

SCIENCE

THE SEARCH

Discovering the Principles
that Govern God's Creation

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BOOK 4 SCIENTIFIC THEORIES

THE CORNERSTONE CURRICULUM PROJECT

OBSERVATION NOTEBOOK

— Use a spiral or three ring binder to record your data —

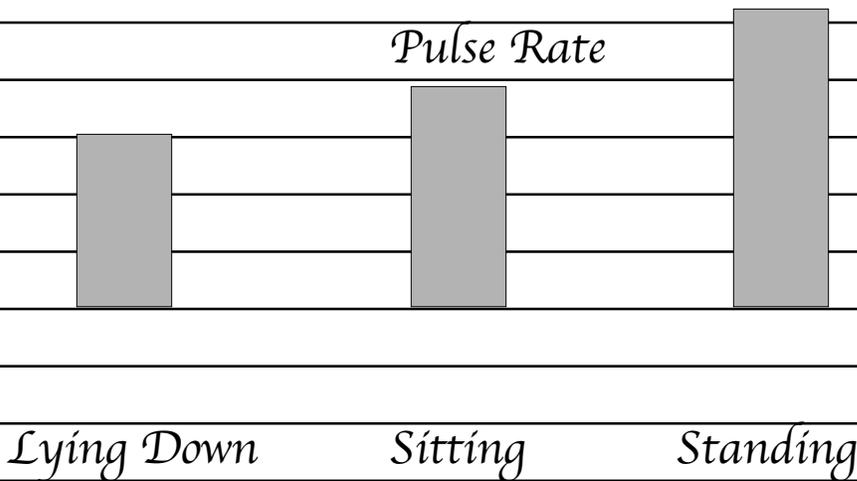
9/9/94 Activity 1 - Thump! Thump!

Pulse Rate:

What might effect pulse rate:

- . Running
- . Lying Down
- . Eating
- . Sitting
- . Standing

SAMPLE



ACTIVITY 1

THUMP - THUMP

MATERIALS

watch with a second hand, or stop watch

OVERVIEW: EXPLORING THE CONCEPT - CIRCULATORY SYSTEM

LESSON PLAN

MATERIALS OR INFORMATION I NEED

WHAT I AM TO DO AND TO CONSIDER

"As a human you have been created with many systems in your body. Your eyes, heart, and lungs are three parts of body systems. You are going to begin investigating one of these systems today."

"Put the fingers of your left hand on the thumb side of your right wrist. Press with your fingers."

"Describe what you feel."

"That 'thump, thump' feeling is called your **pulse**."

"Find your pulse again."

1. You will need a clock with a second hand or a stop watch. Have your mom or dad keep track of the time and you count your pulse.

"Count the number of beats for one minute."

"Ready ... set ... count."

At the end of one minute ...

"Stop." ...

"How many times did you feel your pulse?"

"That is called your **pulse rate**."

"What are some things that might affect your pulse rate?"

"How do you think **standing, sitting, and laying down** would affect your pulse rate? ... Why do you think so?"

"Do you think your pulse rate would be more or less when standing, sitting, or lying down?"

"Why do you think so?"

"How do you think it would be different?"

"Find your pulse rate while you are standing, sitting, and lying down. Wait one minute in each position before you begin."

"Keep track of your results."

"Make a bar graph of your data."

"What does your data tell about body position and pulse rate?"

"Did you expect your pulse to be the same in each position?"

"Find out how pulse rates are affected by:

- Age
- Time of day
- Eating & drinking
- Boy or girl

Hint: You might consider the following: Find the pulse rate for everyone in your family. Include grandparents if possible. Another investigation would be to compare the affect of drinking a cola versus a fruit juice. Be sure that all other variables are controlled (i.e. Stay the same). Note: Cola drinks containing caffeine will show a significant effect after a period of time. Monitor the changes over 30 minutes.

"Make a bar graph of your results."

"What did you find out about pulse rates?"

"What variable seems to have the greatest affect on pulse rate?"

Optional ... you may need to contact your local veterinarian.

"Find the pulse rate of one of your pets."

"Where did you find the pulse?"

"How fast was the pulse?"

"How does it compare with your pulse rate?"

ACTIVITY 2

FAST ... FASTER ... FASTEST

MATERIALS

jump rope
watch with a second hand, or stop watch

OVERVIEW: EXPLORING THE CONCEPT - CIRCULATORY SYSTEM

LESSON PLAN

MATERIALS OR INFORMATION I NEED

WHAT I AM TO DO AND TO CONSIDER

Begin this activity before you get out of bed!

"Before you get out of bed this morning take your pulse rate."

"How many times did you feel your pulse in one minute?"

"Since you have been resting, this is called your **resting pulse rate**."

"What do you think will happen to your pulse if you exercise? Later today you will test your idea."

1. Later in the day ... you will need a jump rope.

"Find your pulse rate after you jump rope for one minute."

"Ready ... set ... go! ... [After one minute] stop."

"Begin taking your pulse."

"How did your pulse rate change?"

"What can you say about pulse rate and exercise?"

"What affect would other types of exercise or work have on your pulse rate?"

"Which do you think would increase your pulse rate the most:

- Mowing the lawn
- Running
- Playing basketball
- Riding a bike
- Sweeping or mopping the floor?"

"What could you do to find out?"

"If you ride your bike for one minute, but run for five minutes, would it be a fair to compare pulse rates? ... Why not?"

"What variable do you want to investigate?"
(Answer: Check the answer key.)

"What are some variables you need to keep the same?"
(Answer: Check the answer key.)

2. If you need help designing and carrying out this investigation, ask your parents. Be sure to find your pulse rate before and after the experiment.

"Design a plan to test the affect of working or exercising on your pulse rate."

"Now, conduct the experiment to find out what effect work has on your pulse rate."

"What did you find out?"

"Make a statement about pulse rate and work (or exercise)."

ACTIVITY 3

GETTING BACK TO NORMAL

MATERIALS

jump rope
stop watch

OVERVIEW: EXPLORING THE CONCEPT - CIRCULATORY SYSTEM

LESSON PLAN

MATERIALS OR INFORMATION I NEED

WHAT I AM TO DO AND TO CONSIDER

1. You will need the graph title
Recovery Rate.

For example, if your resting pulse rate is 70,
then find 70 pulses per minute on the graph.
Draw a horizontal line across the paper at
this point.

"What is your resting pulse rate right now?
Today you are going to raise your pulse rate by
exercising and then find out how long it takes to
come back to your resting rate."

"Using your colored marker, draw a horizontal line
showing your resting pulse rate ... this line
represents your resting pulse rate."

"How long do you think it will take for your pulse to
return to normal after you exercise?"

"After you exercise you will find your pulse each
minute for fifteen minutes."

2. You will need jump ropes.

"You will jump rope until you are breathing hard.
Probably about two minutes. Then record your pulse
rate each minute for fifteen minutes."

"Ready...set....begin jumping."

3. After about two minutes or until you are
breathing hard, then ...

"Stop."

4. With a stop watch or a watch with a
second hand

"Begin taking your pulse. Count out loud. Begin
counting at one each time. Take your pulse every
minute for fifteen minutes. Begin counting."

Continue until you have collected data for fifteen minutes. Since you will be counting, you will need another person to record your data for you.

Find the second minute after exercising...move up the graph until you reach the intersection of the pulse rate. This will help you plot your data.

A short recovery time indicates good physical condition. Begin a regular exercise program...

At the end of each month ...

"Now, take your data and put it on the graph. What was your pulse rate one minute after exercising."

"Find one minute on the graph. Move up the graph until you reach "—" pulses per minute. Place an 'x' at this intersection."

"Continue for each minute after you exercise."

"Next, connect each 'x' with a line."

"What does this graph mean?"

"How long did it take for your pulse rate to get back to normal?"

"Did it go below your resting pulse rate? ... Why do you think it did?"

"The length of time for your pulse to return to its resting rate is called the **recovery time**."

"Why don't you begin a regular exercise program and monitor your pulse rates and the recovery time."

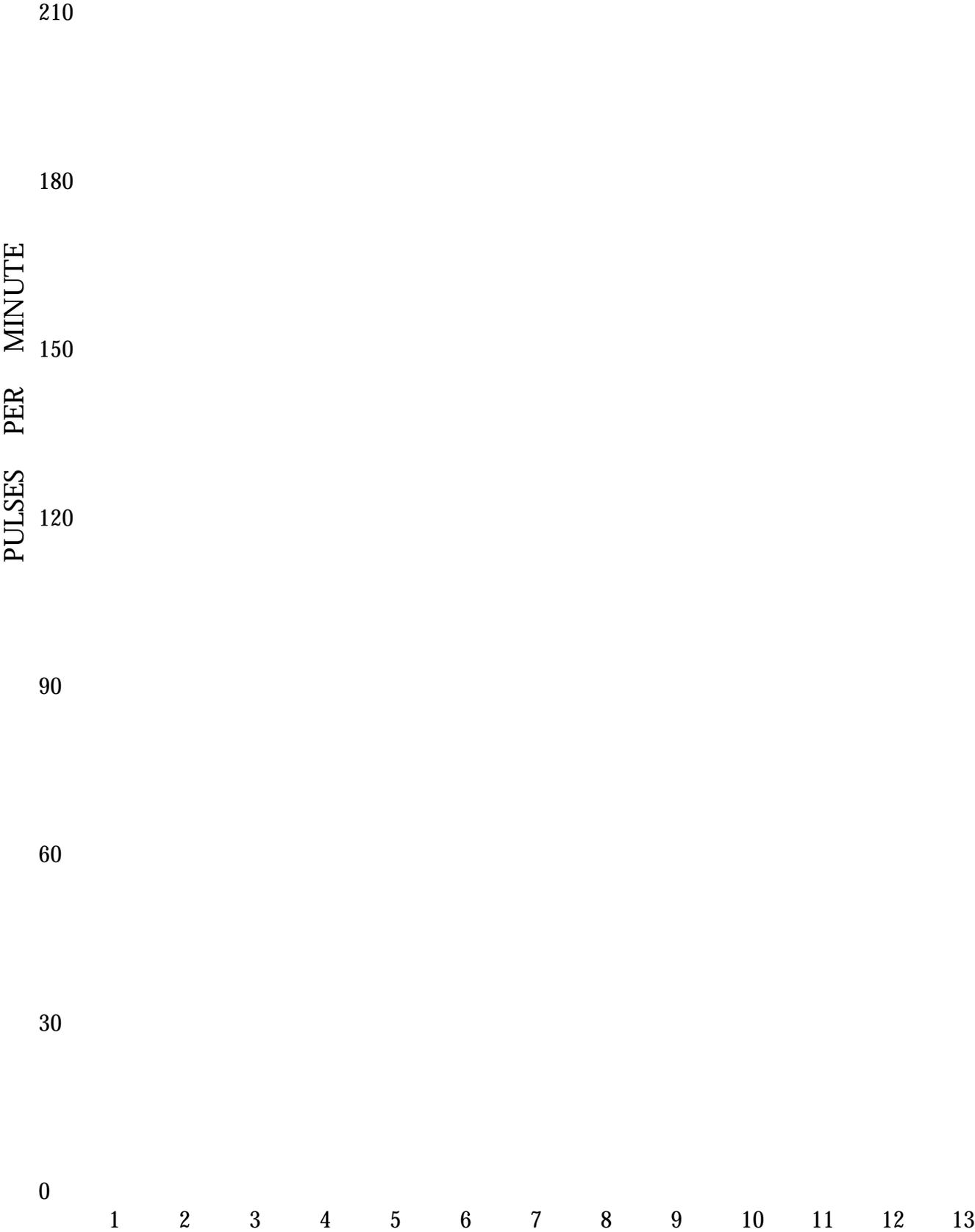
"Do you think that recovery time can be changed by exercise? See if regular exercise will affect your recovery rate?"

"At the end of each week record the number of minutes it takes for your pulse to return to the resting rate."

"Also put this data on the graph."

"What can you say about recovery rate and exercise?"

PULSE RECOVERY RATE



ACTIVITY 4

CIRCULATORY SYSTEM - A MODEL

MATERIALS

bottle, plastic, 32 ounce, detergent bottle

corks, 2

straws, 2 hard plastic

rubber tubing, 2, 10 inches each, and 1, 24 inches - they should snugly fit over the straw

jars, 2

OVERVIEW: NAMING THE CONCEPT - CIRCULATORY SYSTEM

LESSON PLAN

MATERIALS OR INFORMATION I NEED

WHAT I AM TO DO AND TO CONSIDER

"In the last several activities you have been observing the variables that affect your pulse."

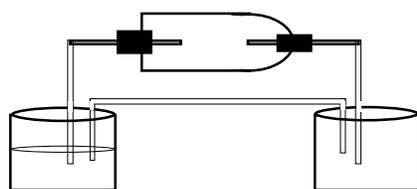
"What causes this 'thump-thump' that you feel?"
(Answer: Check the answer key.)

"Yes, your pulse has something to do with your heart and blood."

"Today, you are going to build a model to explain why you feel your pulse."

1. You will need the necessary materials.

The two corks will need to be drilled so that the straws will very snugly fit into the hole. Hammering a large nail through the cork will also work.



JAR 1

JAR 2

You will need the two jars.

"Here is how you will assemble the materials."

"Gently twist the straw through the hole in the cork. Then do the same with the other cork and straw."

"Cut a hole in the bottom of the plastic bottle. Fit one of the corks into the hole."

"Take the lid off the bottle. Fit the second cork into the hole in the top of the bottle."

"Now, attach a piece of rubber tubing to each straw."

"Label this jar '1'. And the other jar '2'."

"Pour water into Jar 1 so that it is half full. Leave the other jar empty."

"Put one of the pieces of tubing hanging from the bottle into Jar 1. Put the tubing from the other end of the bottle into Jar 2."

"Using a piece of paper, label the tube into Jar 1 'a'." Label the tube going into Jar 2 'b'."

NOTE: You will need the assistance of one or two other people to make the model work correctly.

"Put water into the bottle until it is about half full. To do this, you can remove the stopper at the top of the bottle. Squeeze tube 'b' tightly so that the water does not leave the bottle while it is being filled. Hold the bottle on its side. Squeeze tube 'a' with your fingers."

"Now, give the bottle a quick, hard squeeze. Do not release the bottle. Observe what happens. Hold the end of tube 'b' above jar 2. Now, release the bottle. Repeat this until the water in the bottle is about half gone."

"Tightly squeeze tube 'b'. Squeeze the bottle and release it. What happens to the water in jar 1? Repeat this several times. Make a careful record of what happens when each tube is squeezed tightly."

"You also have a piece of rubber tubing about 24 inches. Put one end of that tubing into the jar tube b has been emptying into. Suck the air out of the long tubing. Start the water running from jar 2 to jar 1. You may have to practice a few times. Practice as much as you need to keep the water running between the jars."

"Now your equipment is working. Water is moving from jar 1 to jar 2 through the bottle. You know how to squeeze the bottle and the tubes to do this. Practice until you can keep the amounts of water in jars 1 and 2 the same."

"Describe how the water goes from Jar 1 to Jar 2. Compare how the water reaches Jar 2 with how it goes from Jar 2 to Jar 1. Be sure to compare the way the water flows in both cases. Make accurate records about the differences in the flow from Jar 1 to Jar 2 and from Jar 2 to Jar 1."

(Answer: Check the answer key.)

The idea -

"Feel your pulse. Now, go back to the model. What in your experiment could be compared with the thump of your pulse?"

(Answer: Check the answer key.)

"What caused the short bursts of water that entered jar 2? Use your data to answer this question."

"What in your body causes the thump of your pulse? Use the data you have gathered to make a model of how your heart pushes blood through your body. How does your model allow you to explain heart beat?"

(Answer: Check the answer key.)

"Your fingers were an important aid in moving water from Jar 1 to Jar 2. Explain their purpose in the experiment. Your heart has a way of doing what your fingers did. In your heart there are **valves**."

"The **valves** in your heart keep blood in its proper place. Your fingers worked as valves in your experiment. Your heart delivers blood to the arteries in your body. It delivers blood to the arteries in spurts. What represents the arteries in your model?"

"After the arteries deliver blood to the body, the veins collect it. The veins deliver blood back to the heart."

"Answer these important questions:

- What represents the veins in your model?
(Answer: See answer key.)

- What represents the heart in your model?"
(Answer: See answer key.)

- What represents the arteries?"
(Answer: See answer key.)

- What represents the valves?"
(Answer: See answer key.)

"The heart delivers blood to the arteries in spurts. Your model tells you how the veins deliver blood back to the heart. Make a record of how this happens. You know you can feel the spurts of blood being delivered to the arteries. Why can't you feel the blood being delivered back to the heart?"
(Answer: See answer key.)

"Describe the flow of water in your model."

"Make a diagram showing the movement of the water in your system. Draw arrows showing this movement. Indicate the places where spurts occur.

"This is a simple model showing the movement of blood through your body."

"The complete system of movement is called the **circulatory system**."

RECOMMENDED READINGS:

At this time you should encourage your children to select several books from the library that would expand their understanding of the circulatory system. Below are several suggested selections:

Schneider, Leo. *Lifeline: the Story of Your Circulatory System*. New York: Harcourt Brace and Jovanovich, 1958.

Weart, Edith Lucie. *The Story of Your Blood*. New York: Coward McCann & Georghagan, Inc., 1960.

Zim, Herbert S. *Your Heart and How It Works*. New York: William Morrow and Co., 1959.

This is only a beginning! Your local library will have many, many good books describing the circulatory system. Spend as much time reading and expanding the ideas of this unit as your child's interest will allow.

CONTACT THE AMERICAN HEART ASSOCIATION for additional information.

Their number is 1-214-373-6300. Their address is 7320 Greenville Ave., Dallas, Texas 75231.

FIELD TRIPS to your local hospital or blood bank would be very profitable. You may even want to have your personal physician type your child's blood.