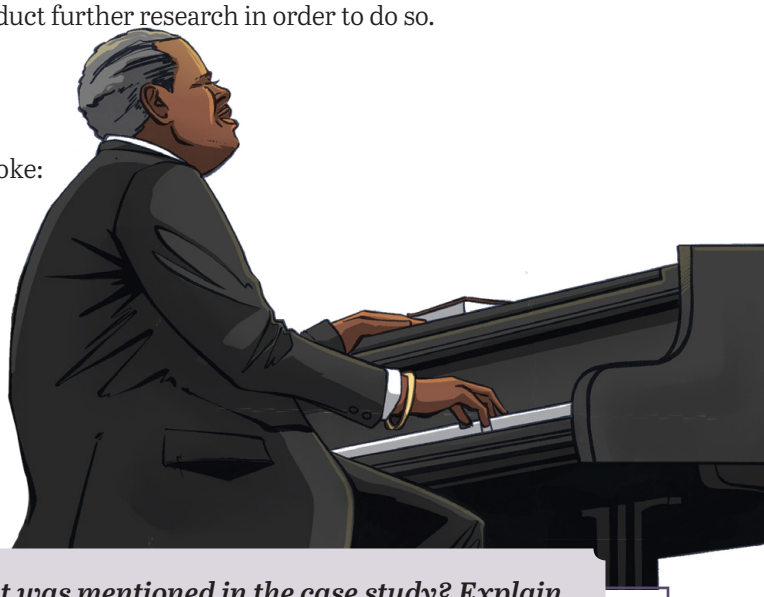
PART B

Read the case study entitled "A Case of Cerebrovascular Accident" (https://www.nsta.org/ncss-case-study/case-cerebrovascular-accident) and answer the questions at the end. You may need to conduct further research in order to do so.

PART C

Read the following article to learn more about Oscar Peterson's stroke:

- "Pianist dazzled jazz world with technique, creativity" (https://www.latimes.com/archives/la-xpm-2007-dec-25-me-peterson25-story.html)



PART D

Using the information you have learned in Parts A-C, make a hypothesis based on the question below:

Did Oscar Peterson have the same type of stroke that was mentioned in the case study? Explain.

WORKSHEET #3: FOUNDATIONS OF RESILIENCY

NAME: _____

PART A

How did Oscar Peterson's stroke affect his music? Use the following video evidence below to compare.

VIDEO ANALYSIS	PRE-STROKE Oscar Peterson, Count Basie, Joe Pass (1980) https://jazzonthetube.com/video/words-music-1980/	POST-STROKE Oscar Peterson Quartet (2004) https://www.youtube.com/watch?v=R-rfw_0q5_w
HAND PLACEMENT ON THE KEYS		
COMPLEXITY OF OSCAR'S PIANO PLAYING		
RELIANCE ON HIS BAND MEMBERS		
OTHER THINGS I NOTICED		

PART B

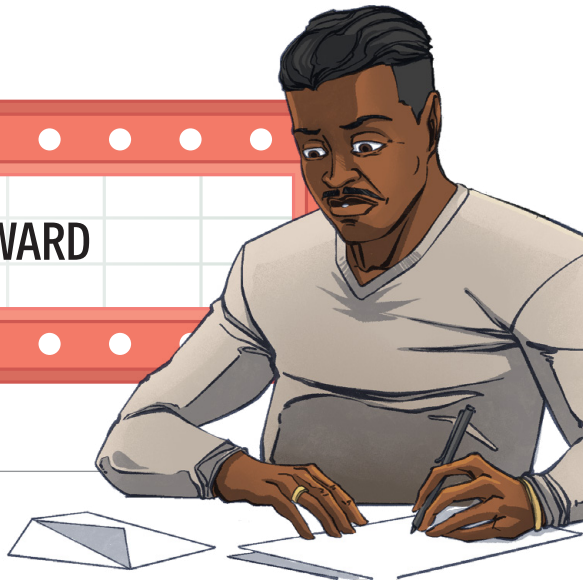
Building **resiliency** is an important skill in order to endure hardships and overcome challenges in your life. Even after Oscar Peterson suffered a stroke, he showed resiliency and put in a lot of hard work so that he could continue to follow his passion.

Use the article below to identify resiliency skills. Which ones do you use (strengths) and which ones do you continue to work on (challenges)?

- The Mayo Clinic: "Resilience: Build skills to endure hardship" (https://www.mayoclinic.org/tests-procedures/resilience-training/in-depth/resilience/art-20046311)

RESILIENCY SKILLS	MY STRENGTHS	MY CHALLENGES

WORKSHEET #4: MOVING FORWARD



NAME: _____

PART A

Since Oscar Peterson's stroke in 1993, there have been enhancements in the technologies that detect and treat strokes. Artificial Intelligence (AI), for example, can be used in many ways to assist doctors with all levels of stroke care, from implementing a medical diagnosis, to consultation and rehabilitation.

Scan through the following journal article and list 5 ways AI can be used for medical purposes:

♪ *How to Improve the Management of Acute Ischemic Stroke by Modern Technologies, Artificial Intelligence, and New Treatment Methods* (https://pmc.ncbi.nlm.nih.gov/articles/PMC8229281/)

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

4. _____

_____

_____

5. _____

_____

_____

PART B

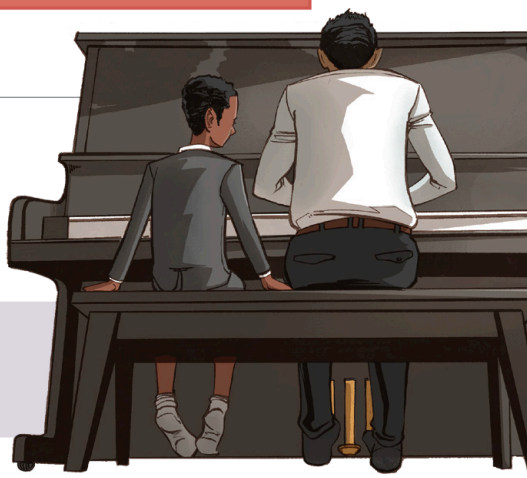
Let's take this opportunity to use Artificial Intelligence (AI) and ask questions about strokes.

Using the code given by your teacher, access the science chatbot on schoolai.com to gain more insight on strokes, their symptoms, how to diagnose them, and the prognosis when a stroke has been detected.

After you have finished your conversation with the chatbot, write a reflection on what you have learned about strokes. How might this information apply to Oscar Peterson?

Get into groups and discuss: What are the ethical implications of using AI in a medical context? Record your findings below.

WORKSHEET #5: DEMONSTRATION OF LEARNING



NAME: _____

PART A

Class Inquiry Question:

How can the personality and/or the passion of the musician Oscar Peterson be a model for resiliency?

Record your response to the class inquiry question below. Be sure to use what you have learned from **Worksheets #1-4** to support your answer.

PART B

Individual Inquiry Question:

How can I use my learning of Oscar Peterson to better understand myself, become a more resilient person, and thrive in my community?

Choose one of these options below as the catalyst to answer the individual inquiry question:

- Lyrics to a song that represents your own life journey
- Artwork/picture that encapsulates your identity and learning
- Musician/artist/leader who emulates characteristics you strive to achieve
- Medical/technological advancement that helps overcome personal barriers
- Other

A Case of Cerebrovascular Accident

by
David F. Dean, Department of Biology, Spring Hill College

Case Presentation

Samuel Dexter is a 52-year-old African-American man who is both a husband and father. He is moderately obese (BMI of 32), and has smoked two packs of cigarettes a day for the past 38 years. He awakes one morning with weakness on his right side. He is a bit confused, sees double, and his speech is slurred. When he attempts to walk to the bathroom, he stumbles a few times and falls once. His wife suspects that he has suffered a stroke and calls 911. Emergency personnel arrive within minutes of her call and transport Samuel to the emergency room of the nearest hospital.

Upon examination by the emergency room physician, Samuel is found to have right hemiparesis and diminished pinprick and two-point discrimination on the right side of his head and arm. His deep tendon reflexes are brisk on the right and there is a positive Babinski reflex on the right. He has difficulty articulating answers to the questions he is asked, speaking only a few words and frequently responding with just a verb or a noun. His ability to respond to complicated verbal commands, whether spoken or written, is not impaired. In addition, his systemic blood pressure was found to be 160/100. A serum lipid profile was performed and the results are shown in the table below.

Table 1. Serum Lipid Profile Results	
Triglycerides	220 mg/dl
Total Cholesterol	280 mg/dl
LDL	210 mg/dl
HDL	30 mg/dl

Questions

1. Define the terms *ischemia* and *infarction*.
2. What is a stroke? Describe the mechanism(s) by which strokes occur.
3. Define the term *collateral blood flow,* and describe how this and other factors affect the development of stroke.
4. List the risk factors that predispose an individual to suffer a stroke. What are the five warning signs that indicate an individual is having a stroke? Which of the risk factors and warning signs did Mr. Dexter possess based on the clinical history?
5. What are *Brodman areas* and how do they relate to the neurological deficits that occur as the result of stroke?
6. What is the functional relationship between *Broca's area* and *Wernicke's area?*

7. Define the terms *ipsilateral* and *contralateral* as they apply to the functionality of the central nervous system.
8. Explain the significance of the findings of brisk deep tendon reflexes and Babinski sign on the affected side of Samuel's body.
9. Based upon the historical and physical exam findings, what specific area(s) of Samuel's brain have been damaged as the result of his stroke?
10. Describe the means by which individuals who survive a stroke regain at least part of their lost abilities.

Image Credit: Based on *Peasant Sitting At A Table* by Vincent Van Gogh, 1885.

Originally published 12/02/05 at http://www.sciencecases.org/stroke/stroke.asp