

# EAT YOUR BUGS!

(Grade Level: 9<sup>th</sup>)

## Introduction:

This lesson will be a part of a thematic unit on bugs. It is to be taught to a 9<sup>th</sup> grade Health Education class as a part of a nutrition unit. In 9<sup>th</sup> grade Health class the students learn about proteins, carbohydrates, fats, vitamins, and minerals, but just learn to relate them to food most available in U.S grocery stores such as beef, pasta, potato chips, vegetables, and milk. In this unit they will learn that there are viable alternatives (if you can stomach them, that is!)

## Behavioral Objectives

Students will list the 5 nutrients found in bugs. Students will learn cultural sensitivity by learning that eating bugs may not be the norm in the United States of America, but it is in many other countries of the world. Students will compare the nutrition found in raw insects with cooked animal food.

## Arizona State Standards

Health Standard 1: Nutrition

Students comprehend concepts related to health promotion and disease prevention.

Health Standard 2: Food Pyramid

Students demonstrate the ability to access accurate health information.

Health Standard 4: Cultural sensitivity

Students analyze the influence of culture, media, technology and other factors on health.

## Anticipatory Set

1. Teacher has a slide on the board that says “Café Menu”
2. Teacher says to students, “You’re going out to lunch at a new restaurant with your friends. You’re starving and your stomach is growling. You sit down and open a menu. Under appetizers you see ‘Caterpillar Soup’ (Teacher adds that to the menu above). The special of the day is ‘Grasshopper Tacos’ (Teacher adds to the menu above). And for dessert – ‘Chocolate Covered Crickets’ (Teacher adds to the menu above). Suddenly you don’t feel so hungry anymore!”
3. Teacher asks, “Do you remember the 5 types of nutrients we’ve been talking about this week? If you need a little help remembering, take out your copy of the food pyramid and look at it.”
4. Teacher asks, “Who can name one of the types of nutrients we’ve been talking about?” (Protein) “Good! What kinds of foods could we eat that have protein in them?” (Meat, chicken, fish, dried beans, etc) “OK, what’s another type of nutrient?” (Carbohydrate) “Yes. Good. What could we eat that has carbohydrates?” (Rice, pasta, fruits, vegetables) “Alright – What’s another type of nutrient that we eat?” (Fat) “What about fat? Where can we find it on the pyramid?” (At the top) “Why is it at the top?”

(Because we should try to limit the amount we eat of it) “What can we eat that has fat in it?” (Salad dressing, ice cream, chocolate, etc) “Who can tell me 1 of the last 2 types of nutrients?” (Vitamins) “Good! What kinds of foods can we eat that have vitamins in them?” (Most foods) “Who can remember some important vitamins?” (A, B, C, D,) “Excellent! Now, who knows the last category of nutrients?” (Minerals) “Very good! What kinds of minerals do people eat?” (Iron, calcium, sodium)

5. Teacher says, “Now, we’ve talked about many different kinds of foods that contain all 5 of the nutrients that our bodies need. All of them can be purchased down at Fry’s Food and Drug Store. Here’s a question for you – did you know that the human body is perfectly built for bug eating?” (Imagine the responses!) “It’s true! Our body systems can digest insects just like any other kind of food. And insects are full of nutrients.”

### Teacher Input

**Teacher:** “Let’s start our lesson, but before we do let’s take a little quiz to see how much we all know about eating bugs. Turn to the person next to you and work together to answer the following 4 questions on ½ sheet of paper. If you aren’t sure about the answer, just do your best.” (Give a few minutes to answer) “Is everyone finished? Put that aside for later and we’ll go over our answers at the end of class.”

### **Selection Test: EAT YOUR BUGS**

>>CHOOSE THE BEST ANSWER. WRITE THE LETTER THAT GOES WITH YOUR ANSWER>>

1. Why do people eat only certain kinds of bugs?
  - A. Some bugs have no taste.
  - B. Some bugs have ugly colors
  - C. Some bugs are poisonous and not good to eat.
  - D. Some bugs are too small.
2. What causes many people around the world to eat bugs?
  - A. They do not like to eat other foods like cheese and hot dogs.
  - B. Bugs are easy to find and cook
  - C. They like to shock people by eating bugs.
  - D. Bugs are hard to find, so they are in great demand.
3. How does eating crickets and grasshoppers affect your body?
  - A. You get sick because our bodies weren’t made to eat bugs.
  - B. You lose vitamins and minerals
  - C. You hurt the environment and nature.
  - D. You get things your body needs to grow.
4. What would cause more people to eat bugs in the future?
  - A. Bugs need more food to grow than other animals.
  - B. Bugs would then eat other bugs.
  - C. Our bodies might change so we could eat bugs safely.
  - D. It’s a cheap way to produce lots of food without harming the earth.

**Teacher:** “Who do you think eats bugs?” (Write answers on whiteboard or flip chart) “I can see that most of you think that people from other countries far away eat bugs.”

That's OK. Most North Americans don't think that bugs are part of their daily diet, but the fact is that most of us eat bugs every day! It's impossible to keep bugs out of food headed for the grocery store. The U.S. government knows that bugs can't harm humans and that's why it allows up to 34 fruit fly eggs in every cup of raisins and up to three crushed fly maggots in a can of tomato juice."

**Teacher:** "Have any of you ever eaten a bug on purpose?" (Wait for responses) "Did you know that 80 percent of the people around the world eat bugs? Here are some of the types that are eaten. See if you can recognize any of them!"

"Families in **Venezuela** roast **tarantulas** over fires. In **South Africa** people go buggy over **fried termites**. In **Japan**, diners may spend as much as \$40 for one plate of **fly larvae**. People in **Bali** hunt **dragonflies**. They take off the wings and boil the bodies in coconut milk and garlic. In **Nigeria**, people gather piles of **termites**. They dry them in the sun until they are crisp. Then they blend the **dried termites** into flour to bake bread. **Red agave worms** go great with tortillas in **Mexico**. In **Cambodia** you can buy **locusts** by the bagful. Diners cut off the wings and legs before they munch them."

**Teacher:** "Now that you know who eats bugs, let's get to the *meat and potatoes (ha-ha)* of our lesson and find out about bug nutrition. **Crickets and grasshoppers** are loaded with carbohydrates. What does this nutrient give your body?" (Energy) "**Termites, beetles, and earthworms** are very high in protein. What does the human body use protein to build?" (Muscles and bones) **Caterpillars** are rich in fat. Fat provides what for the body to use later? (Energy) Insects are also packed with vitamins and minerals. Just pick up a **cricket** when you want some calcium. What does calcium do to your bones and your teeth? (Makes them strong) **Termites and Caterpillars** can help you get your daily dose of iron. Iron is the building block of what kind of blood cells? (RBC)

**Teacher:** "Here's a chart I like to call 'Bugs and Burgers'. It compares the nutrition found in raw insects with cooked animal food. Protein and fat are listed as the amount in grams. Carbohydrates, calcium, and iron amounts are measured in milligrams. Who can tell me what's bigger, a gram or a milligram? (gram) What percentage of a gram is a milligram? (1/1000 gram = 1 milligram) Let's take a look. . .

FOOD	PROTEIN	CARBO-HYDRATE	FAT	CALCIUM	IRON
CRICKETS	12.9	5.1	5.5	75.8	9.5
GRASSHOPPERS	20.6	3.9	6.1	35.2	5
WATER BEETLES	13.9	2.9	3.5	47.8	5.7
TERMITES	14.2	0	0	0.1	35.5
WEEVILS	6.7	0	0	0.2	13.1
LEAN BEEF	24	0	18.3	9	2.1
COD FISH (BROILED)	22.9	0	0.9	0.03	1

**Teacher:** “Turn to a different partner than you had before and I’d like for you to make 5 different comparisons between bugs and ‘grocery store food’. Here’s an example to help you get started: **Crickets have half as much protein as lean beef.** Take about 5 minutes to write these down on your other ½ sheet of paper.”

**Teacher:** “Let’s get started and write your comparisons on the board. I’m going to ask each group for one, so if another group uses the comparison that you were going to say, just say a different one! OK – Let’s get started.” **Teacher writes all answers on the whiteboard or flipchart. When finished, ask** “Do all of you agree with these comparisons? Put your thumb up if you agree with all of them and put your thumb down if you disagree with one or more.” (What happens next depends on thumbs up or down. If any thumbs are down we’ll discuss the dissenting viewpoint)

**Teacher:** “Now that we’ve discussed the different nutrients of bugs, let’s talk about why people eat bugs. What made them start eating bugs in the first place? Why do people still eat bugs? Why will people continue to eat bugs in the future? Let’s start with the past. Why would anyone want to eat a bug?” (Wait for answers and repeat when students give one) “The real reason the people started to eat bugs is that they learned which bugs were safe by watching animals. If animals didn’t eat a bug, then humans probably steered clear of it also. In time, people discovered that insects such as red ants and some butterflies could make them sick. In fact, the most colorful bugs tend to taste the worst. These insects developed bright colors to help them survive. What are some other different ways that bugs look that help them to survive?” (Wait for an answer. Hopefully something about camouflage comes up and we’ll discuss it)

**Teacher:** “Now that we’re in the new millennium, scientists are looking for new ways to feed the planet. In 1999, the world’s population reached 6 billion people. To feed everyone, we farm areas of land until the topsoil is used up, and we fish the oceans until we may run out of fish. Right now, there are about 200 million bugs for every person alive on this planet. Bugs may be our best hope to feed everyone! Raising insects is easier than raising cows or chickens. It takes up less space, too! Thousands of termites can live in a mound as high as a doorway. Some families in **Kenya** own their own termite mounds. They can easily grab termites from it, fresh for dinner! Does that sound good to you?”

**Teacher:** “Insects also need less food to grow than other animals do. Check out these numbers: It takes 100 pounds of ‘cricket food’ to raise 45 pounds of crickets, but it takes 1,125 pounds of cow feed to raise 45 pounds of beef! About how many times more food does it take to raise beef? Let’s do a quick estimate.” (Teacher writes the numbers 100 and 1,125 on the board.) “Does anyone have the answer? Ten times more. Good!” “Plus, a cow isn’t ready to eat until it’s two years old, but in six short weeks, crickets are ready to munch. Now that’s fast food!”

**Teacher:** “Now, the last burning question in your mind is, probably, how do bugs taste and when would I use them for cooking? With most bugs, your first bite will be nice and crunchy because most of an insect’s body is made of a thin outer shell. Underneath their shells insects don’t have much muscle, which is the part of the animal that we call meat. In other words, don’t expect to slice up a juicy grasshopper steak! If you’ve eaten a clam, you have an idea of what bug insides are like. Who here has ever eaten a clam? What does it feel like to bite down on the insides of one?” (Sort of squishy) “Here’s the million-dollar question – how’s the taste? Each bug has its own special flavor. One

caterpillar has been compared to a mushroom omelet. A type of Mexican stinkbug makes anything but a stinky meal! When added to salsa or tacos, they taste something like cinnamon.”

**Teacher:** “Now I think you’re ready for a recipe. Remember, when we’re cooking, we need to make sure that you’re going to get protein, carbohydrates, fat, vitamins, and minerals in every meal, whether we’re cooking with beef or bugs. First I’ll show you a recipe that I found, and then you’re going to make your own ‘favorite food recipe’ with bugs. Here we go!”

## GRASSHOPPER TACOS

### INGREDIENTS

½ Lb of Grasshoppers

2 cloves of garlic, minced

1 lemon

Salt

2 ripe avocados, mashed

6 tortillas

- Preheat the oven to 350 degrees. Roast grasshoppers in a shallow oven pan for 10 minutes.
- Toss with garlic, lemon juice, and salt to taste.
- Spread mashed avocado on a tortilla.
- Sprinkle on grasshoppers, to taste.
- ENJOY!

**Teacher:** “Before you get started writing your own recipe, let’s quickly go over this one. Are most of the food groups covered? Which one isn’t?” (Milk) “That’s ok. You could drink a glass of milk along with your meal. Which food do we get our protein from?” (Grasshoppers) “How about carbohydrates? Which foods have those?” (Grasshoppers, garlic, lemon, avocados, tortillas) “Good. Where are we going to get our fats?” (Grasshoppers, avocados, maybe tortillas) “Why maybe on the tortillas? Good! It depends on whether we eat corn or flour tortillas! How about vitamins? What are we going to eat that has those?” (Basically everything) “Last of all, what minerals do you think we’ll get from this meal?” (Calcium, iron, sodium) “Excellent!”

**Teacher:** “Now, on your own sheet of paper, write down your ‘favorite bug recipe.’ Just take something that your mom or dad or you like to cook, and replace part of it with bugs. As you’re doing this, also think about getting as many of the 5 types of nutrients into this meal as you can! Also remember that it can be a snack, a main dish, or a dessert.” (Give students time to work on this)

**Teacher:** “I’m going to have you turn your recipes in now, but consider them a first draft. If you’re lying in bed tonight and think of something to make your recipe more interesting, I’ll give you time to revise it tomorrow.” (Collect recipes) “Now, I have a surprise for you! We’re going to take all of the recipes once they’re revised, and we’re going to make a cookbook. We’ll run off copies for everyone in case someone brings in a recipe that looks good!” (hahaha)

## Closure

**Teacher:** “Now, the last thing for today. Take out the pretest that you and your partner did at the beginning of class. Look at it with that partner and see if there are any answers that you might want to change since you’ve learned a little bit more about bugs than you knew before.” (Give students a little time to go over their pretest) “Which group would like to volunteer their answer for #1? Thank you. Does everyone agree? Thumbs up or thumbs down.” Teacher would do the same for all 4 pretest questions.

**Teacher:** “Now remember, if you want to change your recipe for tomorrow, be thinking of ways tonight, because that’s the first thing we’ll do in class tomorrow. Thank you for a fun class today!”

## Modeling the behavior

Teacher will demonstrate an example on the board when one is needed. Teacher will call on students to give an answer, either individually or with a partner. Teacher will write down responses of many on the board. Teacher will give a sample recipe. Teacher will question all students until the desired answer is given.

## Check for comprehension

Teacher will check for understanding by observing the students’ behavior. During the lesson the teacher is consistently questioning the students, and demonstrating each activity with written and oral examples. The students are able to respond with their peers. Teacher will walk around the room during group and individual work times to make sure that all students understand and are on task. She can also use this time for one-on-one assistance for special and ELL students.

## Guided practice

The teacher will guide the students through the previously covered nutrition information, through the new nutrition information about bugs, the countries and people around the world that eat certain types of bugs, the past and future eaters of bugs, and why we might want to eat bugs. Students demonstrate their knowledge by working in partners or independently on comparisons and on the recipe.

## Closure

Students will be able to write a recipe with all of the 5 nutrients included, based on prior knowledge of this and new information given today. The lesson was closed with a review of the pretest, and also something to anticipate for the next day. Students were able to transfer new information and make connections to the world around them.

### Independent practice

Students worked independently on the comparison of nutrients between bugs and beef or fish. They also worked independently on their “bug recipe.” This was directly tied to the lecture and demonstration but gave the students a chance to add their own “flavor” to the lesson.

### Assessment

Teacher will check for understanding by observing the students’ behavior. They are assessed by written application (the comparison and the recipe), and also by the thumbs-up/thumbs-down method. They are given a chance to change their answers on the pretest once more information is given, and also to change their recipe the next day, having more time to think of it. Students are assessed verbally by question and answer by the teacher. Teacher can assess through one-on-one for special needs and ELL students.

### Materials

Pretest

White board or flip chart and markers

MANY visuals on PowerPoint

Food Guide Pyramid

### Modifications for students with disabilities

The modifications for students with special needs include: The visuals that will constantly be a part of the presentation, their own copy of the Food Guide Pyramid that we’ve written notes on in class, collaborative learning with a partner, demonstrations by the teacher and examples left up while doing the work, individual assistance.

### Technology integration

The use of PowerPoint for slides and visuals throughout the lesson will be used. Many visuals are readily available on the World Wide Web.