

Investigations in Nutrition, Diet, and Activity

OVERVIEW

In this unit, students will learn how to make healthy decisions regarding diet and exercise, and how small changes in activity and diet can make a large difference in maintaining a healthy energy balance. Along the way, students will be gaining the skills to design and conduct their own research projects. In seven lessons covering 10–12 class periods, students will track their own diets and activity levels, calculate Caloric intake and expenditure, and learn how to plan meals using the recommended food groups and numbers of Calories from USDA MyPlate. Students will also have an opportunity to learn about current nutritional and obesity-related research, and conduct an independent research project related to nutrition, diet and activity.



Investigations in Nutrition, Diet, and Activity

WHAT KIDS DO		WHAT KIDS LEARN
Organize foods into categories; construct a class food plate.	<p>LESSON 1 Balancing Your Plate</p> <p>Students discuss how to categorize the foods they ate for dinner, construct their own version of the food plate, and compare it to the USDA MyPlate.</p>	How to categorize similar items, interpret data, and begin to critically think about own dietary needs.
Use chart to determine Caloric needs; track and graph daily activity levels.	<p>LESSON 2 Calories Count</p> <p>Students will use the USDA MyPlate to begin the discussion of energy balance and will calculate their own Caloric needs.</p>	How to interpret graphs and charts, and how to determine their own Caloric needs based on key factors.
Track and graph daily activity levels for a new time period; calculate total Caloric needs.	<p>LESSON 2(B) Calories Count, part 2</p> <p>Students will measure weekend activity levels and compare weekend and school day data sets to evaluate total caloric output.</p>	How to compare and contrast data sets, make predictions, and how to ask researchable questions.
Learn about current obesity research; brainstorm and assess local environment.	<p>LESSON 3 Built Environment</p> <p>Students will examine the obesity epidemic and will assess their own environments to identify their accessible opportunities for Calories-In and Calories-Out.</p>	How research impacts nutrition guidelines, how research is conducted, how environments influence action.
Track food consumption for 24-hours; create a graph showing actual food portions consumed.	<p>LESSON 4 Daily Portions</p> <p>Students will track food consumption for 24-hours to evaluate how closely the class is meeting their daily recommended servings of each food group.</p>	How to evaluate data and use the analysis to make hypotheses and recommend improvements to diets.
Estimate how large a 200-Calorie serving is of a snack food, and then calculate the actual Calorie count.	<p>LESSON 5 What Does 200 Calories Look Like?</p> <p>Students discuss how to allocate Calories between meals and snacks, identify controllable areas of their diets, and visualize appropriate serving sizes of snack foods.</p>	How to visualize sample sizes; how to make healthy decisions and where to exercise control of diet.
Use Calorie counters to plan a meal based on recommended Calories, and determine healthy options.	<p>LESSON 6 Build-A-Meal</p> <p>Students use Calorie counters to help plan a meal based on the recommended Calorie amounts, and suggest healthy substitutions or additions to achieve the desired Caloric levels.</p>	How to make healthy decisions and substitutions when menu planning.
Develop a researchable question; collect data; summarize and present data.	<p>LESSON 7 Designing Your Research Project</p> <p>Students learn the steps involved in developing a research project, and then design and implement a research project of their own based on questions generated throughout the unit.</p>	How to develop a research project, create a strong, measurable hypothesis, and how to analyze data.



Lesson 1: Balancing Your Plate

OVERVIEW

In small groups, students discuss how to organize the foods they ate for dinner into categories. From these small group discussions, the class constructs their own version of the food plate. They then make comparisons to the USDA MyPlate and discuss the important messages they identify from MyPlate.

BACKGROUND

The USDA MyPlate gives basic information on the types and amounts of foods to consume each day. The daily amounts are based on a 2,000 Calories per day diet, which is about the requirement of most upper elementary and middle school students. (See ChooseMyPlate.gov) The Choose My Plate 10 tips to a great plate:

1. Balance Calories
2. Enjoy your food, but eat less
3. Avoid oversized portions
4. Foods to eat more often
5. Make half your plate fruits and vegetables
6. Switch to fat-free or low-fat milk
7. Make half your grains whole grains
8. Foods to eat less often
9. Compare sodium in foods
10. Drink water instead of sugary drinks

LEARNING OBJECTIVES

- Students will be able to interpret the USDA MyPlate – identify the food groups and the important nutritional messages expressed.

TIME REQUIRED

One 45- minute period

MATERIALS

For groups of 3–5 students:

- 12–15 half strips of paper (cut long way)
- Markers
- Tape

For class:

- Craft paper roll or blackboard
- USDA MyPlate poster or projection
- Cameras (optional)

Most upper elementary and middle school students require approximately a 2,000 Calories per day diet.



Lesson 1: Balancing Your Plate

OUTLINE

1. Divide the students into groups of 3–5. Give each group 12–15 half sheets of paper (cut the long way). Ask them to think about what they had for dinner the night before, including drinks, and record one food item on each strip of paper. If two or more students had the same item they only need to record it once.
2. Next, have the students discuss in their groups how they would organize all the foods they listed into groups. If questions arise from the groups about how to organize a food like pizza that may contain bread, cheese, vegetables, and meat, allow them to decide how to group it but open it up as a class discussion later.
3. As a class, list the different categories each group came up with on the blackboard. From this list, create a final list that the whole class agrees on. Write those categories onto a large chart or blackboard, each as its own column.
4. Have students tape the food items in columns under the appropriate category.
5. Ask the students if they see any placements that they disagree with. Encourage discussion by asking if a certain food could be placed in more than one category. Ask if the students have seen foods organized in such a way before.
6. Display MyPlate poster or projection. Ask students what they think the important messages are from MyPlate. If needed, guide discussion towards variety of foods and relative amounts of food. Do the students see any limitations to MyPlate as a tool for helping people eat properly? How does MyPlate compare with what the class came up with?
7. Ask students if their food groupings are a fair representation of their nutritional intake. What may have been some reasons for them not eating a healthy dinner last night?
8. During the discussion, record student ideas on the board. Introduce the students to the student research project. Let them know they will have opportunities throughout the unit to practice asking questions and turning them into potential researchable questions. Use an example from the board to demonstrate how to turn it into a researchable question.



THINKING AHEAD

What do you notice about the overall diet of your class? What food groups were under represented? This was a sample of one meal, what could you investigate if you had more time? What substitutions could you make to your dinner to make it healthier?

Have students take pictures of meals to share and to use as a sample record.

What are the similarities and differences between the class food plate and MyPlate?

Lesson 2: Calories Count

OVERVIEW

Use the USDA MyPlate to begin the discussion of energy balance. If students are unaware of exactly how many Calories they need each day, do they have an idea about what is a healthy amount of Calories to consume at a meal? Do they know where to find that information?

The Daily Activity Log gives the students a rough idea about how active they are each day, and helps them to think about small changes they may make to improve their Calories-Out. Have the students chart a school day the first time they complete the log. For accuracy, it is helpful to do this lesson on a Tuesday or later in the week so the students only have to remember what they did the day before and not a day from the previous week.

BACKGROUND

Being physical active every day is a vital component of a healthy lifestyle. Along with a healthy diet, it is instrumental in preventing a range of chronic diseases, including heart disease, cancer, and stroke, which are the three leading causes of death. Physical activity helps maintain a healthy weight, builds lean muscle, reduces fat, promotes strong bone, muscle and joint development, and decreases the risk of obesity. Adolescents should be playing/exercising at moderate to vigorous activity levels for at least 60 minutes every day.

LEARNING OBJECTIVES

- Students will recognize that commercial food labels are based on a 2,000 Calorie diet. While 2,000 Calories is a good estimate of what an adolescent needs each day, students will understand that a person's age, weight, gender, and activity level determine his/her exact caloric need.
- Students will determine their own caloric needs based on their age, gender, and activity level.
- Students will estimate how many Calories they burn during a school day, and begin to identify small changes they can make to increase their Calories-Out.
- Students recognize they should be moderately or vigorously active for at least 60 minutes every day.

TIME REQUIRED

One 45–60 minute period

MATERIALS

For each student:

- Calorie Levels handout
- Daily Activity Log Worksheet

For groups of 3–5 students:

- 12-15 half sheets of paper
- Markers
- Tape
- Poker chips (four containers: white, yellow, orange, red)

For class:

- MyPlate poster
- Poker chip stand (optional)

LESSON PLANNING

Lesson 2(B) compares activity levels from this lesson to a weekend day, and requires an additional class period.

Additional classes also required if you plan to track activity over the course of the unit.

VOCABULARY

- **Calorie:** A unit of energy equal to the amount of heat needed to raise the temperature of one kilogram of water by one degree Celsius. This unit is used as a measure of the energy released by food as it is digested by the human body.
- **Calories-In:** The number of Calories brought in to the body through consuming food and beverages.
- **Calories-Out:** the number of Calories expended from the body through exercise and activity.

Adolescents should be exercising at moderate to vigorous activity levels for at least 60 minutes every day.



Lesson 2: Calories Count

OUTLINE

Activity 1: Energy Balance

1. Review the Lesson 1 MyPlate discussion and the idea that MyPlate provides a general picture of a balanced meal. It does not explicitly tell you how much food to eat each day. Ask students why people have different caloric needs. Introduce the idea of Energy Balance, and that the calories we consume in food and drink are half of the equation. The remainder is how we expend those calories each day.

2. Ask "How many calories should someone your age consume each day?" Identify 2,000 Calories as a good estimate of what an adolescent needs and that food labels are based on a 2,000 Calorie diet. Discuss what happens if a person routinely consumes more than the recommended daily amount. Hand out Calorie Level worksheets so students can determine their daily Calorie needs. (Students will also use this worksheet to determine their daily portions in Lesson 4.)

3. In small groups, have students list some of the activities they do most days. Have them write one activity on each half sheet of paper. Emphasize that the activities are not just sports, but all things they do during the day - walking to school, riding the bus, shopping, watching TV, playing video games, texting, talking on the phone, soccer practice, homework, playing an instrument, etc.

4. Write four category headings on the board: Sitting, Light, Moderate, Intense. Give examples of activities that may go under each heading. Sitting includes times riding in the car or bus, doing homework, in class, watching TV; Light is the equivalent of walking, easy bike riding, shooting baskets; Moderate is sports practice (when not standing around) fast bike riding; Intense is saved for those short bursts like sprinting that you can not maintain for more than a couple minutes at a time. Once each group has used up all their pieces of paper, have them sort them using the four activity levels.

5. Ask for examples for each category, starting with Sitting, and tape those under the correct heading. Before starting the next category, ask if anyone disagrees and thinks an activity should be in a different category. Students will likely recognize that they can run or bike at different intensity levels, and so some activities will fall under multiple headings.

THINKING AHEAD

Inform the students from the start that they will be completing a research project as part of this unit. Spend time after each lesson to brainstorm possible ideas for projects.

What else could we test using the ideas of this lesson?

- Keeping track of activity levels during PE or recess
- Comparing different PE classes. Calories burned playing soccer, weightlifting, lacrosse, archery, etc.
- Weekend vs. School day activity levels
- How many more calories would you, your class, your school burn if you had PE every day?
- Create a plan to reduce the amount of time you spend sitting during the school day.
- Create a map of walking routes and distances around your school.



Lesson 2: Calories Count

OUTLINE

Activity 2: Daily Activity Log

1. Hand out the *Daily Activity Log* worksheets. Describe how to fill in the Log and estimate the activity level for each 15-minute block:

The Daily Activity Log will become a picture of how active you were over the course of one day. Each block represents 15 minutes of time, and the chart runs from 6AM to 9PM. Only place chips in the blocks when you were awake and out of bed. Only place one chip in a block. You will need to determine what you did for the majority of each 15-minute block. The four colors of chips correspond to the 4 activity levels - White for Sitting, Yellow for Light, Orange for Moderate, and Red for Intense.

2. Give the students a few minutes to complete the Log. Remove the chips from the tables once each group as completed their graphs as students often start to modify their original layout to make it appear they were more active than they actually were.

3. Discuss as a class what stands out to them about their Logs. If necessary, prompt students with questions about differences between school days with PE and those without, if weekend days would be different than school days, if time of year or weather might impact their activity levels.

4. Have the students count and record the number of each colored chip in the first box on the *Daily Activity Total* worksheet page. As they count their chips, have them stack them with each color in a separate stack. Ask them what they created by stacking the chips (a bar graph of how much they spend engaged at each activity level.) Discuss how we (and scientists) use graphs to interpret and communicate our data.

5. The *Daily Activity Total* worksheet also provides a rough estimate of the calories burned. The values include the calories burned by the Basal Metabolic Rate (BMR). Students may complete this now or later, depending on the direction of the discussion. When they do complete this section, stress how this is a rough estimate and there are ways they could create a much more accurate representation of their calories burned.

6. Choose a representative sample or use the whole class and make a larger graph. If possible, keep this graph intake for use with Lesson 2(B).

THINKING AHEAD

Inform the students from the start that they will be completing a research project as part of this unit. Spend time after each lesson to brainstorm possible ideas for projects.

What else could we test using the ideas of this lesson?

- Keeping track of activity levels during PE or recess
- Comparing different PE classes. Calories burned playing soccer, weightlifting, lacrosse, archery, etc.
- Weekend vs. School day activity levels
- How many more calories would you, your class, your school burn if you had PE every day?
- Create a plan to reduce the amount of time you spend sitting during the school day.
- Create a map of walking routes and distances around your school.



Lesson 2(B): Calories Count, part 2

OVERVIEW

After a weekend has passed since the beginning of the unit, revisit the Lesson 2 and complete the graph for activity levels over a weekend day. Have students make predictions about what they think will be different or the same about the two graphs. Recreate the school day activity level graph from the students' data, and then compare to the weekend graph.

BACKGROUND

Being physical active every day is a vital component of a healthy lifestyle. Along with a healthy diet, it is instrumental in preventing a range of chronic diseases, including heart disease, cancer, and stroke, which are the three leading causes of death. Physical activity helps maintain a healthy weight, builds lean muscle, reduces fat, promotes strong bone, muscle and joint development, and decreases the risk of obesity. Adolescents should be playing/exercising at moderate to vigorous activity levels for at least 60 minutes every day.

LEARNING OBJECTIVES

- Students will compare data and be able to ask researchable questions based on the results.
- Students will understand some of the reasons that they may not meet their Calorie-In and Calorie-Out objectives every day, but recognize the importance of meeting them week-to-week and month-to-month.

TIME REQUIRED

One 45–60 minute period

MATERIALS

For each student:

- *Daily Activity Log Worksheet*

For groups of 3–5 students:

- Poker chips (four containers: white, yellow, orange, red)

For class:

- Poker chip stand

LESSON PLANNING

Lesson should be taught after a weekend has passed since lesson one was completed.

We may not meet our Calorie-In and Calorie-Out objectives every day, but we should be meeting them week-to-week and month-to-month.



Lesson 2(B): Calories Count, part 2

OUTLINE

Activity 1: Daily Activity Log

1. Return the *Daily Activity Log* packets to the students.
2. If you do not have the class graph from Lesson 2, have the students use their recorded data to recreate it. Quickly discuss what stood out to them about the graph. Ask them to predict what a graph of a weekend day would look like.
3. Decide as a class whether to complete the Log for Saturday or Sunday from the previous weekend. Have students then chart their weekend activity levels.
4. Use the second box on the *Daily Activity Total* worksheet page to record their weekend chip totals.
5. Choose a representative sample, or use the whole class, to create a larger graph.

Activity 2: Discussion & Project Brainstorm

Compare the two class graphs from Lesson 2 and Lesson 2(B). How do the results compare to the students' predictions? Were either a fair measurement for every school day or every weekend day? What could we do to create a more accurate comparison?

Students should recognize aspects of each day that increased or decreased their activity levels. Perhaps they did not have PE on the school day they measured, or it was too cold/rainy to go outside that day. Maybe the weekend before they had an all-day soccer tournament but no games or practice last weekend. Or perhaps they were sick and stayed inside all day.

Direct the discussion towards how accurate the measurement tool we used was. How could we create a more accurate picture of our activity levels? We could use smaller time increments than 15-minute blocks, or more accurate calorie values for all the different activities we do (there are many good online Calorie Calculators.)

Most school days provide limited opportunities for physical activity. Rather than looking at the whole day, a better approach may be to focus on the times we can be active, namely recess and PE, and how we can make small changes to increase the amount of time we are active. Is there a benefit (physical, intellectual, emotional) to being more active during the school day? How could we measure that? Are all students actively engaged during PE? Do some PE classes engage more students than others? How could we measure which PE classes are best for getting the most students active?

THINKING AHEAD

Students should begin to come up with measurable, researchable questions that can be asked based on the results of their class activities.

How did the class predictions match with what was measured between a school day and weekend day?



Lesson 3: Built Environment

OVERVIEW

Students will get a historical perspective on the obesity epidemic and a look at actual research being done today. Students will assess their own environments and identify the opportunities for Calories-In and Calories-Out within walking distance of their homes or school. Students will further develop ideas and concepts for the student research component.

BACKGROUND

The places we spend time in - home, school, and community - influence the decisions we make about what to eat and what to do. Many of us are unaware of the extent to which we are influenced by such external factors. Once we become aware to how various aspects of our environment influence us, we can begin to make the small changes that may ultimately make us healthier.

As obesity rates continue to climb, research has looked at food and recreational opportunities in local environments as contributing factors. The Built Environment refers to all human-made (vs. natural) resources and infrastructure that provide a setting for human activity. This includes our houses, roads, sidewalks, schools, restaurants, shopping centers, and everything else created by us that is built into our environment. The characteristics of the built environment in your community may affect your health in many ways. The availability of sidewalks in your neighborhood may influence you be more physically active; the lack of a grocery store or farm stand near your home may decrease your fresh fruit consumption.

There is a seemingly simple solution to obesity, eat less and exercise more. But when we examine the underlying issues of why we overeat and don't exercise enough, we find innumerable reasons for why we engage in those behaviors - genetic predisposition, the neighborhood we live in, the availability of fresh foods, the proximity of recreational facilities, etc.

LEARNING OBJECTIVES

- Expose students to the interesting and relevant research taking place locally, increasing their understanding of the diversity of health science careers and research processes.
- Students will become increasingly aware of the types of food options available to them.
- Identify ways to make the school community a healthier environment and to encourage healthier decisions.
- Become more aware of how the places you spend time in – home, school, community – influence the decisions you make about what to eat and what to do.

TIME REQUIRED

One 45-minute period

MATERIALS

For each student:

- Your Built Environment Worksheet

For class:

- Obesity Trends presentation
- Cameras (optional)

VOCABULARY

- Built Environment:

Encompasses all of the buildings, spaces, and products created or modified by people. For example buildings, land use, public resources.

Students will become more aware of how environment can influence decision-making regarding diets and activity levels.



Lesson 3: Built Environment

OUTLINE

1. (Optional) As a homework assignment, have students take pictures of the places they can purchase food (Calories-In) and play/exercise/hang out (Calories-Out) in their community. Compile them into a slide show or print some out before class. You could also use the location settings on cameras or smart phones to add the photos directly to an online map of your town.
2. Share the Obesity Trends presentation. Discuss what lifestyle choices the students think may have contributed to this trend. What might be some long-term consequences for society if this trend continues?
3. Introduce the notion of the Built Environment. Have the students use the worksheet to list the opportunities for Calories-In and Calories-Out within their community. Make sure they include all the ones they can think of and not just the ones they go to themselves. Share in a class discussion the types of stores, restaurants, and recreational areas they identify in the community. How often do they go to these places? What are some reasons they do or do not go to these places? (too far away, can't get a ride, no safe way to travel on own, use the drive-thru because they are often out late for sports or other activities)

Optional: Create a color-coded map of your town or a 1 to 3-mile radius around your school. Use a different colored marker/pin/sticker to represent opportunities for Calories-In and Out. These can be further divided into healthy and unhealthy options.

4. Thinking about the School Environment: Does your school sell unhealthy foods in vending machines, student run stores, or in the cafeteria? Are there positive healthy-eating messages in your school? Do you have opportunities for physical activity every day? Are there adequate spaces and equipment for being active?
5. Thinking about your Home Environment: Do your parents encourage you to be physically active? Do you regularly participate in physical activities with your parents or siblings? Are fresh fruits/vegetables available at home for snacking? How often do you eat out? Do you sit down and eat dinner as a family? Do you have a TV in your bedroom? Do you get an allowance? Do your parents put limits on how much time you can watch TV or play video games?
6. Thinking about what Students have Control over: Have students discuss in small groups or as a class the aspects of the school and home environments they can control in terms of what they eat and what they do. How much control do they have of what they eat for breakfast, lunch, dinner, or snacks? Who purchases the food? When do they directly purchase the food/drinks they consume? Think about the times they made unhealthy food choices - What caused them to behave that way?
7. Room to Improve: What improvements could potentially be made in the home, school, and community to support healthy choice? Are there areas the students may be able to affect change - increase physical activity or improve food decisions in the cafeteria?

THINKING AHEAD

By observing these aspects of their environments, students can determine the significant nutrition and physical activity issues and select an area to change or improve.

Where can students most effectively cause change in what they eat and what they do?

Lesson 4: Daily Portions

OVERVIEW

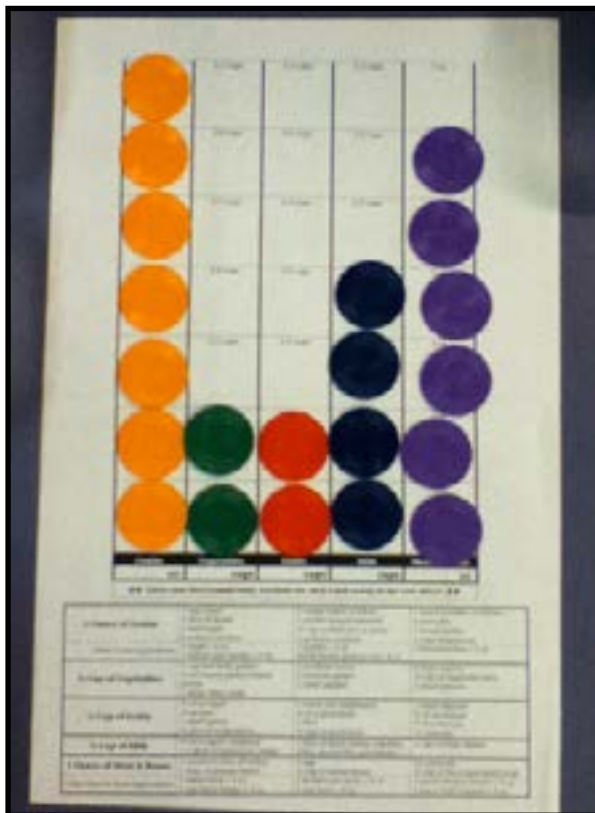
This lesson will provide an overview of how closely the class is meeting their daily portions of each food group based on one 24-hour period. Each student will graph his/her recommended daily portions for the five main food groups using color-coded poker chips. (The poker chip colors correspond to those used on MyPlate). A 24-hour food log will approximate the actual amounts consumed. This data will be graphed next to the recommended amounts.

BACKGROUND

MyPlate reminds you to be physically active every day and to make healthy food choices with specific messages. Eat more from some food groups than others – the different sized food group areas on the plate remind you to eat more of some food groups than others. Every color every day – remember to eat foods from all food groups every day.

LEARNING OBJECTIVES

- Students will identify areas of their diets where they are meeting the recommended needs, and areas where they may need to improve.



DAILY PORTIONS GRAPH

TIME REQUIRED

One 45–60 minute period

MATERIALS

For each student:

- Daily portions worksheet
- 24-hour food log worksheet
- Serving size equivalents handout

For groups of 3–5 students:

- Poker chips (five containers: orange, green, red, blue, purple)

For class:

- Poker chip stand

LESSON PLANNING

Additional classes required if you plan to track diet over the course of the unit.

MyPlate reminds you to make healthy food choices with specific messages: Eat more from some food groups than others. Every color every day.

Lesson 4: Daily Portions

OUTLINE

Activity 1: Recommended Daily Amounts

1. Students use the charts on the *Daily Portion Tracker* worksheet to find and record their daily portion amounts for each food group on the table on the second page of the worksheet.

2. Students use the poker chips (the colors correspond with the colors on the food plate) to fill in the amounts they should be consuming.

3. Use the poker chip display to create a class graph of their daily food requirements.

Activity 2: 24-Hour Food Log

1. Students record everything they ate in the last 24-hours on the 24-hour Food Log. (This can be done in class, or as homework the night before).

2. From this list the students deconstruct each food into its representative food groups. For example, a turkey sandwich may contain 2 slices of bread (grains), 3 slices of turkey (meat & beans), 2 tomato slices (vegetables), 1 slice of cheese (milk), and mustard (not part of a major food group).

3. The students use the *Food Equivalents* worksheet to approximate the actual amounts of each food group they consumed for the day. (From the turkey sandwich alone, there would be 2 ounces of grain, 3 ounces of meat, ½ cup of milk, and ¼ cup of vegetables.)

Activity 3: Graph & Compare

1. Students use the poker chips to record how much they actually consumed of each food group on their own worksheets, and then create a class graph of actual consumption on the poker chip display.

2. Discussion:

- Which food group consumption most closely matched the recommended amount?
- Which food group(s) were lacking?
- What might be some ways to improve class consumption of those food groups?

THINKING AHEAD

- Keep track of fruit or vegetable consumption for one week with the goal of improving class consumption.
- How many food groups are represented in an average school lunch?
- How do school lunches compare with lunches from home?
- Compare class or school consumption of milk vs. soda.
- What healthy snacks are available at stores nearby your school?
- Identify substitutions you or your class can make to reduce calories consumed in drinks.

Which food group did the class come closest to fulfilling?



Lesson 5: What does 200 Calories look like?

OVERVIEW

As a class (or in small groups), students divide the 2000 Calorie daily requirement between all meals and snacks. Discuss how much control students have over what they eat each day. Students will predict and then measure out how much of different snack foods equal an appropriate serving size (200 Calories). By recognizing that snacking is the area of their diets that they have the greatest control and decision-making ability, students will identify potential ways to reduce caloric intake from snacks and increase nutritional value.

Students predict the number of Calories they would burn in 10 minutes doing a variety of activities. When they are given the actual Calorie amounts they work in small groups to design an exercise routine that will burn 200 Calories between the members of the group in 10 minutes or less.

BACKGROUND

Food labels provide much of the nutritional information we need, but they can often be difficult to decipher. Manufacturer serving suggestions can be very different from actual servings for most people. 200 Calories represents an adequate sized snack serving. But some snack foods have significantly more Calories than others. When you consider that an entire plate of broccoli contains the same number of Calories as a small spoonful of peanut butter, you might think twice the next time you decide what to eat.

LEARNING OBJECTIVES

- Students identify the areas of their diets where they have the greatest amount of control.
- Students visualize appropriate serving sizes of various snack foods.
- Students learn how to make healthy food decisions and substitutions in their diets.



EXAMPLES OF 200 CALORIE SERVINGS

TIME REQUIRED

45–60 minutes

MATERIALS

For each student:

- Snack serving size worksheet
- What Does 200 Calories Feel Like? worksheet

For groups of 4–5 students:

- Electronic balance
- Paper plates
- Two different snack foods in plastic containers
- Food labels

For class:

- Blackboard
- 100 Calorie substitution poster
- Exercise equipment

LESSON PLANNING

To prepare, purchase a variety of snack foods that students commonly eat. Place into large plastic food containers.

Remove and laminate the food labels from each food.

Optional: Prepare bags of 200 calories of each food for comparison at the end of lesson.

Students identify the areas of their diets where they have the greatest amount of control.

Lesson 5: What does 200 Calories look like?

OUTLINE

Activity 1: Adding it Up!

1. As a class, discuss how to divide 2000 Calories (the average daily requirements for students their ages) between meals and snacks. Prompts, if needed: How many meals do you typically eat? How many snacks? Do you eat more at dinner or breakfast?
2. Record the consensus on the board.
3. Discuss how much control the students have over what they eat – Who buys the food at the store? Who does most of the cooking at home? Do they bring lunch or eat school lunch?
4. Snack food decisions are one area that the students likely have more control. Identify the times that the students are most likely to snack. What factors go into deciding what snacks they eat?

Use 200 Calories or the number of Calories assigned to a snack for the next activity.

Activity 2: What does 200 Calories look like?

1. Give each group of 4-5 students one snack food sample, plates, scale, and *Snack serving Size* worksheet.
2. Instruct the students to place onto a plate how much of the snack food they think represents an average size snack amount.
3. Use the worksheet to figure out how many Calories are actually represented by the foods on the plates. Did groups take more or less than 200 Calories? If time allows, have groups do the same with a second snack food.

Activity 3: Discussion – Making Substitutions

Encourage students to think of snack substitutions they could make., or strategies to reduce the amount of Calories they consume with some snacks. What happens to our daily caloric intake when we replace soda with water, or some other similar substitution? How many fewer Calories would we consume as a class if every student drank 1 bottle of soda less each week in one week, in one year?

Activity 4: What does 200 Calories feel like?

1. Using the *What Does 200 Calories Feel Like?* worksheet, students work in small groups to predict Calories burned in each of the 9 activities. If using an online Calorie Calculator you can have students choose their own activities.
2. As a class, share and discuss the predictions. Remind the students of the Calorie estimates from Lesson 2. While that lesson was a rough estimate, this lesson permits us to be more accurate. Share actual values for the activities. Stress that these values are for a 90lbs. person, and not all students will burn Calories at the same rate. They may adjust their calories burned values 5-10 Calories in either direction to better represent themselves. This is also where using an online calculator would increase accuracy.
3. In small groups, have the students create an exercise routine that will burn 200 Calories total between the group members.
4. Allow the students to feel the effort required to burn Calories by implementing their exercise routine.

THINKING AHEAD

If you watch TV for 1 hour and consume one can of soda and one bag of chips, what is the net amount of calories?

If you play Wii instead of watch TV, now what is the net?

Next, substitute an apple and water for the chips and soda. What is the net now?

Can you design a chart of the best and worst food/activity combinations?

We just did a lesson on what 200 Calories looks like. What does 200 Calories feel like?

Snack food decisions are one area that the students likely have more control.

Lesson 6: Build-A-Meal

OVERVIEW

In the previous class, we divided the 2000-Calorie daily requirement between meals and snacks. Using these values, students work in groups to create a typical meal. Students use a calorie counter or online resource to calculate how closely their meal is to the class determined Calorie amount. Students then suggest healthy substitutions or additions to achieve the desired Caloric levels.

BACKGROUND

A healthy meal starts with more vegetables and fruits and smaller portions of protein and grains. Think about how you can adjust the portions on your plate to get more of what you need without too many calories. And don't forget dairy—make it the beverage with your meal or add fat-free or low-fat dairy products to your plate.

ChooseMyPlate.gov recommends 10 tips for healthy meals:

1. Make half your plate veggies and fruits
2. Add lean protein
3. Include whole grains
4. Don't forget the dairy
5. Avoid extra fat
6. Take your time
7. Use a smaller plate
8. Take control of your food
9. Try new foods
10. Satisfy your sweet tooth in a healthy way

LEARNING OBJECTIVES

- Learn how to make healthy food decisions and substitutions in your meal planning.

TIME REQUIRED

One 45–60 minute period

MATERIALS

For each student:

- List of Calorie counter foods handout
- Build-A-Meal worksheet

For groups of 2–4 students:

- Calorie counter dial

LESSON PLANNING

Using the Internet: you may also identify a good website that has calorie information for a wider variety of foods and allow the students to create a meal on their own and then research the caloric content.

Students will learn how to make healthy food decisions and substitutions in their meal planning.



Lesson 6: Build-A-Meal

OUTLINE

1. Write the 2000-Calorie breakdown on the board from the previous lesson. Ask if there are any changes the students want to make at this point.
2. Divide the students into groups of 2 – 4 and have them use the *List of Calorie Counter Foods* to plan out a typical meal. If using an online resource, the students can choose any foods they would like.
3. Point out that if they include a cheeseburger as part of their meal, they need to include the patty, bun, cheese, and any other ingredients.
4. Remind them to check the serving size listed on the counter. They may need to multiply the calorie amount by their actual number of servings.
5. Have each group share their meals. Is it a meal they would typically eat? Did it provide more or less Calories than the goal amount? Does it offer foods from multiple food groups? Should we modify the 2000 Calorie breakdown after doing this lesson?
6. Have the groups make substitutions or additions to their meal to make it healthier and meet the Calorie goal. What are the long-term Calorie savings from some of the small student substitutions if done every day over the course of a week, a month, a school-year?

THINKING AHEAD

The idea about making small substitutions and changes to what we normally do is a big idea for this unit. Getting the students to recognize the real Calorie savings from substituting skim milk for whole milk, or not getting cheese on a burger, is important. This ties in with the What Does 200 Calories Look Like. What other ideas for substitutions can the students come up with? What other questions might we be able to investigate with the Student Research Questions later on? Perhaps looking at school lunches or brown bag lunches and figuring out the Calories and then looking for healthier substitutions.

The idea about making small substitutions and changes to what we normally do is a big idea for this unit.

Lesson 7: Designing Your Research Project

OVERVIEW

Asking good, researchable questions is not an easy task. Lead the class through two examples of turning a big idea into researchable questions. In small groups, students then begin working on their own questions.

BACKGROUND

To do research is to be involved in a process. These are the essential components of that process followed in this unit.

Phase 1: Developing a Researchable Question

- Narrow the focus and clarify the issues
- Hypothesis/State the Problem: a statement that asserts a relationship between two concepts
- Select measurable variables
- Develop a measurement tool (survey, observation checklist)
- Select a sample

Phase 2: Data Collection

Phase 3: Summarize and Present Data

- Organize data
- Draw conclusions
- Make suggestions for further research

LEARNING OBJECTIVES

- Understand the steps involved in developing a research project.
- State a strong hypothesis.
- Develop measurable variables.
- Collect and interpret data
- Draw conclusions

TIME REQUIRED

30–45 minutes to present PowerPoint
Additional 30–45 minutes for small group work to develop questions
2–3 more class periods needed to collect data, interpret data, and present

MATERIALS

For each student:

- Developing a Good Question worksheet

For class:

- Developing Research Questions PowerPoint
- List of questions/ideas generated over the course of the unit

LESSON PLANNING

Review the PowerPoint and script.

VOCABULARY

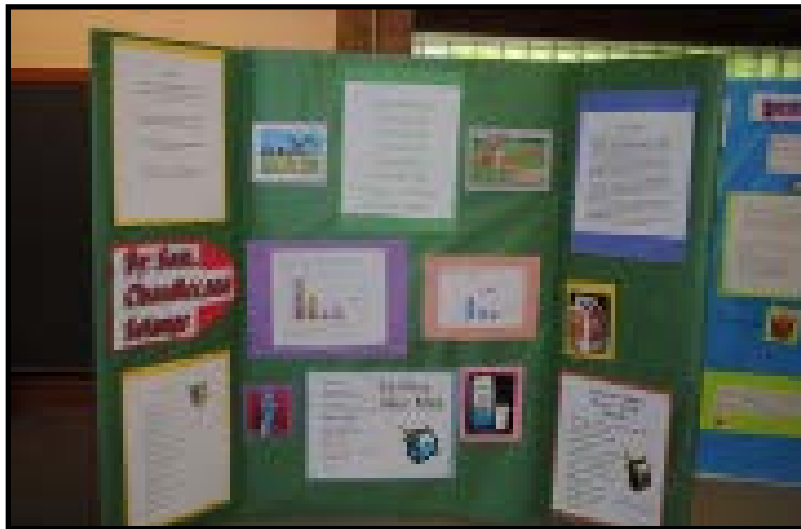
- Hypothesis: A testable, suggested solution to a problem based on evidence. a statement that asserts a relationship between concepts.
- Variable: A concept of which it is possible to have more or less, or different kinds, and is measurable.
- Population: Group about who we want to draw conclusions
- Sample: A subset of a population

A hypothesis should be narrow, clear, and measurable.

Lesson 7: Designing Your Research Project

OUTLINE

1. Follow the PowerPoint and script to help the students develop their own questions.
2. As a class, make a list of what we can measure about our diet or activity. Brainstorm big ideas and possible research topics. Refer to the list of questions and ideas that have been generated over the course of the unit.
3. Divide the students into research groups to come up with a list of possible questions.
4. Once each group has an approved research question, they will state their hypothesis, identify their measurable variables, design the data collection tool, and create a time frame for completing their project.



STUDENT RESEARCH PROJECT

To do research is to be involved in a process.



Bonus Lesson: Calorimeter

OVERVIEW

Now that the idea of Calories has been introduced, the students will have the opportunity to measure how much energy a Calorie represents. This experience also gives the students practice at following a procedure, collecting data, and interpreting data.

BACKGROUND

A calorimeter is a device used to measure the amount of energy released from burning food samples. Energy is stored in the chemical bonds of the foods we consume. By burning different food samples, the chemical energy is released as heat. The more Calories contained in the food sample, the more heat it will give off, and we will observe that in a larger increase in water temperature. Knowing the mass of the sample burned and the change in water temperature will allow us to calculate the caloric content of the food.

All foods provide us with energy. Different foods contain different amounts of energy. The amount of energy contained in any food is measured in calories. A calorie is a unit of energy defined as the amount of heat energy needed to increase the temperature of 1g of water 1 degree Celsius. However, the calorie we use when talking about food is a kilocalorie or 1000 calories. If a food item is labeled as having 20 Calories, it contains 20,000 calories. One food Calorie would increase the temperature of 1 Liter of water 1 degree Celsius. A food calorie is typically written with a capital C, and will be here.

Calories come from the proteins, fats, and carbohydrates within the food. Foods with different proportions of proteins, fats, and carbohydrates will have different amounts of Calories.

One gram of fat contains 9 Calories.

One grams of protein contains 4 Calories.

One gram of carbohydrate contains 4 Calories.

LEARNING OBJECTIVES

- Students will follow a procedure and conduct a laboratory investigation.
- Students will determine the Calories in certain foods.
- Students will identify that all foods provide energy, but some foods are healthier than others.
- Students will practice reading and interpreting food labels.

TIME REQUIRED

One 45–60 minute period

MATERIALS

For each student:

- Calorimeter worksheets

For groups of 4–5 students:

- Calorimeter
- Scale
- Weigh boat
- Distilled water
- Food samples
- Thermometer
- Lighter

LESSON PLANNING

To prepare, locate a place to safely burn food samples.

Remove tops of aluminum cans with can opener.

Use hole-puncher to make two holes just under rim of can, on opposite sides of the can.

VOCABULARY

- Calorimeter: A device used to measure the amount of energy released from burning food samples.

All foods provide us with energy. Different foods contain different amounts of energy.

Bonus Lab: Calorimeter

OUTLINE

1. Divide the students into groups of 4 or 5. Distribute the lab worksheets and have the students read through the procedure.
2. Identify the different roles needed in each group and have groups assign each member a job – water measurer, food sample measurer, temperature recorder, and data recorder. Have one person record all the data while the experiment is running and then share it with the other group members at the conclusion of the experiment.
3. Demonstrate proper weighing techniques, and how to zero the scales. The can may be placed directly on the scale to measure 100g of water. To measure the food sample, first place an empty weigh boat on the scale, zero the scale, then place the food sample in and record the weight.
4. Set-up the calorimeters. Make sure students are taking appropriate safety precautions – loose clothing and hair, safety glasses.
5. Ignite the food samples once each group is ready. Instruct the groups that if a flame goes out before the sample appears to be completely burned to get your attention to reignite it.
6. Once groups have made final measurements, go through the worksheet at a class for computing the Calories/gram.
7. Test other snack food samples if time permits.
8. Discussion: What would account for the difference between calculating Calories/gram using our measurements and the values on the food labels? Could we have done anything to make our results more accurate? All foods provide some energy – a Calorie from junk food will provide the same energy as a Calorie of apple – but what else do we need to consider besides just getting enough Calories?

THINKING AHEAD

All foods provide some energy, but what else do we need to consider besides just getting enough Calories?

Knowing the mass of the sample burned and the change in water temperature will allow us to calculate the caloric content of the food.

