Algorithm Design and the Circulatory System	Grade 5 Human Organ Systems

Lesson Plan

Coding Tool	Algorithm Design
Cross-curricular	Science, Language

Big Ideas
Investigate the structure and function of the major organs of various human body systems;

Learning Goals
To understand that the circulatory system uses blood to nourish all areas of the human body

To explore basic coding concepts including algorithm design and conditional statements

Specific Expectations
Science
3.2 Describe the basic structure and function of major organs in the respiratory, circulatory, and digestive systems
2.5 Use a variety of forms to communicate with different audiences and for a variety of purposes.

Language
1.1. Purpose and audience: Identify the topic, purpose, and audience for a variety of writing forms
1.5 Organizing Ideas: identify and order main ideas and supporting details and group them into units that could be used to develop several linked paragraphs, using a variety of strategies.

Description
In this lesson, students will be introduced to the idea of computational thinking, specifically through writing with algorithms in specific steps first through the idea of procedural writing, and then extending to review the Circulatory System. This lesson should be planned for after the students have an introduction to the circulatory system.

Materials
Printable block cards

Computational Thinking Skills
Algorithm Design
Conditional Statement
Procedural Writing

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Introduction

Minds On: What is procedural writing?

- Facilitate a class conversation about what students remember about procedural writing.
- <u>Procedural writing is a step-by-step explanation of how to do something</u>
- Invite students to work with a partner to describe the procedure of brushing your teeth.
- Share a few with the class.
- Discuss and find areas where information is missing. i.e. Did you say for how long to squeeze the tooth paste tube? Did you turn off the taps after?

New Concept: What is Algorithmic design?

- Explain that in coding<u>, algorithms are the **clear** steps that are used to define a problem, similar to the clear steps needed in procedural writing. "Coding" is the process of writing these steps, something that we can call "writing code" or "coding"</u>
- As a class, review the coding blocks provided (see attached document with blocks for this lesson). Post blocks on board for students to refer to upon explanation. This lesson will discuss: **move, turn, repeat, and if/then, and the "make a command" option.**
  - Move: Indicate where to move (specific distance, steps etc.)
  - Turn: Indicate which direction to turn (left/right and degrees, i.e. 90 degree to the left)
  - Repeat: Indicate a command to complete again
  - If/Then: If something occurs, then something else will occur (i.e. If it is raining, then take an umbrella)
  - Make a Command: Students create a command specific to the task (i.e. pick up toothbrush)
- Introduce the idea of a conditional statement: <u>A conditional statement checks if a condition is true and then only executes code if the condition is true.</u>

Action

Whole Class Task:

- As a class, explore the coding block terminology and decide how you could code for brushing your teeth.

 Example could be:

- Move to bathroom sink
- Open drawer (this is a "make a command" option)
- Take toothbrush and toothpaste out (this is a "make a command" option)
- Close the drawer (this is a "make a command" option)
- Open the cap of the toothpaste (this is a "make a command" option)
- Squeeze 1ml of toothpaste onto toothbrush (this is a "make a command" option)
- Put cap back on toothpaste and put tube away. (this is a "make a command" option)
- Repeat twice per day

 Conditional statements could be:

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- IF sugar eaten before bed THEN repeat
- IF teeth still not clean THEN repeat

Refresh: Review the circulatory system and its main functions to the class
- The circulatory system contains the blood, blood vessels and heart in the human body. This system supplies all parts of the body with oxygenated blood and nutrients.

Task: Create a flow chart, using the block commands, to create code for how the circulatory system works including:
- use at least one "repeat"
- use one conditional statement (if/then or if/else)
- demonstrate understanding of the circulatory system

Remember: Coding is like procedural writing, all steps need to be well detailed and specific.

(See additional attachment for potential example)

Consolidation/Extension
Possible extension questions/challenges:
- How do we code for the fact that the circulatory system does not never end?
  Answer: Forever Loop
- Students could be invited to create code to describe the function of other human organ systems (i.e. Digestive system)
- Allow students time to research "Scratch" and learn about what it is. How is it similar to this learning? Answer: Computational thinking, coding block terms

Assessment
Success criteria
Students will:
- demonstrate understanding of the circulatory system
- use the move and turn block commands
- use at least one repeat command
- use one conditional statement (if/then)

Additional Resources
Circulatory System:
- https://www.youtube.com/watch?v=f9ONXd_-anM
- https://www.youtube.com/watch?v=_qmNCJxpsr0

Algorithm Design intro:

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- https://www.tynker.com/blog/articles/ideas-and-tips/how-to-explain-algorithms-to-kids/

Conditional Statements:
- https://www.tynker.com/school/coding-curriculum/show-teacher-guide?chapter=584ee797af9231f6438b4859