O'BRIEN GROUP ARENA SCIENCE CURRICULUM

Victorian Curriculum Levels Addressed: Levels 7 – 9

At level 7, students are working towards level 8 standards
At level 8, students are working towards level 9 standards
At level 9, students are working towards level 10 standards

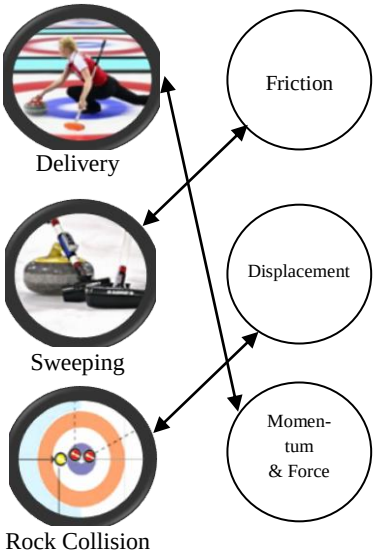
Forces in Curling

Name 3 ways friction plays a part in the sport of curling

Answers man include, though are not limited to:
Gripping the rock,
friction between the ice and rock, slowing the rock down
Friction between the brooms and ice
Gripping the brooms

What is a physical reaction to friction?

Heat as particles become more charged and vibrate faster



How might this reaction affect the ice when teams are sweeping during a curling game?

Sweeping heats up the ice, thus melting a thin layer on top of the ice allowing the rock to slide further. It also helps to reduce the effect of the pebbled ice surface, creating less friction under the stone.

Domain	Content Strand	Proficiency Strand	Key Elements of Standards
Science	**Science Understanding:** Physical Sciences	Literacy	**Level 7:** Change to an object's motion is caused by unbalanced forces acting on the object **Level 8:** Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems **Level 9:** Energy transfer through different mediums can be explained using wave and particle models
	Science as a Human Endeavour: Use and Influence of Science	Ethical Understanding	**Level 7/8:** Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. People use understanding and skills from across the disciplines of science in their occupations **Level 9:** The values and needs of contemporary society can influence the focus of scientific research

Sport Science

Compare the three different types of ice skates: Speed, Figure and Hockey. Each has been scientifically designed for the sport they are used in and have different prominent features.
With the requirements of each ice sport in mind, in each of the boxes below write a possible explanation for the particular design and how it might affect the skaters' technique.

Speed Skate

Long Thin Blade: *More blade surface on the ice to push with thus creating more power. Thinner blade for gripping the ice better*

Low Boot: *Speed skaters need to crouch low for optimal power and less wind resistance. With a high ankle boot this wouldn't be possible*

Figure Skate

High Boot: *Figure skaters require a lot of ankle support for jumps and spins. Without the high boot they would be more prone to ankle injuries.*

Toe Pick: *Contrary to popular belief, the toe pick should never be used for stopping! Instead if it used to assist figure skaters with their jumps and spins*

Hockey Skate

Hard Toe Cap: *To protect skaters' toes from being hit by hard pucks on the ice*

Curved Blade: *A curved blade allows skaters to create a more natural 'running' feel assisting skaters to perform faster busts of speed.*

Domain	Content Strand	Proficiency Strand	Key Elements of Standards
Science	**Science as a Human Endeavour:** Use and Influence of Science	Ethical Understanding	**Level 7/8:** Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. People use understanding and skills from across the disciplines of science in their occupations. **Level 9:** Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities. The values and needs of contemporary society can influence the focus of scientific research.

Sport Science Experiment – Part 1

Aim: *To make a prediction on which combination of clothing modifications will work best in creating an aerodynamic uniform resulting in the fastest running time, and then prove your hypothesis with scientific evidence.*

Method:

Complete three runs with the following variations

- ***Run 1:*** *Run in your school uniform as it is!*
- ***Run 2:*** *Place hole at the bottom of an extra large (un-used) garbage bag big enough for your runner's head. Wear it like a poncho!*
- ***Run 3:*** *Place arm holes in the garbage bag and fasten any excess garbage bag material down creating a tight fit. Aim for a smooth finish at the front. Place a swimming cap or bandanna over the runners head holding any hair down.*

After each run, record the results in the provided table

Equipment:

- *Stop watch*
- *Pencils/Pens*
- *XL Garbage bag*
- *Swimming Cap or Bandanna*
- *Sticky Tape or large bull dog clips*

Domain	Content Strand	Proficiency Strand	Key Elements of Standards
Science	**Science Understanding:** Physical Sciences	Literacy Critical and Creative Thinking	**Level 7:** Change to an object's motion is caused by unbalanced forces acting on the object **Level 8:** Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems **Level 9:** Energy transfer through different mediums can be explained using wave and particle models
	Science Inquiry Skill: Questioning and predicting	Literacy Critical and Creative Thinking	**Level 7/8:** Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge. **Level 9:** Formulate questions or hypotheses that can be investigated scientifically.
Science	**Science Inquiry Skill:** Planning and Conducting	Literacy Critical and Creative Thinking Personal and social capability Ethical Understanding	**Level 7/8:** Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed. In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task. **Level 9:** Plan, select and use appropriate investigation methods,

Science		Numeracy Information and communication technology capability	including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods. Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data.
	Science Inquiry Skill: Processing and analysing data and information	Literacy Critical and Creative Thinking Numeracy Information and communication technology capability	**Level 7/8:** Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions. **Level 9:** Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies. Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.
	Science Inquiry Skill: Evaluating	Literacy Critical and Creative Thinking Numeracy	**Level 7/8:** Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method. Use scientific knowledge and findings from investigations to evaluate claims. **Level 9:** Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data. Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems.
	Science Inquiry Skill: Communicating	Literacy Information and communication technology capability	**Level 7/8:** Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate **Level 9:** Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations.

Sport Science Experiment – Part 2

Your teacher will provide you with some extra equipment are specially designed to hinder your opponent's performance in a variety of ways. You are required to choose one piece of equipment to handicap another team in a class race.

Handicap Options may include:

- ***Weighted Backpack***
- ***Open Umbrella***
- ***Ankle weights***
- ***Big Shoes***
- ***Any others you can think of!***
- ***Hand held weights***
- ***Protective/goalie gear***
- ***Sweater Pants/Tight pencil style skirt***
- ***XL Garbage bag (with head hole but no arm holes)***

Once each team has been delegated a handicap – it's time to race! The first team to the finish line, wearing their handicap equipment, wins!

Students are then required to justify their choice of equipment and explain how that piece of equipment will handicap the other teams using scientific terms in relation to forces such as friction, gravity and wind resistance.

Domain	Content Strand	Proficiency Strand	Key Elements of Standards
Science	**Science Understanding:** Physical Sciences	Literacy Numeracy Personal and Social capability	**Level 7:** Change to an object's motion is caused by unbalanced forces acting on the object **Level 8:** Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems **Level 9:** Energy transfer through different mediums can be explained using wave and particle models
	Science as a Human Endeavour: Use and Influence of Science	Use and influence of science	**Level 7 & 8:** Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management **Level 8:** People use understanding and skills from across the disciplines of science in their occupations **Level 9:** Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities. The values and needs of contemporary society can influence the focus of scientific research.
	Science Inquiry Skills: Evaluating	Literacy Numeracy Critical and Creative Thinking	**Level 7 & 8:** Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method **Level 9:** Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data