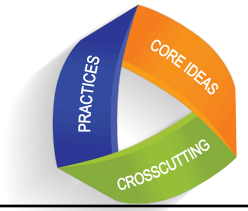
Distance Learning Unit 3 Patterns NGSS Biology



Unit 3: Homeostasis				
Unit Resources:	Vocabulary	Rubrics	Anchoring Investigation Folder Paper Packet (under construction)	Digital Interactive Notebook Unit Tracker LT Scale

ALT3: Explains how cells are organized into organisms

Anchoring Phenomenon: The heart beats faster during exercise.

Unit Essential Question: How do the cells, tissues, and organs of the body work together to control heart rate during exercise?

NGSS Performance Expectations Academic Supporting Targets (ASTs) with links to evidence statements:

HS-LS1-3 (AST 3.1): Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-2 (AST 3.5): Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Note: the regular classroom version of this unit also covers HS-LS1-4 on cell division and development, but that standard has been moved to the Distance Learning Unit 4: Genomics to save time.

Practices: Developing and Using Models / Planning and Carrying Out an Investigation
Crosscutting Concepts: Systems and System Models / Stability and Change / Structure and Function
Disciplinary Core Ideas: Structure and Function / Growth and Development of Organisms

Task Set # (Days)	Essential Question & Activities	Practice & Extension	SEPs CCCs DCIs	Evidence of Student Learning/ Assessment
Engage				
1 (30 min)	**EQ:** What do you know about heart rate? What parts of your body are involved in controlling it? Why does it go up? Go down? **Phenomenon**: Your heart rate increases when you exercise. ● Fill out H, K, and W part of a HKWL (template here) with the question "what do you know about heart rate and exercise?" and "what questions do you have?" Use these slides as a guide that have embedded video ● Career Connection: Cardiovascular Technologist (video embedded in slides) ● Fill out Unit Tracker TS1 boxes		**SEP:** Asking questions **CCC:** Stability and Change **DCI:** Structure and Function	
Explore and Explain				
2 (90 min)	**EQ:** How do our cells work together to maintain homeostasis? **Phenomenon**: Your heart rate increases when you exercise. ● Use slideshow as a guide for this task set. Students pair share questions and look at example concept maps, learn about feedback loops, and homeostasis. *(30 min)* ● Introduce the student task with slides 12 & 13. Students read and annotate an article about the control of heart rate during exercise and then complete a partially filled out model of the feedback loop. Student template - Modeling HR Control: Article and Concept Map. ● This vocabulary list can be given to students as a guide while they read and create the map ● Alternates: : Students can do a similar activity as above but make the whole map themselves (longer - depending on student familiarity with concept maps and concept map drawing tools) - or create only one of the feedback loops (exercise / stressor **or** relaxation) - would be shorter. ● Key for Concept Map of Heart Rate Control ● Fill out Unit Tracker TS5 boxes	As another example of homeostasis, students can read this article on blood glucose.	**SEP:** Developing and using models **CCC:** Systems and System models **DCI:** Structure and function	Students read and annotate the article then complete the concept map of the feedback loop.
3	**EQ:** How does a given exercise affect heart rate? How can we use that information to make decisions about exercise programs? **Phenomenon**: Not all exercises are cardiovascular exercises.	Students can put their extension efforts into their	**SEP:** Planning and Carrying Out an Investigation	Lab Procedure evaluated for AST 8.2 (MYP Criterion B)

(150 min)	• Use this slideshow throughout the lesson as a guide.
	• Heart Rate Inquiry Resource Packet
	• Each student gets a copy of Heart Rate Inquiry Student Template.
	• Student groups each select an exercise that they think will affect heart rate, and make a wild guess as to the average heart rate of a group of test subjects after 65 seconds of this exercise.
	• Students write a step-by-step procedure describing how to collect data
	• Videos for how to collect heart rate:
	  ○ With a device
	  ○ Without a device
	  ○ Data collection: individually or in a group if they can agree on an exercise and a procedure.
	• Desmos graphing: Measuring Effect of Exercise on Heart Rate Calculate standard deviation using Google Sheets IF IN A GROUP (template linked in inquiry doc).
	  ○ Here is a link to a teacher desmos you can use as well where students can input their average data. **Be sure to insert the link to your class code in the student template!!**
	• Presentation for Data Discussion (Sample - make your own copies for your classes)
	• Board Discussion to classify and analyze graphs (Students can use Board Meeting Discussion Cards for their verbal participation)
	• Return to Wild Guess: Students generate their data-informed prediction about the heart rate of a new test subject performing their exercise for 65 sec, and their level of confidence in this new prediction (use confidence chart).
	• Calculate maximum heart rate using the calculation table in the student template - compare this result to their maximum heart rate, determine whether this exercise is a recommended cardiovascular exercise.
	• Complete Lab Conclusion - Student Exemplar (please don't share widely)
	• Fill out Unit Tracker TS6 boxes
		background research, lab design, data collection, and conclusion	**CCC:** Stability and Change, Structure and Function
			DCI: Structure and Function
				Data Collection & Graph evaluated for AST 8.3 (MYP Criterion C)
				
				Lab Conclusion evaluated for AST 8.4 (MYP Criterion C)

Summative Assessment Summary

Supporting Target & NGSS Performance Expectations	Possible Summative Assessments
HS-LS1-3 (AST 3.1): Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	• Heart Rate Inquiry
HS-LS1-2 (AST 3.5): Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	• Concept Map
ALT 8 Uses the inquiry process as a controlled and data-driven means to investigate scientific questions.	• Heart Rate Inquiry

Science and Engineering Practice Look Fors:

Practice	Grades 9-12 Science and Engineering Practice "Look Fors"
Practice 2: Developing and Using Models	• Evaluate strengths and limitations of models looking at: process, mechanism, and design criteria. • Design a test of a model to ascertain its reliability and be able to move between models base on merits and limitations. • Use a model to predict the relationships between systems or components of a system. • Develop and use multiple types of models to predict phenomena and provide detailed accounts
Practice 3: Planning and Carrying Out Investigations	• Work as an individual or a team to produce data as evidence to revise models, support explanations or test solutions to problems. Students should consider confounding variables and evaluate design to ensure controls. • Critically analyze design of an experiment to decide the accuracy of data needed to produce reliable measurements and limitations of the data (number of trials, cost, risk, time etc.) • Select appropriate tools to collect, record, analyze and evaluate data. • Make directional hypotheses about dependent and independent variable relationships.

Other Unit Resources