

## Design a Healthy Snack

<p><b>Lesson Plan for Grades:</b> Middle School  <b>Length of Lesson:</b> 2 hours</p>
<p><b>Authored by:</b> UT Environmental Science Institute  <b>Date created:</b> 05/05/2017</p>
<p><b>Subject area/course:</b></p> <ul style="list-style-type: none"> <li>• Health Education, Mathematics</li> </ul>
<p><b>Materials:</b></p> <p><b>**Please be aware of student’s food allergies and omit any ingredients as needed**</b></p> <ul style="list-style-type: none"> <li>• Pre-baked plain granola</li> <li>• Spices: cinnamon, ginger, nutmeg</li> <li>• Sticky sweetener: honey, agave syrup, creamy peanut butter (omit if needed)</li> <li>• Seeds: roasted unsalted sunflower seeds, sesame seeds, flaxseeds</li> <li>• Dried fruits: raisins, dried apricots, dried shredded coconut, dried cranberries</li> <li>• Nuts: roasted unsalted almonds, unsalted pistachios, chopped pecans (omit if needed)</li> <li>• Legumes: dry roasted unsalted peanuts (omit if needed)</li> <li>• Other: crispy rice cereal (plain), semisweet chocolate chips</li> <li>• Bowls, ¼ and ½ measuring cups, tablespoons (1 set per team)</li> <li>• Stirring spoons, spatulas, disposable food plastic gloves, paper towels, wax paper</li> <li>• Markers, poster board, butcher paper</li> <li>• Calculators, cookie cutters (optional)</li> </ul>
<p><b>TEKS/SEs:</b></p> <p><b>§115.22. Health Education, Grade 6</b>  (4) Health information. The student comprehends ways of researching, accessing, and analyzing health information. The student is expected to:</p> <ul style="list-style-type: none"> <li>• (B) use critical thinking to research and evaluate health information</li> </ul> <p><b>§115.23. Health Education, Grades 7-8</b>  (4) Health information. The student knows how to research, access, analyze, and use health information. The student is expected to:</p> <ul style="list-style-type: none"> <li>• (A) use critical thinking to analyze and use health information such as interpreting media messages;</li> <li>• (B) develop evaluation criteria for health information</li> </ul> <p><b>§111.26. Mathematics, Grade 6</b>  (4) Proportionality. The student applies mathematical process standards to develop an understanding of proportional relationships in problem situations. The student is expected to:</p> <ul style="list-style-type: none"> <li>• (E) represent ratios and percents with concrete models, fractions, and decimals;</li> <li>• (G) generate equivalent forms of fractions, decimals, and percents using real-world problems, including problems that involve money</li> </ul> <p><b>§111.27. Mathematics, Grade 7</b>  (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:</p> <ul style="list-style-type: none"> <li>• (A) apply mathematics to problems arising in everyday life, society, and the workplace;</li> </ul>

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- (F) analyze mathematical relationships to connect and communicate mathematical ideas; and
- (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

#### §111.28. Mathematics, Grade 8

(1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

- (A) apply mathematics to problems arising in everyday life, society, and the workplace;
- (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
- (F) analyze mathematical relationships to connect and communicate mathematical ideas; and
- (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

#### Lesson objective(s):

- Students will be able to read nutrition labels.
- Students will understand how the different parts of a nutrition facts labels affect us.
- Students will apply this knowledge and create their own healthy snack from materials provided.
- Students will correctly calculate nutritional facts using fractions or percentages.

#### Differentiation strategies to meet diverse learner needs:

- The teacher should ask students whether they prefer to read or watch videos to learn about concepts; then have students learn in their preferred learning style. However, the teacher may assign students certain methods to improve their skills. For example, if a student prefers reading, teachers may have them watch a video and take notes to improve their listening skills.
- ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets as well as a verbal instruction and demonstration.

#### ENGAGEMENT (10 minutes)

- As a class, watch the highlights video “Top Ten Healthcare Problems” (total length of video 6:29) part of *Hot Science – Cool Talks #104* “Never Wait for a Doctor Again?” found at [www.hotsciencecooltalks.org](http://www.hotsciencecooltalks.org).
- Teacher leads class discussion, “According to Dr. Johnston of the Dell Medical School, one of the top five healthcare problems is that you can’t find an apple in a vending machine. He goes on to explain that it is difficult to find healthy choices. What healthy choices do you think you have found in vending machines?” Students will share their choices and why they think are healthy.
- Teacher explains class will explore how nutrition facts labels work and teams will design their own healthy granola bar.

#### EXPLORATION (15 minutes)

- Divide class into 7 different groups of 3-4 students. Each team looks at the nutrition facts labels and decides which is the healthiest nutritional choice.
- Each team will then research and answer one of the nutritional questions included in the handout and provide a 3-minute presentation to the whole class.

#### EXPLANATION (25 minutes)

- Each team will lead a 3-minute presentation for the whole class answering one of the nutritional questions included when comparing the different snacks.
- Teacher should lead discussion highlighting questions that are not selected by the class.

#### ELABORATION (50 minutes)

- Each team will now be food chemists and are given the task to create a healthy granola bar.

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- Teams decide what nutritional qualities their granola bar must have (high in fiber, high protein, low sugar, etc.) and select the appropriate ingredients.
- Teams calculate the nutritional content for their new snack and create a nutrition facts label.
- Each team will share a final product with a poster that details their snack name, nutritional characteristics and nutrition facts label. Team will share their information through a report, skit, demo or commercial.

#### **EVALUATION (20 minutes)**

- Teams have 2 minutes to present a report, skit, demo or commercial sharing their snack, why it's a healthy choice (high in fiber, high protein, low sugar, etc.) and the nutrition facts label.
- Each team is evaluated by teacher using the included evaluation.
  - The teacher should be continuously making sure that the students have accurately calculated nutritional value based on serving size and proportions used.
  - The teacher should make sure all students have a chance to understand and ask questions.
  - The students should demonstrate their understanding of the nutritional values and labels as well as their knowledge of future application.

#### **SOURCES AND RESOURCES**

- **Presenter Name's Hot Science – Cool Talks #104, "Never Wait for a Doctor Again?",** [www.hotsciencecooltalks.org](http://www.hotsciencecooltalks.org)
- **Science Cooks! SciGirls Live Healthy,** [www.scigirlsconnect.org](http://www.scigirlsconnect.org)
- **"Food-a-Pedia", U.S. Department of Agriculture,** [www.choosemyplate.gov](http://www.choosemyplate.gov)

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#### EXPLORATION ACTIVITY (STUDENT HANDOUT):

**1. Below are the nutrition facts labels of four snacks found in vending machines. Use the information in the labels and look online to help answer the questions below.**

<i><b>Snickers</b></i>	<i><b>Sun Chips Garden Salsa</b></i>	<i><b>Skittles</b></i>	<i><b>Welch's Fruit Snacks</b></i>
<b>Nutrition Facts</b>	<b>Nutrition Facts</b>	<b>Nutrition Facts</b>	<b>Nutrition Facts</b>
<b>Serving Size:</b> 1 bar	<b>Serving Size:</b> 1 bag (1.5 oz)	<b>Serving Size:</b> 1 bag (~ 2 oz)	<b>Serving Size:</b> 15 pieces
<b>Servings per package:</b> 1	<b>Servings per package:</b> 1	<b>Servings per package:</b> 1	<b>Servings per package:</b> 2
<b>Total Calories:</b> 250	<b>Total Calories:</b> 210	<b>Total Calories:</b> 250	<b>Total Calories:</b> 90
<b>Proteins:</b> 4 g	<b>Proteins:</b> 4 g	<b>Proteins:</b> 0 g	<b>Proteins:</b> 1 g
<b>Carbohydrates:</b> 33 g	<b>Carbohydrates:</b> 27 g	<b>Carbohydrates:</b> 56 g	<b>Carbohydrates:</b> 23 g
<b>Total Sugars:</b> 27 g	<b>Total Sugars:</b> 4 g	<b>Total Sugars:</b> 46 g	<b>Total Sugars:</b> 12 g
<b>Total Fat:</b> 12 g	<b>Total Fat:</b> 9 g	<b>Total Fat:</b> 2.5 g	<b>Total Fat:</b> 0 g
<b>Saturated Fat:</b> 4.5 g	<b>Saturated Fat:</b> 1 g	<b>Saturated Fat:</b> 2.5 g	
<b>Dietary Fiber:</b> 1 g	<b>Dietary Fiber:</b> 4 g	<b>Dietary Fiber:</b> 0 g	

1. What are nutrients? What are calories?
2. What are serving sizes? How do they affect nutritional facts?
3. What are proteins? Why would you want high protein foods?
4. What are carbohydrates?
5. What are the differences between *Total Sugar* and *Added Sugar*?
6. What is the difference between *Total Fat* and *Saturated Fat*?
7. What is fiber? Is it a good idea to have foods high in fiber?

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### ELABORATION ACTIVITY (TEACHER HANDOUT)

#### **Purpose:**

Design a healthy granola bar and correctly calculate a nutrition facts label.

#### **Materials:**

If you decide to use different ingredients, you will need to look up the nutritional facts online at [www.choosemyplate.gov](http://www.choosemyplate.gov). You must create a free account to access the “Food-a-pedia” section of the web site.

- Pre-baked plain granola
- Spices: cinnamon, ginger, nutmeg
- Sticky sweetener: honey, agave syrup, creamy peanut butter (omit if needed)
- Seeds: roasted unsalted sunflower seeds, sesame seeds, flaxseeds
- Dried fruits: raisins, dried apricots, dried shredded coconut, dried cranberries
- Nuts: roasted unsalted almonds, unsalted pistachios, chopped pecans (omit if needed)
- Legumes: dry roasted unsalted peanuts (omit if needed)
- Other: crispy rice cereal (plain), semisweet chocolate chips
- Bowls,  $\frac{1}{4}$  and  $\frac{1}{2}$  measuring cups, tablespoons (1 set per team)
- Stirring spoons, spatulas, disposable food plastic gloves, paper towels, wax paper
- Markers, poster board, butcher paper
- Calculators, cookie cutters (optional)

#### **Safety Information:**

- Be aware of students’ food allergies and omit any ingredients as needed.
- Students should use disposable gloves or spatulas to mix ingredients.

#### **Procedure:**

- Students work in teams of 3-4. As a team, they must decide what nutritional qualities their granola bar must have (high in fiber, high protein, low sodium, low sweetener, etc.) and select the appropriate ingredients.
- Teams calculate the nutritional content for their new snack and create a nutritional label.
- Each team will share a final product with a poster that details their snack name, nutritional characteristics and nutrition facts label. Team will share their information through a report, skit, demo or commercial.

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#### ELABORATION ACTIVITY (STUDENT HANDOUT):

### *Nutrient Reference Guide*

*Spices like cinnamon, ginger & nutmeg may be added to your recipe for added flavor. You do not need to add the nutritional facts for those spices.*

<b>Dried Fruits (serving size ½ cup)</b>			
<b>Raisins</b>	<b>Apricot, Dried</b>	<b>Coconut, Dried, Shredded</b>	<b>Cranberries, Dried</b>
Total Calories: 217	Total Calories: 157	Total Calories: 212	Total Calories: 169
Protein: 2 g	Protein: 2 g	Protein: 1 g	Protein: 0 g
Carbohydrates: 57 g	Carbohydrates: 41 g	Carbohydrates: 24 g	Carbohydrates: 45 g
Total Sugars: 43 g	Total Sugars: 35 g	Total Sugars: 17 g	Total Sugars: 36 g
Total Fat: 0 g	Total Fat: 0 g	Total Fat: 13 g	Added Sugars: 28 g
		Saturated Fat: 12 g	Total Fat: 1 g
Dietary Fiber: 3 g	Dietary Fiber: 5 g	Dietary Fiber: 5 g	Dietary Fiber: 3 g

<b>Seeds</b>		<b>Legumes</b>	
<b>serving size ½ cup</b>		<b>serving size ½ cup</b>	
<b>Sesame</b>	<b>Sunflower, Roasted, Unsalted</b>	<b>Flax</b>	<b>Peanuts, Roasted, Unsalted</b>
Total Calories: 425	Total Calories: 400	Total Calories: 387	Total Calories: 427
Protein: 13 g	Protein: 14 g	Protein: 13 g	Protein: 17 g
Carbohydrates: 20 g	Carbohydrates: 15 g	Carbohydrates: 21 g	Carbohydrates: 16 g
Total Sugars: 0 g	Total Sugars: 2 g	Total Sugars: 1 g	Total Sugars: 3 g
Total Fat: 36 g	Total Fat: 35 g	Total Fat: 31 g	Total Fat: 36 g
Saturated Fat: 5 g	Saturated Fat: 5 g	Saturated Fat: 3 g	Saturated Fat: 5 g
Dietary Fiber: 13 g	Dietary Fiber: 7 g	Dietary Fiber: 20 g	Dietary Fiber: 6 g

Source: "Food-a-Pedia", U.S. Department of Agriculture, [www.choosemyplate.gov](http://www.choosemyplate.gov)

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### *Nutrient Reference Guide*

*Spices like cinnamon, ginger & nutmeg may be added to your recipe for added flavor. You do not need to add the nutritional facts for those spices.*

<b>Sweeteners</b> serving size 1 tablespoon			<b>Other</b> serving size ¼ cup
<b>Honey</b>	<b>Agave Syrup</b>	<b>Peanut Butter, Creamy</b>	<b>Chocolate Chips, Semi-sweet</b>
Total Calories: 64	Total Calories: 65	Total Calories: 97	Total Calories: 202
Protein: 0 g	Protein: 0 g	Protein: 4 g	Protein: 2 g
Carbohydrates: 17 g	Carbohydrates: 16 g	Carbohydrates: 3 g	Carbohydrates: 27 g
Total Sugars: 17 g	Total Sugars: 14 g	Total Sugars: 2 g	Total Sugars: 23 g
Added Sugars: 16 g	Added Sugars: 14 g	Added Sugars: 1 g	Added Sugars: 22 g
Total Fat: 0 g	Total Fat: 0 g	Total Fat: 9 g	Total Fat: 13 g
		Saturated Fat: 2 g	Saturated Fat: 7 g
		Dietary Fiber: 1 g	Dietary Fiber: 2 g

<b>Nuts</b> serving size ½ cup			<b>Other</b> serving size ½ cup
<b>Dry Roasted Almonds, Unsalted</b>	<b>Pecans, Chopped</b>	<b>Pistachios, Unsalted</b>	<b>Rice Crispy Cereal, Plain</b>
Total Calories: 413	Total Calories: 377	Total Calories: 349	Total Calories: 47
Protein: 14 g	Protein: 5 g	Protein: 13 g	Protein: 1 g
Carbohydrates: 14 g	Carbohydrates: 8 g	Carbohydrates: 18 g	Carbohydrates: 11 g
Total Sugars: 3 g	Total Sugars: 2 g	Total Sugars: 5 g	Total Sugars: 1 g
Total Fat: 36 g	Total Fat: 39 g	Total Fat: 28 g	Added Sugars: 1 g
Saturated Fat: 3 g	Saturated Fat: 3 g	Saturated Fat: 3 g	Total Fat: 0 g
Dietary Fiber: 8 g	Dietary Fiber: 5 g	Dietary Fiber: 6 g	

Source: "Food-a-Pedia", U.S. Department of Agriculture, [www.choosemyplate.gov](http://www.choosemyplate.gov)

**Design a Healthy Snack**

**ELABORATION ACTIVITY (STUDENT HANDOUT):**

*You are a team of food chemists tasked with creating a healthy granola bar that can be added to your school's vending machine.*

**1. Brainstorm the nutritional characteristics for your granola bar.**

*Do you want high protein or fiber? Low in sugar or calories?  
Pick TWO characteristics you want your granola bar to have.*

*Each team will receive 1 cup of plain granola (nutritional characteristics listed below). As a team, brainstorm what additional ingredients and the quantities to add to reach your team's desired nutritional characteristics. Use the Nutritional Reference Guide to see characteristics of different ingredients. You do not need to add the nutritional fact of spices you use (cinnamon, ginger or nutmeg). You may use up to FOUR ingredients (including the granola) to create your recipe.*

<p><b>Plain Granola Nutrition Facts</b></p> <p><b>Serving Size:</b> ½ cup</p> <p><b>Total Calories:</b> 170</p> <p><b>Protein:</b> 6 g</p> <p><b>Carbohydrates:</b> 33 g</p> <p><b>Total Sugars:</b> 10 g</p> <p><b>Total Fat:</b> 2 g</p> <p style="padding-left: 20px;"><b>Saturated Fat:</b> 0 g</p> <p><b>Dietary Fiber:</b> 3 g</p>	<p>Nutritional characteristics of our granola bar:</p> <p>1.</p> <p>Ingredients to use:</p> <p>2.</p> <p>Ingredients to use:</p> <p>Additional ingredients to use (flavor, consistency)</p>
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**2. Calculate the servings for EACH ingredient.**

*For each of the ingredients in your granola bar, calculate the amount used in the final recipe. Your team may choose to use only half or twice as much of the servings listed in the resource guide (1/4 cup, 1/2 tablespoon, etc.).*

*To calculate final serving sizes:*

***amount in final recipe / serving size = how much of a serving was used***

***Do not use more than FOUR ingredients (including the granola) in your recipe. Spices do not count towards limits in the ingredients you may use.***

**Chart 1. Servings per ingredient**

<i>Ingredients</i>	<i>Amount in final recipe</i>		<i>Serving size (in reference guide)</i>		<b>Column A</b> <i>How much of a serving was used</i>
<i>Ex. Rice Crispy Cereal, Plain</i>	<i>1 cup</i>	<i>/</i>	<i>1/2 cup</i>	<i>=</i>	<i>2 servings</i>
<i>Granola, Plain</i>		<i>/</i>	<i>1/2 cup</i>	<i>=</i>	
		<i>/</i>		<i>=</i>	
		<i>/</i>		<i>=</i>	
		<i>/</i>		<i>=</i>	

**3. Try out your recipe!**

Mix the dry ingredients in a bowl. Add the sweetener to bind everything together and use the spatula (or the plastic gloves) to evenly mix everything. Place your mixture on wax paper and gently spread it to create a bar. Then, decide how many servings to create (1 bar, 2 balls, 2 bites, etc.).

**4. Calculate the nutritional information for EACH ingredient in your recipe.**

Fill out the tables in the next page for all of the ingredients you used.

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<b>Chart 2. Nutritional Information for Ingredients</b>					
<b>Example: Crispy Rice Cereal, Plain</b>					<b>Column B</b>
<i>Nutrient</i>	<i>Amount in one serving (reference guide)</i>		<i>How much of a serving used (Chart 1, Column A)</i>		<i>Amount in recipe</i>
<b>Carbohydrates</b>	<b>11</b>	<b>X</b>	<b>2</b>	<b>=</b>	<b>22</b>
<b>Ingredient # 1: Granola, Plain</b>					
<i>Nutrient</i>	<i>Amount in one serving (reference guide)</i>		<i>How much of a serving used (Chart 1, Column A)</i>		<i>Amount in recipe</i>
Proteins		X		=	
Carbohydrates		X		=	
Total Sugars		X		=	
Total Fat		X		=	
Saturated Fat		X		=	
Dietary Fiber		X		=	
<b>Ingredient # 2:</b>					
<i>Nutrient</i>	<i>Amount in one serving (reference guide)</i>		<i>How much of a serving used (Chart 1, Column A)</i>		<i>Amount in recipe</i>
Proteins		X		=	
Carbohydrates		X		=	
Total Sugars		X		=	
Total Fat		X		=	
Saturated Fat		X		=	
Dietary Fiber		X		=	
<b>Ingredient # 3:</b>					
<i>Nutrient</i>	<i>Amount in one serving (reference guide)</i>		<i>How much of a serving used (Chart 1, Column A)</i>		<i>Amount in recipe</i>
Proteins		X		=	
Carbohydrates		X		=	
Total Sugars		X		=	
Total Fat		X		=	
Saturated Fat		X		=	
Dietary Fiber		X		=	
<b>Ingredient # 4:</b>					
<i>Nutrient</i>	<i>Amount in one serving (reference guide)</i>		<i>How much of a serving used (Chart 1, Column A)</i>		<i>Amount in recipe</i>
Proteins		X		=	
Carbohydrates		X		=	
Total Sugars		X		=	
Total Fat		X		=	
Saturated Fat		X		=	
Dietary Fiber		X		=	

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#### 5. Calculate TOTAL nutrients in the recipe.

Find the TOTAL for each of the nutrients that you used in the ingredients of your recipe, refer to *Chart 2, Column B* from the tables created in the previous step.

**Chart 3. Total Nutrients**

Ingredient	Calories	Protein (g)	Carbohydrates (g)	Total Sugars (g)	Total Fat (g)	Saturated Fat (g)	Dietary Fiber (g)
# 1 Granola, Plain							
# 2							
# 3							
# 4							
<b>Totals (Row 5)</b>							

#### 6. Find the nutrition facts per serving.

Divide the each of the nutrients (Chart 3, Row 5) by the number of servings (number of bars, balls, bites or other portions your team came up with).

Round to the nearest tenth for each nutrient.

**Chart 4. Nutrition Facts Per Serving**

	Total (Chart 3, Row 5)		# of portions		<b>Column C</b> Amount per serving
Calories		/		=	
Protein (g)		/		=	
Total Sugars (g)		/		=	
Carbohydrates (g)		/		=	
Total Fat (g)		/		=	
Saturated Fat (g)		/		=	
Dietary Fiber (g)		/		=	

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**7. Create your poster and be ready to share!**

Each team will have 3 minutes to share through a report, skit, commercial, song or video the healthy snack they developed. Teams need to create a poster with the following information that will also be included in the 3-minute share-out.

<h1>Snack Name</h1>	<h1>Nutrition Facts</h1> <p>Serving Size: _____</p> <p>Total Calories: _____</p> <p>Protein: _____ g</p> <p>Carbohydrates: _____ g</p> <p>Total Sugars: _____ g</p> <p>Total Fat: _____ g</p> <p>Saturated Fat: _____ g</p> <p>Dietary Fiber: _____ g</p>
<h1>Nutritional Characteristics</h1>	

Below is the chart that will be used to evaluate your posters.

1	2	3	4
Two of the following components are missing or incomplete - snack name, nutritional characteristics or nutrition facts label.	One of the following components are missing or incomplete - snack name, nutritional characteristics or nutrition facts label.	Snack name is included. Only ONE nutritional characteristic included. A clear nutrition facts label is included but not calculated correctly.	Snack name is included. Poster clearly states TWO nutritional characteristics included. A clear nutrition facts label is included and calculated correctly.