

**ITQ ARTS AND SCIENCE INTEGRATION
GRADE 5
DANCE AND LIFE SCIENCE**

**We Got the Beat – The Circulatory System
Lesson #1**

FOSS California, Grade 5, Living Systems, Investigation 1, Part 1

CONTENT STANDARDS

Dance Grade 5

- 1.4** Incorporate the principles of variety, contrast, and unity with dance studies.
- 2.1** Create, memorize and perform complex sequences of movement with greater focus, force/energy, and intent.

Science Grade 5

- LS2A** Students know many multicellular organisms have specialized structures to support the transport of materials.
- LS2B** Students know how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO₂) and oxygen (O₂) are exchanged in the lungs and tissues.

ESSENTIAL QUESTIONS (*Questions students might ask about the topic*)

- What is the role of the circulatory system in keeping my body healthy and active?
- How can I use dance to help me memorize the parts of the circulatory system and how they work?

OBJECTIVES & STUDENT OUTCOMES (*Students will be able to.....*)

- demonstrate the sequential steps of the circulatory system through chanting, memorizing and performing movement sequences formed into a dance study.
- describe how oxygen, carbon dioxide, and nutrients are transported by the blood to and from the heart and body.

ASSESSMENT (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
 - Student performance
 - Student response to inquiry
- **Feedback for Student**
 - Teacher Feedback
 - Peer feedback

WORDS TO KNOW

Dance

- **Chasse:** A dance step in which one leg literally chases in other foot from its position (step-together-step).
- **Contrast:** To set side-by-side to emphasize differences.
- **Dance Sequence:** The order in which a series of connecting movements and shapes occur.
- **Dance Study:** A short work of dance that investigates a specific idea or concept and shows a selection of movement ideas.
- **Pathway:** A line in which a person or a part of a person, such as an arm or head, moves (e.g, her arm took a circular path or he traveled along a zigzag pathway).

Science

- **Artery:** A blood vessel that carries blood from the heart to the body.

- **Blood:** A liquid tissue that flows to and from cells.
- **Blood Vessel:** Where blood flows (arteries, veins, and capillaries).
- **Capillary:** The smallest blood vessel. Gases, nutrients, and wastes are exchanged between capillaries and cells.
- **Circulate:** To move in or flow in a circle.
- **Circulatory System:** The system of blood vessels and organs that transports blood to all the cells in the body.
- **Heart:** A muscular organ that pumps blood.
- **Left Atrium:** The upper chamber on the left side of the heart.
- **Left Ventricle:** The lower chamber on the left side of the heart.
- **Lung:** The organ in animals where gases, such as oxygen and carbon dioxide, pass between the atmosphere and the blood.
- **Right Atrium:** The upper chamber on the right side of the heart.
- **Right Ventricle:** The lower chamber on the right side of the heart.
- **Transport:** To move or carry.
- **Vein:** The blood vessel that carries blood from the body to the heart.

MATERIALS

- *FOSS California, Grade 5, Living Systems, Investigation 1, Part 1*
- Illustrations of a human heart (attached)
- Illustrations of circulatory system (attached)
- The Circulation Dance - Pathway and Staging (attached)
- 20, 8"x10" pieces of red construction paper labeled "oxygen"
- 20, 8"x10" pieces of blue construction paper labeled "carbon dioxide"
- One roll each, black, red, and blue painter's tape
- CD Player and music
- Science notebooks, one per student

RESOURCES

- *FOSS California, Grade 5, Living Systems, Investigation 1, Part 1*
- Animation of pumping heart, with labels at <http://www.kscience.co.uk/animations/heart.swf>
- Animation of blood flow at http://www.kscience.co.uk/animations/blood_system.swf
- How Blood Gets Around the Body at <http://library.thinkquest.org/5777/cir1.htm>
- "Ballet Basics", Sandra Noll Hammond, Mayfield Publishing Company, 1974, pg 98

PREPARATION

- Present vocabulary from *FOSS California, Grade 5, Living Systems* and teach Investigation 1, Parts 1 and 2
- Ample space in which to move. Use tape, chalk or yarn to mark the floor space with the pathway of the circulatory system (See/use Diagram #7 as your reference) Mark the pathway on the floor with red painter's tape to identify the pathway of the arteries and blue painter's tape to identify the pathway of the veins.
- Carefully look over the diagrams attached to this lesson. Diagrams 3 and 4 represent the Circulatory System. Decide which of these diagrams your students will best understand.
- 20 each, 8"x10" red and blue pieces of paper. The red labeled oxygen, the blue labeled carbon dioxide.

WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

(5 minutes)

- Post diagrams #1 and 2
 - *Ask: Can you tell me what these pictures represent? [A (human) heart]*
- *Say: Diagram #1 is an illustration of the human heart and diagram #2 is a photograph of a real human*

heart that has been preserved.

- Ask:
 - What can you tell me about the **heart**? [Pair share and accept student responses.]
 - What can you tell me about the **circulatory system**? [Pair share and accept student responses.]
- Say: Today we are going to create a dance about the **circulatory system**, its structures, and the way the structures work.

MODELING (Presentation of new material, demonstration of the process, direct instruction)

(20 minutes)

- Post the **circulatory system** vocabulary list and diagrams #3 and 4 (see preparation).
- Say : The **circulatory system** is made up of the vessels and the muscles that help and control the flow of the **blood** around the body. This process is called **circulation**. The **blood** flows around the body in a circular pathway, **transporting** oxygen and nutrients to all the cells in the body. The main parts of the system are the **heart, arteries, capillaries** and **veins**. We will also talk about the **lungs**. Even though the **lungs** are part of the respiratory system, the **circulatory system** works very closely with the respiratory system.
 1. The **Heart**: (refer to diagram #5)
 - Say: Your **heart** is a very strong muscle. It has four chambers, two on the right and two on the left (very similar to rooms with doors) that contract and release at different times to pump blood all through your body. The right and left **atria** contract first while the lower chambers, the **ventricles** release. Then the **ventricles** will contract and the **atria** will release. Their beats work in opposition. Their beats are **contrasting**. The **atria** beat first, the **ventricles** beat second, i.e., **atria, ventricles. atria, ventricles.**
 - Arrange students in groups of four in a block formation (each pair of students standing side-by side and facing the other pair of students).
 - Identify each student: **right atrium, right ventricle, left atrium, and the left ventricle.**
 - Remind students that they are viewing the chambers from the front of the body.
 - Say: The main function of the right side of the **heart** (point to diagram #5, then to the two students as the right **ventricle** and **atrium**) is to receive oxygen poor blood filled with CO₂ from the body. The left side of the **heart** (point to diagram, then to the two students as the left **ventricle** and **atrium**) is to pump oxygen rich blood to all the cells of the body.
 - Teach: Contract and release (**contrast**) sequence
 - Say: Pull in your stomach strongly like someone has punched you. Punch your arms forward as you contract. Arch your back and put your chest out. Pull your arms back as you release. The emphasis is on the contract movement.
 - When both **atria** contract, the **ventricles** release. When the **ventricles** contract, both **atria** release. Say: Contract, release, contract release. Atria, ventricles, atria ventricles.
 2. The **Lungs**:
 - Say: The **lungs** are where the blood picks up oxygen to take to the rest of the body. Every time you inhale air (have students take a deep breath), oxygen is given to your red blood cells. Every time you exhale air (have students blow out air) your lungs get rid of carbon dioxide that is a waste product of the cells.
 - Students who will represent the lungs will give an oxygen molecule (hold up a red oxygen label) to a blood cell to take to the body and receive a carbon dioxide molecule (hold up a blue carbon dioxide label) from the blood cell as it returns from the body to the lungs.
 3. The **blood, arteries, veins, and capillaries**
 - Refer to Diagram #7.
 - Say: This is the pathway that the **blood** takes on its journey around the human body. Note that the **pathway** is circular. That's why we call it the **circulatory system**. The **blood** travels through a plumbing system called **blood vessels**. The **blood vessels** consist of **arteries** that carry oxygen and nutrient rich **blood** away from the **heart** and to the body's cells. **Veins** carry nutrient depleted and CO₂ from the body's cells back to the **heart**. Think of the words **arteries** and away (from the heart) as both starting with the letter a to help you remember.
 - (Trace the diagram with your fingers). Say: **Blood** leaves the left side of the heart and travels through **arteries** that gradually divide into **capillaries**. In the **capillaries**, food and oxygen

are released to the body cells, and carbon dioxide and other waste products are returned to the bloodstream. The **blood** then travels in **veins** back to the right side of the **heart**, where it is pumped directly to the lungs. In the lungs, carbon dioxide is exchanged for oxygen, and this renewed **blood** flows back to the left side of the **heart**, and the whole process begins again.

- Teach the Chants:
 - *Left from the heart, away through the arteries.* Perform the shoup step to the left: double basic step (stepping to the left, step-together-step-touch.)
 - *Right to the heart, the veins, the veins.* Perform the shoup step to the right (step to the right, step-together-step-touch).
- Teach: Locomotor movement (the chasse or step-together-step) in general space with intention.
 - Designate an area of the space where the **heart** would be. Arrange students in close proximity to that place.
 - In general space, have students chasse while raising the arms overhead (as if happy and lively) to show **arterial blood** rich in oxygen moving away from the designated place (**heart**).
 - (As the students are moving) say: *You are oxygen-rich blood in the **arteries** moving away from the **heart** to the cells of the body.*
 - In **contrast**, have students create a movement toward the designated place to show **venous blood** depleted in oxygen and nutrients. Use appropriate expression. (Movement should look **contrasting** to chasses: limp, slouched posture, tired expression, dragging etc.).
 - (As the students are moving back to the place where they started) say: *You are oxygen-depleted blood in the **veins** moving back to the **heart** from the cells of the body.*
 - Repeat both movements, away and toward the designated space, one more time.
 - Briefly discuss with students how these two contrasting energies feel.

4. The Body

- Say: *When your body does not get enough oxygen you feel lazy, tired, or sleepy.*
 - Teach students the following **sequence** (single basic step: step-touch-step-touch)
 - Beat 1: Step and slide to the right, swing arms up out to the side
 - Beat 2: Swing arms down, close left foot to the right
 - Beat 3: Step and slide to the left, swing arms out to the side
 - Beat 4: Swing arms down, close right foot to the left
 - Say: *step right touch left, step left touch right or swing and touch, swing and touch.*

GUIDED PRACTICE (Application of knowledge, problem solving, corrective feedback)

(20 minutes)

- Setting up the **circulation** dance (refer to diagram #7)
 - Select four students to be the left and right **atria** and **ventricles** of the **heart**. Place the **heart** a little above the center of the space. Students will be on their knees.
 - Select two volunteers to be the right and left **lung**. Place one student above and on either side of the **heart**.
 - Select five students to represent the body. Place these students a distance below the **heart**. Arrange students one in the middle and two on either side of the middle student.
- Say: *We are going to **circulate** or walk the **pathway** the blood takes from the **heart**, to the **lungs**, back to the **heart**, and to the body through the **arteries**, **capillaries**, and back to the **heart** through the **veins**. Follow me. We are **circulating**.*
 - Follow the diagram or the taped **pathway** on the floor. Begin in the right side of the **heart**.
 - Say:
 - *We are **circulating** through the **heart** to the **lung**.* Walk to the right **lung**,
 - *We are **circulating** back to the left side of the **heart**.*
 - *We are **circulating** to the body* (continue straight to the body).
 - *We are **circulating** back to the right side of the **heart*** (curve around and head back to the

- right side of the **heart**).
- Continue the same process as you lead the students to the left **lung**, to the left side of the **heart**, to the body, back to the right side of the **heart**.
 - *Ask: What did you notice about the pathway we took as we journeyed through the body as a **blood cell**? [We moved in circular **pathways**.]*
 - *Say: I will select four students to represent the **blood cells** that will journey through the body. Two of our **blood cells** will travel to the right **lung** and two will travel to the left **lung** at the same time.*
 - Assign the four students in pairs. Starting at the right side of the heart, send one pair to the right **lung** and one pair to the left **lung**. At the **lung**, the student representing the lung will give each student an oxygen label. Have students representing oxygenated **blood cells** meet back at the left side of the **heart**. Travel to the body where the center person in the body formation will take the oxygen label and hand them a carbon dioxide label. Travel back to the right side of the **heart** as deoxygenated **blood**.
 - Repeat the **pathway**. Have the first pair who traveled to the right **lung** now travel to the left **lung**. The students who traveled to the left **lung** will travel to the right **lung**. The student as the **lung** will take the carbon dioxide label and exchange it for an oxygen label. Repeat the **pathway** as before.
 - Once the **pathway** is understood, begin the dance without music. The heart will pump doing the contract and release movement on their knees, the lung will give oxygen and receive carbon dioxide, the body will do the slide step and the center person will exchange oxygen for carbon dioxide labels and the blood will travel as oxygenated blood with the chase step while raising arms and return to the heart with a **contrasting** movement. Repeat the process a few times with and without music.
 - Time permitting, switch groups so that everyone has a chance to demonstrate and observe.
 - Videotape the demonstration.

DEBRIEF & REFLECT (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)
(5 minutes)

- *Ask: What are the parts of the **circulatory system**? [Heart, arteries, veins, capillaries, and blood]*
- *Say/Ask: The **lungs** are part of the respiratory system yet they work very closely with the circulatory system. Can you tell me how the **lungs** work with the **circulatory system**? [The **lungs** take in oxygen when we inhale and transfers it to the blood which takes it to the body. The blood brings back carbon dioxide to the **lungs** and when we exhale the **lungs** get rid of the carbon dioxide.]*
- Answer the following questions in your science notebook:
 - Describe the general path taken by the **blood** through the **circulatory system**? Draw a diagram.
 - How did the dance exercise help you to understand the **circulatory system**?

EXTENSION (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Rehearse the Circulatory System dance daily for 10 minutes. Students will need to memorize the dance for lesson #3.
- Using pieces of which butcher paper cut into six-foot lengths, have students trace their body and draw the diagram of the circulatory system on their silhouettes.