Lesson Plan: Making Art with Forces!

PLANNING THE LESSON - Part 1

Grade: 3

Timeframe: 60 - 80 minutes

Curriculum Areas: Science and Art

Title of Unit: Forces and Motion

Context:

This lesson uses an inquiry-based and hands-on approach to scientific exploration through art and serves as an introductory lesson to the Forces and Motion unit in grade 3. Students are problem-solving and working both independently and collaboratively to manipulate forces to create art. As the introductory lesson to the new unit, the aim is to spark a sense of wonder and curiosity as students explore and see how art can help us better understand science.

Curriculum Expectations:

Ontario Science Curriculum (2022)

Strand A. STEM Skills and Connections

Overall Expectation

A1. STEM Investigation and Communication Skills: use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures

Specific Expectations

A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials

A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

Strand C. Matter and Energy (Forces and Motion)

Overall Expectation

C2. Exploring and Understanding Concepts: demonstrate an understanding of how forces cause motion and changes in motion

Specific Expectations

C2.1 describe different types of contact forces and non-contact forces

C2.2 describe different ways a force can be exerted on an object

C2.3 describe how different forces applied to an object, including forces of varying magnitude, can cause the object to start, stop, or change its direction, speed, or shape

C2.4 identify ways in which forces are used in their daily lives

Cross Curricular Expectations and Opportunities:

Ontario Arts Curriculum (2009)

Overall Expectation

D1. Creating and Presenting: apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles, and techniques of visual arts to communicate feelings, ideas, and understandings

Specific Expectations

D1.2 demonstrate an understanding of composition, using principles of design to create narrative art works or art works on a theme or topic

D1.4 use a variety of materials, tools, and techniques to respond to design challenges

Overall Expectation

D2. Reflecting, Responding, and Analysing: apply the critical analysis process to communicate feelings, ideas, and understandings in response to a variety of art works and art experiences

Specific Expectations

D2.2 explain how elements and principles of design are used to communicate meaning or understanding in their own and others' artwork

Targeted Transferable Skills:

Collaboration

Student Descriptors:

- Students participate successfully in teams by building positive and respectful relationships, developing trust, and acting cooperatively and with integrity.
- Students learn from others and contribute to their learning as they co-construct knowledge, meaning, and content.
- Students assume various roles on the team, respect a diversity of perspectives, and recognize different sources of knowledge, including Indigenous ways of knowing.
- Students address disagreements and manage conflict in a sensitive and constructive manner.

Communication

Student Descriptors:

- Students ask effective questions to acquire knowledge; listen to all points of view and ensure that those views are heard; voice their own opinions; and advocate for ideas.

Assessment:

Self-assessment	Peer-assessment	Teacher-assessed
In creating their artwork label, students think critically and reflect on their own artwork in creating their artwork label. Students demonstrate what they already know about forces and motion in describing their artistic process.	Students leave feedback for their peers by giving them comments using post-it notes.	Teachers can assess what prior knowledge students are bringing to the unit by observing and taking anecdotal notes as they work at each station. Reading the students' artwork label allows teachers to determine whether students are using topic-specific vocabulary effectively as well as identify any misconceptions that need to be addressed.

Accommodations and/or Differentiated Instruction:

- General methods for differentiation:
  - Flexible working environments (where possible, allow students to work in different spaces in the classroom)
  - Working with quiet background music/class playlist
  - Visible timer displayed somewhere in the classroom
  - Allow and encourage translanguaging where applicable
- Groupings:
  - To the teacher's discretion, allow free-choice or assign groups for station rotations
- Scaffolded making process:
  - Ensure students are familiar with safety rules and expectations
  - Support students with developing fine/gross motor skills by providing assistance and/or more accessible tool

- Provide materials such as brush grips, easy-grip brushes, gloves, etc. for students who may want them
- Encourage student experts to help and assist their peers
- All techniques at each station will first be modelled by the teacher
- If time permits, allow students to experiment at each station using scrap paper first before making their good copy
- Provide the option for students to use templates rather than blank canvases

Materials/Resources:

Mental Set	Body	Closure
- Museum tickets - Sample art - Post-it notes - Stationary	- Canvas (colored paper, white paper, fabric canvas, etc.) - Paint - Water - Pipettes - Paintbrushes - Ramps - Small circular objects (marbles, foam balls, toy car wheels, etc.)	- Post-it notes - Stationary - Artwork label (cardstock paper, sticker label, etc.)

DELIVERING THE LESSON - Part 2

Mental Set ***Estimated time: 15 - 20 minutes***

Tuning in: Art Museum Gallery Walk

Bring the art museum to the classroom with this tuning in activity! This lesson works best if you're able to schedule it after morning or afternoon recess. Prior to letting students out for recess, let them know that the art museum will be transported to the classroom for them to visit. Give each student a ticket to the art museum which they will be responsible for keeping safe for the entire recess. They will need the ticket to re-enter the classroom!

Notes:
This activity is a way to bring a field trip to the classroom! Depending on the time and materials available, teachers can go all out in decorating the classroom to look like an actual museum. Similar to an actual museum, videos can also be displayed on devices around the classroom that provide more information about the art pieces. Include detailed artwork labels to go along with each piece of art (this will help scaffold the closing activity for the lesson). This is also an excellent opportunity to co-teach with art specialists at the school e.g. invite them to act as the guide for a quick tour around the museum.

Setting Up:
Begin by displaying various pieces of drip painting art created by famous artists around the classroom. Some famous drip painting artists include Jackson Pollock, Janet Sobel, Norman Bluhm, Ian Davenport, Joan Mitchell, etc. It is to the teacher's discretion if they want to focus

on one particular artist's work, or if they would like a variety of work displayed. Outside the classroom, display a list of rules for the museum including but not limited to:

1) Please do not touch the artwork
2) No food or drinks are allowed in the museum
3) Please walk and do not run in the museum
4) Please be respectful of others and speak softly

Start of Class:
As students are coming back from recess, go through the rules for the museum that are displayed outside the classroom. Explain that they will each be given a small post-it note and after having viewed all artwork, they will need to choose their favourite piece and explain why on their piece of post-it note. Students can stick their post-it note next to their chosen piece of artwork once they are done. Depending on how many pieces of art are displayed; how many students there are, etc., determine how long you will give the students to complete this task.

Wrap Up:
Invite students to share which piece was their favourite and why. Teachers can also highlight comments that identify elements and principles of design. Encourage students to also explain how the artwork makes them feel and why.

Scaffolds/Extensions:

- Allow students to draw their response instead of writing
- Provide sentence starters and/or relevant vocabulary in the classroom
- Provide hand-out with guiding prompts/questions
- Allow students to work in pairs/groups

Checks for understanding:

- Thumbs up/thumbs down if they understand their task
- As each student presents their ticket, ask them to provide one museum rule that is on the list before allowing them to enter

Culturally Relevant and Responsive Teaching Connections:
Some students may share that they've never been to an art museum; have visited art museums elsewhere in the world; have visited other types of museums, etc. This allows the teacher to develop a more in-depth understanding of the student demographic and their exposure thus far to museums.

Sharing the Purpose/Objectives ***Estimated time: 3 minutes***

The purpose of today's lesson is to create motion art! You will:

- See how much you remember from the simple machines and movement unit from grade 2
- Explore different types of contact and non-contact forces
- Investigate how you can manipulate forces to create art

Input/Modelling/Demonstration ***Estimated time: 10 - 12 minutes***

Introduce drip painting/action painting as a technique in art. There are lots of different ways to begin this lesson! One option is to go through some fun facts about drip painting that are given as multiple-choice questions; students can vote before the correct answer is revealed. If a specific artist was chosen for the museum displays, introduce some fun facts about the artist. Teachers can also show videos/clips of artists creating their drip painting so that students can see what this technique of art looks like in action.

Culturally Relevant and Responsive Teaching Connections:

While this lesson may not allow time for exploration on this specific topic, it's worth noting that despite Jackson Pollock being arguably one of the most well-known drip painting artists, it was actually Janet Sobel, a female artist, who pioneered and invented the drip technique (Grovier, 2022). It is worthwhile to make connections to the Matilda effect in which historically, many male scientists took credit for the work of female scientists (Lamm, 2023). This provides opportunities to make connections to social justice issues that students may wish to explore.

Guided Practice ***Estimated time: 5 - 7 minutes***

Activity: Making Art with Forces

Through three station rotations, each student will create a unique piece of art using various techniques which all relate to forces! During modelling/demonstration, invite students to follow the teacher as they move along each station. At each station, ensure to explicitly remind students to think about the forces at work.

Station 1: Drip Technique

This station allows students to explore the concept of balanced and unbalanced forces as they use applied force to manipulate the paint on their canvas. In addition, students are also seeing normal, gravitational, and friction force in action. Depending on the type of canvas and paint used, friction force can be made more apparent!

Using pipettes, students will transfer paint onto their canvas and create various patterns by moving and rotating their canvas in different directions. When modelling this, take note to demonstrate:

- Not mixing the paints using the pipettes
- Not touching the pipette to the canvas
- Experimenting with how much paint is collected using the pipettes
- Experimenting with how much paint is dispersed each time using the pipettes
- Experiment with dispersing the paint at different heights
- Experiment with the speed and direction in which you are moving the canvas

Scaffolds/Extensions:

- Teachers can pre-mix all the paint so that it is the perfect consistency for the pipette
- Teachers can provide water and paint and ask that students determine the perfect consistency prior to beginning to paint
- Teachers can provide a baking trays for students to put their canvas on to make moving it easier
- Teachers can provide pipette alternatives e.g. straws, syringes, etc.

Station 2: Splatter Technique

Similar to station 1, this station allows students to explore applied force with the assistance of gravitational force. In addition, students are seeing muscular force in action as they experiment with different ways to flick the paint onto their canvas using their hands and arms.

Using paintbrushes, students splatter paint onto their canvas by tapping the brush against their hand/wrist. When modelling this, take note to demonstrate:

- Experimenting with different distances from the canvas
- Experimenting with how strongly you are tapping the brush against your hand
- Experimenting with how much paint is used each time
- Practicing safety by only applying paint on the canvas

Scaffolds/Extensions:

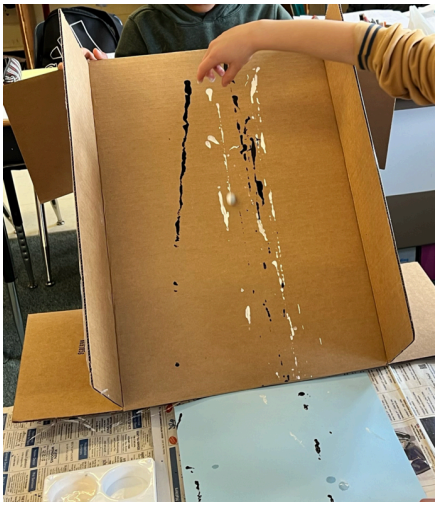
- This station also works with rubber bands (allows for a greater focus on elastic and tension force):
    - Wrap multiple elastics around any shallow container e.g. baking tray, bin, cardboard box, etc. Ensure that the container still allows students to slide their canvas under the elastics. Applying paint onto the elastics, students can flick the paint onto their canvas by pulling on the elastics and letting go.

(Craftulate, n.d.)

- Teachers can pre-mix all the paint so that it is the perfect consistency for the pipette
- Teachers can provide water and paint and ask that students determine the perfect consistency prior to beginning to paint
- Teachers can provide various brush types and/or other painting utensils

Station 3: Rolling Technique

This station allows students to explore how simple machines help us manipulate the direction and magnitude of forces Students are seeing applied, friction, and gravitational force in action as they experiment with various ramps and objects.



Students dip various small, round objects e.g. marbles, foam balls, etc. into paint. Dropping these objects down a ramp with their canvas at the bottom, students create various patterns on their canvas as the objects travel across. When modelling this, take note to demonstrate:

- Not throwing objects against the ramp, but dropping them gently on the ramp
- Letting go of the objects at various heights
- Adjusting the ramp to try different angles
- Changing where the canvas is placed in relation to the ramp to see how that affects the paint patterns
- Rolling the object(s) completely in paint before dropping it on the ramp
- Only dropping one object at a time on the ramp

Scaffolds/Extensions:

- Ramps of various materials can be provided so that students can see how different materials affect the speed at which objects roll down the ramp
- Various objects can be provided so that students can see how different materials roll down the ramp
- Materials that do not roll down well can also be provided

Checks for understanding:

- Thumbs up/thumbs down before moving onto a new station
- Asking for volunteers to help demonstrate at each station
- Can I… questions before moving onto a new station e.g.
    - Can I… throw objects at the ramp?

Independent Practice ***Estimated time: 15 - 20 minutes***

Students will each be given a canvas and assigned a station to start. After 5-6 minutes, students rotate to the next station and continue building on their canvas. As some students will be starting on different stations, this provides a wonderful opportunity to examine how different techniques layer on top of each other.

As students are painting at each station, teachers should observe and take anecdotal notes. Teachers are encouraged to ask prompting questions as students are at their stations to get them to begin thinking about forces:

Station 1	Station 2	Station 3
- When the canvas is on the table, why doesn't the paint move? - What makes the paint move in certain directions? - How do you control which direction the paint moves? - Let's say you tilt the canvas to the right, why can't the paint move left? - How does the speed you move the canvas affect the way the paint moves?	- How does the amount of strength you use affect the way the paint is applied onto the canvas? - Can you control the direction the paint goes? How? - Why do you think the paint always flicks down onto the canvas, and doesn't just float in the air?	- How does changing the angle of the ramp affect the way the objects roll down? - How does the weight/shape/size of the objects affect the way they roll down? - How come some objects don't roll down the ramp at all? - Can you control the direction that the objects roll down in? How? - What other factors affect how quickly the objects roll down the ramp?

Safety Guidelines:

Ensure the following before beginning the station rotations:

- Students are wearing smocks and safety goggles (in case of paint splatter)
- Tabletops are cleared and covered with newspaper/table covers/etc.
- Chairs are either tucked in or moved aside to provide students with sufficient space to move around
- Long hair is tied/clipped back as students will have paint on their hands once they begin the activity
- Make clear that paint is being used for this activity which should not be ingested

Scaffolds/Extensions:

- Provide assistance and support at stations where necessary
- Provide students with the choice of using a template instead of creating on a blank canvas
- Provide students with choice on the size/material/colour/shape of their canvas
- Each station can have a small instruction card with written and visual step-by-step instructions
- Provide students with choice of wearing gloves if they don't want direct contact with the paint
- Increase/decrease amount spent at each station

Closure ***Estimated time: 15 - 20 minutes***

After finishing their artwork, students can do a gallery walk around the classroom to see everyone else's art. Similar to how they left a comment on a piece of art at the start of the lesson, they will now leave a post-it note with a positive comment on a piece of their choice. Teachers can explicitly instruct that only one post-it note is allowed on each art piece to ensure that everyone receives a comment from their peers.

Lastly, students will create an artwork label for their piece of artwork. On the label, students need to include:

- Title of the piece
- Name of artist
- Date created
- Medium used
- A short description of how they created their piece
- 4-5 sentences on how forces and motion were used to create their piece i.e. a description of each station and what forces were at work

The artwork label acts as a pre-assessment to the unit. Teachers can gauge what students already know about forces and motion as well as how effectively they are using appropriate vocabulary to describe their artistic process.

Scaffolds/Extensions:

- Co-create an artwork label as a class to use as a guide (note: ramp material ends up looking like a piece of art that can be used as a sample)
- Provide teacher approximated sample of artwork label
- Provide word mat/sentence starters for students to refer to
- Allow students to create their artwork label digitally
- Provide guiding questions/prompts for students to help students answer how forces and motion were used to create their piece

As this is meant to act as a pre-assessment, make note of which students require additional support!

Homework/Reminders:

Students are encouraged to access Google Classroom and/or visit the library to learn more about one of the following types of painting techniques and begin thinking about how forces and motion are at play:

- Pendulum painting
- Balloon splatter painting
- Blow painting
- Action painting
- Fluid painting/acrylic pouring

Reflections and Next Steps:
As the introductory lesson to the forces and motion unit, this lesson provides valuable information which should inform future lesson planning. There are endless cross-curricular opportunities to allow for the integration of art in learning about forces and motion. Student voice and choice are encouraged through their chosen medium of art while collaboration and communication skills are developed through working with their peers (especially at station 3 involving the ramps). The final written component is a low-stakes and fun pre-assessment that students can re-visit and add more to at different points in the unit.

As students develop more topic-specific vocabulary and a more in-depth understanding of how contact and non-contact forces function, they can also annotate a copy of their artwork with arrows and labels to demonstrate their understanding of direction of movement. Teachers can also co-create a descriptive plaque with students that complements the student artwork to be used as part of the classroom display. During this process, teachers can introduce topic-specific vocabulary and model how to use it accurately to describe their artistic process.

References

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