The Game of Hockey

Hockey at Engelberg, Switzerland between 1910 and 1915. Source: Flickr Commons project, 2015

The game of hockey has drastically changed since its inception in the early 1800s. The game was influenced by the Irish game, hurling: using a hurley (stick) and wooden block instead of a ball. This cultural foundation eventually spread throughout Canada.

The game's initial shape came from field hockey, including face-offs (once known as bullying) and hitting your opponent in the shins with a stick – advancing into an informal game known as "shinney" or "shinty." The name origin and game recognized today as hockey was attributed from the French word "hoquet" (shepherd's stick), typically made from Birch and Hornbeam trees – durable wood for play. Hornbeam wood was eventually phased out, replaced with Yellow Birch and Ash in the 1920's. Yet to enhance performance, blades were inserted into a joint and glued to a wooden shaft

The name origin and game recognized today as hockey was attributed from the French word "hoquet" (shepherd's stick), typically made from Birch and Hornbeam trees – durable wood for play.

by the well known Canadian Hockey Company, Hespeler. The next phase of advancements would not take place until the 1950s.

In the 1950s, hockey stick manufacturing companies – Sher-Wood and Canadien – started using fiberglass. By wrapping lightweight Aspen

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

wood, it lowered the sticks overall weight for better stick-handling. It also made it easier for players to bend or "curve" the blade of the stick (sometimes called a 'banana blade') for better puck control and speed on a player's pass and shot.

By the 1990s and into the 21st century, we see many of the same sticks created and used today, including the following:

- Aluminum sticks with wood blades: consistent weight and flex;
- 2-piece composite stick: ultra lightweight shaft for maximum shot speed;
- 1-piece composite stick: maximum control and shot speed;
- Carbon Fiber and high strength composite: maximum control, shot speed, and durability.

The other vital part of play is the puck. The puck's history is not nearly as transformative as the stick's evolution. Believe it or not, the first pucks were frozen cow dung, rubber balls, and the aforementioned blocks of wood. Game historians depict the first puck was invented and used in 1875; the edges were cut-off the rubber ball to stop it from bouncing during play. The hockey puck would retain the use of rubber, but the edges of the puck were beveled for better control, speed, and overall performance around the early 1930s. In 1940, the puck would undergo a slight change to its weight and circumference, which is essentially the puck we see and play with today.

The early days of organized indoor hockey was not well-received by fans due to its rough and violent play, as reported by the Daily British Wig of Kingston, Ontario, Canada in 1875: "Shins and heads were battered, benches smashed and the lady spectators fled in confusion". This led to modifying the game's rules and the need for safer equipment during play.

H.C. White Co., publisher, Courtesy the Library of Congress
Playing "bandy" or hockey on a field of ice, in the Engadine, Switzerland in 1907.

By the late 1800s, the game's popularity increased considerably as Canada's most popular sport, in conjunction with lacrosse. An important part of the game's approval came from its overall safety by way of equipment updates: shin pads, sticks, helmets, and chest protectors. Because of this attention, the Canadian Hockey League was formed in 1899, and by 1903, the first professional hockey team was formed in the United States in Houghton, Michigan, by way of imported Canadian players.

The game has changed immensely since the days of cow dung, wooden blocks, and the shepherd's stick. Changes created to induce high performance and play. Yet the most important advancements are ensuring all players, officials, and spectators feel safe and part of the game as a testament to hockey's initial acceptance and growth over 100 year ago.

Sources:
Ice Hockey - The National Hockey League | Britannica
The History of Hockey Sticks - Going Bar Down
What are Hockey Pucks Made of & Who Makes Them? - BS Hockey

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

The Stick & Puck

GRADES 6-8

Explain

Using the article, video, and classroom discussion, complete the following criteria and constraint table.

Criteria	Constraints

Elaborate

Using the rating system of 1 - 5 (1 = Best; 5 = Worst), have students rate which ball/puck was easiest to control and release with the hockey stick and explain why.

Ball/Puck Type	Rate: 1 - 5	Reason for rating
Golf ball		
Ping Pong ball		
Tennis ball		
Hockey puck		

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

The Stick & Puck

GRADES 6-8

Using the rating system of 1 - 5 (1 = Best; 5 = Worst), have students rate which ball/puck was easiest to control and release with the below bat/stick and explain why.

Bat/Stick Type	Rate: 1 - 5	Reason for rating
Baseball/ Softball bat		
Golf club		
Tennis racket		
Hockey stick		

Based on evidence from the article, video, and your experiment, write a claim and support it with evidence and reasoning: Explain how and why the hockey stick controls and releases each ball type differently and why the hockey puck behaves differently when using a baseball/softball bat, golf club, tennis racket, and hockey stick.

Claim: How did the evolution of the hockey stick and hockey puck become a design that handles and controls its intended sport effectively?

_____

_____

Evidence: Using your data, explain why your claim is supported.

_____

Reasoning: Justify your response.

_____

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

The Stick & Puck

GRADES 6-8

Evaluate

1. What were some constraints of the first hockey stick and puck? Why do you think participants felt they needed to make a change?

2. How has the structure of the hockey stick and puck changed over time? What drove this change?

3. How have the materials of the hockey stick and puck changed over time? How do you think the use of natural materials versus synthetic materials impacted play?

4. What was the purpose of this article? Provide evidence from the text to support your claim.

5. Do you think there will be future changes to the game of hockey? If so, what changes do you foresee being made and why?

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

The Net

GRADES 6-8

Elaborate

Using the scale 1 inch = 1 foot (12 inches) calculate the dimensions of the scale model.

Width

$$\frac{\text{Model}}{\text{Actual}} \quad \frac{1 \text{ in}}{12 \text{ in}} = \frac{w}{\quad}$$

Height

$$\frac{\text{Model}}{\text{Actual}} \quad \frac{1 \text{ in}}{12 \text{ in}} = \frac{h}{\quad}$$

Depth

$$\frac{\text{Model}}{\text{Actual}} \quad \frac{1 \text{ in}}{12 \text{ in}} = \frac{d}{\quad}$$

Support Post

$$\frac{\text{Model}}{\text{Actual}} \quad \frac{1 \text{ in}}{12 \text{ in}} = \frac{x}{\quad}$$

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

The Net

GRADES 6-8

Evaluate

Before you cut your craft sticks, make a plan for how many of each dimension (width, height, depth, support post) you will need in your scale model.

Width	Height	Depth	Support Post

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Playing on Ice

GRADES 6-8

Elaborate

Create and label an outline that demonstrates the transformation from a gas to a liquid to a solid. Use lines, arrows, boxes and/or circles to concisely describe each composition's transformation from a few molecules to a defined structure.

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Playing on Ice

GRADES 6-8

Evaluate

Draw a scale model of a hockey rink. Depict how the playing surface/ice is created and sustainable using information and data throughout the lesson, including molecular composition and transformation by way of heat/energy before, during, and after a hockey game.

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Ice Time

GRADES 6-8

Explore

Draw a line connecting the ice marking to its corresponding rule.

Ice Marking		Rule
Center Line		Used to separate the ice into three zones: offensive, defensive, and neutral
Dots		Used for face-offs: marks where the players can position themselves
Blue Lines		Used to judge icing
Circles		Used to judge goals
Goal Line		Used for face-offs

Elaborate

1. What ice marking can be found at (10, 1)?

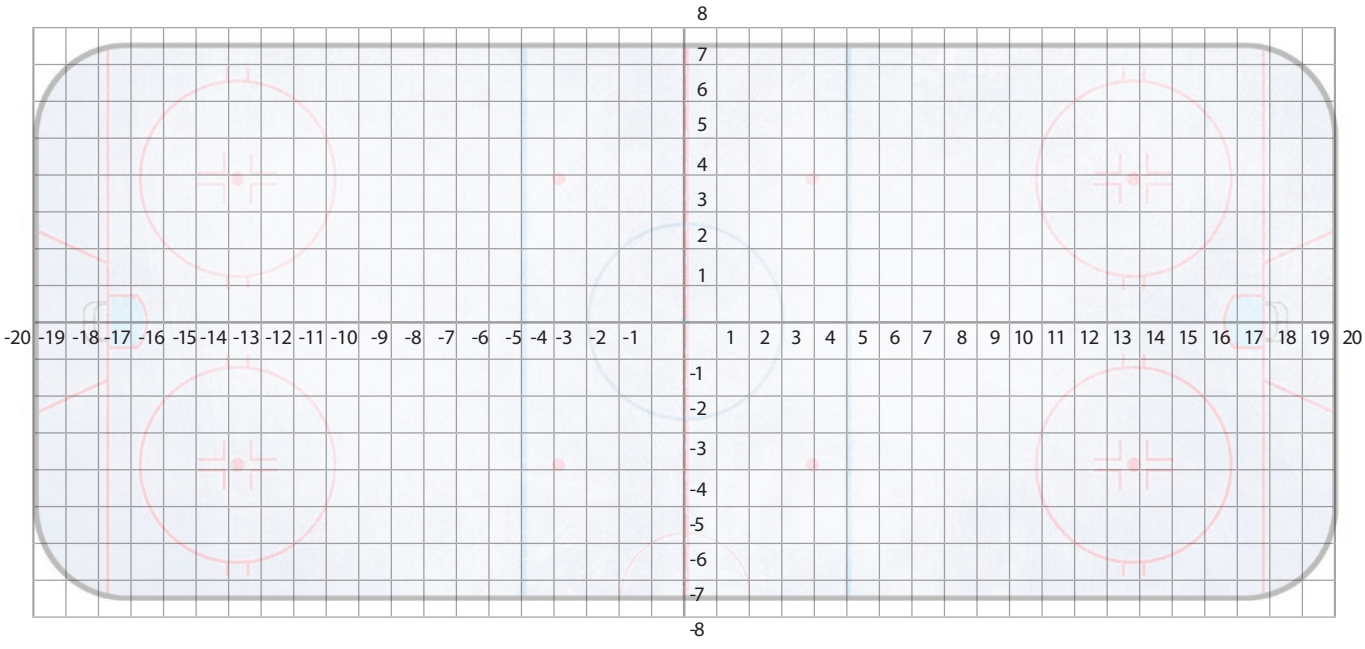
_____

2. What ice marking can be found at (0, -5)?

_____

3. What two ice markings can be found at the origin (0, 0)?

_____



© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Module 4.0

Name: _____ Class: _____

Ice Time

GRADES 6-8

Evaluate

Use the coordinate plane to find the distance between the ice markings by finding the absolute value.

1. Find the distance between the blue lines at (-5, 2) and (5, -2).

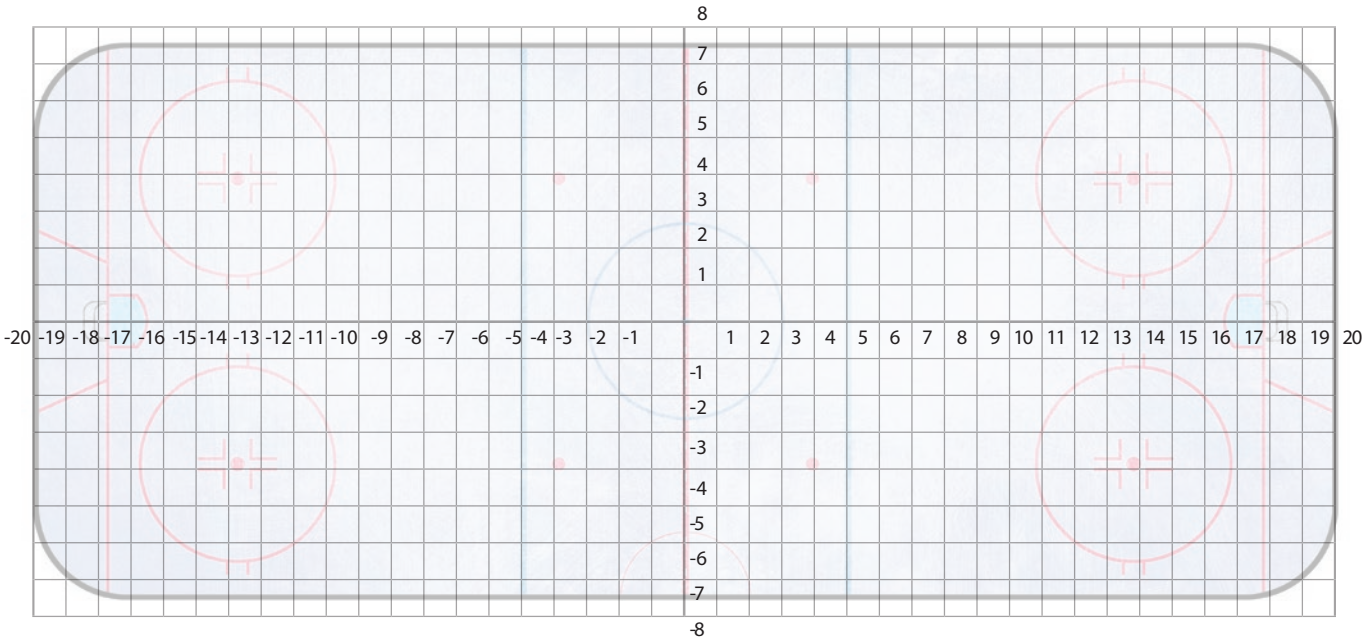
_____

2. Find the length of the goal line using (-18, 7) and (-18, -7).

_____

3. Find the distance a player would have to skate to go from one goal line (-18, 4) to the other (18, 4).

_____



© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Ice Time

GRADES 6-8

Evaluate

Use the coordinate plane to find the distance between the ice markings by using the Pythagorean Theorem.

1. Find the distance between the face-off dots at (-14, -4) and (14, -4).

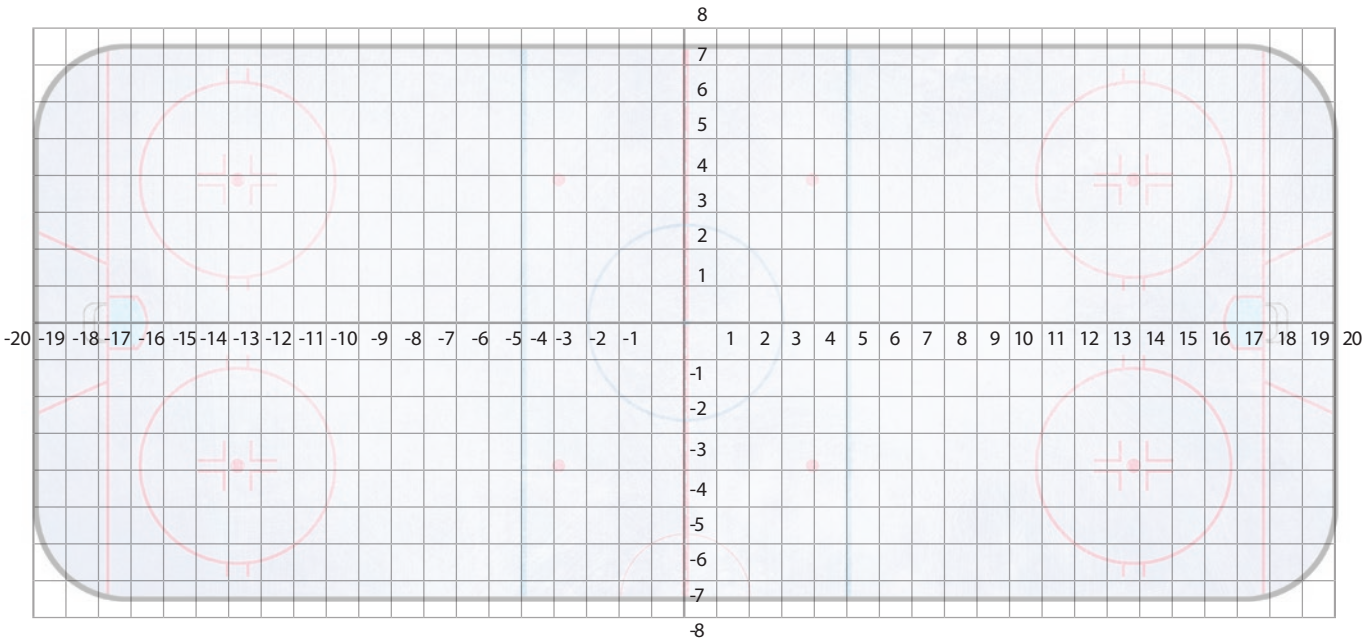
_____

2. Find the distance a player would have to skate from the goal line at (-18, -3) to the center line at (0, 5) to avoid an icing penalty.

_____

3. Find the distance a player would have to shoot the puck for it to go from the face-off dot at (14, 4) and the goal at (18, 0).

_____



© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Puck Precision

GRADES 6-8

Elaborate

Take five forehand shots from each of the 3 shooting spots and record your makes and misses below.

Distance of Shot = 10 ft	Shot 1	Shot 2	Shot 3	Shot 4	Shot 5
Left Side					
Center					
Right Side					

Calculate your shooting percentage for each shooting spot.

1. Left Side

_____

_____

2. Center

_____

_____

3. Right Side

_____

_____

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Puck Precision

GRADES 6-8

Evaluate

Take five forehand shots from each of the 3 shooting spots and record your makes and misses below.

Distance of Shot = 15 ft	Shot 1	Shot 2	Shot 3	Shot 4	Shot 5
Left Side					
Center					
Right Side					

Calculate your shooting percentage for each shooting spot.

1. Left Side

2. Center

3. Right Side

4. How do your shooting percentages compare from 10 feet away to 15 feet away?

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Puck Precision

GRADES 6-8

Extend

Take five slap shots from each of the 3 shooting spots and record your makes and misses below.

Distance of Shot = 10 ft	Shot 1	Shot 2	Shot 3	Shot 4	Shot 5
Left Side					
Center					
Right Side					

Calculate your shooting percentage for each shooting spot.

1. Left Side

2. Center

3. Right Side

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Shooting Forces in Hockey

GRADES 6-8

Elaborate

What variables do you need to control?

Pass and Shot Type	Speed (measured by radar) m/s	Time of travel (From video) s	Acceleration (Calculated (SI-SF)/time) m/s^2	Mass kg	Force F=MA N (newtons)
Forehand Pass					
Forehand Shot					
Slap Shot/ One-timer					

Evaluate

How does a change in force affect a change in motion? Support your answer with evidence from the experiment.

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

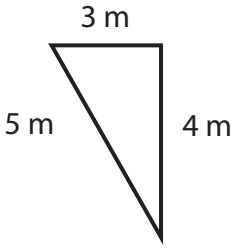
Name: _____ Class: _____

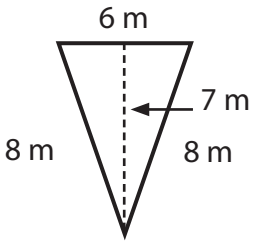
Skating in the Zone

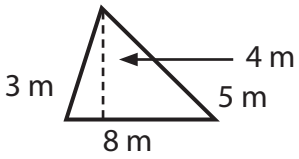
GRADES 6-8

Explain

Use the formula A = ½BH to calculate the area of the triangles below.







Elaborate

Outline the shooting triangle and measure all three sides. Then use the table to record if each student made or missed their shot from this location.

Shot Location 1		Shot 1	Shot 2	Shot 3
Side Lengths of Triangle:	**Person 1**			
Base = **Height =**	**Person 2**			
Area Calculation:	**Person 3**			
	Person 4			

Shot Location 2		Shot 1	Shot 2	Shot 3
Side Lengths of Triangle:	**Person 1**			
Base = **Height =**	**Person 2**			
Area Calculation:	**Person 3**			
	Person 4			

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Skating in the Zone

GRADES 6-8

Shot Location 3		Shot 1	Shot 2	Shot 3
Side Lengths of Triangle:	**Person 1**			
Base = **Height =**	**Person 2**			
Area Calculation:	**Person 3**			
	Person 4			

Shot Location 4		Shot 1	Shot 2	Shot 3
Side Lengths of Triangle:	**Person 1**			
Base = **Height =**	**Person 2**			
Area Calculation:	**Person 3**			
	Person 4			

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

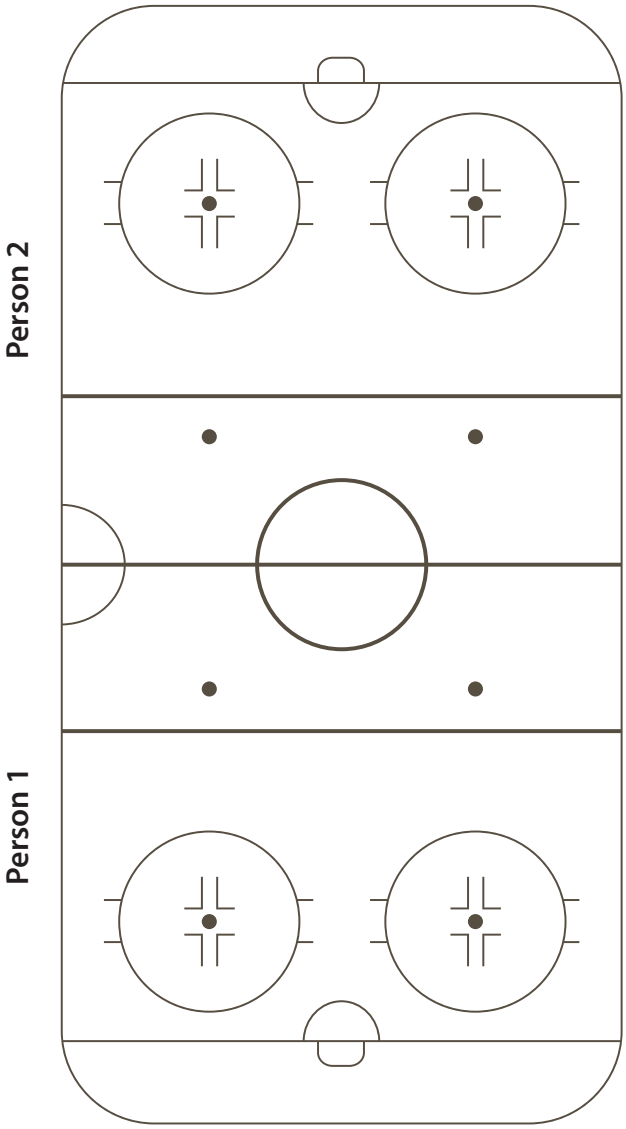
Name: _____ Class: _____

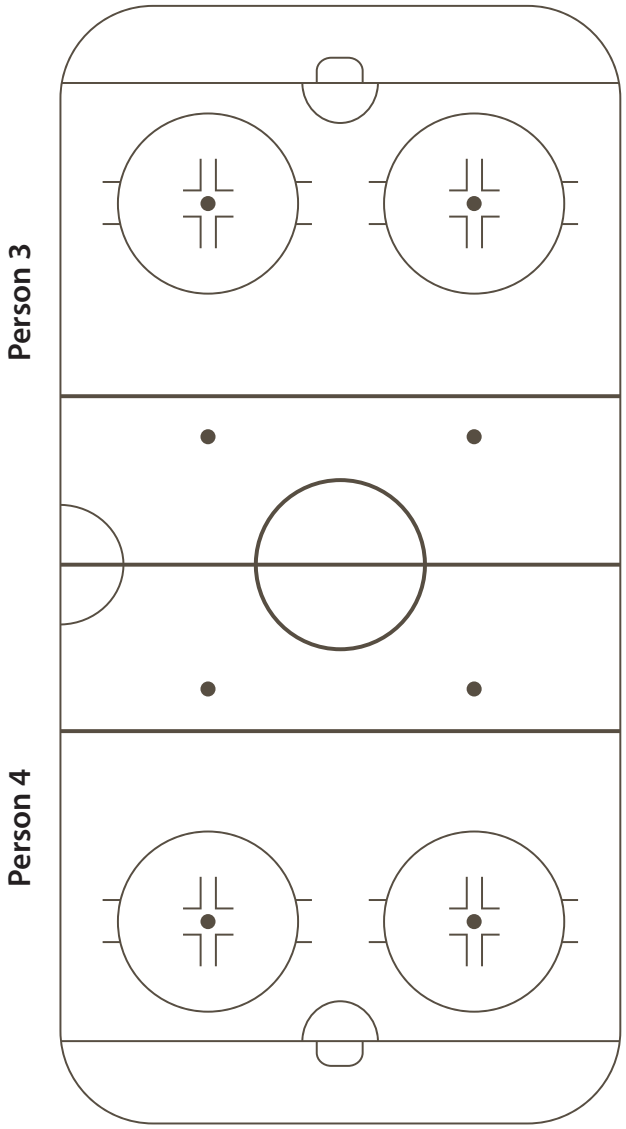
Skating in the Zone

GRADES 6-8

Evaluate

Sketch the shooting triangle for each of the four shot locations. Label each side with correct measurements and include the area in the center.





© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Skating in the Zone

GRADES 6-8

Extend

Claim: What is the relationship between the shooting triangle area and number of goals scored?

Evidence: Using your data, explain why your claim is supported.

Reasoning: Justify your response.

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Advancements in Hockey

GRADES 6-8

Elaborate

Circle your stance regarding instant replay: ***For*** or ***Against***

Brainstorm: What problems do increased use of instant replay in hockey solve?

OR

What problems do increased use of instant replay in hockey cause?

Criteria for Improvements/Changes of Instant Replay	Constraints for Improvements/Changes of Instant Replay

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Name: _____ Class: _____

Advancements in Hockey

GRADES 6-8

Evaluate

Letter to the Commissioner's Office of the NHL (National Hockey League):

- Does science and technology (instant replay) make hockey more fair?
- Would an increased use of instant replay enhance or detract from the game?
- How can instant replay be improved to meet the needs of all stakeholders: referees, game officials, players, coaches, and fans?

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.

Evaluate: Ask students to research one of the following Paralympic Sports and prepare a presentation.

Alpine Skiing
Archery
Badminton
Blind Football
Boccia
Canoe
Cross Country Skiing
Cycling
Equestrian
Goalball
Judo
Para Ice Hockey
Powerlifting
Rowing
Sitting Volleyball
Snowboarding
Swimming
Table Tennis
Taekwondo
Wheelchair Basketball
Wheelchair Curling
Wheelchair Fencing
Wheelchair Rugby
Wheelchair Tennis

Have students answer the following questions based on their research:

- What is the sport?
- How does the paralympic sport compare?
- Who can participate?

  Some sports restrict the type of disability you must have in order to participate.
- What technological advancements (glasses, implants etc.) are used to make this game accessible?
- What type of engineering advancements (wheelchair, prosthetics, guide sticks, etc.) are used to make this game accessible?
- What type of scientific advancements (medicine, surgery, etc.) are used to make this game accessible?

Ask students to present their projects. This can be done using a gallery walk, in small groups, or even large group presentations.

Extend: Have students form groups based on similarities of the type of engineering advancements during their presentations. Have students sketch their own design of their advancements as a group.

© 2023 STEM Sports®, LLC. All rights reserved and unlicensed copying or use prohibited.