



Science Objectives

- Students will learn how food and exercise work together to determine weight loss, gain, or maintenance over time and that a balance is needed.
- Students will discover how their daily intake of calories from proteins, carbohydrates, and fats compares to the recommended daily allowance for middle school age.
- Students will learn that daily exercise will raise their basic metabolic rate (BMR), calories burned while at rest.

Vocabulary

- Biometrics
- Body Mass Index (BMI)
- Basic Metabolic Rate (BMR)
- carbohydrates (carbs)
- proteins
- fats
- nutrient
- percent body fat
- Calorie
- Four Food Groups
- lifestyle

About the Lesson

- This lesson involves students using TI-Nspire technology to simulate, observe, and manipulate the factors that affect weight over time.
- As a result, students will:
 - Reinforce understanding of the interaction between food intake and exercise on weight gain and how they can utilize tools to help them make good choices.
 - Understand that maintaining an optimal weight is important to maintaining good health and that a balance is needed between eating and exercise.
 - Recognize that they should follow expert recommendations for food and exercise types and amounts.

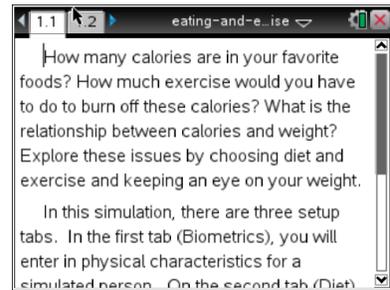


TI-Nspire™ Navigator™

- Send out the *Eating_and_Exercise.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to allow students to show how they manipulate factors that effect weight gain, loss, or maintenance.

Activity Materials

- Compatible TI Technologies:  TI-Nspire™ CX Handhelds,  TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

Lesson Files:

Student Activity

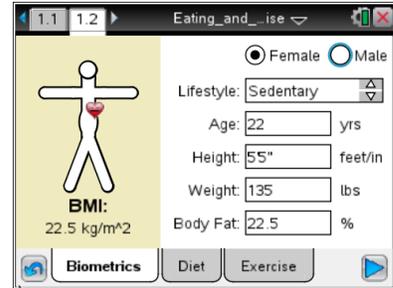
- Eating_and_Exercise_Student.doc
- Eating_and_Exercise_Student.pdf
- Eating_and_Exercise.tns



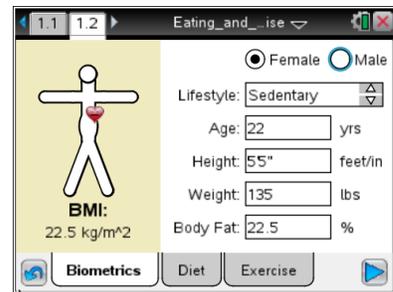
Discussion Points and Possible Answers

Move to the Biometrics tab.

In this simulation, students will find three tabs—**Biometrics**, **Diet**, and **Exercise**. They should select any of the tabs during the simulation to change their input.

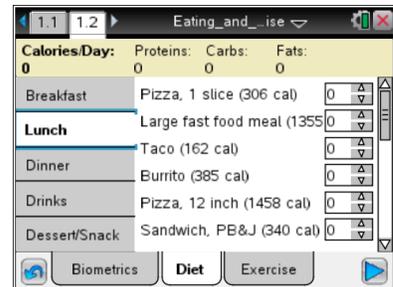


1. Students should first fill in the information for **Biometrics**, such as Female or Male, Lifestyle (use up and down arrows to select from a menu), Age, and Weight. (Note: The percent body fat will be calculated automatically.)



Tech Tip: When students select Age, Height, or Weight, the keyboard will appear on the screen. To enter numerical values, students should select the “.?123” button to the left or right of the space bar. After they have entered the numerical value, they should select “return” to return to the main screen.

2. Then students should select **Diet**. Here they should enter their own typical daily intake of food for breakfast, lunch dinner, snacks/desserts. They should include beverages for each meal and snack that they typically drink. Students should use the up and down arrows to indicate amounts.





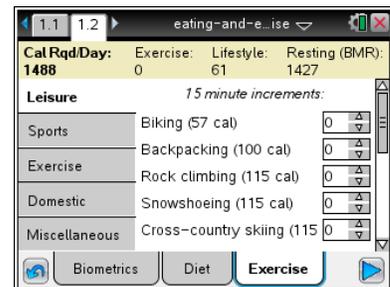
- When students have finished these entries, they should record the amounts of Calories from proteins, carbs, and fats.
- Divide the number of Calories from proteins, carbs, and fats by the total number of Calories and multiply by 100. This calculates the percentage of Calories from each nutrient.

Answer: Students will calculate their daily percentage of calories from proteins, carbs, and fats using the formula shown above in Q1. Answers will vary, but students will likely have most of their Calories coming from carbohydrates and the least of their calories from fats.

- How do your percentages of these nutrients compare with the recommended percentages for middle school students (proteins 10% – 30%, carbohydrates 45% – 65%, fats 25% – 35%)?

Answer: Students will compare their daily percentages that they calculated in Q1 with these recommended daily allowances for middle school students: proteins 10%-30%, carbs 45%-65%, and fats 25%-35% (<http://www.mayoclinic.com/health/nutrition-for-kids/NU00606>)

- Select **Exercise**. Use the up and down arrows to enter the time you spend doing each type of activity for the selected day of the week. For example, if you ride your bike for an hour, or 60 minutes, you would enter 4 because the time listed is 15 minutes ($4 \times 15 = 60$). Grab and drag the scroll bar on the right for more choices. Estimate times as required.



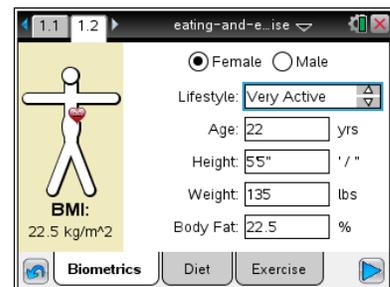
- As you add activities, what do you notice about the changes in the total calories burned for Exercise?



Tech Tip: Remind students that  will reset data they have entered. They will be prompted to choose which data they want to reset.

Move back to Biometrics.

- Change your lifestyle to one that is more or less active.

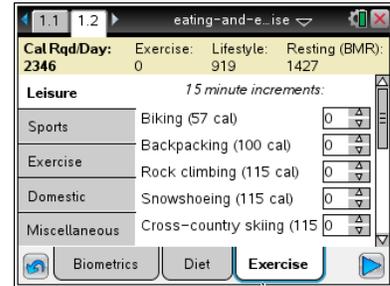




Move back to Exercise.

Q4. What do you notice about how the Lifestyle number changes as a result of the change you made in number 5 above?

Answer: The Lifestyle number increases or decreases depending on whether I entered a more or less active Lifestyle for Biometrics.



Q5. How does the combination of numbers for Exercise, Lifestyle, and Resting (BMR) affect the Calories/Day (calories burned per day)? Why do you think this is so?

Answer: The Lifestyle number increases or decreases depending on whether I entered a more or less active Lifestyle for Biometrics.

Q6. If you want to maintain your current weight, how do you get the total Calories per day burned to equal total Calories consumed?

Answer: I need to add or subtract the amount of food intake and/or increase or decrease exercise until there is a balance.

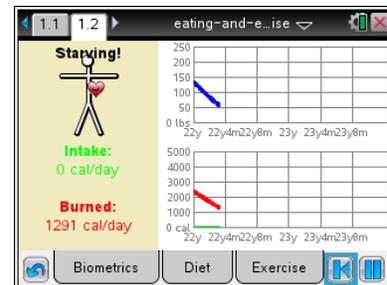
6. Now select the arrow  on the bottom right of the screen. This will show a timeline graph that compares the amount of calories you consume every day compared with the amount of calories you burn.

Q7. What happens to your weight over time if your current intake of food and exercise stay the same?

Answer: Answers will answer that they gained, lost, or maintained their current weight.

Move back to Diet.

- Students are to keep the biometrics and exercise they entered previously the same. They need to change at least one food for each meal: breakfast, lunch, dinner, and dessert/snack to foods they think are healthier.
- Students should select the arrow again. Then, they should select  to replot the graph and observe changes in all the lines on the graph.
- Now set weight goals for you based on the information in the introduction about BMI and a Normal weight range.





- Q8. Are the food choices you made the second time better suited to your weight goals? If not how would you change them again?

Answer: Students should assess how the food choices they made affected their weight goals by comparing the calorie intake to calories burned graphs.

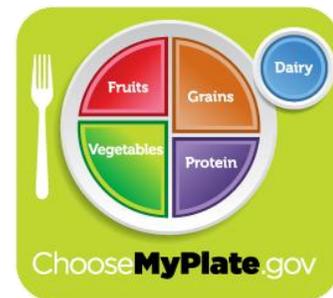
Move back to Biometrics.

10. Students now change exercise levels only and keep their diet the same.
11. They should select the arrow and observe the changes in all lines of the graph.
Q9. How did changing only exercise levels and not diet affect your weight over time?

Answer: Students should use the graph to assess how changing only exercise levels and not diet affected their weight goals. Likely, weight would go down if diet was left the same.

Analysis Questions.

12. Students should now use the Internet to investigate other ways to maintain maximum health. They can go to the website <http://www.choosemyplate.gov/> which shows a divided plate that helps people/children visualize the percentages of the four food groups and dairy recommended by the government. (See picture at the right.)



- Q10. What do you notice about the percentages of space that each of the food groups takes up on the plate? Why do you think this is so?

Answer: Vegetables take up about 30% of the plate. Fruits and vegetables together take up about 50%.

- Q11. What percentage of the plate do vegetables take up? The percentage of fruits and vegetables combined?

Answer: Vegetables take up about 30% of the plate. Fruits and vegetables together take up about 50%.

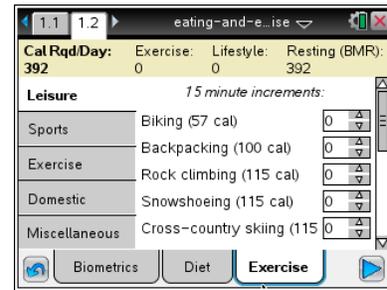
- Q12. Why do you think dairy is included as a separate icon?

Answer: The dairy icon reminds us that dairy should be a part of our diet.



13. Students should go to tab **Exercise** and look at the exercises listed. (Be sure to use the scroll bar to view all of them.)

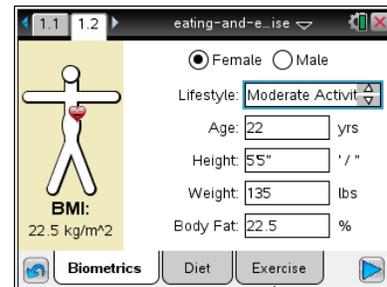
Q13. List the group of exercises you think burn the most calories in the same amount of time. Then list the group of exercises you think burn the least. Then view Internet sites such as <http://www.nutristrategy.com/activitylist4.htm> to check your estimate.



Answer: Generally speaking these activities burn the most: rock climbing, backpacking, snowshoeing, cross-country skiing, canoeing, and rowing. These burn the least: bicycling (less than 10 mph), downhill skiing, surfing, kayaking, horseback riding, and fishing.

14. Students will now try improving food and exercise choices again based on what they learned from the research. They will observe how the graphs change.

Q14. How did your research about food and exercise help you make better choices as you input improved diet and exercise choices?



Answer: Students might answer that they chose more vegetables and then secondly fruits for meals and snacks to maintain a more optimum weight level.



TI-Nspire Navigator Opportunities

Allow students to volunteer to be the Live Presenter and demonstrate how to adjust the biometrics, food, and activity on each tab. Use Quick Poll to check for understanding during the course of the activity.

Wrap Up

When students are finished with the activity, collect students' worksheets.

Assessment

- Formative assessment will consist of questions embedded in the student worksheet. Analyze questions in the student worksheet with the students.
- Summative assessment will consist of questions/problems on the chapter test.