Welcome to STEM Multi-Sport

Thank you for showing interest in STEM Sports® Multi-Sport 3-8!
We are excited for you to experience a STEM Sports® lesson.

In this 75-minute lesson, **The Evolution of the Football Helmet,** you will tackle the STEM concept of Science. Depending on the age of your students, you can choose from a lesson designed for grades 3-5 or 6-8.

You can get started teaching the lesson right away without any professional development or training! Should you need any assistance while trying out your STEM Multi-Sport 3-8 lesson, please email us at **info@STEMSports.com.**

We hope you and your students enjoy **The Evolution of the Football Helmet!** See the last page of this lesson for more information on the complete STEM Sports® Multi-Sport 3-8 Curriculum and Kit.

~The STEM Sports Team

Module 1.0

GRADES 3-5

The Evolution of the Football Helmet

Concept
Science: Senses and the Brain

Objective
Students will describe how damage to the brain can influence the senses. Students will describe how helmet technology can help protect players from damage to the brain.

Time
(1) 75-minute session

Standards

Next Generation Science Standards Connections

4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Background:
While there are a few different stories regarding the first football helmet, the most-told story dates to an Army-Navy football game in 1893. Admiral Joseph Mason Reeve was urged by doctors to quit playing as another hit to the head may cause permanent damage. Determined to play in the rivalry game, Reeve went to his shoemaker and had him fashion a moleskin cap with ear flaps.

In 1939, the first plastic helmet was introduced. This was also during the time of World War II in which production lines suffered and as a result the helmets were dangerous and prone to shattering. As a result of the faulty plastic production, the NFL banned the helmets for a year before being re-introduced as a padded plastic helmet.

Let's review the major advancements in football helmets:

Lode Shell: Softer shell absorbs impact load by deforming like a car bumper, then bouncing back.

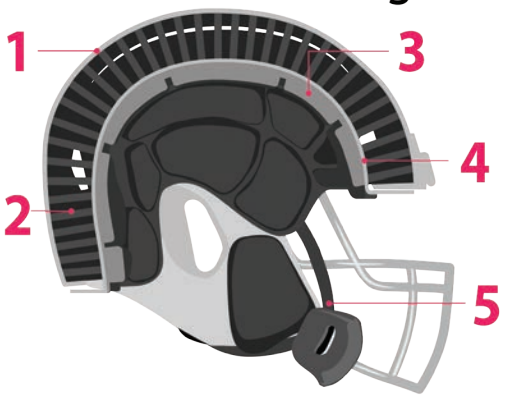
Core Layer: Inch-and-a-half-thick layer of vertical struts that bend and buckle to slow down impact forces.

Form Liner: Waterproof textiles and foams create a form liner that mimics mattress-like memory foam for fit and comfort.

Arch Shell: Hard plastic layer protects against skull.

Chin Strap: Two of the four snaps fasten to the inner shell to curb energy flowing through the jaw.

The Helmet Reimagined



Supplies Provided
Worksheets

Visit STEMSports.com/digitaltools to access presentation decks, worksheets, and answer keys.

Materials Needed
Pencils

Sequence of Lesson

Have your students take this lesson's assessment prior to engaging by visiting: STEMSports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Engage: Ask students if they wear a helmet when they ride a bike or play sports. Have them explain to a neighbor why or why not?

Explore: Students will use the worksheet to make observations on each helmet.

Explain: Explain to students the information they collect is from their senses, such as hearing and seeing. This, then, becomes information that people can understand, write down or say aloud. Tell students a "concussion is temporary unconsciousness or confusion caused by a blow on the head." Explain to students that when the brain is impacted (they fall or get hit) the brain gets hurt and swells. When the brain swells, it can impact senses and the way we think.

Elaborate: Ask the student to rate the helmets on a 1-7 scale, with 1 being the best helmet to protect a player's brain and 7 being the worst helmet. They should justify their ratings based on observational data.

Evaluate: Students should write a letter to the NFL to explain why helmets are important to protect the brain from injury.

Have your students retake this lesson's assessment to effectively evaluate their comprehension by visiting: STEMSports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Extend: Students can use the Engineering Design Process from Module 3 to design a better helmet.

STEM Jobs in Sports
- Sports Equipment Manufacturer
- 3D Printing Engineer
- Team Doctor
- Exercise Physiologist
- Entertainment/Sports Lawyer

For a growing list of occupations throughout the sports industry, click on the resource tab at STEMSports.com.

Fun Facts
Legendary Browns coach Paul Brown invented the first face mask, the single-bar face mask as a way to keep his QB on the field after a facial injury.

Module 1.0

Name: _____

The Evolution of the Football Helmet

GRADES 3-5

No Helmet	**Helmet 1** 
Helmet 2 	**Helmet 3** 
Helmet 4 	**Helmet 5** 
Helmet 6 	**Helmet 7** 

Name: _____

The Evolution of the Football Helmet

GRADES 3-5

Helmet	Observations	Rating
No Helmet		
H1		
H2		
H3		
H4		
H5		
H6		
H7		

Module 1.0

GRADES 6-8

The Evolution of the Football Helmet

Concept
Science: Body Systems

Objective
Students will explain how a helmet protects the nervous system by using historical data. Students will explain how a head injury impacts the nervous system and neuron cells. Students will evaluate historic and current helmet technology by discussing how the helmet would protect the player from head injuries.

Time
(3) 50-minute blocks

Standards

Next Generation Science Standards Connections

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

National Standards for K-12 Physical Education Connections

Standard 4: The physically literate individual exhibits responsible personal and social behavior that respects self and others.

Background:
While there are a few different stories regarding the first football helmet, the most-told story dates to an Army-Navy football game in 1893. Admiral Joseph Mason Reeve was urged by doctors to quit playing as another hit to the head may cause permanent damage. Determined to play in the rivalry game, Reeve went to his shoemaker and had him fashion a moleskin cap with ear flaps.

In 1939, the first plastic helmet was introduced. This was also during the time of World War II in which production lines suffered and as a result the helmets were dangerous and prone to shattering. As a result of the faulty plastic production, the NFL banned the helmets for a year before being re-introduced as a padded plastic helmet.

Supplies Provided
Worksheets

Visit STEMSports.com/digitaltools to access presentation decks, worksheets, and answer keys.

Materials Needed

Copies of Article, Pencils and Diagrams of the Brain, Spinal Cord, and Nerves throughout the Body
Optional: Prototyping Materials

Sequence of Lesson

Have your students take this lesson's assessment prior to engaging by visiting: STEMSports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Engage: Have students look at the image of an early football helmet. Ask them to discuss with a partner the benefits and limitations of this helmet. Ask them if they would be okay playing football with this helmet? Would their parents be okay with them playing with this helmet?

Explore: Have students visit and read the article on concussions in football, which can be found at **STEMSports.com**, then click on STEM Football under Resources. These questions should help guide their informal discussions.

- Context clues: What makes football a dangerous sport to play?
- Recall and summarize: What are football supporters doing to prevent and protect players from concussions?
- Claim and evidence: Are football supporters doing enough to prevent and protect against concussion? What else can be done? Support your opinion with evidence.

Explain: Explain to students how the nervous system is the control system of all other systems in the body. Provide diagrams of the brain, spinal cord, and nerves throughout the body. Have students copy a labeled diagram of a neuron cell into their notebooks. Using this teacher resource to develop understanding, explain how impacts to the head can kill neuron cells: visit **STEMSports.com,** then click on STEM Football under Resources.

Elaborate: Review the worksheet and observe each helmet to formulate an argument about the limitations and advantages of each helmet, as well as a prediction on how each helmet works to prevent damage to the nervous system of your teammate.

Evaluate: Students will diagram the parts of the nervous system of a player in their helmet and provide an explanation on how the helmet protects the nervous system.

Have your students retake this lesson's assessment to effectively evaluate their comprehension by visiting: STEMSports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Extend: Have students create a testable model of the brain and test how a helmet would protect it from impact. Or, students can use the Engineering Design Process to design a better nervous system protection device.

STEM Jobs in Sports

- Sports Equipment Manufacturer
- 3D Printing Engineer
- Team Physician
- Exercise Physiologist
- Sports Commissioner

For a growing list of occupations throughout the sports industry, click on the resource tab at STEMSports.com.

Fun Facts

Legendary Browns coach Paul Brown invented the first face mask, the single-bar face mask as a way to keep his QB on the field after a facial injury.

Name: _____ Class: _____

The Evolution of the Football Helmet

GRADES 6-8

No Helmet	**Helmet 1** 
Helmet 2 	**Helmet 3** 
Helmet 4 	**Helmet 5** 
Helmet 6 	**Helmet 7** 

Name: _____ Class: _____

The Evolution of the Football Helmet

GRADES 6-8

Helmet	Observations	Advantages	Limitations	Prediction: Percent of concussions
No Helmet				
H1				
H2				
H3				
H4				
H5				
H6				
H7				

Thank you for trying STEM Multi-Sport 3-8!

We hope you and your students enjoyed your STEM lesson.

Continue the learning with the complete STEM Multi-Sport 3-8 Curriculum Kit that includes seven more learning modules for students grades 3-5 and 6-8. The kit also comes with:

- Content for 16+ hours of STEM instruction
- Sports equipment and science supplies
- Assessments to evaluate student learning
- Ready-to-use worksheets
- STEM Sports glossary to support STEM vocabulary
- Standards aligned lessons

How to get started with STEM Multi-Sport 3-8

Talk to us

Our team is ready to answer your questions
Email: info@STEMSports.com
Phone: 602.845.0316

View lessons

Visit STEMSports.com/stem-multi-sport-grades-3-5-6-8 to see all lesson topics.

Discover other STEM Sports

Check out STEMSports.com/curriculum to see all our sports kit options.

*All lessons are aligned with Next Generation Science Standards (NGSS) and/or Common Core State Standards (CCSS) and National Standards for K-12 Physical Education.

STEM sports