

**CODE/MOE/UOIT Makerspaces Project--Lesson Planning Template**

**School Board: Bruce Grey Catholic District School Board**

**Grade(s): 6**

**Subject(s): Science & Math - Flight**

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| **BIG IDEAS:**  **Science**  Flight occurs when the characteristics of structures take advantage of certain properties of air.  Air has many properties that can be used for flight and for other purposes.  **Math**  Record and graph data and draw conclusions from their data.  **Curriculum Expectations:**  **OVERALL:**  **Science**  2. investigate ways in which flying devices make use of properties of air;  3. explain ways in which properties of air can be applied to the principles of flight and flying devices**.**  **Math**  Collect and organize discrete or continuous primary data and display the data using charts and graphs, including continuous line graphs;  Read, describe, and interpret data, and explain relationships between sets of data.  **SPECIFIC:**  **Science**  2.3 investigate characteristics and adaptations that enable living things to fly;  2.4 use technological problem-solving skills to design, build, and test a flying device (e.g., a kite, a paper airplane, a hot air balloon);  2.5 use appropriate science and technology vocabulary, including aerodynamics, compress, flight, glide, propel, drag, thrust, and lift, in oral and written communication;  2.6 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes;  3.1 identify the properties of air that make flight possible (e.g., air takes up space, has mass, expands, can exert a force when compressed);  3.3 identify and describe the four forces of flight – lift, weight, drag, and thrust;  3.4 describe, in qualitative terms, the relationships between the forces of lift, weight, thrust, and drag that are required for flight;  3.6 describe ways in which the four forces of flight can be altered.  **Math**  Collect and organize discrete or continuous primary data and display the data in charts, tables, and graphs that have appropriate titles, labels, and scales;  Select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph;  Read, interpret, and draw conclusions from primary data;  Demonstrate an understanding of mean and use the mean to compare two sets of related data. | |
| **Learning Goals:**  “We are learning to…”  Identify characteristics and adaptations that enable living things to fly.  Understand that gases expand to fill a space. That air expands when heated.  Demonstrate and explain how the shape of a surface over which air flows affects the role of lift in overcoming gravity.  Demonstrate and describe methods used to alter drag in flying devices.  Record and graph data, interpret what the data is showing. | **Success Criteria:**  “We will be successful when…”  Success Criteria should be co-created with students. Criteria can include:   1. Design their own flying device. 2. Alter their device and explain how changing different aspects alters the flight of the device. 3. Accurately calculate the mean, graph their data and come to a conclusion. |
| **Lesson Overview:**  Students will design a flying device that flies the farthest and explain how drag, lift, weight and thrust affects the flight. | |
| **Materials and Technology:**   * Consumable Maker Materials: tape, cardboard, construction paper, straws, glue, cups, playdough, markers, paper, balsa wood, scissors, paper clips, etc. * Maker Materials: Makey Makey, Littlebits, Lego, etc. * iPads, chromebooks * google slides, presentations | |
| **Student Accommodations/Modifications:**   * **allow the use of technology to write** * **accurately calculating the mean (average)** * **graphing the data properly, using the correct graph (line graph), having proper labels on their graph** | **Lesson will be differentiated by:**   * **Content, specifically:** * **Process, specifically:** * **Product, specifically:** * **Environment, specifically:** |
| **MINDS ON: Getting Started** | |
| During this phase, the teacher may:  • activate students’ prior knowledge;  • engage students by posing thought-provoking questions;  • gather diagnostic and/or formative assessment data through observation and questioning;  • discuss and clarify the task(s). | During this phase, students may:  • participate in discussions;  • propose strategies;  • question the teacher and their classmates;  • make connections to and reflect on prior learning. |
| **Describe how you will introduce the learning activity to your students.**   * Show videos on flight (e.g. airplanes, hot-air balloons, gliders, etc.) * Teacher makes their own paper airplane and collects data on the distance it flies   **What key questions will you ask?**   * Have you ever been in an airport? * What did you see there? * Have you ever flown in an airplane, etc? * Have you ever seen a hot-air balloon? * What characteristics does air have? * How does an object fly?   **How will you gather diagnostic or formative data about the students’ current levels of understanding?**   * Taking anecdotal notes of the students responses (can also use an iPad to record small group discussions).   **How will students be grouped? How will materials be distributed?**   * Teacher decides on the pairs | |
| **ACTION: Working on it** | |
| During this phase, the teacher may:  • ask probing questions;  • clarify misconceptions, as needed, by redirecting students through questioning;  • answer students’ questions (but avoid providing a solution to the problem);  • observe and assess;  • encourage students to represent their thinking concretely and/or pictorially;  • encourage students to clarify ideas and to pose questions to other students. | During this phase, students may:  • represent their thinking (using numbers, pictures, words, manipulatives, actions, etc.);  • participate actively in whole group, small group, or independent settings;  • explain their thinking to the teacher and their classmates;  • explore and develop strategies and concepts. |
| **Describe the task(s) in which your students will be engaged.**   1. In groups students build and fly simple hot-air balloons made from plastic bags. 2. Students make and decorate a simple rocket out of paper and glue the edges together leaving the bottom open. They then insert a straw and blow into it to make the rocket fly. Measure the average distance their rocket goes after an agreed upon number of trials. 3. Students research flight. 4. Students make their own paper airplane, collect data on the distance it flies. 5. Then they alter their plane according to specific criteria that has been taught. 6. Collect new data. 7. Create a line graph of their data. 8. Draw conclusions from their data.   **What misconceptions or difficulties do you think they might experience?**  Correctly identifying the four forces, and accurately describing how they affect the flight of their craft.  Accurately calculating the mean  Accurately making a graph.  **How will they demonstrate their understanding of the concept?**  Making and throwing their plane models, then collecting data.  After students can make alterations then repeat the trial flying process.  Collect their data on a chart, calculate the mean flying distance and graph their results.  **How will you gather your assessment data (e.g., checklist, anecdotal records)?**  Checklist  Anecdotal records  Data charts  Graphs  **What extension activities will you provide?**   * Make a multiple line graph using data from other students in the classroom. | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher may:  • bring students back together to share and analyse strategies;  • encourage students to explain a variety of learning strategies;  • ask students to defend their procedures and justify their answers;  • clarify misunderstandings;  • relate strategies and solutions to similar types of problems in order to help students generalize concepts;  • summarize the discussion and emphasize key points or concepts. | During this phase, students may:  • share their findings;  • use a variety of concrete, pictorial, and numerical representations to demonstrate their understandings;  • justify and explain their thinking;  • reflect on their learning. |
| **How will you select the individual students or groups of students who are to share their work with the class (i.e., to demonstrate a variety of strategies, to show different types of representations, to illustrate a key concept)?**  Teacher creates pairs or small groups or students work independently.  **What key questions will you ask during the debriefing?**  What changes helped you device to fly better?  How would you change your device?  If you could do it over again, is there a device you would use that is different than yours? Why? | |