

Grade 3: Physical Safety

Lesson 7: Preventing Broken Bones

Objectives:

- ✓ Students will discover how to prevent broken bones.
- ✓ Students will conduct an experiment to see the importance of the appropriate protective gear.
- ✓ Students will hear from athletes what protective gear they wear and why it is important.

Materials:

- Pictures of sports figures (**See Figure 2**)
- Pictures of protective gear (**See Figure 2**)
- Popsicle Sticks
- Markers
- Tape
- Newspaper, bubble wrap, foam, toilet paper, tissue paper (you may use other materials depending on what you have available)
- Eggs (one per group – hard boiled OR raw)
- Large sheets of paper (for posters)
- “Consequence Game” Cards (**See Figure 1**)
- Magazines with pictures of sports figures
- Bulletin Board space

Activity Summary:

In this lesson students will explore the importance of preventing broken bones and the different precautions that should be taken when engaging in weight-bearing exercises and sports.

Background Information for the Teacher:

When engaged in active sports and exercise, it is important that students wear protective gear to help prevent injury. Many childhood accidents are a result of falls or collisions in the course of sports or other physical activities. Although according to statistics from the Centers for Disease Control **boys** tend to be **more at risk** than girls for these types of accidents, they occur for both genders and each must wear protection. The reason boys tend to have more of these kinds of accidents is not clear, but it **might** be because **boys take more physical risks than girls**. (It’s also possible that girls are more coordinated at an earlier age.)

In-line skating and skateboarding, while popular activities with many children, are two of the most common injuries, according to the CDC. These injuries commonly include broken or injured wrists. Wearing good **wrist braces** can help prevent or minimize this type of injury. **Skateboarders** in particular appear to be at great risk for **head injuries**. **Protective helmets and knee pads** are

extremely important for anyone engaged in rapidly moving activities where falling is a concern, such as skateboarding, skating or bicycling.

Students who are resistant to using safety gear need to be reminded that football players, baseball players, hockey players, and **all professional athletes use safety equipment** appropriate to the sport they are playing. Find ways to make using safety equipment the “cool” thing to do. Have magazines available that feature photographs of famous sports figures in full protective gear.

Vocabulary:

accidents
helmet
wrist brace
knee pad

Engage (5 minutes):

1. Put students in pairs. Give each pair of students a Popsicle stick. Have the students write a name of a bone on the Popsicle stick, then help the students break the stick in half.
2. **Ask: “What happened to your bone?”** (*It’s broken.*) Add: **“We need to make a cast for our bone.”**
3. Give each group tape and tell the students to repair the bone. Tell them they need to make the bone just as strong as it was before it broke.

Explore: (25 minutes)

*(NOTE: This experiment uses eggs. If you would like to have **less of a mess**, use hard-boiled eggs.)*

Ask: **“How can we prevent our bones from breaking?”** Write students guesses on the board.

Put students in groups of three or four and assign roles: **Supply Manager**, **Representative #1**, and **Representative #2**. Each group will receive a different protective material:

- Group 1 – NEWSPAPER**
- Group 2 – BUBBLE WRAP**
- Group 3 – FOAM**
- Group 4 - TOILET PAPER**
- Group 5 – TISSUE PAPER**

Each group will need: One egg
Tape
Directions

Directions:

1. Imagine the egg is your skull. We need to protect the brain inside the skull while we are playing a sport.
2. Wrap the egg in the material your group was given. Wrap it well! Be sure to protect it!
3. Write a hypothesis and predict what will happen. (Ex. Will the egg break when dropped from a desk? Why? Why not?) Be sure to consider these questions: What protective material would be best to use? What protective material would be the worst to use?
4. When all groups have completed protecting their eggs have representative #1 from each group come up with their wrapped egg.
5. Write the different protective materials on the board. Have the student stand in front of the wrapping material that their group used.
6. Have student representative #1 from each group stand on a chair. Then, holding the egg straight out from their body, have each student DROP their egg.
7. Have the student representative #2 from each group **gently** unwrap their egg. What happened? Examine each egg. Have student representative #2 report to the class what happened to the egg. Report (no crack, one crack, cracked but insides are not coming out, cracked and insides are coming out, completely smashed.)
8. Have all students record the information in their journal. (Record the material used and what happened to the egg.)

Ask: ***“What does this tell us about our bones?”*** (*Using the appropriate protection when you exercise or participate in sports can prevent broken bones.*) Have the students write a brief report in their journals. (You may have students hand in information as an assessment– then discuss.)

Explain (5 minutes):

Have students recall the sticks used at the beginning of the lesson. Ask: ***“What did we do?”*** (*We broke them.*) Ask: ***“Then what did we do?”*** (*We made a cast.*) Explain: ***“When we break bones we have to put them back in place and let them heal. Broken bones can take awhile to heal.”***

Ask: ***“Why would we not want to break bones?”*** (*Bones protect internal body organs (ask for examples), support the body, help us move, prevent a trip to the doctor, and prevent going through a lot of pain.*)

“To prevent broken bones it is important to protect them. How can we protect our bones?” (*By wearing appropriate gear for the activity.*)

Have students discuss different protective gear and ask how they think that protects their body.

Extend: (15-20 minutes)

Let each student choose a sport that they enjoy doing, then have them think of all the protective gear they should wear. Next, have students make a “campaign-style” poster that convinces others to wear protective gear for that sport. Remind students to be sure their poster clearly shows 1) what the sport is; 2) what protective gear needs to be worn; and 3) why wearing protective gear is important. You may wish to exhibit the student posters in the hallway.

Evaluation:

Use the “Extend” activity as an assessment. Collect students’ science journals.

Independent Practice:

- “Choose Your Consequences” Game (**See Figure 1**)
- Have students play the game with the questions about safety. If you wish, after one or two times of playing with the safety questions, you may add them to the nutrition and exercise questions and make a larger deck of questions. Or, if this is the first time students have played the game, add questions as they complete the other lessons in the unit.

Optional Enrichment Activity: Classroom Guests

To help convince students it is “cool” to wear protective equipment, you may want to ask a few “famous” high school athletes (representing different sports) to dress up in their protective gear and visit your classroom. In small towns especially, elementary students know and strongly admire all the high school athletes. This can be very encouraging and inspirational for the children. Before the visitors arrive, tell the students who is coming and have them write down questions in advance about the sport AND about the protective equipment the athletes will be wearing. Preparing questions BEFORE the visitors arrive will help the students think of thoughtful questions. (Example questions: Why do you need to wear a helmet in football? Does everyone wear knee pads in volleyball? Guide the students in writing their questions.)

Station Activity:

Have pictures of sports figures and corresponding protective gear. Have the students match the appropriate protective gear with the appropriate picture. (**See Figure 2**)

Station Activity:

Collect magazines (preferably sports/health magazines) and have students cut out pictures of people participating in a sport and wearing protective gear. Make a bulletin board collage in the back of the room.

Missouri Standards:**Health Frameworks:**

III. Risk Assessment and Reduction

B. Injury Prevention and Control

What all students should know:

1. There are observable conditions in a safe home, school, or neighborhood environment.

What all students should be able to do:

- a. Identify actions that are risky or harmful because of their effects upon self and others.

What all students should know:

2. There are ways to assess the environment and to recognize the potential for danger in everyday situations

What all students should be able to do:

- a. Identify potential risks in daily living and apply basic health and safety procedures.

What all students should know:

3. Basic first aid procedures and decision-making skills can help protect their safety and well-being.

V. Physical Activity and Lifetime Wellness

C. Injury Prevention/Treatment and Rehabilitation

What all students should know:

1. Prevention techniques for exercise-related injuries, including the use of protective gear.

What all students should be able to do:

- d. Discuss the importance of safety in all activities in relation to the environmental conditions, proper technique, and the use of protective gear.

Science Grade Level Expectations:

Strand 7: Scientific Inquiry

1. Science Understanding is developed through the use of science process skills, scientific knowledge, investigation, reasoning, and critical thinking.
 - A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigation methods in order to obtain evidence relevant to the explanation.
 - a. Pose a question about objects, materials, organisms, and events in the environment.
 - b. Plan and conduct a fair test to answer a question.

- B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations.
 - a. Make qualitative observations using the five senses.
- C. Evidence is used to formulate explanations.
 - a. Use qualitative and quantitative data as support for reasonable explanations.
- D. Scientific Inquiry includes evaluation of explanations in light of scientific principles.
 - a. Evaluate the reasonableness of an explanation
- E. The nature of science relies upon communication of results and justification of explanations.
 - a. Communicate simple procedures and results of investigations and explanations through: oral presentations, drawings and maps, data tables, graphs, writings.

Strand 8: Impact of Science, Technology and Human Activity

- 3. Science and technology affect, and are affected by, society.
 - A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done.
 - b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (assess locally).

Figure 1

CHOOSE YOUR CONSEQUENCES

Nutrition:

<p>You want an afternoon snack that is good for your bones. You choose:</p> <ul style="list-style-type: none">a) a candy barb) a flavored drinkc) a piece of celery with cheese	<ul style="list-style-type: none">a) Candy is not good for your bones. Go back 2 squares.b) Flavored drinks are not good for your bones. Go back 2 squares.c) Cheese and celery is a great choice. Move forward 2 squares.
<p>For breakfast you want a balanced meal that is good for your bones. You choose whole wheat toast, peanut butter and a glass of</p> <ul style="list-style-type: none">a) grape juiceb) milkc) soda	<ul style="list-style-type: none">a) Grape juice is a good drink, but it isn't high in calcium for your bones. Stay where you are.b) Milk is high in calcium and a great choice. Go forward 3 squares.c) Soda is terrible for your bones. Go back 3 squares.
<p>For lunch you have a tuna sandwich and carrot sticks. You can buy one thing to go with it. You buy</p> <ul style="list-style-type: none">a) a cup of strawberry yogurtb) a piece of cakec) a bag of chips	<ul style="list-style-type: none">a) Good choice! Yogurt is high in calcium and good for your bones. Go forward 3 squares.b) Cake might taste good, but it isn't very good for you. Go back 2 squares.c) Chips might taste good, but they don't have anything good for your bones. Go back 2 squares.
<p>For dinner you have a chicken drumstick, ½ a potato, and some vegetables. What vegetable would be a good choice for calcium?</p> <ul style="list-style-type: none">a) spinachb) cornc) eggplant	<ul style="list-style-type: none">a) Correct! ½ cup cooked spinach has over 100 mg calcium. Go forward 1 square.b) Corn is a good vegetable, but it doesn't have as much calcium as spinach. Stay where you are.c) Eggplant is a good vegetable, but it doesn't have as much calcium as spinach. Stay where you are.
<p>You want a dessert that is good for your bones. What do you choose?</p> <ul style="list-style-type: none">a) a piece of apple pieb) a candy barc) a small dish of ice cream	<ul style="list-style-type: none">a) Apple pie tastes great but it doesn't have a lot of calcium. Stay where you are.b) Candy bars don't have much good nutrition. Go back 1 square.c) Ice cream is made from milk so it has calcium. Go forward 1 square.

<p>You're at your friend's house after school and she offers you something to drink. You choose</p> <ul style="list-style-type: none"> a) a glass of milk b) a soda c) a flavored fruit drink 	<ul style="list-style-type: none"> a) Milk has lots of calcium. Good choice! Move forward 3 squares. b) Soda has lots of sugar and carbonation that is not good for your bones. Move back 3 squares. c) Flavored fruit drinks have lots of sugar and not a lot of calcium. Move back 2 squares.
<p>You want to eat a breakfast that is good for your bones. You've chosen oatmeal and raisins. What should you have with it?</p> <ul style="list-style-type: none"> a) milk b) toast c) yogurt 	<ul style="list-style-type: none"> a) Milk is a good choice. Move forward 3 squares. b) Toast is fine, but doesn't have much calcium. Stay where you are. c) Yogurt is a good choice. Move forward 3 squares.
<p>You want a snack that is high in both calcium and magnesium. What would you choose?</p> <ul style="list-style-type: none"> a) grapes b) an apple c) figs 	<ul style="list-style-type: none"> a) Grapes are a good food, but not really high in calcium or magnesium. Stay where you are. b) Apples are good food, but not really high in calcium or magnesium. Stay where you are. c) Figs are a great choice. They're high in both calcium and magnesium. Go forward 2 squares.
<p>You had a cheese sandwich with two slices of cheese, celery and carrot sticks, and an apple for lunch. Do you need more calcium at this meal?</p> <ul style="list-style-type: none"> a) Yes b) No 	<ul style="list-style-type: none"> a) Two slices of cheese gives you a lot of calcium. You don't really need any more at this meal. Stay where you are. b) Correct! Two slices of cheese gives you a lot of calcium. You don't really need any more at this meal. Move forward 2 squares.
<p>You're having dinner at a friend's house. His mother made tofu and broccoli for dinner. How much calcium is in this meal?</p> <ul style="list-style-type: none"> a) None b) A little c) A lot 	<ul style="list-style-type: none"> a) Think again. Both tofu and broccoli have calcium. Stay where you are. b) It has even more than that. Tofu and broccoli are both high in calcium. Stay where you are. c) You're right—there is almost as much calcium as a glass and a half of milk. Move forward 3 squares.

Exercise:

<p>You're going out to recess with friends and you want to do something good for your bones. You decide to:</p> <ul style="list-style-type: none">a) run laps around the trackb) play on the swingsc) sit in the shade	<ul style="list-style-type: none">a) Good choice. Running is good for your bones and your heart. Move forward 3 squares.b) Playing on the swings is good fun but it doesn't help your bones. Stay where you are.c) Sitting is restful but not good exercise. Go back 1 square.
<p>After school you want to do something good for your bones. You decide to:</p> <ul style="list-style-type: none">a) arm wrestle a friendb) play a video gamec) play basketball	<ul style="list-style-type: none">a) Arm wrestling is a fun contest but doesn't help your bones. Go back one square.b) Playing video games doesn't help your bones. Go back 2 squares.c) Playing basketball is good exercise. Go forward 3 squares.
<p>It's time for recess. What do you choose that is good exercise and will build strong bones?</p> <ul style="list-style-type: none">a) playing kickballb) playing handballc) jumping rope	<ul style="list-style-type: none">a) Right—kickball is very good exercise and good for your bones! Go forward 3 squares.b) Right—handball is good exercise, especially when you run a lot. Go forward 2 squares.c) Right—jumping rope is great for your bones. Go forward 3 squares.
<p>After school you have some time to play. What can you do that's good for your bones?</p> <ul style="list-style-type: none">a) play jacksb) play catchc) run a relay	<ul style="list-style-type: none">a) Playing jacks doesn't give you much exercise. Move back 1 square.b) Playing catch can be good if you run a lot. Move forward 1 square.c) Running relays can be very good for your bones. Move forward 2 squares.
<p>You've finished your homework and want to do something that is good exercise for your bones. You choose to:</p> <ul style="list-style-type: none">a) play cardsb) do 50 push upsc) jump rope	<ul style="list-style-type: none">a) Playing cards might be good exercise for your mind, but not your body. Go back 1 square.b) Doing push ups is good for your bones. Go forward 2 squares.c) Jumping rope is great for your bones. Go forward 2 squares.
<p>You're helping with some chores. In order to help your bones also, you choose to:</p> <ul style="list-style-type: none">a) dust the furnitureb) bring in the groceriesc) mow the lawn	<ul style="list-style-type: none">a) Dusting the furniture is a helpful thing to do, but it doesn't help your bones much. Stay where you are.b) Bringing in the groceries is good exercise, especially if you are carrying heavy bags or going up and down stairs. Go forward 2 squares.c) Mowing the lawn is great exercise. Pushing the lawnmower really works your bones. Go forward 3 squares.

<p>You're helping with some chores. In order to help your bones also, you choose to:</p> <ul style="list-style-type: none"> a) take the dog for a walk b) wash windows c) carry the heavy laundry basket upstairs 	<ul style="list-style-type: none"> a) Taking the dog for a walk is good exercise, especially if you walk fast and you go for at least 20 minutes. Go forward 2 spaces. b) Washing windows is very helpful and can be some exercise. Go forward 1 space. c) Carrying the laundry upstairs can be very good exercise if the basket is heavy. Go forward 2 squares.
<p>You decide to do more weight-bearing exercise each day. You choose to:</p> <ul style="list-style-type: none"> a) climb stairs b) walk the dog c) play more video games 	<ul style="list-style-type: none"> a) Climbing stairs is good weight bearing exercise. Go forward 2 squares. b) Walking the dog is good weight bearing exercise, especially if you walk fast and go for at least 20 minutes. Go forward 2 squares. c) Playing more video games does nothing for your bones. Go back 2 squares.
<p>You decide to do more weight-bearing exercise each day. You choose to:</p> <ul style="list-style-type: none"> a) watch more TV b) run laps around the yard c) do push ups 	<ul style="list-style-type: none"> a) Watching more TV does nothing for your bones. Go back 3 squares. b) Running laps around the yard is good exercise. Go forward 2 squares. c) Doing push-ups is great weight-bearing exercise. Go forward 2 squares
<p>You've finished your homework and want to do something good for your bones. What do you choose?</p> <ul style="list-style-type: none"> a) watching TV b) eating dessert c) take out the trash 	<ul style="list-style-type: none"> a) Watching TV does nothing for your bones. Go back 2 squares. b) Eating dessert doesn't do much for your bones unless it has a lot of calcium. Go back 2 squares. c) Taking out the trash could be very good for your bones if you lift and carry heavy objects. Go forward 2 squares.

Safety:

<p>You are going skateboarding. What do you do to protect your bones?</p> <ul style="list-style-type: none">a) go slowlyb) go with a buddyc) wear a helmet, knee and elbow pads	<ul style="list-style-type: none">a) Going slowly doesn't work very well when you're skateboarding. Go back 1 square.b) Going with a buddy doesn't help protect your bones much. Go back 1 square.c) Wearing protective gear is the best idea. Go forward 3 squares.
<p>Your friend meets you to go skateboarding. For protective gear she's wearing elbow and knee pads. What is she missing?</p> <ul style="list-style-type: none">a) a wrist watchb) her helmetc) a hair band	<ul style="list-style-type: none">a) A wrist watch won't help prevent broken bones. Go back 1 square.b) Right! A helmet is essential in preventing broken bones. Go forward 3 squares.c) A hair band does nothing to prevent broken bones. Go back 2 squares.
<p>Your friend meets you to go bicycling. For protective gear he's wearing a helmet and knee pads. What is he missing?</p> <ul style="list-style-type: none">a) a wrist braceb) elbow padsc) sunglasses	<ul style="list-style-type: none">a) A wrist brace could help prevent injury to your wrist. Go forward 1 square.b) Right! Elbow pads will help prevent broken bones. Go forward 2 squares.c) Sunglasses do nothing to prevent broken bones. Go back 2 squares.
<p>You're on a soccer team and the team is getting new protective gear. Which item is not essential for protecting your bones?</p> <ul style="list-style-type: none">a) elbow padsb) T shirtc) knee pads	<ul style="list-style-type: none">a) Elbow pads are essential protective gear. Go back 1 space.b) Right! A T shirt doesn't really protect your bones. Go forward 1 space.c) Knee pads are essential protective gear. Go back 1 space.
<p>In baseball, what do batters wear for extra protection?</p> <ul style="list-style-type: none">a) wrist bracesb) shoesc) a hard helmet	<ul style="list-style-type: none">a) Many players wear wrist braces, but the batter wears something even more important for extra protection. Go forward 1 square.b) Good shoes are important, but they're not extra protection while you are at bat. Stay where you are.c) Yes, a hard helmet protects the batter from being hit by a fast moving ball. Go forward 2 squares.
<p>Your brother is riding his new scooter. You tell him to be sure to wear what?</p> <ul style="list-style-type: none">a) his helmetb) his knee padsc) his elbow pads	<ul style="list-style-type: none">a) Yes—go forward 2 spaces.b) Yes—go forward 2 spaces.c) Yes—go forward 2 spaces.
<p>Your brother and sister are running relays on their in-line skates. What is one thing they should wear to protect themselves?</p> <ul style="list-style-type: none">a) helmetsb) socksc) sunglasses	<ul style="list-style-type: none">a) Yes—go forward 2 spaces.b) No—socks won't help you protect your bones. Go back 1 square.c) No—sunglasses won't protect your bones. Go back 1 square.

<p>You are going to ride your bike. What's an important piece of protective equipment?</p> <ul style="list-style-type: none"> a) a T shirt b) a helmet c) sunglasses 	<ul style="list-style-type: none"> a) A T shirt won't help prevent broken bones. Go back 1 square. b) A helmet could help prevent broken bones. Go forward 2 squares. c) Sunglasses won't help prevent broken bones. Go back 2 squares.
<p>You are riding in the backseat of the car on your way to school. What's the most important thing you can do to protect yourself.</p> <ul style="list-style-type: none"> a) be very quiet b) keep your hands to yourself c) fasten your seat belt 	<ul style="list-style-type: none"> a) Being quiet can be helpful, but it won't prevent broken bones. Stay where you are. b) Keeping your hands to yourself is a good idea but it won't prevent broken bones. Stay where you are. c) Fastening your seat belt is a great idea and will help you in case of an accident. Go forward 2 spaces.
<p>You are wearing protective gear and riding your scooter on a busy walking path. What can you do to protect other people?</p> <ul style="list-style-type: none"> a) Push people out of the way so they won't slow you down. b) Be very careful when passing people on the walkway. c) Ride with three friends so you take up the whole path. 	<ul style="list-style-type: none"> a) This could be very dangerous for other people. Go back 4 spaces. b) Yes, if you are aware of other people, and very careful when you pass, then everyone will be protected. Go forward 3 spaces. c) This is impolite and could be dangerous for others. Go back 4 spaces.

Figure 2



