

# The Lymphatic System

Lymphin' Large



Follow the Loops Crew on a **time-traveling** adventure to the **15th Century in Tenochtitlan...** the capital city of the Aztec Empire with a young Montezuma. As the loops crew learns how Aztec aqueducts similar to the human lymphatic system.

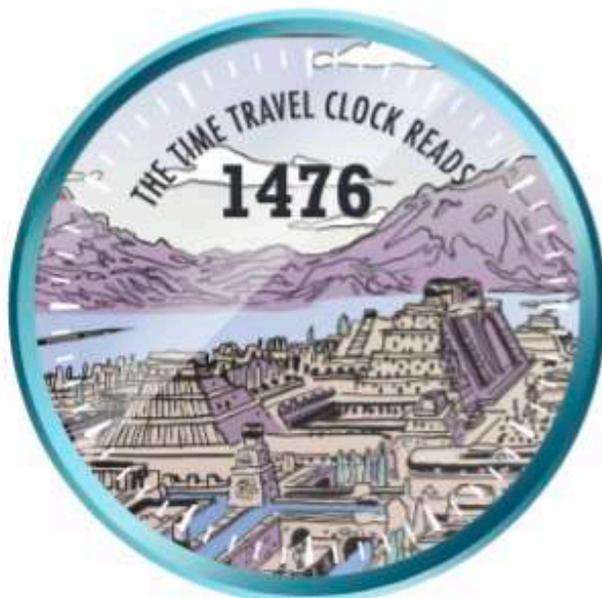
# Hello Adventurer!

## Welcome to Adventure 10 - The Lymphatic System.

In this workbook, you will learn about Tenochtitlan, Mexico and your body's Lymphatic System. There will be information to read, activities to complete, and quizzes to take when you are ready to challenge yourself! Take your time along the way - spend as much or as little time as you like on each activity.

**Good luck, and have fun!**

*Destination:*  
**Ancient Mexico**



**Get ready  
to start flowing!**

## LEARN ABOUT The Lymphatic System

Maintaining blood pressure and seeking intruders, this system is the body's first line of defense.

## VISIT Ancient Mexico in 1476

The vast metropolis of Tenochtitlan started as a tiny island, but grew to an impressive size.

## MEET Montezuma II

He ruled over a nation of great engineering projects, advanced knowledge and vast territory.



## Ximpoanoltih\*

(That means "Welcome!" in Nahuatl)

The language of the Ancient Aztecs.

**\*Say it like this: "shee-mo-puh-NOT-tee"**

The strongest syllable is shown in **CAPITALS** and **red**.



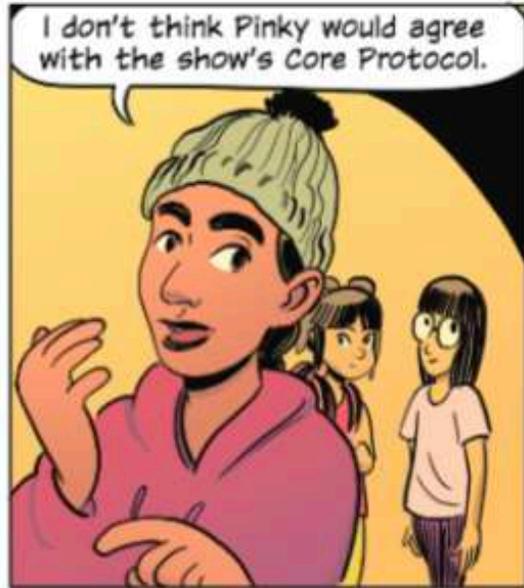
**Enter this portal for....**



# **Time Skaters Adventure 10**

## **LYMPHIN' LARGE**

# LYMPHIN' LARGE

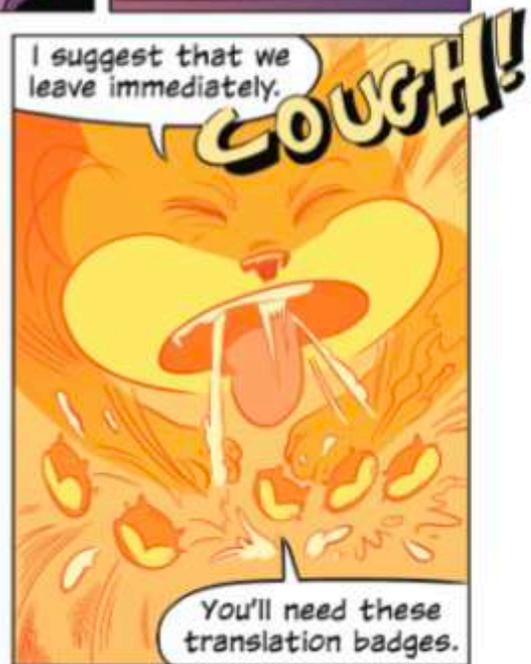


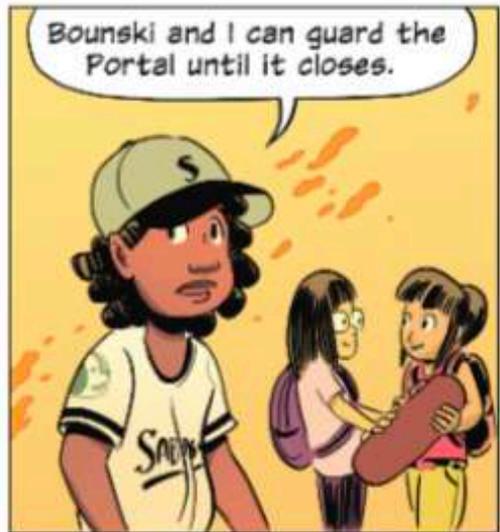
"Never interfere with another culture's timeline!"



FLASH!







# Learning Calendar

## Part 1

### Know Your History



**Locate** Mexico on the world map using a globe, an atlas, or an online map.

**Read** the comic **Lymphin Large**. Find it at the beginning of this Adventure Guide!

**Gather** the adventure equipment from around your house - use the checklist on pages 32-33.

**Dig into** *Know Your History*

**Explore** the paths *Where Water Winds* and **engineer** as an *Aztec Temple Tester*

**Peruse** *How the Gods Got Game*, and **score** when the *Ball's in Your Court*

**Get your moves on** in *Know Your Aztec Dance*, and **express yourself** in *Color Your Danza Azteca*

**Get up-to-date** with *Know Your Aztec Calendar*, and **travel through** *Take Time for a Spin*

**Code your way through** *Know Your Aztec Codex*, and **get creative** in *Long Story Short*.

**Transcribe** *Az-tec-hnically Speaking*

**Analyze** *Ancient Aztec Answers*

## Part 2

### Know Your Science

**Get involved** with *Know Your Lymphatic System*

**Dive into** *Know Your Spleen*

**Deliver** *Lymph Service*



**Sort your way through** *System Scramble*

**Determine** *whether To B Cell or Not to B Cell*

**Merge everything together** *with Movin' On Up*

**Locate** *The Lost Lymphocytes*

**Piece together** *Ex-SPLEEN What You Mean*

Part **3**

## **Know Your Appetite**



**Wander through** *Explore Your Aztec Market*

**Expose your taste buds** *in Experience Mexican Cuisine*

**Prepare** *Mexican Hot Chocolate and Squash & Corn Tamales*

**Share** *your dishes with your family*

**Discuss** *Thoughts for Young Chefs around the table!*

Part **4**

## **Show What You Know!**



**Bring everything together**  
with *Connect the Lymph Nodes*

**Check out** *Further Reading for more opportunities to learn.*



*Great job  
on all your  
hard work!*

A cartoon illustration of a young girl with dark hair in pigtails, wearing a pink tank top, green cargo pants, and blue sneakers with pink laces. She is wearing black wristbands and knee pads and is riding a black skateboard with pink wheels. A speech bubble next to her says "Great job on all your hard work!".

# Know Your History

## Tenochtitlan: City of Marvels

In 1325, on the site of present-day Mexico City, the Aztecs started building a great metropolis called **Tenochtitlan\*** on a small island in Lake Texcoco. They chose the location based on a sign from the gods. The sign was an **eagle perched on a cactus with a snake in its beak.**

At its height, the city boasted huge stone temples and palaces, canals, fresh running water, and a royal zoo.



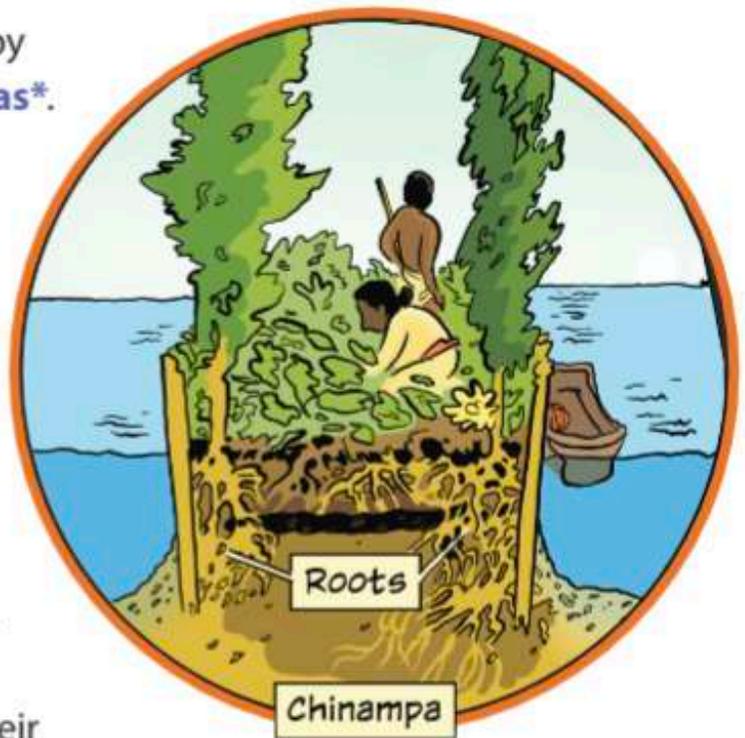
So, how did the Aztecs turn a small island into such a thriving capital?



## Chinampas

The Aztecs extended the small island by creating more islands called **Chinampas\***. These are like floating gardens. First, they sank wooden boards into the lake. Then, they filled in the area between the boards with mud, rocks, and reeds. In this way, they expanded their city until it covered five square miles.

Spanish conquistador, Hernán Cortés, landed in Mexico in 1519. By that time, the chinampas provided food for a population of 5 to 6 million people! Their aqueducts carried fresh water for drinking and watering crops. Their agricultural system is considered a marvel of its time.



\*Say them like this:

tenochtitlan - "teh-knowch-**TEET**-lawn"

chinampas - "chee-**NAHM**-pa"

The strongest syllable is always shown in **CAPITALS** and **red**.

# Build Your Own Aqueduct

## Materials:

- Cardboard tube
- Cardboard boxes
- Plastic wrap or plastic sheeting
- Scissors
- Duct Tape

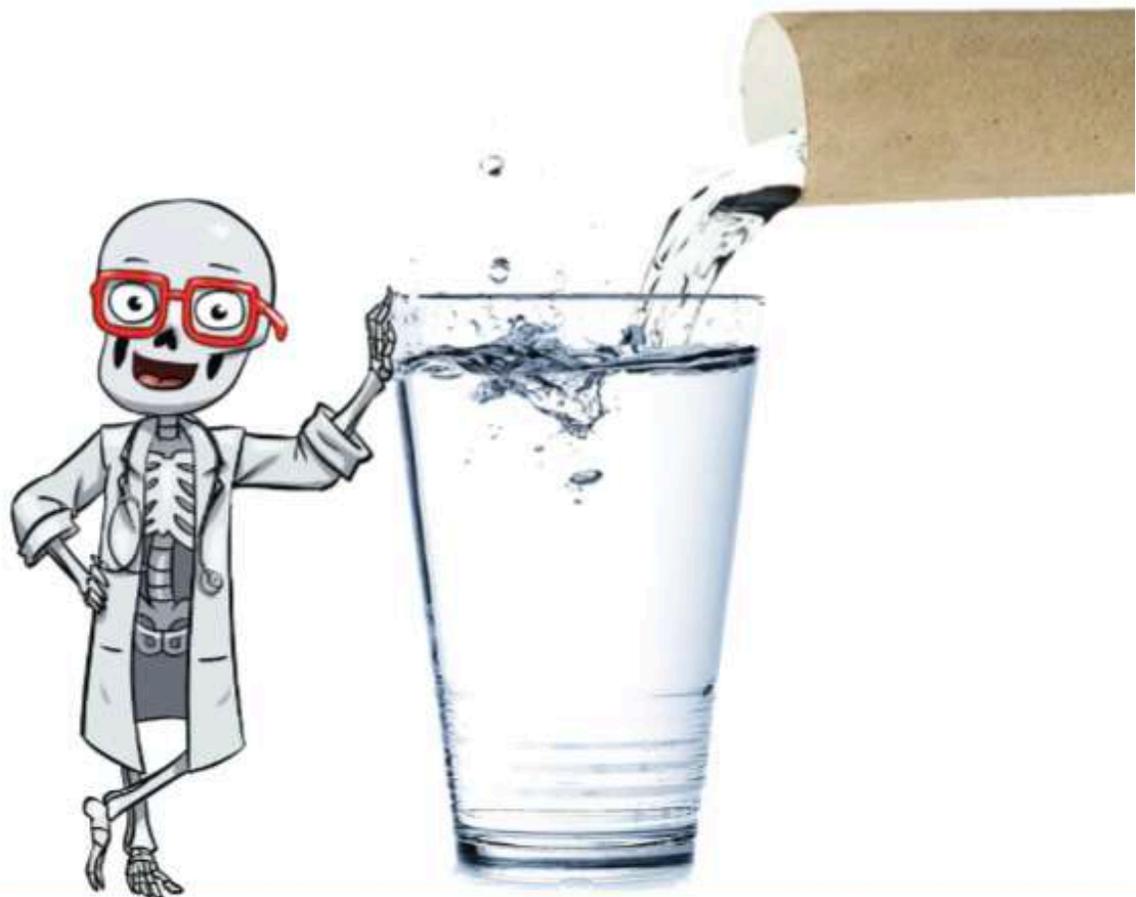
## Directions:

1. Cut your cardboard tubes in half lengthwise, to create a long U-shape. Use tape to connect the two halves to extend the tube if it is shorter.
2. Starting at the end, wrap the plastic so that it covers the inside of the U and just goes over the edge. Tape it down tight. That will be the bottom of your aqueduct.
  - Repeat as needed moving up the tube, ensuring that each new plastic section overlaps the previous one.

3. Using your cardboard boxes, construct supports for the tube using these instructions:

- Cut out two matching triangular pieces at the height you want your tube to start.
- Cut out a rectangular piece approximately twice the width of your tube and the length of your triangle bottoms.
- Tape the bottoms of the triangles to the rectangular piece, and the top of the triangles to either side of the end of the tube.
- Repeat this process for every few inches of the tube, with the triangles 1" lower each time.

4. Place your aqueduct somewhere that the water can safely pour and add water slowly on the taller end to watch it travel with just the aid of gravity.



# Know Your Lymphatic System

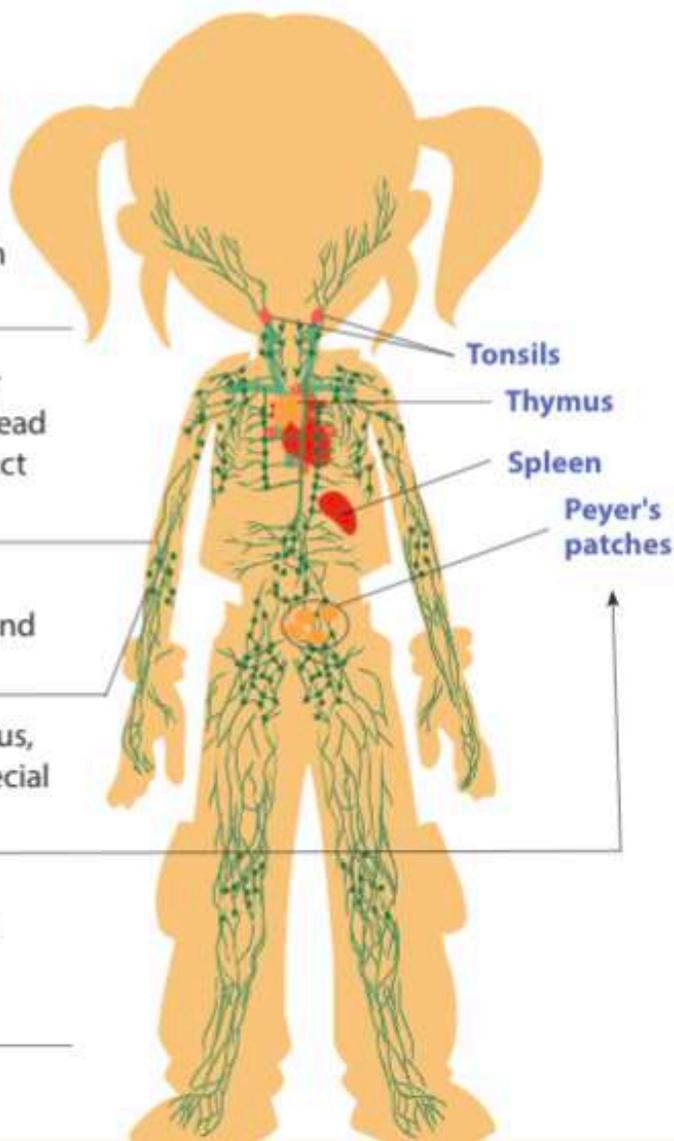
## Cleaning House

Your circulatory system and immune system can't do their jobs on their own. They need the body's unsung hero: the lymphatic system.

This system helps maintain your blood pressure and serves as the body's first line of defense, seeking and destroying foreign invaders like viruses and bacteria.

### YOUR LYMPHATIC SYSTEM HAS FIVE KEY COMPONENTS:

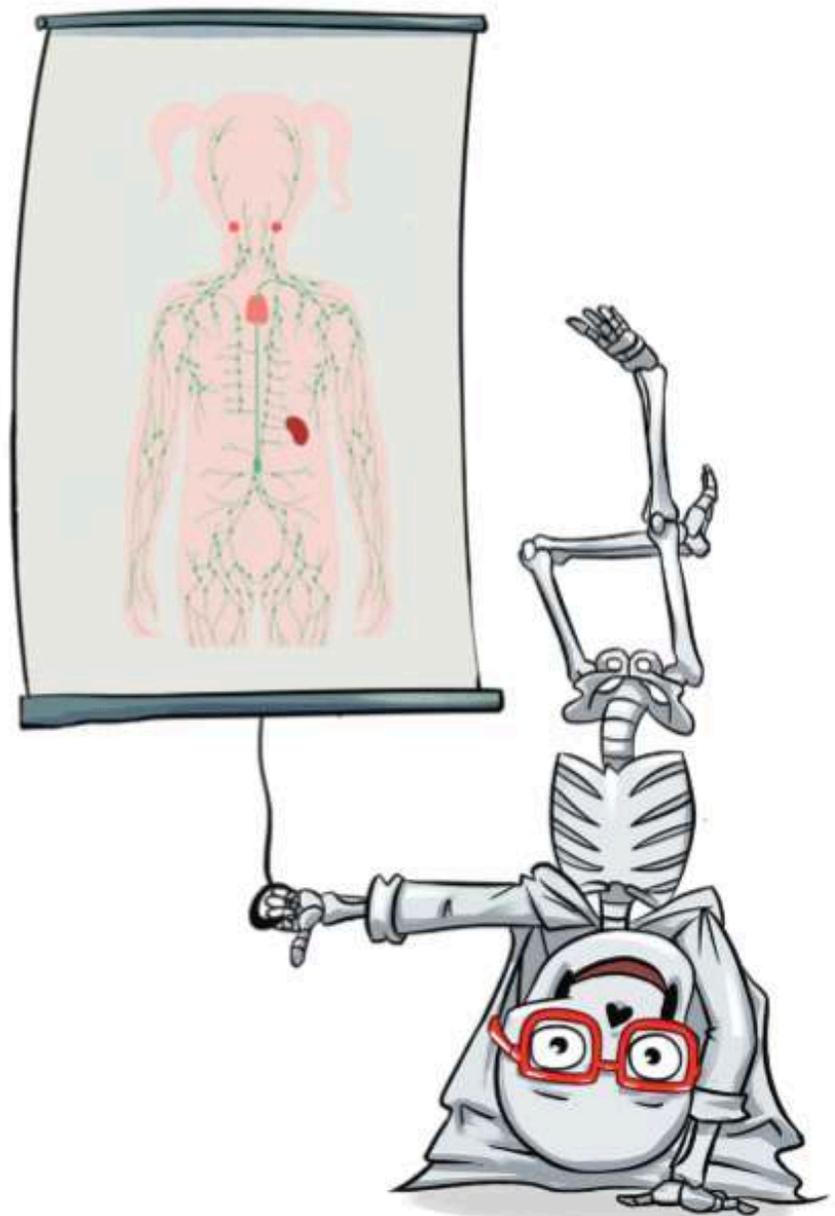
- 1 **Lymph**—the fluid that travels through your lymphatic system.
- 2 **Lymphatic Vessels**—a lot like your blood vessels, but they carry lymph instead of blood. Think of them as a big aqueduct for lymph fluid.
- 3 **Lymph Nodes**—checkpoints that filter your lymph and check for viruses and bacteria.
- 4 **Lymph Organs**—your tonsils, thymus, spleen, and Peyer's patches perform special functions to protect your body.
- 5 **Lymphocytes**—white blood cells that live in the lymphatic tissue. They're your body's guardians and deal with harmful foreign invaders.



Blood travels through your body via thin blood vessels called capillaries. As it pushes through these capillaries, the pressure inside forces some of the blood's clear fluid, called plasma, to leak out.

Don't worry, this is normal! Most of this fluid goes back to your blood vessels, but each day, three whole liters of fluid get left behind. Your lymph vessels collect that fluid—now called lymph—and start it on the journey back to the bloodstream.

And you need that fluid! Your body requires roughly five liters of blood in circulation to function properly. If your lymphatic system didn't return that fluid to your bloodstream, eventually your blood pressure would drop so low that you would die. That's why the lymphatic system works both to maintain the fluid balance in your body and filter your blood.



# Lymph Service

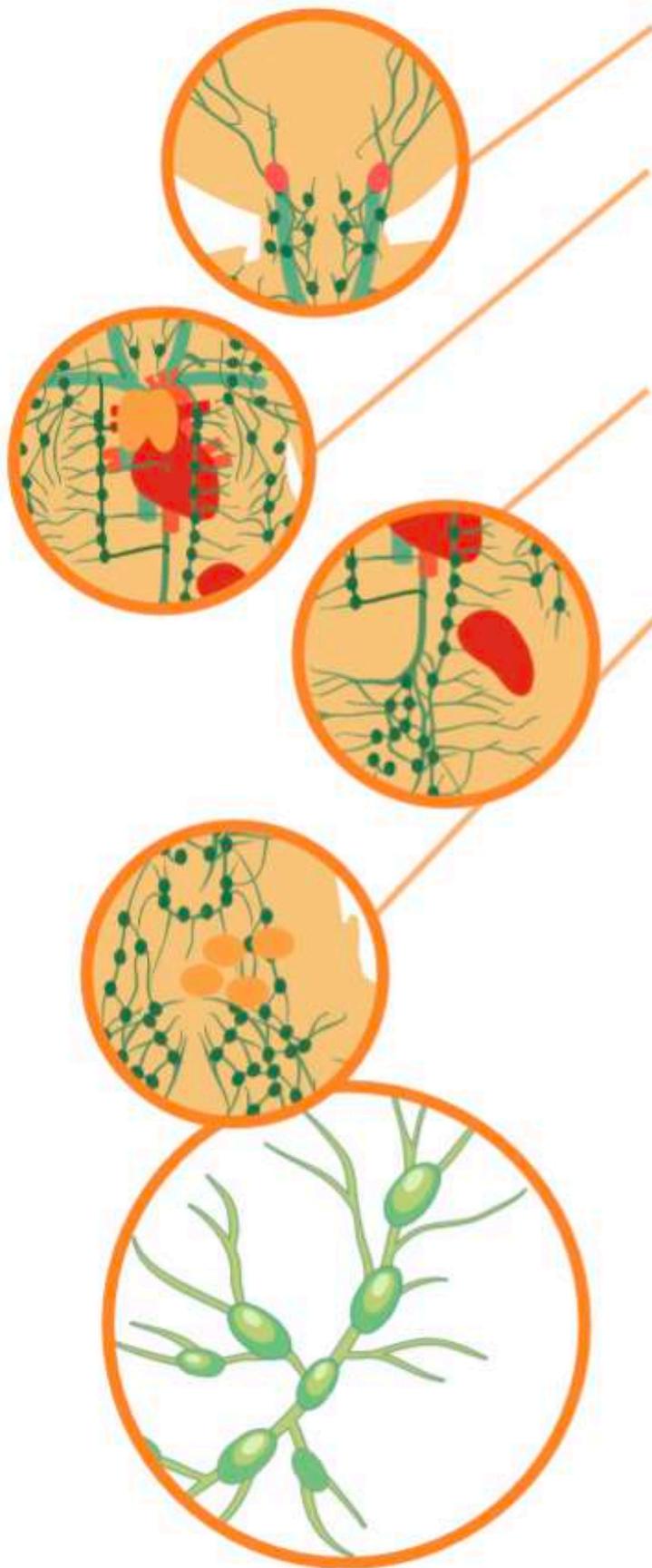
## Materials:

- Poster Board
- Markers, craft paint, or other materials
- 3 empty liter bottles
- Water
- Optional: Yarn, beads, glue

## Directions:

1. Start by laying your poster board flat on the floor. Ask a friend to help you trace your body, from your neck to your hip area, on the poster board.
2. Fill in the poster version of you with your Lymphatic System components: *lymph*, *lymphatic vessels*, *lymph nodes*, *lymph organs* (the *tonsils*, *thymus*, *spleen*, and *peyer's patches*), and *lymphocytes*. Use the diagram located in Know Your Lymphatic System to help you place your parts.





3. Paint your tonsils on each side of the back of your throat.
4. Paint your thymus. Your thymus can be compared to a pair of butterfly wings and is located in front of your heart.
5. Draw in your spleen behind your left ribs and near your stomach. From a back angle, it might look sort of like a clenched fist.
6. Add in your peyer patches, which appear round or oval in shape and are stationed in the lining of your small intestine.
7. Once you are finished illustrating the lymphatic system organs, design lymphatic vessels and lymph nodes using your markers. Draw lines to represent vessels and circles to represent nodes. If you want to be extra crafty, try using yarn for vessels and beads for nodes (you'll need some liquid glue to hold things in place).

**Bonus:**

To imagine how much lymph is floating around your whole body at one time, take your 3 empty liter bottles and fill them to the top with water. Now set those next to your diagram.

# Know Your Appetite

## Experience Mexican Cuisine

Agriculture was the largest part of the Aztec economy. All of Aztec society depended on the success of the crops that grew on the chinampas (*water garden*). The three main crops were corn, squash, and beans. Corn and beans are still two of the main ingredients used in Mexican cooking today.

Another popular food was chia, an edible seed that the Aztecs used to boost their energy. Today, chia is known as a healthy super food because of its high levels of protein and fiber.

The Aztec diet was mostly vegetarian, although they did fish, hunt wild game, and domesticate a few animals, such as turkeys and ducks. However, because the chinampas were so productive, the Aztecs were able to grow crops for millions of people. Nutrient- and protein-rich corn and beans became staples of the Aztec diet.



Corn



Squash



Beans

# Mexican Hot Chocolate

**Chocolate has been cherished in Mexico since it was discovered by the Aztec people.**

They used the cacao bean (the main ingredient in chocolate) not only for food, but as a form of money as well.

The hot chocolate drink that the Aztecs enjoyed was very different from the kind that you have probably tried. Instead of sugar, the Aztecs mixed their chocolate with spices, peppers, and corn meal, making their hot chocolate less watery.

Today, many people still enjoy a traditional hot drink called "atole" that includes both chocolate and corn, and in some cases, cinnamon.

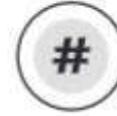




**Prep Time:**  
5 minutes



**Cooking Time:**  
5 minutes



**Serves**  
4 People

## Ingredients:

- 5–6 cups milk
- 1 round Mexican chocolate bar (Ibarra or Abuelita), broken into chunks
- 1 cinnamon stick
- 1 pinch nutmeg



## Preparation:



1. Heat the milk in a saucepan over medium to low heat. While the milk is heating up, add the cinnamon stick and the pinch of nutmeg.
2. When the milk is hot, remove the cinnamon stick, add the chocolate, and whisk it vigorously until the chocolate is melted and the milk is frothy. Then it is ready to serve! You can use your cinnamon stick as a stir stick.



**An alternate way of making this recipe is to pour the hot milk and the chocolate into a blender. Once in the blender, close the lid on tight and mix for 10 seconds or until all the chocolate is melted and mixed.**

**CREATED WITH LOVE  
BY THE  
KNOW YOURSELF TEAM**

