a WOW Lab BLUEPRINT Indoor Rockets

Quebec - Achievements and Competencies

Learning Outcomes

Cycle 2 (Gr. 3-4)	Cycle 3 (Gr. 5-6)
Lengths and angles	Lengths and angles
Characteristics of motion	Gravitational attraction
Effects of a force	Characteristics of motion
	Effects of a force

The Quebec Achievements and Competencies are based on the Progression of Learning Outcomes derived from the Quebec Education Plan set by the Ministere de l'Education, du Loisir et du Sport.

Specific Expectations

CYCLE 2 (Gr. 3-4)

MATHEMATICS

MEASUREMENT

A. Lengths
    1. Compares lengths
D. Angles
    1. Compares angles

In *Indoor Rockets*, students will engineer their own plastic rockets and launch them inside the classroom. Students will predict how far their rockets will go when they are launched at certain angles. Students can compare the distance the rocket travelled to the angle it was launched at. They will discover that the rocket travels the furthest when it is launched at a 45 degree angle. Students should explain why this is the case.

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SCIENCE

MATERIAL WORLD

C. Forces and motion
    5. Characteristics of motion
        a. Describes the characteristics of motion (e.g. direction, speed)

As the rockets are being launched, students should make note of the angle they were launched at, the distance they travelled, their height in the air, their speed, and the way they moved through the air. Students should describe the motion of the rocket considering all of the factors that affect its motion.

    6. Effects of a force on the direction of an object
        a. Identifies situations involving the force of friction (pushing on an object, sliding an object, rolling an object)
        b. Identifies examples of a force (e.g. pulling, pushing, throwing, squeezing, stretching)
        c. Describes the effects of a force on an object (e.g. Sets it in motion, changes its motion, stops it)

During the launch of the rocket, the only factor to consider is thrust. Students may realize that by reducing the amount of friction between the pump nozzle and the rocket body, the initial velocity of their rocket will be increased. Students will identify that an initial force applied to the rocket sets it in motion through the air. There are many forces acting on the rocket from the time it is launched until it lands and students should identify all of these forces, including drag, gravity, and lift.

F. Appropriate Language
    1. Appropriately uses terminology related to an understanding of the material world

Students are required to use the appropriate terminology throughout the activity (e.g. acute angles, obtuse angles, right angles, displacement, speed, gravity, friction, free fall).

CYCLE 3 (Gr. 5-6)

MATHEMATICS

MEASUREMENT

A. Lengths
    1. Compares lengths
D. Angles
    1. Compares angles

In *Indoor Rockets*, students will engineer their own plastic rockets and launch them inside the classroom. Students will predict how far their rockets will go when they are launched at certain angles. Students can compare the distance the rocket travelled to the angle it was launched at. They will discover that the rocket travels the furthest when it is launched at a 45 degree angle. Students should explain why this is the case.

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SCIENCE

MATERIAL WORLD

C. Forces and motion

3. Gravitational attraction on an object
   a. Describes the effect of gravitational attraction on an object (e.g. free fall)

Students will recognize that gravity is a force acting on their rockets. They should describe its affect on the distance travelled by the rocket. Teachers can ask students if heavier objects fall faster than lighter ones. This will lead into a discussion about acceleration due to gravity and teachers can explain that it is the same for all objects.

5. Characteristics of motion
   a. Describes the characteristics of motion (e.g. direction, speed)

As the rockets are being launched, students should make note of the angle they were launched at, the distance they travelled, their height in the air, their speed, and the way they moved through the air. Students should describe the motion of the rocket considering all of the factors that affect its motion.

6. Effects of a force on the direction of an object
   a. Identifies situations involving the force of friction (pushing on an object, sliding an object, rolling an object)
   b. Identifies examples of a force (e.g. pulling, pushing, throwing, squeezing, stretching)
   c. Describes the effects of a force on an object (e.g. Sets it in motion, changes its motion, stops it)

During the launch of the rocket, the only factor to consider is thrust. Students may realize that by reducing the amount of friction between the pump nozzle and the rocket body, the initial velocity of their rocket will be increased. Students will identify that an initial force applied to the rocket sets it in motion through the air. There are many forces acting on the rocket from the time it is launched until it lands and students should identify all of these forces, including drag, gravity, and lift.

F. Appropriate Language

1. Appropriately uses terminology related to an understanding of the material world

Students are required to use the appropriate terminology throughout the activity (e.g. acute angles, obtuse angles, right angles, displacement, speed, gravity, friction, free fall, acceleration due to gravity, qualitative observation, quantitative observation).

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Strategies

EXPLORATION STRATEGIES

- Distinguishing between the different types of information useful for solving the problem
- Recalling similar problems that have already been solved
- Becoming aware of his or her previous representations
- Drawing a diagram for the problem or illustrating it
- Formulating questions
- Putting forward hypotheses (e.g. individually, as a team, as a class)
- Anticipating the results of his or her approach
- Taking into account the constraints involved in solving a problem or making an object (e.g. specifications, available resources, time allotted)
- Examining his or her mistakes in order to identify their source
- Using different types of reasoning (e.g. induction, deduction, inference, comparison, classification)
- Using empirical approaches (e.g. trial and error, analysis, exploration using one's senses)

STRATEGIES FOR RECORDING, USING AND INTERPRETING INFORMATION

- Using a variety of observational techniques and tools
- Using technical design to illustrate a solution (e.g. diagrams, sketches, technical drawings)
- Using different tools for recording information (e.g. diagrams, graphs, procedures, notebooks, logbook)

COMMUNICATION STRATEGIES

- Using tools to display information in tables and graphs or to draw a diagram
- Exchanging information
- Comparing different possible explanations for or solutions to a problem in order to assess them (e.g. full-group discussion)