

LESSON:

Mapping Solutions for Obesity

Summary: Students read the *EHP* article “Sharing Solutions for Childhood Obesity” and discuss as a class the issue of obesity. Using maps and other resources, students generate a variety of local exercise routes considering numerous factors like distance, difficulty, safety, and attractiveness for walking, biking, or rollerblading. The group then brainstorms ways to share the routes to encourage exercise within their community.

EHP Article: “Sharing Solutions for Childhood Obesity”
EHP Student Edition, November 2005, p. A520–A522
<http://ehp.niehs.nih.gov/docs/2005/113-8/niehsnews.html>

Objectives: By the end of this lesson, students should be able to:

1. identify solutions for reducing childhood obesity;
2. create exercise routes for various distances on a map of the local community;
3. measure distances in kilometers and miles within the community;
4. estimate length of walking time per distance;
5. convert miles to kilometers; and
6. encourage physical activity in the community.

Class Time: 1 hour

Grade Level: 9–12

Subjects Addressed: Environmental Health, Science, Math, Health

► Prepping the Lesson (60–90 minutes)

INSTRUCTIONS:

1. Obtain a class set of *EHP Student Edition*, November 2005, or download the article “Sharing Solutions for Childhood Obesity.”
2. Read the article “Sharing Solutions for Childhood Obesity.”
3. Obtain a map, as detailed as possible, of your school grounds or local community. Contact your local library or city transportation office for assistance in obtaining a detailed map. Mapquest, Google Maps, or Google Earth may also be used to obtain a map of the surrounding community. Be sure you know the scale used on the map you select, even if you have to determine the scale yourself.
4. Make copies of the Student Instructions and map as needed.

MATERIALS (per student):

- 1 copy of *EHP Student Edition*, November 2005, or 1 copy of “Sharing Solutions for Childhood Obesity”
- 1 map of local area, with the scale used on the map (may be useful to have the map on a transparency)
- 1 copy of the Student Instructions
- Ruler (with the appropriate measurement used for the scale on the map), paper, or other tools for measuring distances on a map, such as a map wheel

VOCABULARY:

- built environment
- kilometers
- obesity
- scale



BACKGROUND INFORMATION:

The article and guidelines within the lesson should provide sufficient information. This lesson could follow the “Unequal Housing, Unequal Health” lesson from *EHP Student Edition*, August 2005.

RESOURCES:

Environmental Health Perspectives, Environews by Topic page, <http://ehp.niehs.nih.gov/topic>. Choose Built Environment, Obesity

Google Maps, <http://maps.google.com/>. Type in your location to get a map of the local area. Zoom in and out to decrease or increase area for map.

Google Earth, <http://earth.google.com/>. Download the free Google Earth software to receive maps with satellite imagery.

GMaps Pedometer, <http://www.sueandpaul.com/gmapPedometer/>. Use this website to help record distances in a community using Google Maps.

Mapquest, <http://www.mapquest.com>.

Physical Activity for Everyone, Centers for Disease Control and Prevention, <http://www.cdc.gov/nccdphp/dnpa/physical/index.htm>.

Promoting Physical Activity: A Guide for Community Action, Centers for Disease Control and Prevention, http://www.cdc.gov/nccdphp/dnpa/physical/health_professionals/community_guide.htm.

INSTRUCTIONS:

1. Distribute copies of the Student Instructions and have the students read the article “Sharing Solutions for Childhood Obesity.”
2. Lead a brief classroom discussion on childhood obesity and why the students think it is a health problem.
3. Ask the students to brainstorm solutions for solving the childhood obesity problem. One of the solutions should be to increase physical activity. Ask how individuals could increase their physical activity (exercising in their community).
4. Tell the students they are going to help their community increase their physical activity by developing exercise routes in their local area that are of varying distances.
5. Break the students into small groups (2–3 students) and provide a copy of the map you previously selected for the lesson. (It may be easier for the students to have the map on a transparency.)
6. Discuss the scale used for the map and how to convert the map scale into distances for the “real world.” Be sure students are able to use the map scale to measure distances between places.
7. Before students start creating exercise routes, you may want to discuss safety issues, such as location of sidewalks, busy streets, areas to avoid, challenging routes with hills, physical features and attractiveness of the route, how well lit the streets are, proper equipment (e.g., bike helmets, properly fitting shoes, water bottle), etc.
8. Have students develop exercise routes that could be used for walking, running, biking, or rollerblading for various distances in miles and kilometers, such as 1 mile, 3 miles, 5 miles, 10 miles, and 15 miles. (It is suggested to do both miles and kilometers as the community will be more familiar with miles but unit conversions to kilometers are a useful skill.) You may want to provide parameters for the exercise routes, such as each route should start and end at the school, each running/walking route should have a sidewalk, each route should not cross a busy road/highway, and each should be as simple as possible so that an individual may easily follow the route.
9. Review the students’ maps and promotion ideas. Select the best ones for posting on a website or inclusion in a local newspaper. You could have your students research information to include in an article to accompany the map, such as length of time it should take to walk one mile for best results (20–25 minutes), how much exercise a person should get each week, etc.

NOTES & HELPFUL HINTS:

- To shorten the time needed for the lesson, have each student group create one exercise route for one distance.
- To extend the lesson, have students create the map of the community themselves, developing a scale for their maps and noting sidewalks, busy streets, and other important landmarks. Student could go into the community to practice their route to check the distance. If your school has a cross-country or track team, they may have a trundle wheel for measuring long distances, or use a GPS unit or pedometer for measuring distance by walking.
- Use Mapquest, Google Maps, or Google Earth to obtain a map of your community. Google Maps and Mapquest allow you type in an address, zoom in/out, and print maps, and are very simple to use. Be sure to note the scale used for the map you select. The scale may appear on the screen but not print on the map.
- Google Earth requires free software to be downloaded onto the computer. Google Earth provides pictures with satellite imagery, which is very exciting for students but is also more complicated to use, and the resolution may not be as clear depending upon your computer and printer.



- To assist students in measuring the distances on the map, you could purchase map wheels or use the following technique:
 - On the straight edge of a piece of paper, measure the distance of the exercise route using the scale on the map (e.g., 2 inches = 1 mile). Mark the distance on the paper.
 - Using this piece of paper with the length of the exercise route measured, place the corner of the piece of paper at the beginning point of the exercise route on the map.
 - Line up the straight edge of your piece of paper and angle it along your selected street, making a second mark on your paper at the next intersection where the exercise route turns or the street turns.
 - At each turn, continuing making marks on the straight edge of your piece of paper. The distance between these marks represents the distance in a straight line. Continue until your exercise route equals the distance you first measured on your piece of paper (i.e., 1 mile).
- To assist students in measuring the distances on the map, you could use the online resource GMaps Pedometer <http://www.sueandpaul.com/gmapPedometer>. This mapping application works with Goggle Maps to help record distances. By double-clicking on the map, you can create an exercise route, and the distance will automatically be measured.

▶ Aligning with Standards

SKILLS USED OR DEVELOPED:

- Communication
- Computation
- Manipulation
- Reading maps and legends
- Unit conversions

SPECIFIC CONTENT ADDRESSED:

- Measuring distances
- Using map scales
- Mapping
- Obesity
- Built environment

NATIONAL SCIENCE EDUCATION STANDARDS MET:

Unifying Concepts and Processes Standard

- Change, constancy, and measurement

Science and Technology Standard

- Abilities of technical design

Science in Personal and Social Perspectives Standard

- Personal and community health

▶ Assessing the Lesson

Step 2: Think of some solutions for solving the childhood obesity problem and share one of those solutions with the class.

Verbal responses during classroom discussion. Criteria: Relevance and accuracy of responses.

Step 3: In this activity you are going to help your community increase their physical activity by developing exercise routes of varying distances in the local area.

Check that students completed steps A) through C).



Exercise routes: There will be a variety of exercise routes developed by students. Use the criteria you established to assist students in developing their routes for assessment, including accuracy (distance), ease of route, starting and end points, attractive physical features of the route, etc.

Step 4: Answer the following questions.

- A) How did you determine your route? Did you pick the distance first and find a route that was closest to that distance? Or did you pick the route first and then determine the distance?

Answers will vary.

- B) Why did you choose to determine your route that way?

Better responses will give thoughtful reasons like “there are hills on this route and it would provide more challenge,” or “We thought one mile would be a good distance to maximize work-out and not take up too much time.”

- C) Were you able to map a route that has sidewalks and does not cross a busy road/highway?

Answers will vary.

- D) On average, if a person walks 2–3 miles per hour, how long will it take someone to walk your route? Show your calculations and include units. Be sure the units cancel correctly!

Answers will vary; calculations should show units. For example,

$$2 \text{ miles} \times 1 \text{ hour} / 2 \text{ miles} = 1 \text{ hour}$$

- E) What is the distance of your route in kilometers (km)? (1 kilometer = 0.621 mile). Show your calculations and include cancelled units.

Answers will vary; calculations should show units. For example,

$$2 \text{ miles} \times 1 \text{ km} / 0.621 \text{ mile} = 3.22 \text{ km}$$

Step 6: Give one idea for how you will you promote your walking route.

Answers will vary. Look for thoughtful and creative ideas.

► Authors and Reviewers

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STUDENT INSTRUCTIONS: Mapping Solutions for Obesity

Step 1: Read the article "Sharing Solutions for Childhood Obesity."

Step 2: Think of some solutions for solving the childhood obesity problem and share one of those solutions with the class.

Step 3: In this activity you are going to help your community increase their physical activity by developing exercise routes of varying distances in the local area. Do the following steps:

- A) Break into small groups (2–3 students) and either obtain a copy of a local map or print some maps off the Internet (<http://www.mapquest.com/> or <http://maps.google.com/>).
- B) In your group, discuss distance, the location of sidewalks, busy streets, hills, areas to avoid, etc. Using your copy of the local map, create an exercise route. Be sure to take the parameters assigned by your teacher into account (i.e., starting and end points). Write your route below.
- C) Determine the scale used on the map (e.g., 1 inch = 1 mile). Write the scale below.

Step 4: Answer the following questions.

- A) How did you determine your route? Did you pick the distance first and find a route that was closest to that distance? Or did you pick the route first and then determine the distance?
- B) Why did you choose to determine your route that way?
- C) Were you able to map a route that has sidewalks and does not cross a busy road/highway?



- D) On average, if a person walks 2–3 miles per hour, how long will it take someone to walk your route? Show your calculations and include units. Be sure the units cancel correctly!
- E) What is the distance of your route in kilometers (km)? (1 kilometer = 0.621 mile). Show your calculations and include cancelled units.

Step 5: Give one idea for how you will you promote your walking route.

