Bay Area Scientists in Schools Presentation Plan

Lesson Name: Learning about our guts is a must!
Presenter(s): Chelsey Lee, Jenny H Chang, Lili Mohebbi, Jennifer Pham, Melinda Weilage
Grade Level : 3rd Grade

CA Science Standards Connections: 3rd Grade, Physical and Life Sciences

3-PS-1. Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept:

b. Students know sources of stored energy take many forms such as food, fuel, and batteries.
c. Students know machines and living things convert stored energy to motion and heat.

3-LS-3. Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept:

a. Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.

Next Generation Science Standards Connections: 4th Grade, Physical and Life Sciences

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

5-PS3-1. Use models to describe that that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model to describe phenomena. (4-PS4-2) Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)	**PS3.D: Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) **PS3.D: Energy in Chemical** Processes and Everyday Life The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) **LS1.C: Organization for Matter and Energy Flow in Organisms** Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)	**Systems and System Models** A system can be described in terms of its components and their interactions. (5-LS2-1)

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Common Core Standards:

ELA/Literacy:

W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Mathematics:

MP.2 Reason abstractly and quantitatively.

FOSS Connections:

3rd Grade Module: *Structures of Life*

Investigation 4: *Human Body*

5th Grade Module: *Mixtures and Solutions*

Investigation 4: *Fizz Quiz*

5th Grade Module: *Living Systems*

Investigation 2: *Nutrient Systems*

Investigation 3: *Transport Systems*

Teaser:

Have you ever wondered what happens to your food between swallowing it and pooping it out?

Opening question(s): "Where does digestion begin?" "Can you name some organs in the digestive system?"

Objective(s):

We need food to survive. Our body processes food by using the digestive system. Students will learn applicable information about the basic process of digestion. They will also be encouraged to make healthier food choices and learn about common ailments of the digestive system.

Vocabulary/Definitions: *3 – 6 important (new) words*

gastrointestinal tract
peristalsis
Ingestion
Digestion
Mechanical and Chemical
Elimination
Esophagus
Stomach
Intestines

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Materials:

What will you bring with you?

General: name tags,

Demo activities: unsalted crackers, tissue paper; vinegar, loaf of bread, and Ziploc bags (tentative)

Station 1: Organs: Bring in digestive organs from storage to display to the children. (This section will be mainly vocabulary)

Station 2: Nutrition: Pre-made squares that we will have cut out for them to make their own idea of what "My Plate" should look like. (Here we can have them pair off so it would be ideal if the teacher already gave them a buddy)

Station 3: Helpers of the Digestive System

What should students have ready (pencils, paper, scissors)?

Pencils

Classroom Set-up:

Students should be split into 3 groups

Power/Water: Not required

Estimated setup time: 5 minutes

Estimated cleanup time: 5-10 minutes

Classroom Visit

1. Personal Introduction: _____ **Minutes**

Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?

(All of us *chyme* in together)

Hi! We're students from UC Berkeley who have been studying human anatomy. We want to share our knowledge with you and how to take care of our bodies.

So when you eat your food, do you ever think about what happens after? (And no, not just going to the bathroom!)

Topic Introduction: _____ **Minutes**

What questions will you ask to learn from students? Big Idea(s), vocabulary, assessing prior knowledge…

Saltine digestion activity (Chelsey)

Everyone will get one saltine. Place the saltine in your mouth for 1 minute. Do not chew! Now, chew and swallow!

Did it change in taste?

Yes! Why? Mechanical (physical chewing) and Chemical Digestion (little workers in your saliva called enzymes)

After we swallow, what happens next? You'll learn a little bit from each station.

2. Learning Experience(s): _____ **Minutes**

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring… Describe in order, including instructions to kids.

Station 1: A Journey Through Your Digestive System (Chelsey, Jennifer)

- Materials: models, wet specimens (?), chart of the digestive system, paper cut-outs or a coloring worksheet (?), digestive tube (?)
- Guide students through the steps of digestive system with simplified paper model/poster of major digestive system organs → compare w/ the real thing (wet specs!)
    - Think about all the food we eat, how big do you think your stomach is? The organ that holds and breaks down all this food? Is it bigger or smaller than you imagined? (vocab: chyme, digestion)
    Supplies: Life sized model organs
    - Our intestines are all folded and squished up inside of us, but if you stretch them out they reach to be 25 ft long!! (vocab: peristalsis, absorption)
    Demonstration: 25 feet digestive tube
- Look at Magic School Bus episode, "For Lunch" for some ideas.
    - Maybe we can divide this among two people: one person presents on the process in depth, and the other discusses organs.
- Include an interactive activity (ex. touching/pointing a model, tape paper cut-outs of organs on body, coloring sheet, Velcro suit, digestive tube and peristalsis)

Station 2: Nutrition 101 (Lili)

-Topics: food groups, healthy eating

-Supplies: Prepared cut outs with : Protein, Vegetables, Fruits, Grains & Dairy, Paper plates

- Bring examples of food

-Teach students about MyPlate (http://www.choosemyplate.gov/).

- Activity: Let students compose their own plates with prepared cutouts. Ask each pair why they chose to create their plate the way they did.
    - Remember, your eyes are bigger than your stomach!
    - A big part of my plate is also: to exercise! You need to burn some of that food off as energy! What are some ways we can exercise to burn off all the fuel we eat?

Station 3: Helpers of the Digestive System (Jenny and Melinda)

-Topics: Microbes and Fart, Stomach Acid and Indigestion & heartburn

-Supplies: 1 Ziploc, Bread, Vinegar for demonstration

-Fart: *How many people have heard, smelled or farted a fart before? Did you know there are little bacteria living in our guts (intestines) that help us digest food?*

- Farts (aka flatulence) is the act of passing intestinal gas from the anus. Intestinal gas comes from several sources: air we swallow, gas that seeps into our intestines from our blood, gas produced by chemical reaction in our guts, and *gas produced by bacteria living in our guts*.
    - Farts are not burps through the mouth
- Over 100 trillion microbes in our gut

-Indigestion (aka upset stomach, dyspepsia)

- Indigestion usually happens when people eat to much, too fast, or foods that don't "agree" with them
- People often have heartburn with indigestion. *Has anyone heard of heartburn?*
    - It has nothing to do with the heart
    - When swallowing, food passes down the throat and through the esophagus to the stomach. Normally, a muscular valve called a sphincter opens to allow food into the stomach (or to permit belching); then it closes again. Then the stomach releases strong acids to help break down the food. But if the lower esophageal sphincter opens too often or does not close tight enough, stomach acid can reflux or seep back into the esophagus, damaging it and causing the burning sensation we know as heartburn.
- Bread in Bag with Vinegar Demonstration
    - Example of how acids break down foods in our stomach
    - Let every kid squish bag - example of churning and mechanical digestion

3. Wrap-up: Sharing Experiences _____ Minutes

Putting the pieces together – how will students share learning, interpret experience, build vocabulary?

Ideas:

1) Meet again as a class. Have students gather in large group (i.e. by table) and share ideas with all of us. What was your favorite new word and what did you learn about that word?

4. **Connections & Close:** _____ **Minutes**

What else might kids relate this to from their real-life experience? How can they learn more?

How can today's knowledge contribute to healthier eating? To overall health?
Does the lesson encourage students to consider a career in science or medicine?

Thanks and good-bye! Clean-up.

Total 50 – 60 Minutes

Follow-up – After Presentation

Suggest students write a letter explaining "How we learned about the digestive system?"

-Healthy eating - Activities, games, and print outs encouraging kids to make proactive decisions about their health by eating healthy and exercising!
http://www.choosemyplate.gov/kids/

- Spit Test - In this biology activity (page 8 of the PDF), learners will explore how saliva assists in the beginning of the digestive process. By comparing chewed and unchewed crackers, they will see first hand that saliva changes the starch in food into sugar. Although this activity was included as a post-vist for a workshop about the human body, it also makes an excellent stand alone activity!
http://smile.cosi.org/grossscienceteacherpacket.pdf#page=8

- What Makes Flatulence? - Learners recreate the digestion process that takes place within their large intestines. They mash up bananas into mush, then place it in an Erlenmeyer flask covered with a balloon. Learners observe the banana for three to five days, and watch as gas is produced which inflates the balloon. http://www.asm.org/index.php/component/content/article/23-education/k-12-teachers/8213-what-makes-flatulence

-The Magic School Bus Inside the Human Body by Joanna Cole. Arnold has swallowed the Magic School Bus! Now, instead of seeing an exhibit of the human body at a museum, the class is taking a look at Arnold's stomach, his intestines, his bloodstream, and more from the inside on this heart-stopping fieldtrip - one the reluctant Arnold would be happy to miss. http://www.amazon.com/Magic-School-Inside-Human-Body/dp/0590414275

Name:_____ **Date:**_____

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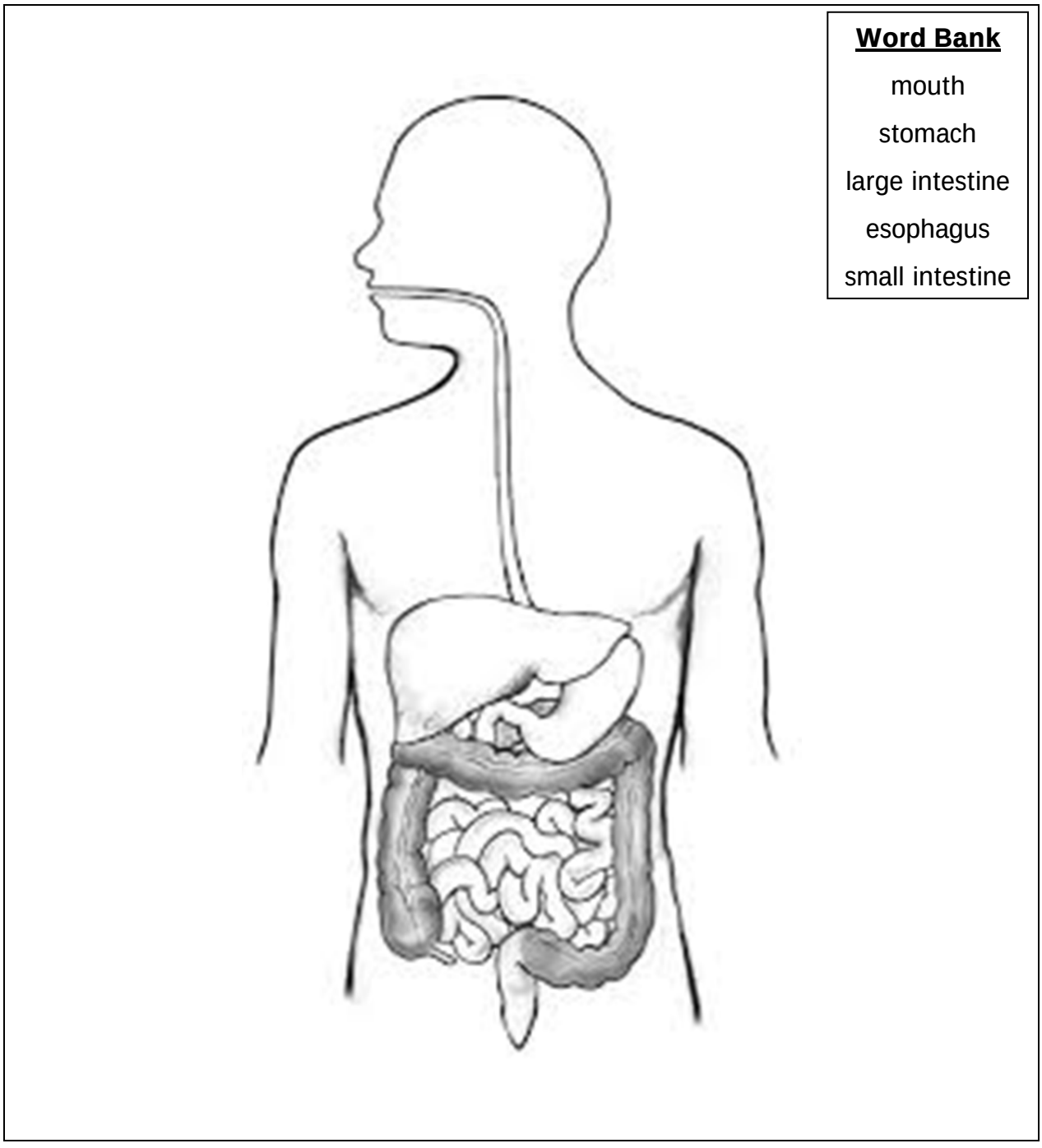
Digestive System Worksheet

(a) Label the parts of the digestive system on the following diagram.



Name:_____ **Date:**_____

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Digestive System Worksheet

(b) Match the parts of the digestive system with their function

1) Stomach	**A)** chewing and mixing food with saliva
2) Esophagus	**B)** absorption of nutrients into blood
3) Large intestine	**C)** peristalsis moves food
4) Mouth	**D)** water is absorbed and the rest is waste
5) Small intestine	**E)** acid is made here and food is churned

(c) Fill in the word "mechanical" **OR** "chemical" to say what kind of digestion takes place.

1. Stomach muscles help churn the food, and help with _____ digestion of food.

2. The acid and enzymes in the stomach help with _____ digestion of food.

3. Teeth in the mouth help grind the food into smaller pieces and help with _____ digestion.

4. Saliva has enzymes and helps with _____ digestion of food.