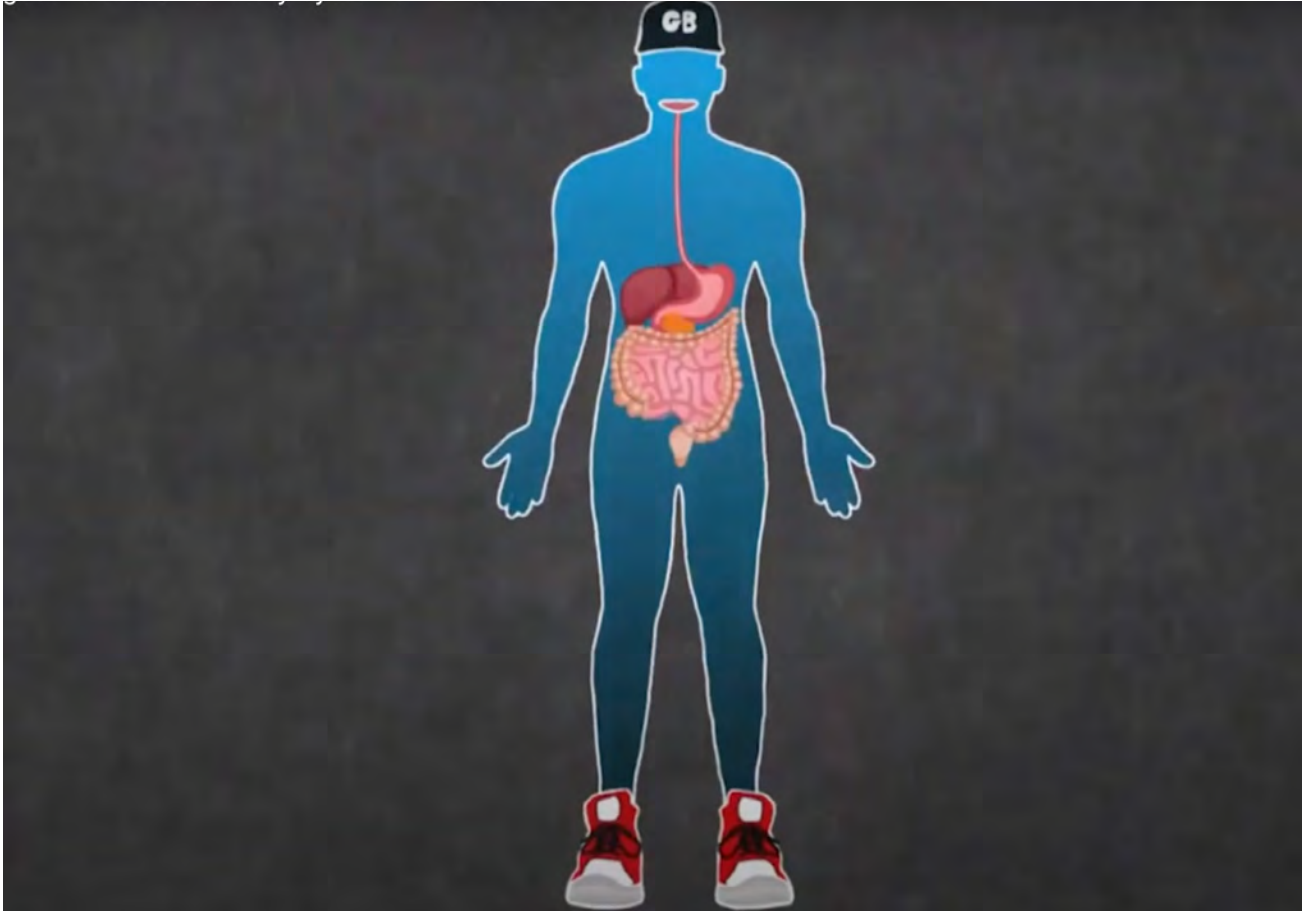


FOOD AND THE BODY: **THE DIGESTIVE & CIRCULATORY SYSTEM**



SUMMARY

This lesson teaches how our bodies break down and absorb food, as a foundation for understanding how our diets affect our health. We teach the process of digestion and how nutrients are absorbed into the bloodstream and delivered to our cells.

Duration: 90 mins, 2 Sessions | Grade Level: 4th-7th

Module 2: Food and the Body

Digestive and Circulatory Systems

LESSON CONTENTS

• At A Glance	2
• Lesson Breakdown	3
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• Detailed Lesson Script	
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LESSON RESOURCES

greenbeetz.org

our website hosts lesson slides, google forms, lesson videos, and teacher training videos, glossary, standards alignment and more

Worksheets *(linked)*

- Digestive and Circulatory System Diagram and worksheet
- Video Worksheet(s)
- Exit Cards

DIGESTIVE & CIRCULATORY SYSTEMS: AT A GLANCE



ESSENTIAL QUESTION

How do nutrients get from your food into your body?



STUDENT LEARNING GOALS AND OBJECTIVES

After this lesson students will be able to:

- Explain how our bodies digest food, and how our food is broken down and distributed to the cells across our bodies.
- Identify the various parts of the digestive system, and describe their basic functions.
- Understand the connection between how the food we eat affects the health of all parts of our bodies.



VOCABULARY

- **Digestion** - the breakdown of food into tiny nutrients
- **Digestive System** - a group of organs in the body that work together to break food down into small nutrients and that then allow the nutrients to absorb into the blood
- **Circulatory System** - a group of organs in the body that work together to move important nutrients and chemicals to and from the cells)



KEY POINTS

- Each organ is made up of different types of cells. For our bodies to be healthy, our cells need to be healthy.
- Each of these cells needs many different nutrients in order to be healthy. In order for nutrients, water and energy to reach our cells, two things must happen:
 - 1st: food has to be broken down into tiny pieces by our digestive system.
 - 2nd: small food particles (**nutrients**) and water must be absorbed into the bloodstream (**circulatory system**).
- Everything that the digestive system absorbs goes directly into our bloodstream, where it is delivered to the trillions of cells throughout our body (from head to toe!).

LESSON BREAKDOWN

TIME	ACTIVITY	MATERIALS/RESOURCES
PART 1		
3 min	Introduction	Lesson Slides
10 min	Activity: what we Know, what we Want to know, and what we've Learned	KWL Chart
5-7 min	Video: The Digestive & Circulatory Systems	Vimeo or YouTube • Video Worksheets
5-10 min	Digestive System Demo	Lesson Slides & Diagram
5 min	Digestive System Worksheet	• Worksheet Copies
5-7 min	Food Detective Assessment	Exit Card
Extension Option: Digestion & Circulatory Cracker Eating Demo		Crackers, tubing, a ziplock bag, water/vinegar, pantyhose, string, & a towel
PART 2		
5-8 min	Recall & Review	Digestive System Worksheet
15 min	Activity: Systems Creation	• Labels/Nametags of Digestive Organs • Beads or something similar
10 min	Snackz & Factz	Corn salsa and chips
5 min	Test Your Noodle & Green Beetz Points	Slides
5-8 min	Food Detective Assessment	Exit Card

PRIOR KNOWLEDGE AND MISCONCEPTIONS

PRIOR KNOWLEDGE

Students will have varying knowledge about the digestive system. Some may know most of the names of the organs involved and their function and many may know very little beyond the stomach. In The Natural Food Cycle lesson students were introduced to the idea that early humans used only their “jaws” to chew food - it is worth reminding students of this so you can make the connection that the mouth is the first location of digestion.

COMMON MISCONCEPTIONS

Students may think the process of digestion is a quick process given how much quicker liquids move through one’s system and they may find it hard to imagine how long the small intestine is.

Students may still not fully understand that nutrients are “broken down” and then “absorbed” into the bloodstream or how.

POSSIBLE RESPONSE

Be prepared to visually demonstrate the length of the small intestine with measuring tapes, string, anything that you can wind around your classroom to show 24ft of length.

Return to the train analogy presented in the lesson video to help students understand the role of each organ.

DETAILED LESSON SCRIPT: PART I

Introduction

3 minutes

Use these questions to get your class thinking about today's key points and then move them into the next activity. Keep this quick as you'll complete a more thorough assessment next.

LESSON SLIDES



Introduction Questions:

- How long ago did you eat breakfast?
- Where do you think your breakfast is now?
- What do you think it looks like now?



Activity: KWL Chart

10-15 minutes

A useful way to assess and peak student interest in this topic is to complete a KWL chart (leave the learned part for the end). You can have students first share with partners to ensure all participate and then share their ideas as a class.

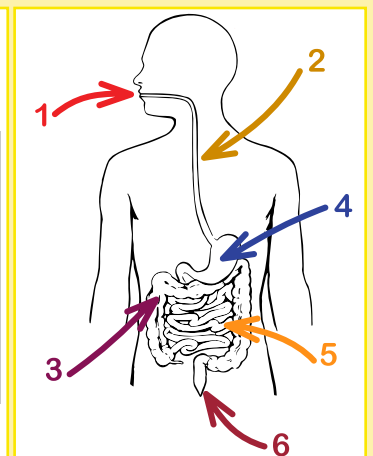
Circulatory & Digestive Systems: Part 1 - KWL Introduction & Exit Card

Name: _____ Date: _____

1. Talk with your partner and jot down something you KNOW about digestion.
2. Talk to your partner and jot down a QUESTION you have about digestion.

At the END of the lesson, I'll ask you to add what you LEARNED to the last column.

What I think I K now	What I W ant to Know	What I L earned



SAY

What do you KNOW and what do you WANT to know about the digestive system and circulatory systems?

DO

You can review and share the Lesson Objectives after they've brainstormed a little

After they've completed their Know and Want columns:

SAY

Summarize some of the key points and then ask students whether they know how digestion works as you transition to the lesson video

DO

You can refer to the Digestive & Circulatory Systems Diagram

KEY POINTS



For our bodies to be healthy our cells need to be healthy. Each organ is made up of different types of cells. For example: the heart is made of heart cells, the liver is composed of liver cells, etc. Each of these cells needs many different nutrients in order to function and be healthy.

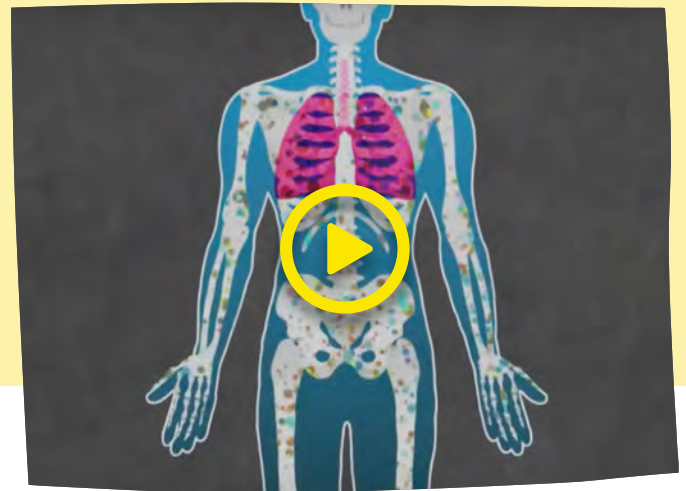
In order for nutrients, water, and energy to reach the cells, two things must happen:

1. Food has to be broken down into tiny pieces by our digestive system,
2. The small food particles (nutrients) and water must be absorbed into the bloodstream so our blood can deliver it to our trillions of cells via the circulatory system.

Lesson Video: Circulatory & Digestive System

5-7 minutes

To help students understand and retain information, you can have them use the video worksheet found in the resources for this lesson plan.



DIFFERENTIATION VIDEO WORKSHEET

The vocabulary and concepts in this video are sophisticated. You should decide which structure will help your students access the information:

1. Preview the questions as a class
2. Have students watch the video and ask questions
3. Watch the video more than once, pausing at key moments, etc.

The Digestive & Circulatory Systems: Part 1 Video Worksheet

Name: _____

Date: _____

Read the questions before you watch the video. You can jot down your ideas as you watch or wait until the end.

1. What is the speaker comparing an express track to?	
2. What are the "express stops" that are part of this system?	
3. What has to be broken down and distributed along this track?	
4. Who are the "workers" in the first station (the mouth) and what do they do?	
5. What do stomach acid enzymes do?	
6. Where do "nutrients get off the train and absorbed into the blood stream"?	
CIRCULATORY SYSTEM	
7. What do cells need to build organs?	
8. What does he mean when he says the "blood stream runs on the local track"?	
9. Where does anything that doesn't travel through the bloodstream go next?	

Digestive & Circulatory System Demonstration

7-10 minutes

Using the Digestive System Diagram and the script below review the steps of digestion. You can pose these questions to get your students started

1. How does digestion work?
2. Where does digestion start?
3. Can you describe the step-by-step movement of food after you take a bite?

Use this chart to help you describe digestion as you move through the Diagram:







BODY PART / ORGAN	ITS ROLE IN DIGESTION	DEMO/SAY
<p>1. Mouth</p> 	<p>Digestion begins in the mouth. Food is broken down mechanically by chewing and chemically by salivary amylase, an enzyme in our saliva.</p>	<p>Show your own teeth and have students feel the different shapes of their own teeth with their tongues. The front teeth for slicing, the back teeth for grinding up food.</p>
<p>2. Esophagus</p> 	<p>Then food goes down a tube connecting the mouth to the stomach.</p>	<p>Use one hand after another to indicate the squeezing action of the esophageal muscles that push the food down towards the stomach.</p>
<p>3. Stomach</p> 	<p>Food is then churned by our stomach muscles and broken down by an acid called gastric acid.</p>	<p>Squeeze both hands together to indicate that the stomach muscles mash and churn food mechanically while gastric acid breaks down food chemically.</p>

Chart continues on next page...

Digestive & Circulatory System Demonstration (CONTINUED)

<p>4. Small Intestine</p> 	<p>Food then enters the small intestine. Bile, made in the liver and stored in the gallbladder, enters the small intestine to further break down food. Additional chemicals in the small intestine complete the breakdown. Most of the nutrients in our food are absorbed here in the 24 ft. of the small intestine.</p>	<p>Squeeze much like the esophagus. Have 24 feet marked off in the classroom to visually show the length that food travels through the small intestine.</p>
<p>5. Large Intestine / Colon</p> 	<p>Food then goes into the large intestine, or colon where water and electrolytes are absorbed.</p>	<p>A sucking noise can give an interesting hook for the final absorption of water and electrolytes from the large intestine into the bloodstream (although it isn't really a suction process).</p>
<p>6. Rectum</p> 	<p>Last stop: whatever indigestibles are left after passing through the Large intestine are stored in the rectum until we go to the bathroom</p>	<p>--</p>

Connect the Digestive System to the Circulatory System as you demonstrate and discuss:

- *Everything absorbed during the digestive process (in our small and large intestines mainly) goes directly into our bloodstream, where it is delivered to the trillions of cells throughout our body.*
- *The circulatory system is made of our heart and blood vessels. The heart pumps blood throughout our bodies via our blood vessels. Nutrients dissolve in the liquid part of our blood called plasma to flow to all the parts of the body.*

Digestive System Worksheet

3-5 minutes

You can have students work alone or with a partner to complete the worksheet in class or assign it for homework.

Digestion System Diagram & Worksheet

1. Write the name of the digestive organ that corresponds to the number in the diagram. Choose from the following names:

LARGE INTESTINE

RECTUM

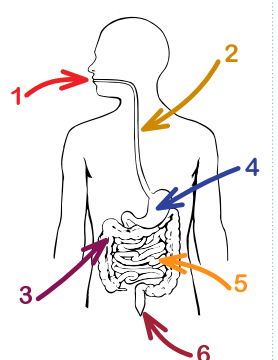
SMALL INTESTINE

MOUTH

STOMACH

ESOPHOGUS

2. Next, fill in the empty boxes with the organ names you just labeled and then draw an arrow linking the organ name to the description of what it does.



Food Detective Assessment

5-7 minutes

Return to the KWL chart(s) you created at the beginning of class and have students now fill in the LEARNED Column as their exit card. You can also instruct them to correct or check off anything under the KNOW category that they confirmed or now disagree with.

Extension Option: Digestive & Circulatory System Cracker Eating Demo

10 minutes

Go through the **Digestive system** and physically “digest” crackers as a class.

Mouth: use your fist or a rubber mallet to act as teeth to grind up a few crackers (you can add a bit of water as saliva but bear in mind that this might make it more difficult to move the food to the “stomach” depending on what you use as an esophageal tube).

Esophagus: place mashed crackers in one end of a flexible tube or paper towel roll and squeeze them through to a waiting ziplock bag (the stomach).

Stomach: add in water or vinegar (a mild acid) to represent gastric acid. Zip closed and continue to mechanically mash the crackers in the bag.

MATERIALS

- Crackers
- Ziplock bag
- Water/vinegar
- Tube/paper towel roll
- Pantyhose
- String
- Towel

Small intestine: pour cracker/liquid mixture into a section of pantyhose (something porous). This will show how nutrients are absorbed across the intestinal wall into the bloodstream (circulatory system). Have a few volunteers unwind a 24 foot piece of string to show its length.

Large intestine: squeeze the last of the cracker mixture onto a towel, and roll it into a tube. Wring out the rest of the liquid. That solid cracker bolus that is left is the final waste: “poop”.

The circulatory system: To demonstrate the dissolving of nutrients into the bloodstream, a demo stirring salt or sugar (nutrients small enough to be absorbed by the small intestine) into water gives an appropriate visual.

DETAILED LESSON SCRIPT: PART II

Recall & Review

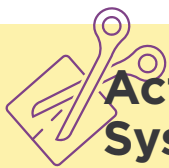
5-8 minutes

Recall the previous session with a question:

ASK	ANSWER
Where do you think your breakfast is now?	<p>Two places their breakfast has gone or is headed:</p> <ul style="list-style-type: none"> • Absorbed into the body (everything that is digestible: water, nutrients, preservatives, vitamins, chemicals, sugars, etc.) • The toilet (indigestibles)

Review the Digestive System Worksheet you assigned in class or for homework during Part 1.

- Did they label the organs correctly?
- Can someone describe the movement of food from organ to organ as it undergoes the process of digestion?



Activity: Systems Creation

15 minutes

As a class you will act out the digestive and circulatory system by absorbing nutrients.



SET-UP FOR TEACHERS		PAIR 4	SMALL INTESTINE
Divide your class into the following pairs and groups:		PAIR 5	LARGE INTESTINE & RECTUM
PAIR 1	MOUTH	GROUP 6	BLOOD STREAM/ CIRCULATORY SYSTEM
PAIR 2	ESOPHAGUS	GROUP 7	CELLS
PAIR 3	STOMACH		



Activity: Systems Creation (CONTINUED)

DIRECTIONS FOR YOUR STUDENTS

Have groups make a body part label(s) for each member of their group. Or you can prepare these ahead of time and hand out.

Instruct Pairs/Groups 1-6 to discuss their organ's function amongst themselves so they are ready to present it to class.

Have Group 7 make a list of cells, remind them that they can list body parts or organs.

CREATE THE "TRACK" WITH YOUR STUDENTS

PAIRS 1-5

makes the tube.

- line the pairs up facing each other, keeping space between them. The nutrients will pass between the pairs as they would through the digestive track.

GROUP 6

lines up near the small and large intestines on either side of the track.

GROUP 7

spreads out around the classroom.

DIGESTING/ABSORBING NUTRIENTS

Bring out a jar of beads, or something similar, and explain that the beads represent different nutrients.

Have the pairs/groups begin to "digest" the jar of beads as you or each group narrates what they do with the nutrients.



Activity: Systems Creation (CONTINUED)

DIRECTIONS TO TEACHERS AS THE NUTRIENT BEADS ARE ABSORBED

Most nutrients should stay close together, undigested, until they arrive in the stomach or small intestine.

The mouth only begins digestion. This group might simply take off the lid and remove a few beads/nutrients.

The small intestine and large intestine should pass most beads out to the blood/plasma group who can carry the nutrients to the various cells of the body. Leaving behind water and indigestibles.

Depending on time, you may want to say that a bloodstream member can only take one nutrient at a time. This will slow down absorption and make a point that digestion can be slow—which is why 24ft of small intestine is required to slowly and fully absorb as many nutrients from our food as possible.

The jar and lid will be too big to absorb across the intestinal walls and can act as your indigestibles. This will be the waste at the end of the digestive system that will sit in the colon/rectum until it is time to poop.

Questions to Consider:

- Were the beads spread out evenly, or did they accumulate in a few places? If there was accumulation, what would that mean for the cell?
- What about this demonstration helped you to understand why the small intestine needs to be so long? Or if it didn't help you to understand, why not?
- What would it have been like if the beads had each been encased in hulls of fiber like a whole grain piece of wheat or rice or corn?

Snackz & Factz

10 minutes

Today we are tasting Corn Salsa. Corn is very fibrous and partially indigestible in whole kernels which means they will likely see some corn in their stool tonight or in the morning which helps illustrate to your students how long food can take to digest.



DO

Have students taste and/or prepare corn salsa

Present/Display the “Facts” about today’s Snack to the class as they are tasting

MATERIALS

- Corn salsa with chips
([Recipe Suggestion](#) if making it)

FACTZ

The outer skin of the corn is called the pericarp. It is very fibrous and tough to digest. Don’t be surprised if a kernel or two shows up in your poop tonight or tomorrow morning!

Corn is a grain and is part of the grass family, just like wheat and oats.

Corn, as we know it, was developed by farmers in what is now Mexico, probably about 9,000 years ago.

Test Your Noodle

5 minutes | (Optional: students complete this online)

1. In order for nutrients and energy to reach the cells from our food, list two things that must happen.
 - a. **Food must be broken down into small particles by our digestive system.**
 - b. **Nutrients must be absorbed into our bloodstream to be delivered to the cells.**
2. List two body parts where food is broken down into smaller pieces.
(mouth, stomach, small intestine)
3. What happens to food that cannot be broken down fully by the digestive system? **(It is eliminated from the rectum as poop)**
4. Fill in the blank: Most nutrients are absorbed into the bloodstream from the _____. **(small intestine)**
5. What is the liquid part of the blood called? Hint: it is where the nutrients dissolve in order to be delivered to all our cells. **(plasma)**

Food Detective Assessment

5-8 minutes

Students can complete this Exit Card to assess what they have learned about the digestive and circulatory systems.

- *How is the food you eat like a train car filled with cargo?*
(Hint: Think of where it goes and what happens to its cargo?)

Circulatory & Digestive Systems: Part 1 - KWL Introduction & Exit Card

Name: _____

Date: _____

1. Talk with your partner and jot down something you **KNOW** about digestion.
2. Talk to you partner and jot down a **QUESTION** you have about digestion.

At the **END** of the lesson, I'll ask you to add what you **learned** to the last column.

What I K now	What I W ant to Know	What I L earned

NAME

DATE

Digestion System Diagram & Worksheet

1. Write the name of the digestive organ that corresponds to the number in the diagram. Choose from the following names:

LARGE INTESTINE

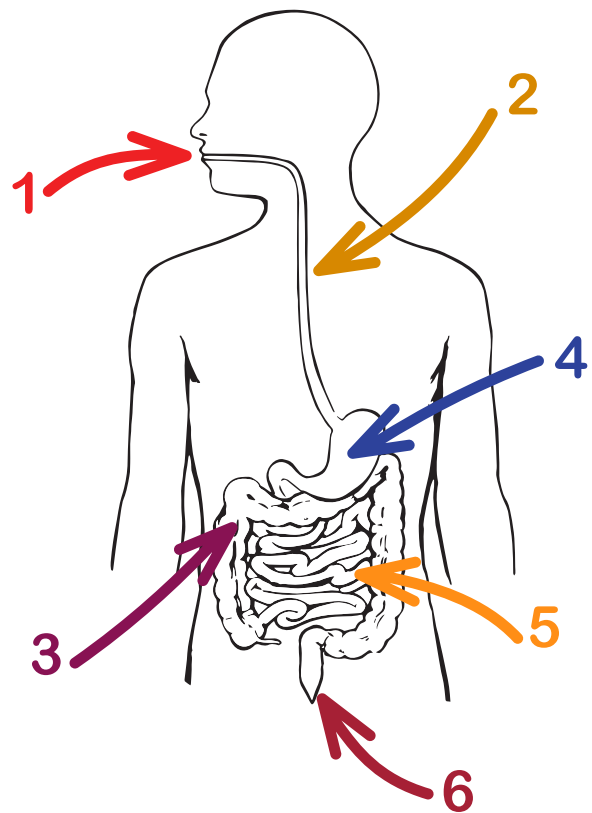
RECTUM

SMALL INTESTINE

MOUTH

STOMACH

ESOPHOGUS



2. Next, fill in the empty boxes with the organ names you just labeled and then draw an arrow linking the organ name to the description of what it does.

4

2

1

5

3

6

- Food is broken down by chewing
- Tube connecting mouth & stomach
- Food is churned with gastric acid
- Food particles are absorbed by this 24-foot organ!
- Water & electrolytes are absorbed
- Poop is stored



The Digestive & Circulatory Systems: Part 1 Video Worksheet

Name: _____

Date: _____

Read the questions before you watch the video. You can jot down your ideas as you watch or wait until the end.

1. What is the speaker comparing an express track to?	
2. What are the “express stops” that are part of this system?	
3. What has to be broken down and distributed along this track?	
4. Who are the “workers” in the first station (the mouth) and what do they do?	
5. What do stomach acid enzymes do?	
6. Where do “nutrients get off the train and absorbed into the blood stream”?	
CIRCULATORY SYSTEM	
7. What do cells need to build organs?	
8. What does he mean when he says the “blood stream runs on the local track”?	
9. Where does anything that doesn’t travel through the bloodstream go next?	

The Digestive & Circulatory Systems: Part 1 Video Worksheet

ANSWERS

1. What is the speaker comparing an express track to?	The digestive or gastrointestinal track.
2. What are the “express stops” that are part of this system?	Mouth, throat, esophagus, stomach, small intestine, and large intestine.
3. What has to be broken down and distributed along this track?	Foods & nutrients.
4. Who are the “workers” in the first station (the mouth) and what do they do?	The teeth and they grind up food and use saliva to break down the food.
5. What do stomach acid enzymes do?	Break down the food so it can go into the small intestine.
6. Where do “nutrients get off the train and are absorbed into the blood stream”?	Small intestine.
CIRCULATORY SYSTEM	
7. What do cells need to build organs?	Nutrients
8. What does he mean when he says the “blood stream runs on the local track”?	The blood stream goes everywhere throughout the body and carries everything from vitamins to oxygen (unlike the digestive system which only goes to 6 stops/organs.)
9. Where does anything that doesn’t travel through the bloodstream go next?	To the large intestine and then out the backdoor.

Name: _____

Date: _____

Digestive and Circulatory Systems: Part 2 - Exit Card

- 1. Compare a train with its cargo to the food you eat?
- 2. Describe what happens to your food and where it goes?

Name: _____

Date: _____

Digestive and Circulatory Systems: Part 2- Exit Card

- 1. Compare a train with its cargo to the food you eat?
- 2. Describe what happens to your food and where it goes?
