# Topic: Health Wheel Self-Care Plan for Diabetics
## Grade 9 to Adult

.

Gloria Edwards and Anne McGinley
Adult Educators
Cortez, Colorado

## Lesson-Planning Approach

Some learners perceive their "world" as a whole, where all things are interconnected and dependent upon each other. These "integrated" students face major challenges in coping with our dominant educational, social, and economic systems, which tend to present information in a linear fashion without the necessity of integration into meaningful context. Integrated students are at-risk of failing as they attempt to grasp information in ways that do not match their experience. Among large populations of at-risk students are many from Native American and similar cultures that do not regard their world as a sum of parts but as a blend of all that they experience.

This lesson plan does include some traditional, linear approaches to delivering information (checklists, rules, analysis, problem solving and organization). In addition to the traditional, linear delivery of information, this lesson plan also includes some of the following strategies, designed to appeal to at-risk students as they learn academic/life skills:

- Integration of technology
- Story telling/anecdotal information
- Non-competitive group and team work
- Performance-based assessment and rubrics
- Visual presentations and practice through technology and other means
- Project-based assignments that integrate family and community
- Activities appealing to multiple intelligences (Gardner)
- Application of Scientific Method to formulate and solve a problem.

## Lesson Overview

This lesson is designed to help create a Health Wheel: a personal, inspirationally based, self-care plan for preventing or managing diabetes in daily life. The student or client researches the causes of diabetes, and creates a "health wheel" that reflects their personal creativity, commitment and desires to manage their diabetes (or diabetes prevention). dents will use a variety of learning styles to identify and develop their own preferences for eating healthy, shopping for appropriate foods, exercising, using technological resources, understanding sugar contents of foods, and building a personal support circle.

## Lesson Objectives

**Project: Health Wheel**

Project Objectives: When students complete this session, they will be able to…

- *Identify* a personal belief system for self- inspiration and motivation
- *Identify* individual likes and dislikes regarding healthy foods and exercise
- *Create* individual shopping lists for personal and family use
- *Establish* a circle of people to offer support
- *Apply* scientific method to discover sugar contents of popular beverages
- *Use technology* to chart information and obtain ideas regarding diabetes and health
- *Create* a personal health wheel out of a variety of materials to represent personal preferences in managing diabetes

Integration of Other Functional/Academic Skills: (Critical thinking is required throughout the lesson.) Students will be able to…

***Math:*** Use math to perform an experiment calculating sugar and density differences in beverages. Design health wheel.

***Reading:*** Read information to learn about Diabetes and help support personal decisions in maintaining healthy lifestyles.

***Writing:*** Write support network, exercise choices, grocery lists, and a personal commitment statement.

***Technology:*** Search the internet for relevant sites, and download information, apply basic features of Microsoft Word, and use Excel to compile data

***Science*** Apply scientific method and correctly format an experiment

## State/National Standards

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http://www.cde.state.co.us/cdeassess/sci.htm#standards

**Reading and Writing**

1. Students read and understand a variety of materials.
2. Students read, select, and make use of relevant information from a variety of media, reference, and technological sources.
3. Students write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling.
4. Students apply thinking skills to their reading, writing, speaking, listening, and viewing.

**Science**

1. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.
3. Life science: Students know and understand the characteristics and structure of living things, the processes of their life, and how living things interact with each other and their environment.
5. Students know and understand interrelationships among science, technology, and human activity and how they affect the world.
6. Students understand that science involves a particular way of knowing and understand common connections among scientific disciplines.

**Mathematics**

3. Students use data collection and analysis, statistics, and probability in problem-solving situations and
communicate the reasoning used in solving these problems.
4. Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems.

**Visual Arts**

1. Students recognize and use visual arts as a form of communication.
2. Students know and apply visual arts materials, tools, techniques, and processes.

## Websites

**Required: (Use this site for reading and background information)**
**www.laplaza.org/health/dwc/nadp (Native American Diabetes Project)**
**www.diabetes.org (American Diabetes Association)**

**Support: (Use these sites for additional information and future reference)**
**www.acefitness.org/nativeamerica/**
**www.okit.com (Native American newsletter)**
**Diabetes Pathfinder: Rick Mendosa**
**www.indianz.com (Tribal issues and current events)**
**www.niddk.nih.gov (National Institutes of Health – Diabetes)**
**www.omsa.uiuc.edu/clearinghouse/native/native/html (Native American Health Issues)**
**www.uchsc.edu/sm/nehcrc (Native Elder Health Care)**

## Pre-requisites

Read at fifth grade level or above

Possess basic computer skills to conduct word processing, search the web, and use Excel or other spreadsheet programs

## Required Materials

- **Sugar Density Experiment**: Coke, Diet Coke or Pepsi and Diet Pepsi, other popular beverages that come in aluminum cans, 5 gallon bucket and water to fill, timer or watch with second hand, Handout * to chart data
- **Health Wheel**: Desired art supplies (willow or grape vines, poster board or paper, paint, markers or color pencils, computer clip art, paper brads or rivets for assembling wheel), and binder for recipes, grocery list, and personal statements.

## Handouts

- "What is Sugar?" Handout One
- Coke Float Worksheet: Handout Two
- Health Wheel Design and Examples: Handout Three
- Lesson Rubric: Handout Four

## Required Equipment/Technology

Network accessible computers, also equipped with a word processing and spreadsheet programs

Floppy disks to save information for future use

# THE LESSON

**Note: Students do not learn from what <u>you</u> do but from what you have <u>them</u> do.**

## PART I

## Preparation

| Activity | Instructor Notes |
|---|---|
| 1. Discuss the topic of self-care health. Write a paragraph or story about an event in your life where personal inspiration may have made a difference. | **Have students relate any experiences with personal inspiration, prayer, or belief system that promotes recovery or helps in managing illness, and why this is an important basis for healing and motivation). Go to web site www.diabetes.org or www.laplaza.org for inspirational stories. Have the students identify images of qualities for health** |
| 2. Pre-Assess prior knowledge of diabetes and health. Go to website www.laplaza.org and become familiar with the basics of diabetes. | **Review with students what diabetes is, what makes it worse, what makes it more preventable or manageable. Have students read website www.laplaza.org to learn how diabetes occurs** |
| 3. Learn about different types of sugar and sugar content in foods: | **Have students read "What is Sugar?" (Handout 1). Obtain a five gallon bucket and several types of popular beverages, both diet and regular. Have students design a spreadsheet for the Coke Float data based on the worksheet example. Observe and record the sinking rates (and therefore densities) of the different beverages and fill in the chart as outlined in the instructions. The students can also create graphs from their spreadsheets. Write answers to the questions outlined in Handout 2. Aspartame is more than a hundred times sweeter than sugar. This means that there is much more real sugar used in regular soft drinks than artificial sugar in diet soft drinks to attain the same level of sweetness. The larger amount of sugar in the regular drink makes it denser than the diet soft drink. The liquid in the drinks is the only variable that changes between the two types of drinks. Both types of drinks have about the same amount of aluminum in the can and trapped gases (air and carbon dioxide). All of these components are lighter, or less dense, than water, so the can floats. When more sugar is added to the drink, the liquid becomes denser than water, so the can sinks. The time it takes for the can to sink (or the rate) can be measured and shows us how dense, or how sweet, the drink is.** |
| | |

## Presentation

| | |
|---|---|
| Hand out examples of Health Wheel (Handout 3) | **Have students discuss and decide what medium they will choose to construct their wheel (paper, cardboard, vines, etc).** |
| | |

## Performance and Practice

| **Instructions for students** | **Teacher notes** |
|---|---|
| Create Personal Health Wheel | **Using mediums of choice, have the students create a health wheel using meaningful images for each portion of the wheel. Wheels can be made from wound vines, poster board, or cardboard. The images on the upper portion of the wheel can be made or drawn by the student, or obtained from clipart. The students write their personal health choices on the bottom (or underneath) portion of the wheel.** |
| Make a personal resource binder with your preferred recipes and grocery lists for use by self and other family members | **Use the web sites as resources for recipes.** |
| Discuss Rubric | **Have students perform self-assessment of their performance in reading, writing, scientific method, use of technology, and creation of personal care plan. .** |

## Lesson Assessment Strategy (Formative – As the lesson progresses)

### Preparation, Presentation and Overall Implementation (Instructor)

1. Are the instructions and expectations for the class clear from the beginning?
2. Am I spending sufficient time on modeling the skills I want students to acquire?
3. Is there enough variety in the lesson to appeal to most learning preferences?
4. How many learning intelligences am I addressing?
5. Are students "connecting" to lesson objectives? How?
6. How is this lesson "integrated?"

### Performance and Practice (Student)

1. Do all students have the skills to follow instructions? If not, what measures am I taking to address the challenge?
2. Are all students participating in the activities either by active observation or by voicing their thoughts?
3. Am I identifying the strengths of each student and pairing/grouping people accordingly? What results am I getting?
4. How are students performing? Are all of them able meeting 80% of the lesson objectives? If not, what am I doing to help them achieve more?

### Technology

1. Is the technology working?
2. How are students reacting to the technology, and what do I need to remember when I teach this lesson again?
   How are students applying or wanting to apply their technical skills in other areas?

## Activity Checklist

| | |
|---|---|
| Discuss diabetes and personal goals. Complete statement regarding personal belief system and its place in individual healthy living. | |
| Discuss the rubric for the final project | |
| Go to website www.laplaza.org and www.diabetes.org, become familiar with diabetes and management | |
| Perform coke float experiment, read "What is Sugar", complete accompanying calculations and questions. Develop spreadsheets. | |
| Design and create health wheel | |
| Make a book or binder including preferred recipes (can be gotten from websites). Write personal self-care statement. Write a standard grocery list that can be used by self or other family members to keep healthy foods on hand | |

# Handout One: What Is Sugar?

Adapted and revised with permission from "Chemical Cuisine – Natural and Synthetic Chemicals in Foods"
Carolina Biological Teamed With Teachers
Mickey Sarquis, Editor, Center for Chemistry Education
Terrific Science Press, Miami University, Middletown, Ohio

## What Kind of Sugar Is It?

Our earliest ancestors were concerned with finding enough food to sustain them. Archaeological evidence indicates that they ate lean meats, berries, fruits, roots, and wild grains. This diet was balanced with frequent strenuous exercise, which was a natural part of their lives. Contemporary lifestyles and diets are quite different. However, our digestive and circulatory systems are relatively unchanged. Today, Americans appear to be more nutritionally conscious than ever before. Nonetheless, the per capita consumption of both artificial and processed sugars continues to increase steadily. Much of the increase can be attributed to the inclusion of sugars in many forms, and the increased consumption of processed foods.

Either natural or synthetic forms of sugars cause sweetness in food. Sugars can be loosely divided into three categories: natural sugars, processed sugars, and synthetic sweeteners. Natural sugars are formed in all green plants through photosynthesis, a process that uses sunlight, carbon dioxide, and water to form carbohydrates. When nutritionists recommend "naturally occurring sugars", for a healthy diet, they mean eating whole fruits and vegetables. These sources of sugars are also sources of vitamins and minerals such as calcium, magnesium, phosphorus, iron, potassium, vitamins E and B, thiamine, riboflavin, and zinc. Sugars that have been extracted from plants and then concentrated are called processed sugars. Modern methods produce, for example, sucrose (table sugar), which is 99.9% pure. While such processed sugars are concentrated sources of both energy and sweetness, they have the disadvantage of having lost the vitamins and minerals found in fruits and vegetables. Synthetic sweeteners are produced in a laboratory. Synthetic sweeteners also lack vitamins or minerals. Dieters often want synthetic sweeteners in their foods because such sweeteners do not contain any usable calories.

Sugars are classified as mono or disaccharides. Monosaccharides, disaccharides, and polysaccharides occur naturally in a variety of plants. Polysaccharides make up starch, which is broken down in the digestive system to digestible sugars. Common monosaccharides include glucose and fructose. Glucose occurs in many fruits and is the sugar carried in the blood. Fructose is the sweetest sugar known. It too, is common in fruits.

## The History of Table Sugar

Sweeteners are important to humans. They have a pleasing taste, and natural sweeteners are a good source of energy. Humans have always consumed natural sugars from fruits and vegetable. There is evidence that very early humans retrieved honey from beehives and Native Americans produced sugar from sugar maples.

The process of refining table sugar (sucrose) from sugarcane was developed in India around 500 B.C. (about 2,500 years ago). It spread through Persia to European Countries in the 12th century (800 years ago), but only the very wealthy could afford it. It was only after European nations began growing vast amounts of sugarcane on "New World" lands with slave labor that sugar became a common item on European tables. Sugarcane became firmly established as one of the staple crops of the colonial southern United States, and much is still grown in the South. However, a larger proportion of U.S. sugar production now derives from sugar beets.

The synthetic sweeteners used today in the United States include saccharin, aspartame, and acesulfame-K. Saccharin is derived from coal tar. Aspartame contains the amino acids phenylalanine and aspartic acid, which breaks down in high heat. Some people have a condition called phenylketonuria (PKU), an inability to digest and use the amino acid phenylalanine, and cannot eat foods containing aspartame. Acesulfame-K is a potassium salt similar to saccharin. These synthetic sweeteners are more concentrated than regular sucrose. Acesulfame-K is 200 times sweeter than sucrose; aspartame is 160 times sweeter, saccharin is 500 times sweeter. In affluent countries, the annual per capita consumption of processed sucrose is about **100 pounds**. One box of sweetened cereal contains approximately 1 cup of added sugar; one can of soda pop contains 40 grams (1/4 cup or 5 tablespoons) of sugar

## Sweeteners and Health

The search for synthetic sweeteners started as a hunt for more economic sweeteners but evolved into the development non-nutritious sweeteners – ones that would not contribute energy (in the form of Calories) to the diet. However, synthetic sweeteners are not replacing table sugar. Even though synthetic sweetener consumption is increasing among Americans, table sugar consumption is not decreasing. **Sugar contributes as much as 30% of the calories consumed by Americans.**

Table sugar provides calories (energy used by the body), but no vitamins, minerals, or enzymes. However, the process of digesting table sugar uses these same nutrients, which robs them from being used by other important bodily functions. Excess calories, as from high amounts of sugar, can cause weight gain, obesity, damage to internal organs, and Diabetes.

Even though synthetic sweeteners must pass comprehensive testing to be approved as food additives in the United States, concerns about their use remain. Saccharin has been shown to cause cancer in laboratory animals. It is still sold since the amount determined to cause cancer to very high. People who have PKU cannot consume foods containing aspartame. Because most synthetic sweeteners are relatively new, more studies are needed to determine possible health risks.

# Handout Two: Coke® Float Activity

Sugar and aspartame are both sweet. But how sweet? Just how sweet are the drinks we enjoy with pizza or on a hot summer's day? In this activity, we will see if regular soft drinks are denser than diet soft drinks. This activity will also help to illustrate the sugar content in popular canned drinks, and help you become aware how much sugar is are consumed when you drink a soda. An extension is provided for those situations where more analysis, measurement and interpretation is desired.

The larger the amount of sugar in a drink makes it more dense. The liquid in the drinks is the only **variable** that changes between two types of drinks. Both types of drinks have about the same amount of aluminum in the can and trapped gases (air and carbon dioxide). The time it takes for the can to sink (or the rate) can be measured.

## Schedule:

Time for preparation (excluding obtaining the drinks) ……10 minutes
Time for basic procedure……...15 minutes
Time for cleanup……10 minutes

## Safety and Disposal

Remind students not to drink any of the soft drinks used in this activity. All of the materials can be disposed of in the garbage.

## Materials:

**Per class**:

- Aquarium or large 5 gallon bucket
- Assortment of drinks: 1 can of Coca-Cola and 1 can of Diet coke, or 1 can of Pepsi and one can of diet Pepsi. Other brands of carbonated regular and diet versions may be used to gain information on drink density and sugar content of different brands. The activity may be extended to non-carbonated drinks sweetened with different types of sugars, and the sinking rates can be measured to reflect density and sugar content.
- Water
- Watch or stopwatch with second hand to measure time.
- Paper and pencil

- **Extension: Figuring Volume and Density**:
  - A scale or balance accurate to 0.01grams
  - 2 50mL graduated cylinders
  - Marker

## Vocabulary

Define the following:

- Rate
- Variable
- Density
- Mass
- Grams (g)
- Milliliter (mL)

## Procedure

**Part 1**

1. Fill the aquarium or five-gallon bucket with water.

2. Prepare a chart or spreadsheet as follows: (A master spreadsheet can be made for the entire class to compare all data.)

| **Coke® Float Activity Data: Carbonated Drinks** | | | |
|---|---|---|---|
| Type of Cola | Floats | Sinks | Sinking Rate |
| Diet | | | |
| Regular | | | |

| **Coke® Float Activity Data: Uncarbonated Drinks** | |
|---|---|
| Brand Name of Drink: | Sinking Rate: |
| | |
| (Add Rows as Needed) | |

3. Students will place cans into water one at a time and record their observations on the spreadsheets. The students can work in pairs, with one person timing the sinking and the other placing and releasing the cans. The spreadsheets can then be entered into the computer using Excel, and graphs or charts can be made using the data.
4. Students will analyze their information and write answers to questions on the worksheet.

**Part 2**
**Extension**:

1. Have the students open the carbonated drink cans and let the gases escape (this may be done overnight and the extension completed the next day after sodas are "de-fizzed".
2. Label one 50 mL graduated cylinder "D" for diet and the other "R" for regular
3. Determine the **mass** of each of the graduated cylinders on the balance and record its weight to the nearest one-hundredth of a gram.
4. Fill the graduated cylinder labeled "D: with the diet cola to the 50-mL mark (you may need to allow the fizzing from the carbonation to settle a few times). Determine the mass of the graduated cylinder plus beverage and record the combined mass.
5. Repeat using the cylinder labeled "R" and the regular cola.
6. Have the students calculate the densities of the two colas using the guidelines on the worksheet.

# Coke® Float Worksheet

Names:

_____

1. What happened to the diet and regular cans of soda when they were placed in the water? Why?

_____

_____

_____

2. Calculate the density of the diet and regular soft drinks using your measurements in the table below:

| Calculated Density of Soft Drinks | | | | | |
|---|---|---|---|---|---|
| Type of Cola | Weight of Graduated Cylinder (g) | Weight of Cylinder plus Cola (g) | Weight of Cola | Volume of Cola (mL) | Density of Cola (g/mL) |
| Diet | | | | | |
| Regular | | | | | |

3. Did the results of the densities calculated in Question 2 support your answer to Question 1? Explain.

_____

_____

4. Name one or more additional factors, which might contribute to the different densities of the diet and regular cans of soda and thus affect their ability to float.

_____

_____