Lesson One

GOAL: For youth to:
- analyze the key points of a decision situation and evaluate the cereal choices based on nutritional value, cost, taste preference and amount of money available for purchase.
- select a healthy cereal at the lowest price for a given situation
- defend decisions made by giving a set of oral reasons.

MATERIALS:
- Consumer Choices Member Guide for each participant, Member Guides contain all necessary worksheets
- Nutrition labels and prices for several types of breakfast cereals (You may also have youth bring these from home)
- Pencils for each participant
- Small hand calculators (optional)

SITUATION:
Healthy ready-to-eat cereals in appropriate amounts can be part of a nutritious diet for both youth and adults. Whether enjoyed at breakfast or other times; ready-to-eat cereals are tasty, convenient and an economical source of good nutrition.

Today, there are hundreds of cereals on the market from which to choose. In the 1990’s, the average American consumed almost 15 pounds of cold cereal annually. However, by 1999, that amount had declined to about 13 pounds due in part to the advent of other breakfast choices such as cereal bars, fast foods and heat and serve convenience foods. Ready-to-eat cereal prices had been on the incline until about the mid 1990’s when declining sales resulted in price cuts in 1996. Cereal prices have remained constant with small increases since that time.

When comparing cereals with other breakfast choices, they are still an economical nutritional choice.

OBJECTIVES:
Participants will increase their awareness of the ready-to-eat cereal market by recognizing:
- the many types of ready-to-eat cereals available
- smart purchasing strategies to select healthy food choices
- consumer buying practices influence what retailers sell and manufacturers produce

Participants will increase their nutrition knowledge of ready-to-eat dry cereals by identifying:
- the USDA* Dietary Guidelines and MyPyramid Food Guidance System
- nutritional benefits of whole grain foods
- components of the nutrition facts food label
* United States Department of Agriculture

Participants will demonstrate their skill/behavior changes by their ability to:
- identify healthy choices of whole grain ready-to-eat cereals
- identify ready-to-eat cereals that contain excess amounts of sugar, sodium and/or fat
- calculate the cost per ounce of cereal

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- identify ready-to-eat cereals that contain excess amounts of sugar, sodium and/or fat
- calculate the cost per ounce of cereal
PREPARATION:

   The worksheet “Using MyPyramid in Your Life-Children and Youth” can be used to determine daily energy needs and meal plans according to age, gender and activity level. This publication can be found at [http://fycs.ifas.ufl.edu/pyramid/index.htm](http://fycs.ifas.ufl.edu/pyramid/index.htm). Make copies of materials for participants.

2. Read the “How to Understand and Use the Nutrition Facts Label” publication developed by the Food and Drug Administration. This publication can be found at: [www.cfsan.fda.gov/~acrobat/foodlab.pdf](http://www.cfsan.fda.gov/~acrobat/foodlab.pdf)

3. Ask participants to complete a three day diet history. An activity sheet is included in the member booklet. Provide copies for all participants.

4. Ask participants to bring empty cereal packages from home. These packages will be used to practice label reading. Make copies of materials for participants.

CONCEPTS TO TEACH:
1. The many types of ready-to-eat cereals available
   Ready-to-eat cereals can be part of a healthy diet. Cereal is no longer just a breakfast food. Many people of all ages enjoy cereal as part of a lunch and dinner meal, between meal snacks and as an ingredient in many foods such as casseroles, main dishes, vegetable dishes and desserts.

2. Smart purchasing strategies to select healthy food choices.
   Include in this section how to calculate cost per ounce, using store and manufacturer's coupons, comparing store brands and nationwide brands, etc.

3. Consumer buying practices influence what retailers sell and manufacturers produce
The 2005 USDA Dietary Guidelines provide advice for people two years and older about how good dietary habits can promote health and reduce risk for major chronic diseases.

The USDA Dietary Guidelines describe a healthy diet as one that:
- Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products;
- Includes lean meats, poultry, fish, beans, eggs, and nuts; and
- Is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars.

Since everyone has different nutritional needs and food preferences, the USDA created the MyPyramid Plan to help people choose the foods and amounts that are right for them. These guidelines focus on selecting smart food choices from every food group, finding balance between food and physical activity, and getting the most nutrition from the calories consumed.

MyPyramid is made up of five food groups representing over 50 different nutrients necessary for good health. The five food groups are grains, vegetables, fruits, milk and meat and beans. These foods contain a variety of nutrients such as protein, carbohydrate, fat, vitamins, minerals and water. It is our responsibility to select foods in appropriate amounts that provide our bodies with the right balance of these nutrients.
THE NUTRITIONAL BENEFITS OF WHOLE GRAIN FOODS

The 2005 Dietary Guidelines for Americans recommend that at least half of all the grains we eat should be whole grains. Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas, and grits are examples of grain products. Ready-to-eat cereals are made from whole grains as well as refined grains. Whole grain ready-to-eat cereals in appropriate amounts can be an important part of a healthy diet.

Fiber is important for maintaining a healthy digestive system. In addition to promoting normal bathroom habits, proper amounts of water and dietary fiber each day can help protect against the development of type 2 diabetes, obesity, certain types of cancer and heart disease.

Grains are divided into 2 subgroups, whole grains and refined grains.

**Whole grains** contain the entire grain kernel -- the bran, germ, and endosperm. Examples include: whole-wheat flour, bulgur (cracked wheat), oatmeal, whole cornmeal and brown rice.

**Refined grains** have been milled, a process that removes the bran and germ. This is done to give grains a finer texture and increase the time they can stay in the pantry. This process also removes important nutrients such as dietary fiber, iron, and many B vitamins. Some examples of refined grain products are: white flour, degermed cornmeal, white bread and white rice.

Most refined grains are enriched. This means certain B vitamins (thiamin, riboflavin, niacin, folic acid) and iron are added back after processing. Fiber is not added back to enriched grains. Check the ingredient list on refined grain products to make sure that the word “enriched” is included in the grain name. Some food products are made from mixtures of whole grains and refined grains.
SPECIAL NUTRITION CONSIDERATIONS
WHEN SELECTING DRY CEREALS

Sugar Content:
Carbohydrate is our body’s main source of energy. Starch and sugar are the two types of carbohydrate found in food. Some starches also contain fiber which is important for a healthy diet. While all carbohydrates provide four calories (energy) per gram, they are all not nutritionally equal.

Many foods contain a combination of carbohydrates as well as other nutrients such as vitamins, minerals and water such as fruits and vegetables. These foods are called nutrient dense. There are also some foods that just contain sugar, such as candy and certain dessert foods which provide many calories with little or no other nutrients. These are called empty calorie foods.

Today, many dry cereals as well as other breakfast foods look and taste like desserts. We need to consider the amount of sugar in the cereal compared to the total nutritional value. When we eat some of these “candy cereals” it is like eating milk and sugar instead of milk and cereal. The goal is to get most of our carbohydrates from foods that contain starch, fiber and naturally occurring sugars (fructose and lactose) rather than plain sugar (sucrose) foods that provide only calories and little if any other nutrients.

Foods contain natural and added sugar. Natural sugar is lactose in milk and fructose in sugar. Added sugars are sugars and syrups that are added to foods or beverages during processing or preparation.

Foods that contain most of the added sugars in American diets are:

- regular soft drinks
- candy
- cakes
- cookies
- pies
- fruit drinks, such as fruitades and fruit punch
- milk-based desserts and products, such as ice cream, sweetened yogurt and sweetened milk grain products such as sweet rolls and cinnamon toast

Reading the ingredient label on processed foods can help to identify added sugars. Names for added sugars on food labels include:

- brown sugar
- corn sweetener
- corn syrup
- dextrose
- fructose
- fruit juice concentrates
- glucose
- high-fructose corn syrup
- honey
- invert sugar
- lactose
- maltose
- malt syrup
- molasses
- raw sugar
- sucrose
- sugar
- syrup
**Sodium Content:**

**Sodium** is a mineral that the body needs in small amounts. It serves to maintain normal cell function by helping to regulate fluid volume in the body. It is found in foods mostly as **sodium chloride**. Sodium chloride is another name for table salt. One teaspoon of salt contains about 2,000 milligrams (mg) of sodium. Sodium occurs naturally in many foods and is also added in processing. Most sodium added to foods comes from salt. Other ingredients and food additives contain sodium as well.

Your body needs only a small amount of sodium. Most health experts agree that we should consume sodium in moderation to reduce risk of certain health problems such as heart disease, high blood pressure, stroke and kidney disease.

**The Dietary Reference Intakes for daily sodium intake are:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Adequate Intake (milligrams)</th>
<th>Upper Limit (milligrams)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-6 months</td>
<td>120</td>
<td>Not available</td>
</tr>
<tr>
<td>7-12 months</td>
<td>370</td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 years</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>4-8</td>
<td>1200</td>
<td>1900</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-13 years</td>
<td>1500</td>
<td>2200</td>
</tr>
<tr>
<td>14-18</td>
<td>1500</td>
<td>2300</td>
</tr>
<tr>
<td>19-30</td>
<td>1500</td>
<td>2300</td>
</tr>
<tr>
<td>31-50</td>
<td>1500</td>
<td>2300</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-13 years</td>
<td>1500</td>
<td>2200</td>
</tr>
<tr>
<td>14-18</td>
<td>1500</td>
<td>2300</td>
</tr>
<tr>
<td>19-30</td>
<td>1500</td>
<td>2300</td>
</tr>
<tr>
<td>31-50</td>
<td>1500</td>
<td>2300</td>
</tr>
</tbody>
</table>

THE COMPONENTS OF THE NUTRITION FACTS FOOD LABEL

The Nutrition Facts label is a tool to help us choose food products based on their nutrition composition. The label is designed to provide the nutrient content of select nutrients per serving. The nutrients listed on the label include: total fat grams, saturated fat grams, trans fat grams, protein grams, total carbohydrate grams, fiber grams, sugar grams, sodium milligrams, percent of calcium, percent of vitamin A, percent of vitamin C and percent of iron.

In addition to these listed nutrients, the manufacturer has the option of including additional information on other nutrients provided such as B vitamins, folic acid, potassium, zinc, phosphorus, copper, magnesium and vitamin D.

In addition to the nutrition label there is an ingredient list on the food label. By law food companies have to list the ingredients in descending order by weight. The most abundant ingredient is listed first, then the second, and so on.

Putting it All Together- Here are some nutritional guidelines to consider for selecting a ready-to-eat cereal’ nutritive content:

- First ingredient listed is whole grains or whole wheat
- Has less than 6 grams of sugar per serving.
- Has at least 4 grams of fiber per serving.
- Has no more than 200 milligrams of sodium
- Has no more than 5 grams of fat per serving
While all food packages list the number of servings per package, this predetermined amount (such as ½ cup or ¾ cup) may be less or more than the actual amount of cereal actually eaten at a meal or snack. Therefore, the most economical way to purchase cereal is to know approximately how much is eaten and then judge the cost according to the “actual serving.” This information will guide purchases according to cost as well as how often to replenish the product.

Based on personal eating habits, there are two methods to get this information. If a family regularly eats the serving size listed on the package, such as ½ cup, then we could expect the package to provide the number of servings listed on the label. However, if a family eats more than the listed serving size, such as two to three times that amount, then it is best to calculate the cost based on the total ounces or weight of the cereal in the package.

To determine the cost per serving, divide the number of total servings listed on the nutrition facts label into the cost of the package. For example, if you purchase a $3.50 package of cereal that contains 10 servings, the cost per serving would be 35 cents.

To determine the cost per ounce, divide the cost of the package by the number of ounces it contains. For example, if you purchase a $3.50 package of cereal that contains 12 ounces, the cost per ounce would be 29 cents.

Example: Mary really enjoys eating cereal for breakfast as well as for an afternoon snack. She usually eats one cup of cereal for breakfast and one cup for snack every weekday. If the cereal package costs $4.00, weighs 14 ounces and contains 14 – ½ cup (one ounce) servings how much is she actually paying per serving? How many days will the package last before she needs to buy more cereal?

First, Mary should determine the cost of this cereal based on the actual amount she eats per meal since it is much more (twice as much) than the ½ cup serving listed on the package.

- According to the package there are 7 cups of cereal in the box. This is calculated by multiplying the ½ cup serving by the 14 servings in the package.

- Then she needs to determine the cost per ounce. If the package costs $4.00, and there are 14 ounces in the package, the cost per ounce is 29 cents. This is calculated by dividing $4.00 by 14. Therefore, her actual cost per one cup serving is 58 cents. This is calculated by multiplying her two ounce or one cup serving by 29 cents.

Finally, this package of cereal will last only three days since Mary eats 2 cups each day with a cup leftover.
ACTIVITIES TO PERFORM:

1. **MyPyramid Eating Plan and Assessment** - Determine the daily nutritional needs of each participant. Information to learn would include:
   - recommended daily calorie and physical activity levels;
   - approximate amounts of servings from each of the different food groups;
   - use of discretionary calories from sugars
   - application to how ready-to-eat cereals meet dietary needs.

Have each participant learn their nutritional requirements by completing the personal assessment located at the youth section located at [www.MyPyramid.gov](http://www.MyPyramid.gov), and completing the worksheet “Using MyPyramid in Your Life-Children and Youth.” You may also use the prepared posters of recommended daily food intake included in this manual. Depending on resources, this activity can be done at home or as part of a 4-H club meeting.

Then have each participant complete a three day food history (actual food and fluid intake). Food Diary Worksheets are included in both the Leader and Member booklets.

Participants should then compare their actual eating habits to the recommended plans. This can be done by recording the deficiencies and excesses (example: need to eat more fruit, reduce intake of sweets, etc) on a piece of paper and then have a group discussion.

2. **Food Label Scavenger Hunt** — Conduct label reading exercises to:
   - identify healthy choices of whole grain ready-to-eat cereals
   - identify ready-to-eat cereals that contain excess amounts of sugar, sodium and/or fat

First, discuss the purpose of food labels and the importance of using the information to make wise choices. Distribute and discuss the Food and Drug Administration’s publication How to Understand and Use the Nutrition Facts Label. This publication can be found at [www.cfsan.fda.gov/~acrobat/foodlab.pdf](http://www.cfsan.fda.gov/~acrobat/foodlab.pdf).

Then, take a field trip to the grocery store. Have the group record the ingredient information from reading four different dry cereal packages. Have the youth record their answers on the worksheets located in this manual. This activity may also be done in a 4-H club meeting with labels of cereals that the youth bring from home.

3. **Calculate the Cost & Smart Shopping Strategies** — Using the Member worksheets, have youth learn to:
   - determine the cost per serving
   - determine the cost per ounce —for actual consumption by the individual/family as compared to the cost based on servings listed by manufacturer.
   - compare cost savings using other strategies, like store brands, coupons, etc.

Keep in mind the “actual” serving size when calculating cost. Remember, sometimes we can figure cost based on the listed number of servings on the package, but if the usual serving is much more than that listed, it is best to calculate cost per ounce.
4. Putting It All Together: What’s Your Choice?
Now let’s combine all the information collected to select the best choice. Using the sample judging situation, let you select the best choice for the given situation. Have youth practice providing reasons for their choices.

Have youth create new situations and products for continued decision-making practices.

**SAMPLE CEREAL JUDGING SITUATION**

Rose and Charlie are looking for a cold breakfast cereal they can switch to because they need to reduce their food bill by at least $10.00 per month. They want to reduce their credit card debt faster and pay less interest. They have decided to save the money on cereal and are willing to change cereals and brands to do this. Currently they spend $32.00 a month on 8 boxes of cereal. They eat cereal once a day every day, but each one eats two ounces (about twice the amount recommended as a serving size on the cereal boxes) a day. There are only the two of them in their family. They would also like to find a cereal with at least 3 grams of fiber per serving. Which of the cereals listed below is the best buy for them?

**Note:** 1 ounce = 28.35 grams

<table>
<thead>
<tr>
<th>Cereal</th>
<th>Fiber</th>
<th>Pkg. Size</th>
<th>Serving Size</th>
<th>Servings per Pkg.</th>
<th>Cost per Pkg.</th>
<th>Cost per Serving</th>
<th>Cost per Day</th>
<th>Cost per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Publix Toasted Oats</td>
<td>3 grams</td>
<td>425 grams</td>
<td>32 grams</td>
<td>13</td>
<td>$2.00</td>
<td>$0.15</td>
<td>$0.60</td>
<td>$18.00</td>
</tr>
<tr>
<td>2. General Mills Cinnamon Grahams</td>
<td>1 gram</td>
<td>432 grams</td>
<td>30 grams</td>
<td>14</td>
<td>$2.50</td>
<td>$0.18</td>
<td>$0.72</td>
<td>$21.60</td>
</tr>
<tr>
<td>3. Kellogg’s Frosted Mini Wheats</td>
<td>5 grams</td>
<td>454 grams</td>
<td>51 grams</td>
<td>9</td>
<td>$2.29</td>
<td>$0.254</td>
<td>$1.016</td>
<td>$30.48</td>
</tr>
<tr>
<td>4. Poast Honey Nut Shredded Wheat</td>
<td>4 grams</td>
<td>567 grms</td>
<td>52 grams</td>
<td>11</td>
<td>$2.75</td>
<td>$0.25</td>
<td>$1.00</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

**Answers:**
Placings: 1-2-4-3  Cuts: 5-5-2

**Justification**

First Place: The main need of Rose and Charlie is to save $10.00 per month. With choice 1 they can save more: $14.00 per month, which will help them pay off their debts sooner. The second need they have is to get at least 3 grams of fiber per serving. This need is also met with this cereal.

Second Place: This cereal choice will save them $10.40 per month, which meets their main need. However, the fiber need will not quite be met.

Third Place: This cereal choice will save them only $2.00 per month, although it does exceed the fiber need.

Fourth Place: This cereal choice will only save $1.50 per month, although it also exceeds the fiber need.
Use this diary sheet to track your meals for three days. Be sure to include all foods that you eat for meals or snacks.

<table>
<thead>
<tr>
<th>FOOD GROUP</th>
<th>DAY ONE</th>
<th>DAY TWO</th>
<th>DAY THREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAINS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEGETABLES</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FRUITS</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MILK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEAT AND BEANS</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Think about added sugars and oils you consumed over these three days and make a list of them below:

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
**Food Label Scavenger Hunt**

1. **Compare** the **ingredient list** from **four different cereal packages**. 
(Select two cereals you usually eat as well as two cereals you have never tried)

<table>
<thead>
<tr>
<th>Product</th>
<th>First Ingredient Listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
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</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>

Which product(s) had whole wheat or whole grain listed first?

Which product(s) had sugar or another sweetener listed in the first three ingredients?

2. **Compare** the **nutrition facts label** from the same cereal packages

<table>
<thead>
<tr>
<th>Nutrition Info.</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serving Size (in cups)</td>
<td></td>
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<tr>
<td>Calories per Serving</td>
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<tr>
<td>Fat grams</td>
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<tr>
<td>Sodium milligrams</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate grams</td>
<td></td>
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<td></td>
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<tr>
<td>Sugar grams</td>
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</tr>
<tr>
<td>Calcium percent</td>
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<td></td>
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<tr>
<td>Iron percent</td>
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</tr>
</tbody>
</table>

Which cereal had the **highest** amount of fiber per serving? ____________________

Which cereal had the **lowest** amount of fiber per serving? ____________________

Which cereal had the **highest** amount of sugar per serving? ____________________

Which cereal had the **lowest** amount of sugar per serving? ____________________

Which cereal(s) had sodium content **greater than** 200 milligrams (mg) per serving? ____________________

Which cereal was the best choice based on nutrient content? ____________________
3. Calculate the cost of the cereal by serving and per ounce (weight).

<table>
<thead>
<tr>
<th>Product</th>
<th>Package Cost</th>
<th>Servings/Package</th>
<th>Package Size</th>
<th>Cost per Serving</th>
<th>Cost per Ounce</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td></td>
<td></td>
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<tr>
<td>#2</td>
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<tr>
<td>#3</td>
<td></td>
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<tr>
<td>#4</td>
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</tbody>
</table>

Based on cost per serving which product is the least expensive?

Based on cost per serving which product is the most expensive?

Based on cost per ounce which product is the least expensive?

Based on cost per ounce which product is the least expensive?
Lesson Two

GOAL: For Youth To:
- understand the importance of using sun care products
- analyze and evaluate products for effectiveness
- use sun care products effectively.

MATERIALS:
- Consumer Choices Member Guide for each participant.
- Variety of sun care products with prices for youth to evaluate and compare.

SITUATION:
Florida is called the Sunshine state, and for a very good reason! Days are long and the sun is bright. Balmy weather and white beaches entice both residents and tourists to bask in the sunshine. Most of the swimmers and sun bathers are striving for a “healthy tan,” unaware there is no such thing as a “healthy tan.” Some young people who are unable to spend time in the sunshine even go to “tanning booths” to get a tan.

Contrary to popular belief, suntans are not healthy. Whether obtained in the sunshine or a tanning booth, they are an invitation for skin cancer. The occurrence of skin cancer in the U.S. is increasing rapidly. Southerners are more likely than others to develop skin cancer. In the South there are more cases of skin cancer than all other cancers combined. Skin cancer is actually the most common type of cancer in the U.S. According to the current estimates, 40 to 50% of Americans who live to age 65 will have skin cancer at least once.

A state’s geographic location determines the length of the day, the amount of sunshine, and the sun’s intensity. States such as Florida, California, and Texas that have the most sunshine also have the most skin cancer. For example, one study found that Dallas, Texas, has two and one-half times more skin cancer than Minneapolis, St. Paul, Minnesota.

The Food and Drug Administration (FDA), the medical profession, and educational groups are attempting to inform the public about dangers associated with overexposure to sunshine. Physicians say there are two types of overexposure, one is the severe sunburn, along with the associated pain and peeling. The other is the accumulated exposure to the sun that puts the skin through a repeated cycle of injury, repair, and ultimately permanent damage. Harmful effects build up with each exposure, whether sunburn occurs or not. Dermatologists say that in Florida if you are going to be outdoors for more than 15-20 minutes you should use sunscreen or sun block. Sunscreen use should start in early childhood and continue throughout life.

Overexposure to sunshine can produce serious consequences which are not obvious at the time of exposure. Young people are at greatest risk because they have their entire lives ahead of them and the effects of overexposure are cumulative. The results do not become obvious until years later when nothing can be done to reverse the damage.
OBJECTIVES:
For program participants to:

- Become informed about ultraviolet radiation and its presence in sunshine.
- Understand causes of potential skin problems and to take actions that will avoid overexposure to sunshine.
- Become informed about sun care products and learn to distinguish between product types.
- To read and understand labels used on sun care products.
- Identify the type of sunscreen or sun block appropriate for their individual needs.
- Compare cost and effectiveness of various types of sunscreens and sun blocks.
- Develop the habit of using a sun care product when there is moderate or long term exposure to sunshine, whether for work or recreation.

PREPARATION:

1. Read guides provided and research the different brands and types of products on the market.
2. Check out the SUN WISE Educational Kit from EPA from your local Extension office or go to: http://www.epa.gov/teachers/order-publications.htm#health or http://www.epa.gov/sunwise/educator_resources.html to locate additional resources to assist in teaching this topic.
3. Check out the video tapes, “Sun Safety: Growing Health Concerns,” “Sun Sense,” and “Protect Your Skin”. The Sun Safety video tape is new and excellent. (Available from County Agent.)
4. Ask participants to bring in sun care products to use in judging situations.
5. Contact a local health professional, i.e. dermatologist to come talk to youth about impacts of the sun on their skin/future health.
6. For a creative activity, order ultraviolet detecting beads from http://www.teachersource.com to have youth make sun sensitive bracelets and use for teaching experiments.

CONCEPTS TO TEACH:
Contrary to popular belief a suntan is not healthy. Potential dangers include:

- A sunburn can be as dangerous as a burn resulting from fire, hot water, or other heat sources.
- Premature drying, wrinkling, and aging of the skin.
- Increased potential of skin cancer and keratosis.
- People living in the South, have more exposures to the sun than people living in the Northern states with shorter days and less intense sunshine.
- Residents of Southern states such as Florida, California, and Texas have more skin problems than do residents of Northern states.
- Excessive exposure to the sun will damage the skin of all people, regardless of race or skin color. However, people with very dark skin are the least affected.

Those who are most susceptible to the adverse effects of sun exposure are people who:

- Have light colored skin and eyes.
- Are of Northern European backgrounds.
• Have very tender, sensitive, or thin skins such as children and older people.
• Are taking certain medications, for example: medications such as retinoic acid or retinoin taken for acne, tranquilizers, diuretics, and others. People taking medications should consult their doctors about exposure to sunshine.
• Use chemicals such as skin bleaches.

In Florida, most people who are exposed to sunshine need some protection. They include:
• Anyone who works and/or plays in the sunshine. For example students who are in the sun for 30 minutes or longer at one time.
• Golfers, swimmers, joggers, gardeners, picnickers, spectators at games held in the open, and others involved in outdoor recreation or play.
• People taking certain types of medications.
• Fishermen, farmers, lifeguards, and others who work outdoors.

The type and extent of protection needed is determined by:
• Skin type, age and condition of the individual.
• Length and type of exposure.

Where a person is exposed to the sun influences the amount of radiation received.
• A person will sunburn or blister faster at the beach than in locations such as in a garden or on a golf course. At the beach the sun’s radiation is reflected by the water and sand. Even on an overcast day it’s easy to burn because of the reflected radiation of the sun.
• An umbrella is some help but 50 – 75% of the ultraviolet radiation is reflected to the individual sitting under the umbrella.
• Wet T-shirts and light clothing provide only limited protection. About 45% of the sun’s radiation is transmitted with the water droplets. Long, loose fitting beach robes do provide considerable protection.
• Remember, most of the sun’s radiation penetrates the water. Staying under the water while swimming does not prevent sunburns.
• Clouds can filter out visible light but about 80% of the ultraviolet radiation passes through. Therefore, an overcast day is not a protection.

ULTRAVIOLET RADIATION - UVB AND UVA RAYS—THEIR PRESENCE IN SUNSHINE

UVB, the short ultraviolet rays that are responsible for burning and deep tanning. These rays are responsible for the cumulative effects that sunshine can have on skin. The greatest exposure to UVB rays occurs during the mid-day hours, from about 10 AM until 3 PM.

UVA rays are ultraviolet rays that are milder than UVB rays but that penetrate more deeply. UVA is present in sunlight throughout the day. These rays accentuate damaging effects of UVB including the development of skin cancer. They can harm blood vessels and contribute to the development of skin cancer. They are believed to be responsible for photosensitive skin reactions of people who take medications or are exposed to certain chemicals. The UVA rays are used in tanning booths.
The reddening effect of a sunburn is the skin’s response to exposure to excessive sunlight. To shield itself against future exposure, the skin releases melanin. Different skin types contain different amounts of melanin. The less melanin available, the fairer the complexion, and the less protection the skin has. Contrary to some beliefs, fog, over-cast skies, and light clouds do not protect against sunburn. It is important for you to use a sunscreen or sun block that protects from both UVB and UVA rays.

In 1978 a panel, under the direction of the FDA, evaluated the effectiveness of sunscreens and sun blocks. The panel recommended that all sunscreens and sun blocks be required to state the Sun Protection Factor (SPF) on the label. The industry immediately adopted the labeling without waiting for a FDA rule. Because of the growing popularity of activities that involve exposure to sunshine, national health organizations are trying to educate the public about risks associated with overexposure. Sunscreens and blocks are easily available, and some cosmetics now contain sun protection ingredients.

It is important for people to use a sunscreen or sun block, and especially young people. It is also important for them to learn about the similarities and differences in the products and how to shop for the choices that best fit their situations and needs. This project is designed to teach young people the importance of using sun care products, how to comparison-shop for them, and how to use them effectively.

HAZARDS OF OVEREXPOSURE

Several significant skins problems result from overexposure to ultraviolet rays from the sun. These are:

- Premature aging of the skin, producing wrinkles, leathery appearance, making you look older than your age.
- The appearance of blotchy, dark brown or “age” spots.
- Thinning of the skin in some areas showing the blue lines of blood vessels, causing easy bruising. In other areas the skin becomes thick, tough, and scaly.
- The likelihood of keratosis, and discolored scaly growths, some of which are precancerous.
- The possibility of skin cancer. The American Cancer Society estimates there will be more than a million new cases of skin cancer diagnosed in the U.S. this year.

SKIN CANCERS:

**Basal cell**, the most common type of skin cancer is usually found on the head, neck, hands, and trunk. It grows slowly and can be successfully treated or surgically removed, but it can be fatal if ignored.

**Squamous cell** is a more serious type of cancer that is slow growing. It can be treated or surgically removed, but neglected it can eventually grow down within the skin and metastasize to other organs and cause serious damage or death.

**Melanoma** is a very serious type of cancer with a high mortality rate. The number of cases is growing, there will be about 51,4000 new cases of melanoma this year with about 9,800 deaths. More than half of those diagnosed with melanoma will eventually die from the disease. For many years little was understood about melanoma, however recent findings suggest it may be traced to intense, short-term exposure before age 20 accompanied by
blistering and painful sunburn. The likelihood of melanoma at sometime during one's life has increased from 1 in 1,500 people in 1930 to 1 in fewer than 200 people today.

Basal cell and squamous cell carcinomas are almost always curable when they are detected and treated early. However, if left untreated, they can cause severe disfigurement and even death. Melanoma is a very serious and is becoming more common. Also more people are having skin cancer. All races have skin cancer, however dark skin people have fewer cases.

**TYPES OF SUN CARE PRODUCTS**

A variety of sun care products are available – offering protections that range from full to none. Sun care products are divided into 3 categories:

**Suntan lotions and creams.** These products are primarily lubricants and moisturizers for the skin. They provide no protection against ultraviolet radiation. They do not prevent blistering, burning, and provide no help in getting a tan.

**Sunscreens** filter some of the sun’s radiation, reducing its harmful effects for a period of time. Sunscreens permit some tanning, but require a longer period of exposure to acquire a tan. They substantially extend the period of time a person can stay in the sunshine without getting a sunburn. This permits a person to work or play longer without skin damage. The protection provided by sunscreens varies widely ranging from minimum to maximum protection.

**Sun blocks**, deflect virtually all ultraviolet radiation, prevent tanning and provide maximum protection from the sun’s radiation when used as directed. These products enable the person who always burns or blisters to be exposed to sunshine without injury.

It is important to select the correct type of sun care products for your needs. Suntan lotions, advertised to promote tanning, only moisten the skin as it bakes. They do not speed tanning. Neither do they protect against burning. Sunscreens are different from suntan lotions. They contain chemicals developed within the last few years that selectively absorb radiation from the “burning” wavelengths of the UV (ultraviolet) spectrum. Sunscreens are sold in cream and lotion forms. When applied they seem to disappear into the skin. These chemicals have been declared safe by the FDA and effective against sunburn.

Some sunscreens/sun blocks are marketed for specific uses, for example, the face, children and sensitive skin. Sunscreen/sun blocks for the face usually use special very mild creams at their base. Those for babies have no alcohol, and use non-irritating skin creams and may avoid PABA (para-aminobenzoic acid) since some people are allergic to it. These sunscreens/sun blocks can be used by anyone, the SPF is the indicator of effectiveness.

Most young people spend a lot of time out of doors. Acne is a problem for many teenagers. Retinoic acid and similar products are widely used in treating acne. The FDA, the American Academy of Dermatologists and other doctors warn people using Retinoic acid and other acne medications about the patient’s increased sensitivity to sunlight, which will cause skin damage and increased risk of cancer. Those using such medications should carefully follow
their doctors' instructions to use sun blocks.

Interesting combination products are available. For example, sunscreen with insect repellent, and make-up with sunscreen.

**PRODUCT LABELS—What They Tell Us**

The UV-absorption qualities of ingredients in sunscreens and sun block are so identifiable they can be quantified. This enables them to be labeled with the degree of protection provided called the SPF (sun protection factor). Numbers range from 2 to 65. The higher the number, the greater the protection. For example, SPF 15 provides more protection than a SPF 10. If a person’s skin begins to turn red or sunburn when in the sun for 5 minutes, he/she should be able to stay in the sun 20 times as long (about 100 minutes) when using a SPF 20 sun block.

Read the label - all of it! The label tells the SPF number, the list of ingredients, methods of application, and other important information such as whether or not is a water repellent and how long the protection lasts. The FDA has found more than 20 compounds to be effective in sunscreens/sun blocks.

The higher the number the more protection provided. Sunscreens with a number less than 15 provide limited or inadequate protection.

Labels also tell if the sunscreen/sun block is water-resistant or waterproof. Most products are water-resistant for about 40 minutes. Those that are waterproof require soap and water for complete removal. However, both will rub off when you dry-off with a towel or rub against something. You should reapply the sunscreen/sun block anytime you come out of the water and dry-off. Sun blocks must be applied correctly and reapplied at intervals to be effective.

**EFFECTIVE USE OF SUN CARE PRODUCTS**

It is important to apply a sunscreen/sun block carefully and at least 40 minutes before going into the sunshine. Uneven applications can lead to the missed areas burning or tanning unevenly. Instructions on the label should be followed. Reapply after swimming. Studies have found that fewer than half of the people use sun block regularly. Others may not apply enough sunscreen or use it incorrectly. Some do not reapply after sweating or toweling off. Others underestimate their time exposed to sunshine.

For those who are determined to get a suntan, tanning should be done gradually to prevent burning and minimize damage. The amount of melanin (pigment) naturally present in the skin is inherited and determines a person’s ability to tan. Dark people have greater concentrations than light skinned people. Some people will freckle or burn, but never tan. A tan is actually the skin’s response to injury and its attempt to shield itself from harmful ultraviolet radiation. Tan forms when ultraviolet rays stimulate pigment-producing cells in the skin called melanocyte to produce melanin. There microscopic brown-black granules attempt to shield the body from overexposure. After exposure it takes at least 3 days for the melanin to rise to the surface of the skin and form a tan. However, a suntan does not protect a person from a sunburn, and each exposure adds risk. If you burn enough to peel, you lose
the protection of the melanin and the tanning process must start over. The greater the exposure, the more damage to the skin. Damage is accumulated over a long period of time, thus people seeking medical help with skin problems have traditionally been middle age or older. However, dermatologists now report seeing a surprising number of adolescents and young adults with skin problems.

**TIPS FOR SUN SAFETY:**

It takes about 2 weeks for a person to get a suntan. (A sunburn can be obtained within a very short period of time.) If a person is determined to get a suntan, he/she should avoid blistering and avoid excessive exposure.

**To obtain a suntan without blistering:**

- Select the sunscreen best suited for your individual needs. Use it to avoid excessive exposure to the sun's harmful radiation.

- Limit exposure. Start with about 30 – 40 minutes in the sun and gradually increase exposure by 5 – 10 minutes daily until the desired tan is achieved.

- Restrict exposure to the periods **before** 10 AM and **after** 3 PM when the sun's radiation is less intense. (Avoid exposure from 10 AM until 3 PM).

- Move around instead of staying still. A moving person receives less direct radiation than a still person, and can stay in the sun longer without burning.

- Special care should be given to areas rarely exposed to the sun, such as back of legs, upper legs if they haven’t been exposed to the sun recently, lips, noses, shoulders, tops of feet, and other sensitive areas.

- Be very careful about protection from heat stroke or exhaustion.

- Realize that uneven applications of sun care products can result in an uneven suntan. Clothing and shadows may also cause uneven coloring.

- For some people, freckles and dark pigment splotches will result from exposure to the sun.

- Stop with a light or moderate tan, do not overdo it. It is safer to use a skin dye. It colors your skin without the risks associated with sun exposure.

- Wear sun glasses when in sunshine for eye protection. It is now generally believed that excessive sun exposure is a factor in the development of cataracts.

- Dermatologists recommend anyone over 6-months old use a sun block of SPF 15 or higher which protects against UVA and UVB radiation, anytime he/she will be outside for more than 20 – 30 minutes.

- Apply sunscreen at least 40 minutes before going into the sun.
• There are price variations. These result from marketing practices and ingredients used as the basis of sun care products. A $3.00 store brand with SPF 16 provides the same protection as specialty product selling for $8.00. The more expensive product may have special creams that feel nice but do not affect effectiveness. Price is not an indicator of quality.

• Remember you can get a sunburn on cloudy days, with wet clothing, and even in the shade of an umbrella.

• Protect your body with a sun block and your eyes with sun glasses.

**SUGGESTED ACTIVITIES:**
Select several sun care products. Test the products on different types of fabric to see if they stain the fabric. Read the label to see if there is a warning about stain. To test for stains, place a small amount of each product on fabric samples. Let dry. Then rinse to see if the stains remain. Also, place a small amount of each product on the back of your hand or arm. Let dry. Then rub your hand or arm against the fabric to see if the product comes off on the fabric.

Ask each 4-H’er to decide which sunscreen or sun block is most appropriate for him/her. Have each tell the group of his/her choice and the reasons. Then, see if the others agree the choice is correct.

Ask the 4-H’ers to bring any sun-care products they now own to the meeting. Evaluate the protection each product offers.

Show the video tapes, “Sun Safety: Growing Health Concerns,” “Sun Sense,” and “Protect Your Skin”. The Sun Safety video tape is new and excellent. (Available from County Agent.)

Invite a dermatologist or health care specialist to talk with the group about skin care.

Compare the price of different brands and from different stores.

Use your Sun Sense instructional kit.

Set up practice judging situations.

**References:**


Dr. Ruth Wilkerson, Dermatologist, Gainesville, FL (2004).

How to Survive a Season in the Sun, *Consumer Reports*, June, 1980.

In Pursuit of a Summer Tan, *FDA*.

Sample Judging Situation:

Billy and his 5 year old sister are going to the beach with their parents. Mother has put Billy in charge of making sure the family has the needed sun care products. She said to check the supply on hand, and if needed, to buy a sunscreen or sun block. She said to consider the price if he had to buy. Billy has looked around the home and visited the store, and is considering 4 options:

A 10 ounce tube of sunscreen in the home that is labeled SPF 8, protects against UVB and is waterproof.

A 12 ounce bottle of sun block found in the home. It is labeled “Face”, protects against UVA and UVB radiation and has a SPF of 22. It is water repellent. (Mother often uses this product under make-up.)

In the store an 8 ounce bottle of sun block labeled “protects against UVA and UVB” with a SPF rating of 30. It is water repellent. Cost $7.95.

In the store, a 10 ounce bottle of sunscreen with a SPF rating of 12, labeled “water repellent” and protects from UVA and UVB. Cost $5.98.

Help Billy find the best product for his situation.

Answers:

Placings: 2 - 3 - 4 - 1  Cuts:  5 - 5 - 2

Justification:

1st Place: Number 2, the “face” sun block that is in the home. Number 2 is placed over number 3 because preference was to be given to products already in the home. The SPF of 22 meets present recommendations that a SPF of 15 or greater be used. Sun blocks developed for the face are useable by anyone on any part of the body. The SPF is the primary factor in selecting a sun care product. It protects against both UVA and UVB.

2nd Place: Number 3, the sun block in the store. It has a SPF of 30 and protects against both UVA and UVB. Although it is water repellent, sun blocks must be reapplied at intervals and there is not a great deal of difference between water repellent and waterproof. Although the cost is greater, there is much difference in the protection provided by SPF 30 and SPF 10.

3rd Place: Number 4. The in-store product with the SPF rating of 10. It is chosen over number 1 because it has a higher SPF and protects against both UVA and UVB.

4th Place: Number 2. The sunscreen in the home has the lowest SPF and protects only against UVB.
SITUATION:
Did you know that chewing gum has been around for over 900 years? People of all ages have enjoyed chewing gum-like substances in many lands and from very early times. It can be purchased at a variety of locations and it comes with many options.

OBJECTIVES:
For participants to:
• Become aware of the history of gum (timeline)
• Become aware of health information
• Become aware of the variety of gum brands and flavors available
• Compare costs of competing brands of gum

PREPARATION:
• Review member leaflet.
• Visit store locations or go online and compare various types of gum (brand and flavor), their prices, quantity, and whether or not they offer any additional features (sugar free, teeth whitener, etc.).
• Use situations provided and information gathered to practice various mock judging situations.

CONCEPTS TO TEACH:
Timeline:
• For centuries, the ancient Greeks chewed mastic gum (or mastiche pronounced “mas-tee-ka”). This is the resin obtained from the bark of the mastic tree.
• The ancient Mayans chewed chicle, which is the dried sap from the sapodilla tree.
• North American Indians chewed the sap from spruce trees and passed the habit along to the settlers.
• Early American settlers made a chewing gum from spruce sap and beeswax. Lumps of spruce gum were sold in the eastern United States during the early 1800s, making it the first commercial chewing gum in this country. In about 1850, sweetened paraffin wax became popular and eventually exceeded spruce gum in popularity.
• In 1848, John B. Curtis made and sold the first commercial chewing gum called the State of Maine Pure Spruce Gum.
• In 1850, Curtis started selling flavored paraffin gums becoming...
more popular than spruce gums.

- On December 28, 1869, William Finley Semple became the first person to patent a chewing gum - U.S. patent #98,304.
- In 1869, Antonio Lopez de Santa Anna introduced Thomas Adams to chicle. Adams began experimenting with it as a substitute for rubber and he used it to try and make toys, masks, and rain boots. Unfortunately his experiments failed, so as he was sitting in his workshop one day, tired and discouraged, he popped a piece of surplus stock into his mouth. Chewing away, the idea suddenly hit him to add flavoring to the chicle. He recalled how his son and Santa Anna enjoyed chewing this substance. Shortly, he opened the world's first chewing gum factory. Gum made with chicle and similar latexes soon won favor over spruce gum and paraffin gum. It made possible a smooth, springy, satisfying chew that the others lacked, and it held flavors longer and better.
- In 1871, Thomas Adams patented a machine for the manufacture of gum.
- He was not the first person to come up with this idea. John Colgan, from Louisville, Kentucky, came up with this idea in 1875. He used a medicinal resin from the bark of a tree to flavor the gum. Colgan’s idea seemed to make chewing gum taste better for a longer period of time while being chewed.
- By 1888, an Adams’ chewing gum called Tutti-Frutti became the first chew to be sold in a vending machine. The machines were located in a New York City subway station.
- In 1899, Dentyne gum was created by New York druggist Franklin V. Canning.
- By the early 1900s, with improved methods of manufacturing, packaging and marketing, modern chewing gum was well on its way to its current popularity.
- In 1914, Wrigley Doublemint brand was created. William Wrigley, Jr. and Henry Fleer were responsible for adding the popular mint and fruit extracts to a chicle chewing gum. A vast area of farmland is required to raise all the mint plants necessary to meet the Wrigley Company's annual needs for mint oil. If added together, this farmland would equal 53 square miles, or approximately 30,550 football fields. The leading mint producing states are Idaho, Indiana, Michigan, Oregon, Washington and Wisconsin.

### Health Information
- In 1939, scientific studies began showing how chewing reduces muscular tension and helps people feel more at ease. Because it is so well-recognized for helping stay alert at the same time it eases tension, the U.S. Armed Forces have supplied chewing gum to its soldiers ever since World War I. It is still included in field and combat rations today.
- In this same year, when the Federal Food, Drug, and Cosmetic Act was passed, chewing gum was classified as a food.
- Gum appeases cravings for food between meals and most gums are less than 10 calories per piece.
- Chewing gum manufacturers managed to secure an exemption from the labeling requirements for foods because it is impractical to list 25 ingredients on a package as small as the one that gum comes in. As many as 15 natural and synthetic ingredients are lumped together as gum base.
• The F.D.A. itself suggested the reduction in the labeling of the sweeteners in gum. The F.D.A. also allowed gum manufacturers to not list sugar (60 percent of the average stick of gum) in the first position in the ingredient list, a common requirement for most food products.
• Chewing gum can stimulate the production of saliva and increase salivary flow. Saliva is the body’s own natural protection which washes the teeth and neutralizes some of the acid from foods that may cause tooth decay.
• Unless it is sugar free gum, it will contain some type of sweetener. Brands of gum containing sugar can be harmful to your teeth if these types of gum are chewed too often or are removed from the mouth too soon. In fact, studies have shown that if a person chews gum containing sugar, it should be chewed for at least 15 to 20 minutes. After this time, the sugar is gone (and the flavor), but the saliva is sufficiently stimulated to rinse away some of the sugar residue.
• The proper protocol for cavity protection is to chew two pieces of gum three to five times daily for at least five minutes per chewing session. Any less time will decrease the effectiveness of the Xylitol. Xylitol is an artificial sweetener now being used in gum because studies are showing it is beneficial in preventing cavities.
• One drawback to chewing gum is the potential for TMJ (temporomandibular joint) problems. Gum chewing may result in muscle fatigue and pain—especially if it is done frequently and/or for long periods of time.
• Research has not established the relationship between gum chewing and the development of structural changes within the jaw joint, which could lead to fatigue and/or pain.
• One further consideration in purchasing gum would be checking the freshness date code on the package.
ACTIVITIES

Today, the average American chews 200 sticks of gum a year from various brand manufacturers. They may chew it to freshen their breath or because they like the flavor. Gum comes in a variety of flavors, such as: spearmint, peppermint, bubble gum, cool watermelon, spicy cinnamon, lemon ice, and there are many more. Certain brands of gum promise to whiten the customer's teeth, where as other brands promise not to stick to your teeth if you have had dental work.

Conduct an experiment to see which brand/variety of gum will hold its flavor the longest.

Conduct an experiment to see which flavor the youth in your 4-H club find most appealing flavor wise.

Once youth decipher what their favorite type of gum is, have them call or visit supermarkets, convenience stores, shop online and see where they can find their preferred type of gum at the best price.

Here is a chart comparing prices of two varieties of gum at six different store locations.

<table>
<thead>
<tr>
<th>Store</th>
<th>Extra (sugar free gum)</th>
<th>Juicy Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollar General</td>
<td>25 sticks for $1 (4 c. each)</td>
<td>25 sticks for $1 (4 c. each)</td>
</tr>
<tr>
<td></td>
<td>15 sticks for $.85(6 c. each)</td>
<td>17 sticks at $.85 (5 c. each)</td>
</tr>
<tr>
<td>Family Dollar</td>
<td>15 sticks for $.89(6 c. each)</td>
<td>17 sticks at $.89(5 c. each)</td>
</tr>
<tr>
<td>Walgreens</td>
<td>40 sticks for $1.99(5 c. each)</td>
<td>50 sticks for $1.99(4 c. each)</td>
</tr>
<tr>
<td></td>
<td>15 sticks for $1.19(8 c. each)</td>
<td>17 sticks for $1.19(7 c. each)</td>
</tr>
<tr>
<td>CVS</td>
<td>50 sticks for $1.99(4 c. each)</td>
<td>50 sticks for $1.99(4 c. each)</td>
</tr>
<tr>
<td></td>
<td>15 sticks for $.99(7 c. each)</td>
<td>17 sticks for $.99(6 c. each)</td>
</tr>
<tr>
<td>Winn Dixie</td>
<td>15 sticks for $.99 (7 c. each)</td>
<td>17 sticks for $.99(6 c. each)</td>
</tr>
<tr>
<td></td>
<td>40 sticks for $1.99(5 c. each)</td>
<td>40 sticks for $1.99(5 c. each)</td>
</tr>
<tr>
<td>Publix</td>
<td>15 sticks for $.99(7 c. each)</td>
<td></td>
</tr>
</tbody>
</table>

Observe the chart above or one you make and discuss whether sugar free gum is more or less expensive than sugar gum. Also discuss whether bubble gum is more or less expensive than regular chewing gum. Calories are another factor than can be considered when selecting chewing gum.

Interview your dentist or orthodontist and see what their opinion is on the health benefits/risks involved with gum chewing.

For a culminating project, consider purchasing a gum making kit and do this as a fun activity.

Decipher whether making your own chewing gum is more or less expensive, and if the flavor is as good as your preferred variety.
**SOURCES:**
The Kid Who Invented the Popsicle: And Other Surprising Stories About Inventions
by Don L. Wulffson / Paperback – 128 pages (1999) / Puffin

Panati’s Extraordinary Origins of Everyday Things
by Charles Panati / Paperback – 480 pages Reissue edition (September 1989) / HarperCollins

The Chewing Gum Book, Robert Young. 1989 Dillon Press.

Thomas Adams History of Chewing Gum
(URL: www.cadburyadams.com/history/)

Wm. Wrigley Jr. Company
(URL: www.wrigley.com/wrigley/about/about_story.asp)

National Association of Chewing Gum Manufacturers
(URL: www.nacgm.org/)

WrigleyDentalCare.com

www.dentist.net


Sample judging situations:

Zoie enjoys chewing gum, and she wants to buy some to share with her 4-H friends at their upcoming meeting. Zoie has discovered that the sugar free brands tend to keep their flavor the longest, so she wants to purchase Extra sugar free gum in her favorite flavor, Cool Green Apple.

Zoie has $2.25 in allowance money saved up to spend on this purchase, and since she doesn’t know how many members will be present, she wants to purchase the most gum she can for her money. Based on the chart above, what is Zoie’s best option? The most convenient stores between her house and the 4-H meeting place would be Winn-Dixie, Dollar General, and CVS.

Answers:

Zoie’s best option for purchasing chewing gum for her 4-H club would be buying 50 sticks of chewing gum for $1.99 (4 c. each) from CVS. This is a very close comparison to the price at Dollar General, my second option, where for 1 cent more Zoie would have the same amount of gum as she purchased at CVS. The price for my bottom pair increased from 4 to 5 cents more per piece, and so I decided Zoie would be better off price wise to purchase gum from Winn Dixie at the price of 40 sticks for $1.99 (5 c. each) versus Walgreens, which is at the same price but it is not on the way to her 4-H meeting from their house.

Situation 2:
Joe enjoys chewing sugar free gum in any flavor to keep him awake during his dual enrollment college courses. With prom season right around the corner, he is trying to cut costs on extra expenses, and yet Joe is self conscience about his teeth being stained. Out of the four options below, which would be the best purchase for Joe if he is hoping to whiten his teeth?

Orbit White sugar free gum in peppermint flavor  – 12 pieces for $.99
Orbit sugar free gum in spearmint flavor- 12 pieces for $.88
Trident White sugar free gum in peppermint flavor- 14 pieces for $.99
Juicy Fruit- 17 sticks for $1.25

Answers:

I place this situation 3-1-2-4. I place Trident White at the top of the class because it is the most gum in the whitening variety, which is what Joe prefers, for the least amount of money. It is sugar free and he doesn’t have a preference in gum flavor. I place the Orbit white second. It has all of the same characteristics and the Trident White, except Joe gets two fewer pieces of gum for the same amount of money as the Trident White. I place the original orbit gum over the Juicy fruit because it is sugar free and that was one of his preferences. Joe is being cost conscience, but he doesn’t have a particular budget he must stay within and the price difference was only a few pennies difference. For these reasons I place this class of chewing gum 3-1-2-4.
Chewing Gum Scavenger Hunt

Record the different types of chewing gum you can find, locations. Check out the prices, too!

<table>
<thead>
<tr>
<th>Name of Gum</th>
<th>Location</th>
<th>Price</th>
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<tbody>
<tr>
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</table>

Interview 15 consumers in the following ages to determine their preferred chewing gum. Record your findings.

Children less than 12 years of age:

Teens, 13 and older:

Adults, 18 and older:
Lesson Four

GOAL: For Youth to:

- Select an economical and quality MP3 player for a given consumer situation and defend their decision.

MATERIALS:

- Consumer Choices Member Guide for each participant.
- Teachers’ Guide with background material and suggested activities.
- Pencils and calculators for calculating costs (optional)
- Photos of various types of players with specs from on-line sources (optional)

Situation:

MP3 players are the latest new means for music lovers to listen to their tunes. This technology is quickly consigning CD players to the forgotten realms of yesteryear, just like cassette players and record albums. Unfortunately for beginners though, there’s a lot of variation in the features and prices of these portable music marvels. Not only do these devices have wildly different features, but ongoing format wars mean the MP3 player you choose dictates where you can buy your digital music. These devices are anything but one-size-fits-all.

MP3, by the way, stands for MPEG Audio Layer 3 - and without getting too technical - is one way of compressing audio data to a small size. Depending on quality and file format settings, one minute of near CD-quality music will use around 1MB of memory. This means a 5GB player can hold roughly 1000 five-minute songs.

This guide compiled from key sources (CNet.com, Consumer Reports) will help youth analyze and evaluate key considerations and options to help determine the best MP3 player for their needs.

OBJECTIVES: For Program participants to:

- Become knowledgeable of the various digital music formats and digital music players.
- Identify various uses and features of MP3 players.
- Identify three basic types of players on the market.
- Understand the key considerations and options that should be considered prior to purchasing a MP3 player.
- Identify key features to consider to meet various consumer needs.

Key Concepts to Teach:

- Identifying individual needs and uses of MP3 players;
- The basic types of MP3 players on the market;
- Identifying sources of music for use with MP3 players; and
- Identify key considerations and options to help determine the best MP3 player to meet needs;
Introduction to MP3 Players

The MP3 player is the most recent in an evolution of music formats that have helped consumers enjoy their tunes. Records, eight-track tapes, cassette tapes and CDs--none of these earlier music formats provided the convenience and control that MP3 players give music lovers. With an MP3 in hand or pocket, a consumer can create personalized music lists and carry thousands of songs wherever they go.3

All of that stored music and the MP3 player itself fit into a device about the size of a stick of gum or at most a deck of cards. That's a big difference in size -- as opposed to carrying a CD Player and CD storage case. These advantages propel the popularity of MP3 players. This popularity is also related to the wide variety of players available to consumers. MP3 players come in many different shapes and sizes as manufacturers try to appeal to wide audiences. You can even find players that are integrated with other devices and consumer products like stop watches, calorie counters or your cell phone.3

In this consumer study, you will learn more about the technology inside MP3 players and the different types of players out there. You'll also find out where to get tunes and how you can accessorize your player.

The MP3 Format

The MP3 file format revolutionized music distribution in the late 1990s, when file-swapping services and the first portable MP3 players made their debut. MP3, or MPEG Audio Layer III, is one method for compressing audio files. MPEG is the acronym for Moving Picture Experts Group, a group that has developed compression systems for video data, including that for DVD movies, HDTV broadcasts and digital satellite systems.3

Using the MP3 compression system reduces the number of bytes in a song, while retaining sound that is near CD-quality. Anytime you compress a song, you will lose some of its quality, which is a trade off for being able to carry more music files in a smaller storage system. A smaller file size also allows the song to be downloaded from the internet faster.3

The average song is about four minutes long. On a CD, that song uses about 40 megabytes (MB), but uses only 4 MB if compressed through the MP3 format. On average, 64 MB of storage space equals an hour of music. A music listener who has an MP3 player with 1 GB (approximately 1,000 MB) of storage space can carry about 240 songs or the equivalent of about 20 CDs. Songs stored on traditional CDs are already decompressed, so it takes more CDs to store the same amount of songs. Now, some CDs support MP3 files.3

Although MP3 is perhaps the most well known file format, there are various file formats other than MP3 files that can be played on MP3 players. While most MP3 players can support multiple formats, not all players support the same formats. Here are a few of the file formats that can be played on different players3:

- WMA - Windows Media Audio
- WAV - Waveform Audio
- AAC - Advanced Audio Coding (AAC)
- Ogg Vorbis - A free, open, and un-patented music format
- ADPCM - Adaptive Differential Pulse Code Modulation
- ASF - Advanced Streaming Format
- VQF - Vector Quantization Format
MP3 Players--What are My Choices?

First, there's the question of design. A player can have every feature in the world, but if the design doesn't match your needs, you still won't enjoy it. You'll want to look closely at performance; sound quality and battery life can make or break a player, especially if your primary use is when you are “on-the-go”.

Major brands of MP3 players include Apple, Archos, Cowon, Creative Labs, iRiver, Philips, RCA, Samsung, SanDisk, Sony, and Toshiba. Brands from smaller companies are on the market as well.

MP3 Users—What’s Your Type?

MP3 players are as varied as the people who buy them. Choice is based on on several factors, including how you plan to use it, the amount of music you want to carry in your MP3 player, and how much you are prepared to pay. Price per megabyte (ie the cost of the device compared to its storage size) is probably your second concern, followed closely by size.

Before we take a closer look at the products, let’s think about how consumers use these music devices. MP3 players are definitely not one-size-fits-all. They come in a range of shapes and sizes, use different types of memory, and support different formats. You should choose the player that both meets your needs and suits your personality.

There are few main personality profiles for MP3 player users to help determine which player is for you. Some people of course are more than one type, and they should possibly consider buying more than one MP3 player to address various needs. For instance, you might want an ultracompact flash player for jogging or skiing and a high-capacity hard drive-based device for more general use.

Commuting is a Big Part of Your Day?

You listen to your stereo at home, but filling your commute with tunes requires a portable player. If you commute by bus, look for a compact flash-based player and, to seal out as much of the din as possible, a pair of noise-canceling or sound-isolating headphones.

If you spend a lot time in a car, look for a hard drive-based model; size doesn't matter much in this situation, so feel free to save money by buying a heftier unit. You'll also need a cassette-style adapter and a cigarette-lighter charger. The former can be purchased anywhere, but for the charger, stick with manufacturer-approved accessories; that way, you'll avoid frying your player with the wrong voltage or polarity. If your car has no cassette player, you're going to need an FM transmitter device or a direct line-in jack on your car stereo.

Sport and Fitness is your primary use?

If you spend all your free time in the gym, on a skateboard or jogging on the beach, you need an MP3 player that can keep pace. It should be compact and easy to operate with one hand. Rather than looking for one with massive storage, choose a flash-based model (with up to a 1GB of storage) that can also withstand tough workouts better than hard drive-based players. You may also want an armband, an option on many ultracompact models, and a set of headphones that will stay in place rather than the cheap earbuds typically included.
On the go—Weekends Away from Home?
If you spend a lot of time on the go and weekends away from home, you need an MP3 player that will enhance your journeys with music yet doesn't add undue weight to your carry-on. If you travel with the same laptop that stores your music, a compact flash-based player is the way to go, but if you share the family at-home desktop try a higher-capacity player that will hold all or most of your music. Consider one that has an easily removable and replaceable battery. Accessories worthy of consideration include noise canceling or sound-isolating headphones, as well as a portable speaker setup for your room at grandparents, camp or other locations. 

File hoarder?
If your appetite for digital music has your computer's hard drive(s) bursting at the seams, you fit the description of the file hoarder. While sound quality and features are important to you, what you need most is an enormous capacity: at least 40GB but maybe even more. Today's portable music devices max out at 60GB or so, which should be enough to keep you satisfied until manufacturers can fit more memory into the 1.8-inch drives used by high-capacity MP3 players.

Types of MP3 Players

Before you start checking out specific models, you should have a basic understanding of the types of MP3 players available. There are three basic types of MP3 players, each with their own pros and cons and method for storing/accessing MP3s.

Let's take a look at the three types of MP3 players based on memory type:

Solid-State Flash Memory Players

The flash memory MP3 player is the smallest and lightest player, often no bigger than a pack of gum, and they weigh no more than 2 or 3 ounces. They typically can store fewer songs. They're solid-state, meaning they have no moving parts and tend to have longer audio playback time than players that use hard-disk storage.

With no moving parts, the flash player is ideal for the casual digital music fan, who just wants it for a small amount of music or that morning jog. Another advantage of the flash memory player, because of its size, is that its batteries last longer. SanDisk's MP3 line for example, includes exclusively flash-based players.

Storage capacities range from 128 megabytes (MB) to 6 gigabytes (GB), or about 30 to 1,500 songs. Some flash-memory players also have expansion slots to add more memory via card slots on the player. Common expansion-memory formats include Compact Flash, MultiMedia, Secure Digital, and SmartMedia. Sony players may use a MagicGate MemoryStick, a copyright-protected version of Sony's existing MemoryStick media. Memory-card capacities range from about 32 MB to 2 GB. Memory costs have gradually dropped. Price: $15 to $280 for the player; $45 to $50 for a 1-GB memory card.
Solid state players weigh anywhere between 15 and 150 grams and usually have the highest cost per megabyte of all the players - so choose your initial capacity and expandability options carefully.  

Consider the price of the media:

<table>
<thead>
<tr>
<th>Media</th>
<th>Average Price</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Stick Pro (standard)</td>
<td>$50 - $400</td>
<td>128MB - 2GB</td>
</tr>
<tr>
<td>CompactFlash</td>
<td>$30 - $1300</td>
<td>128MB - 8GB</td>
</tr>
<tr>
<td>MultiMedia Card (MMC)</td>
<td>$30 - $1300</td>
<td>128MB - 8GB</td>
</tr>
<tr>
<td>SmartMedia Card</td>
<td>$15 - $90</td>
<td>32MB - 512MB</td>
</tr>
<tr>
<td>MicroDrive</td>
<td>$120 - $280</td>
<td>340MB - 4GB</td>
</tr>
<tr>
<td>Secure Digital (SD)</td>
<td>$15 - $450</td>
<td>32MB - 2GB</td>
</tr>
<tr>
<td>Proprietary Memory</td>
<td>Depends on manufacturer</td>
<td>Depends with manufacturer</td>
</tr>
</tbody>
</table>

**Hard Drive Players**

Hard drive players are bigger and heavier than flash memory players and offer considerably more storage. For those looking for a player that can store their entire music collection, the hard drive is ideal. However, the hard drive does include some moving parts, so there is some skipping when the player is moved around. Because of their size, hard drive players often have more built-in features. However, these features and the hard drive consume more battery power. You can generally expect a charged battery to last 8-20 hours.

Most likely, a high-capacity player can accommodate every song you've ever purchased or ripped from a CD. Hard drives run from 20GB on up, and large players such as the 60 GB Apple iPod can hold around 17,000 songs, assuming an average file size of 3.5MB per tune.

There are two types of hard disk players: micro-drive and standard hard-disk. The palm-sized micro-drive players have a tiny hard drive with a storage capacity of 3 to 8 GB (about 750 to 2,000 songs). They weigh about a quarter-pound. Standard hard-disk players are about the size of a deck of cards, and they have a storage capacity of 10 to 60 GB (about 2,500 to 15,000 songs). They typically weigh less than half a pound. Some hard-disk players with video capability have relatively larger displays, and as a result tend to be the bulkiest models. Price: $140 and up.

Hard disk players offer the best buy when it comes to the amount you pay per-megabyte. They can also act as portable/external hard disks for general files. However, there are some drawbacks. As they're physically larger and heavier (roughly between 150 and 250 grams), they may not be suited to some forms of exercise.
There are battery considerations, too. Generally, hard drive-based players have less battery life than solid state players, and some models use internal (rechargeable) batteries. This poses the potential drawback of battery degradation after a couple of years, with shorter total playback time the possible result. This may be a minor concern, but ask yourself, how long do you want your investment to last?\(^4\)

**Mini-Hard Drive MP3 Players**

In terms of price and size, MP3 players using 1-inch micro hard disks are in-between high-end solid state players and low-end hard disk players. Miniature hard disk models range in size from 1GB right up to 20GB!

Mini hard drive-based players are the newest type of MP3 player and examples in this area include Apple's iPod mini, Creative's Zen Micro, iRiver's H10, Rio's Carbon, and Archos' Gmini range.\(^4\)

They're useful because at between 100 and 150g, they're not quite as big as a full-sized hard disk player, but can also act as a medium-capacity external storage drive. They can also have some of the best battery life available.\(^4\)

Although you'll want to get a bit of extra capacity for your MP3 collection to grow in the future, try and make sure that you don't pay for an extreme amount of extra space you're never likely to use.\(^4\)

**MP3 CD-based Players**

For those who are nostalgic for an old-fashioned CD player, there is a new breed of CD players available that will play MP3 and other digital files. You'll be hard pressed to find a portable CD player these days that doesn't support the MP3 format. These MP3 CD players play MP3 files burned to CD-R/RW discs and your old CD collection. A CD can hold about 10 hours of music. A CD burner is necessary for those buying an MP3 CD player.\(^3\)

The MP3 CD player is cheaper than the flash memory and hard drive memory players. One problem with these, as with many CD players, is that it may skip when jostled. They are also much larger than their digital counterparts are. Players range from 150-gram light weight "discman" style models to 300 gram or more mini ghetto blasters with built-in speakers.\(^3\)

**Evaluate Performance.** Since these players can be prone to skipping, test out a player before you buy it. Give it a gentle shake to simulate walking or jogging with it. Also check the amount of anti-shock protection a CD MP3 player has. Anti-shock protection works by sending the music you hear through a memory buffer (temporary storage area) so if the CD skips, the music shouldn't be interrupted. The minimum shock memory buffer size you'll want is at least 120 seconds (some models have anti-shock of 32 minutes or more!).\(^4\)

**Evaluate compatibility.** Can you use rewritable CDs (CD-RW)? Check whether multi-session discs are supported as well, so you can keep writing new MP3s to your CDs. If you use Windows, see if the player supports the Joliet file system (for long file names) as well as ordinary data CDs. There are also smaller CD-based MP3 players that use 8cm mini-CDS (but blanks are hard to find).\(^4\)
Consider the price of the storage media these players:

<table>
<thead>
<tr>
<th>Media</th>
<th>Average Price</th>
<th>Storage</th>
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</thead>
<tbody>
<tr>
<td>DVD-R</td>
<td>Depends on pack (of 1, 5, 10, 20 etc). On average about $1-$2 each</td>
<td>4.7GB</td>
</tr>
<tr>
<td>DVD-RW</td>
<td>Depends on pack (of 1, 5, 10, 20 etc). On average about $1.20-$3 each</td>
<td>4.7GB</td>
</tr>
<tr>
<td>CD-R</td>
<td>Depends on pack (of 10, 20 etc). Usually 30-70c each</td>
<td>650/700MB</td>
</tr>
<tr>
<td>CD-RW</td>
<td>Depends on pack (of 10, 20 etc). Usually 1$-$2.50c each</td>
<td>650/700/750MB</td>
</tr>
<tr>
<td>Mini-CD</td>
<td>Depends on pack (of 5, 10, 20 etc). On average about 80c-$1 each</td>
<td>202MB</td>
</tr>
<tr>
<td>Mini-CD-RW</td>
<td>Depends on pack (of 5, 10, 20 etc). On average about $2.50-$3 each</td>
<td>185MB</td>
</tr>
<tr>
<td>Click! Discs</td>
<td>Depends on pack (of 2, 10 etc). On average about $20 each</td>
<td>40MB</td>
</tr>
</tbody>
</table>

Battery Life. The battery life of CD-based players could prove a deciding factor in your buying decision. One set of batteries will commonly give you 40 to 50 hours of playback. While you might view batteries as an added expense, that's a lot longer playback than any other player type will give you.

The Hybrid Players
MP3 is no longer just a stand-alone technology. Technology companies are now offering MP3 capability in other consumer products, including personal digital assistants, DVD players and even sunglasses.

Cell phones. An increasing number of phones have built-in MP3 players, some with controls and features that rival stand-alone players. Sprint, Verizon, and other cell-phone providers let subscribers download music over their networks. But music phones are pricey, and most can't store more than 150 songs. Price: 99 cents to $2.50 per song; $150 and up for a phone with a two-year contract, or $500 without one.

Satellite radio. Some pocket-sized XM and Sirius receivers have built-in memory for recording up to 50 hours of satellite programming, and might also let you add your own MP3 songs to the mix. Not all models let you listen to live programming on the go; some must be docked at home. Price: $200 to $400 for the receiver; about $13 a month for satellite service.

The Evolution of Music Players
- 1877 - Thomas Edison invents the phonograph.
- 1880s - Nikolai Tesla invents radio.
- 1887 - Emile Berliner patents gramophone, using flat zinc discs.
- 1906 - First radio program of voice and music is broadcast. Reginald Fessenden broadcast the program using a continuous wave of electromagnetic energy from Brant Rock on Massachusetts's Cape Cod.
- 1929 - Frequency Modulation (FM) radio introduced
- 1934 - Joseph Begun builds first tape recorder for broadcasting.
- 1948 - Columbia Records introduces the long-playing (LP) record, which is played at 33.3 revolutions per minute (RPM).
- 1949 - RCA introduces 45 RPM records.
- 1965 - 8-track magnetic tape introduced
- 1969 - Internet created
- 1979 - Sony Walkman cassette player introduced (By 1995, 150 million sold)
- 1983 - Sony and Philips introduce compact disc technology.
- 1989 - The Fraunhofer Institute in Germany patents MP3 format.
- 1992 - Phillips introduces the Digital Compact Cassette (DCC). Both Sony (with the MiniDisc) and Phillips (with DCC) hope to take over where audio cassettes left off.
- 1998 - First MP3 players introduced (Saehan's MPMMan, sold in Korea)
Music Sources Sources for MP3 Players

Back when the cassette Walkman ruled the portable audio domain, you didn't have to seriously think about whether your player would play the music you bought. And when the first widespread digital format (the compact disc) was introduced, consumers faced relatively minor compatibility issues; you had to buy a CD player but could record cassette mixes from CDs without a lot of hassle. With an MP3 player, you have to consider where your music is coming from to ensure your device will play your music.¹

Here's what you need to know about music sources and compatibility:

**Compact discs (CDs)**
If all of your music is still on CDs, you can buy just about any MP3 player since you'll first need to convert your discs to MP3, WMA, OGG, or one of the other formats mentioned earlier. Check to make sure the necessary software is included with the player. You'll typically use that software to organize the music files, set up various playlists, and transfer music to your device.¹

**Existing music on your computer**
If you've already recorded (ripped) or downloaded lots of music, choose a player that supports the format(s) you're already storing. If it's MP3, you're OK with any player, but rarer formats are supported by only certain devices. When you're reading a MP3 player review, check out the Features or Specs tab to find out which formats the device takes.¹

**P2P networks**
Most tunes available on file-sharing networks (also called peer-to-peer or P2P networks) are already in the MP3 format, so there are no compatibility issues in this situation. Since someone else did the encoding, however, the audio quality of files on these services varies.¹ However, there are other issues with downloading “free” music from such online sources. You risk a copyright-infringement lawsuit by the music industry. You'll also increase your exposure to a host of nasty computer viruses and spyware programs that tend to hitch rides on songs swapped on these sites. Napster, a pioneer of free peer-to-peer music-sharing, now allows you to stream music free from its (now legal) site, for up to five listens per song.²

**Online music stores**
Here's where it gets really tricky. If you plan on buying music downloads from an online music store such as Apple products' iTunes Music Store or Napster, you need to make sure your player will work with the formats offered. In an ideal world, you'd be able to play any legally purchased music on any MP3 player, but due to format wars, that's not possible. If you know you're going to buy tunes online, you'll first have to select a store you like, then a player that supports the store.¹

The files sold by these stores come with usage restrictions that commonly limit playback to three computers and stop you from mass-producing burned mixes. These restrictions can cause device compatibility problems, but the trade-off for consumers is that those safeguards make the labels comfortable enough to license their songs to online stores.¹

One important note: Some MP3 players play normal, unprotected WMAs that you create from your own CDs but not the secure WMAs sold by online music stores such as Napster, BuyMusic, Musicmatch, and so on. Again, this is another compatibility issue to research before you make your purchase.¹
Apple's iPod players still account for more than three out of four MP3 players sold because of its easy to use and self-contained digital-entertainment system. iTunes, its content-management software, works seamlessly—but only with Apple iPods. Its online iTunes store offers by far the largest library of online video content, supplementing its dominance over online music sales. Its content includes many exclusives and also offers comprehensive one-stop access to podcasts, the booming (and mostly free) online downloads that offer everything from National Public Radio broadcasts to music-preview shows to weekly self-help recordings. And while you can play content obtained from the store (and use iTunes software) on virtually any computer, including Windows PCs and Macs, you need an iPod to enjoy it portably.²

Subscription-based music services
Not that all innovative content comes from Apple. Other legal online content sources include BuyMusic, MSN, MusicMatch, Napster, Real, Sony, Wal-Mart, and Yahoo. Unlike iTunes, some of these sites also offer subscription-based services.²

Imagine legally filling up your MP3 player with endless gigabytes of tunes from an online music store and paying less than the price of a CD. How is this possible? Well, you're not actually buying the tracks; instead, you're renting them in an all-you-can-eat scenario for a monthly subscription fee. This is the new world of the on-the-go music subscription services.¹

Typically for less than $15 per month you listen to music on your computer in real time (streaming). Downloaded songs from contemporary artists typically cost less than $1 per song, or $10 for an entire album; music videos, hit TV-show episodes, and short films cost $2 each. Again, these services should be looked at carefully before you buy your player.²

Quick tips from CNet.com for determining online and subscription choices:

• **Hard drive:** Make sure you have a plenty of room on your hard drive since you must download any music that you transfer to your device. Basically, if you stick 20GB of subscription-based music on your portable, you'll need 20GB of free space on your computer.

• **Portable device:** Make sure you have a compatible player and that the device's firmware is up to date. Remember: none of these services work with the Apple iPod.

• **Try it out:** Sign up for the free trial at any of these services, and make sure you're comfortable with the jukebox software as well as the service itself. It's likely that you'll use the service's software for other audio tasks such as ripping, burning, and managing your music library.

• **Keep the music playing:** Remember to sync your device with the service at least once a month. Otherwise, the licenses for your songs could run out, and you'll be stuck with a bunch of songs that won't play.

• **Be organized:** If you don't want subscription-based music mixed in with your general music library, make sure to designate a specific folder for your subscription downloads.

• **Experiment:** The best part of these services is that you can sample and discover tons of music as well as get recommendations from others. Go crazy and download songs and artists you wouldn't have tried otherwise.
New portable models with more features and greater capabilities are continually coming out. Decide how much you're willing to spend on a unit and recognize with changing technology you may want to replace in a year or two. Here are some considerations before you buy:

**Use—Your Personal Needs and Wants**
Determining the type of player depends a lot on how you plan to use it as discussed earlier. Analyze your needs and wants first as you begin your decision process.

**iPod or Not?**
Decide whether to get an iPod. With Apple's family of players so prevalent, and so similar in many ways, it's worth considering the advantages and shortcomings of iPods before going further with your buying decision. iPods are easy to use, thanks to superb integration of the players and the company's iTunes software. The iTunes Store offers the largest selection of legal digital content on the Web, including virtually all the available downloads of major TV shows. And with the use of iTunes software so widespread, it's very likely that a friend or family member from whom you might want to borrow content already uses it—meaning you'll need an iPod to enjoy their songs or videos.²

iPods also have a wide variety of accessories to extend their use, from boomboxes and clock radios with iPod slots to iPod cases that come in every color and fabric imaginable. Few other brands of players have custom aftermarket equipment (although generic gear will, for example, allow you to pipe any player into a component sound system or a car stereo).²

As for drawbacks, iPods typically cost a little more than non-Apple players with comparable capacity. They also lack some of the features and accessories that come with many other players, such as an FM radio, voice recorder, and an AC charger. Equipping a new iPod with some of these options can increase its price by more than $100. And iPods have some special limitations, such as the inability to easily transfer music from your iPod to any other device. In addition, iPods require you to open iTunes to transfer music into the player; competing devices more conveniently let you drag and drop music files without opening music-management software.²

**Computer Performance and Compatibility**
With the exception of the CD-based player, and before you buy any digital player, be sure your computer can handle it. New computers shouldn't be a problem, but make sure any player you're considering is compatible with your older Windows or Macintosh computer (including its operating system). Keep in mind that some operating-system upgrades can exceed the price of a player.²

Your computer must have a USB port. As for speedier, more efficient downloading, a 2.0 USB connection is better than the slower 1.1. Consider high-speed Internet access if you plan to download much of your music. Also keep in mind that getting started can be tricky with some players. Even if compatible with the player, an older computer may not recognize it easily, so you might have to seek help from the player manufacturer.²
You also need hard drive space to equal your player storage capacity for download capability. If you are planning to fill a 5GB player with new downloaded tunes...your computer must likewise have that storage space temporarily available. With many removable media formats, you have the option to manage files on the memory cards/discs by using an adapter. These are always an optional extra, though, and are usually priced around $100 or more.4

Believe it or not, MP3 player manufacturers are still looking to make it easier and are investigating wireless file transfers between your player and PC - through standards such as Wi-Fi, Bluetooth and the emerging wireless USB 2.0 protocol.1

**Weigh type, design, storage capacity and size.**
Unless you are a budget buyer, you should probably forget about players with only 32MB or less of onboard memory. With an average of one minute of near CD-quality music per megabyte, at least 64MB is recommended - even for the most compact player.4

Consider a flash-memory model (holding up to 1,500 songs) if a lower price, smaller size, lighter weight, and long playback time are more important to you than a vast selection of tunes. Look for flash models that can accept external memory cards if you want expanded song capacity. If you have a large music collection that you want to keep with you, a hard-disk player might make more sense. Those players can hold up to 15,000 songs and could serenade you for weeks without repeating a tune. However, a hard-disk player can be more complicated to manage than a flash-memory player. For some, navigating through the menus or directories (folders) of songs might also take longer.2

Hard-disk players vary in size, generally in step with capacity. Mini drive players are about the size of a credit card, and a 4-GB model can hold about 1,000 songs, whereas models with 20-GB hard disks are about the size of a deck of cards and can hold about 5,000 songs.2

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Number of songs*</th>
<th>Hours of play*</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 MB</td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td>256 MB</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>512 MB</td>
<td>250</td>
<td>16</td>
</tr>
<tr>
<td>1 gigabyte</td>
<td>Over 500</td>
<td>30+</td>
</tr>
</tbody>
</table>

* Approximate figures based on CD-quality WMA (64 Kbps)
Source: Six Tips for Buying an MP3 Player with Flash Memory, Microsoft Corporation.

Let's face it, aesthetics go a long way. Just like mobile phones have become fashion accessories, so to have MP3 players - the iPod's sleek design and eye-catching white earbuds are a good example.4

Appearance aside, a player's design also goes hand in hand with its size and weight. This can vary a lot between devices, the lightest weighing around 20g. Most players are more like 150 to 200g, but sometimes a more rugged casing will up the price, which may be worth it to you.4
Also affecting weight are the batteries and any removable storage (media cards) a player might use. All things to keep in mind when choosing a player, whether making a personal statement or just having a functional device is your primary concern.\textsuperscript{4}

**Format Compatibility and Music Choices.**
Consider your music sources and download choices. Be aware that online music copy-protected sources are limited with some models. For example, Sony players work only with one online music store, while iPods are compatible with iTunes and Real.\textsuperscript{2}

Players that support the copy-protected WMA formats, like those from Archos, Creative, RCA, and Samsung, allow access to the greatest number of online stores, and, because of the competition, cheaper music. Another WMA-store benefit: BuyMusic, MSN, Real, and other sites offer songs at a higher bit rate than the standard 128 kbs, which has the potential to sound better. Some players won't play music purchased from any online store.\textsuperscript{2}

Also, note that with most players, you have choices when it comes to software for recording (ripping) music. You can use the software that comes with your computer or player, such as Apple iTunes, MusicMatch, Napster, or Windows Media Player, or download other freeware or shareware applications. If the program has the software plug-in for your player, you can transfer the music to your player directly; otherwise you'll need to use the program that came with your player to perform the transfer. iPod owners, for example, need to use iTunes to transfer music to the player.\textsuperscript{2}

**Price**
Undoubtedly, one of the biggest issues when hunting down the right player is price. Price is driven primarily by the type and size of player you choose. This can vary from el-cheapo CD and solid-state models to nearly $1000 for a full-featured hard disk-based player. You can find budget friendly models for less than $100. The majority of players do range between $100 to $500.\textsuperscript{4}

**Consider headphone quality.**
While many players can produce near audio-CD quality music out of their headphone jacks, the headphones they come with can degrade the quality. Most perform respectably, and any performance differences might not be a bother you in typical, everyday use. If you're particular about listening quality, it would be worth buying better-quality after-market headphones for use with your player.\textsuperscript{2}

**Consider power consumption and battery type.**
With any portable device, batteries are a consideration. A wide variation exists in battery life among players. Depending on the player settings, some will run out of power after only six hours of play, while others can play music for more than 50 hours before their batteries give out. Flash-memory players tend to have longer playback times than hard-disk players. Playing videos can run a battery down in just a few hours.\textsuperscript{2}

Many flash and MP3 CD players use AA or AAA batteries and can accept either standard or rechargeable batteries. You can expect a bit longer playback time using standard batteries, but purchasing a charger and using rechargeable batteries will be more cost effective in the long run as well as being more environmentally friendly.\textsuperscript{2}

Other players use an internal rechargeable nonstandard "block-" or "gumstick-" shaped nickel
metal-hydride (Ni-MH) or lithium-ion (Li-ion) removable battery, which is both more expensive and harder to find. Since flash players need to be synced more often and it's easy to recharge as you sync, flash players with this type of rechargeable batteries may be preferable.²

Most hard drive-based players come with nonremovable lithium-ion batteries, which typically last two to four years. Many manufacturers have some sort of return/repair plan, so check the warranty policy before you buy (the typical replacement cost is about $100).²

**Special Features:**

**Radio tuner**
Some players have built-in FM radio tuners so you can listen to (and record) the radio as well as MP3s. A built-in FM radio tuner is different to an FM transmitter accessory. The transmitters allow you to wirelessly play your MP3s through your car or home stereo!⁴

FM tuners are great when you're traveling to get a feel for the local area in addition to having new, fresh content when you've heard your playlist ten times already. If you are looking at a player with a built-in radio tuner, look for memory presets so you're not left manually channel surfing all the time.⁴

**Recording Capabilities**
A great feature of some players is the ability to record audio straight to memory. This is great for recording a meeting, a lecture or for making verbal notes to yourself and upload the files to your PC. Some devices include built-in microphones, which is far more convenient than something that requires an external one. Additionally, a line-in jack will allow you to dub from another audio device - be it a PC sound card, CD player, cassette deck or whatever.⁴

**Data storage**
Many MP3 players can double as external storage devices, allowing you to shuttle data between PCs. Some models don't even require drivers; thus, you could transfer a resume or a presentation to the laptop of the person seated next to you on a flight. So-called plug-in players don't even need a cable since they have built-in USB connectors.¹

**Ensure upgradeability.**
Depending upon your investment and the player you choose, look for one with upgradable firmware for adding or enhancing player features, as well as accommodating newer encoding schemes or variations of compression. This is particularly important for models with video playback due to the evolving nature of video formats. However, note that upgrading firmware can be a time-consuming and sometimes risky process. MP3 players use several methods for upgrading; one method, which executes the upgrade file on the computer while the player is still attached, can cause permanent damage to the player if there's even a slight interruption during execution. Upgrades can be found at the manufacturer and music-management software application Web sites.¹

**References and Sources**
This document is a compilation from the following internet sources:

SUGGESTED ACTIVITIES:

1. **Determine Needs and Wants in an MP3 Player**
   - identify what your music interests and needs are
   - identify pros and cons of types of MP3 players with consumer uses
   - identify how peers and advertisers may influence our choices

   Using the MP3 Activity Worksheet #1, have youth assess what their interests and needs are—when, where and how much would they use the MP3 player and determine best suitable type that meets their needs. Have them interview someone 5 years older and 10 years older to see how interests or needs may change. Discuss how personal needs and wants influence consumer decisions. Discuss what influences youth decisions for music devices.

2. **Conduct Your Own Consumer Ratings Report**
   - identify sources of consumer ratings
   - compare selected models for performance

   Identify three people who currently own MP3 players. Invite them to your meeting. Have them discuss why they selected their players, how they obtain music, and the specific features of each.

   Have youth at meeting set up rating teams to rate the performance of available MP3 players. Have each team identify criteria for rating the products. They might include:
   - Sound quality
   - Ease of accessing playlists or favorite songs
   - Number of hours of playback

   Conclude with their findings and recommendations for brands, types and features most desirable. Discuss how this might help them narrow their choice.

3. **Compare Products and Research Ratings**
   - identify the various characteristics and features of players by brand
   - identify the various size and price differences among players by brand

   Take a field trip to a local store or a virtual one on-line and complete the MP3 Activity 3 Worksheets—Identifying and comparing four different models of players to meet your needs.
4. **Become a TECH SAVVY Consumer Judge**
   - Analyze a given situation to make the best consumer decision

**Sample Situation:**

Shipera and Arsenio are helping their grandmother select a MP3 player for their older brother, Kenny, as a high school graduation present. Kenny plans to go to College this fall and can use it in place of his stereo system in his dorm room. He could also use it for extra file space for class notes and papers with his new laptop. Help them make the best choice for an economical and useful gift for his first few years in college. Their budget is $100- $200.00.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Storage Capacity</th>
<th>File Formats</th>
<th>Battery</th>
<th>Other Features</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1 Apple iPod Shuffle</td>
<td>Flash player</td>
<td>1 GB</td>
<td>AAC, MP3, WAV</td>
<td>Integrated rechargeable Battery</td>
<td>12 hrs. playback</td>
<td>$99.99</td>
</tr>
<tr>
<td>#2 SanDisk Sansa m260</td>
<td>Flash player</td>
<td>4 GB</td>
<td>MP3 Audible, WMA, DRM</td>
<td>1 AAA Alkaline type Standard internal battery</td>
<td>Voice Recorder, FM tuner</td>
<td>$159.99</td>
</tr>
<tr>
<td>#3 Creative Zen Sleek Photo</td>
<td>Hard Disk</td>
<td>20 GB</td>
<td>MP3, WMA, WMA DRM</td>
<td>1 AAA Alkaline type Standard internal battery</td>
<td>Photo album, Voice recorder, FM tuner</td>
<td>$163.34</td>
</tr>
<tr>
<td>#4 RCA LYRA Micro Jukebox</td>
<td>Hard Disk</td>
<td>4 GB</td>
<td>MP3, WMA</td>
<td>Internal Rechargeable Battery</td>
<td>Red case</td>
<td>$115.00</td>
</tr>
</tbody>
</table>

Placings: 3-2-4-1   Cuts: 4-2-4

No. 3 is the best buy of digital storage for the money with 5 times that of # 2 player. Granted the micro-hard disk provides a little larger unit, but the space and added features make it a good college choice for Kenny.

No. 2 is placed over No. 4 due to identifiable features of flash, solid-state player that is durable with voice recording and FM tuner. Granted No. 4 has the same music storage capacity and supports multiple formats. No. 4 has 4 times the storage as No. 1 for the difference in price. No 1 is placed last due to the limited storage space and the lack of voice recording features that the other players have that might be useful to Kenny in college. Granted the iPod does provide easy use and access to iTunes.
MP3 Players—Consumer Needs and Wants

How would you use a portable, carry-a-long player?

1. When you commute to school or work each day?  ___Yes  ___No
2. To play all your CDs/downloaded music at home?  ___Yes  ___No
3. When you work-out, exercise or jog?  ___Yes  ___No
4. To be able to take your music with you when you go to stay with friends/family on weekends, trips, etc.  ___Yes  ___No

What would be your primary source of music:
___ Downloading music on-line  ___ Existing CD/music collection

How important is listening to music to you?  ___ Not a lot  ___ Some  ___ A lot

What type of Player will best suit your needs?

Now, Interview Someone 5 years older than you and someone 10 years older than you.

Would they use an MP3 player?

What type would best suit their interests and needs?
**Conduct a Tech Review...**

Go on-line or on-foot to your favorite electronics store to do some research on MP3 Players.

On your first search investigate the difference in size and prices by types of players. Complete the chart below of your findings.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Brand</th>
<th>Storage Size</th>
<th>Weight/Physical Size</th>
<th>File Formats</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Players</td>
<td></td>
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<tr>
<td>Standard Hard Disk Players</td>
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<tr>
<td>Mini Hard Disk Players</td>
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<tr>
<td>CD MP3 Players</td>
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</table>
# Let's Review Your Findings...

- How did the players compare in price?

- What brands were more affordable? Or had more types of players from which to choose?

- Where there manufactures that only produced certain types of players?

Which Players did you like best? Why?

What was advantage or disadvantage of each type of player?

<table>
<thead>
<tr>
<th>Player</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
</table>

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**Conduct Tech Review #2...**

Go on-line or on-foot to your favorite electronics store to do some research on MP3 Players. On this search investigate the difference not only the size and prices but features of ONE Type of player from four different stores. Complete the chart below of your findings.

Step 1. Choose a player type: _________________________
Step 2. Choose one storage size to compare, i.e. 512 MB,1GB: ___________

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Weight &amp; Appearance</th>
<th>Battery Type</th>
<th>File Formats</th>
<th>Other Features</th>
<th>Cost &amp; Store</th>
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</thead>
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</tbody>
</table>

Which product is the best buy — price per megabyte?

Which product has the most features for the price?

Which store(s) had the best price?