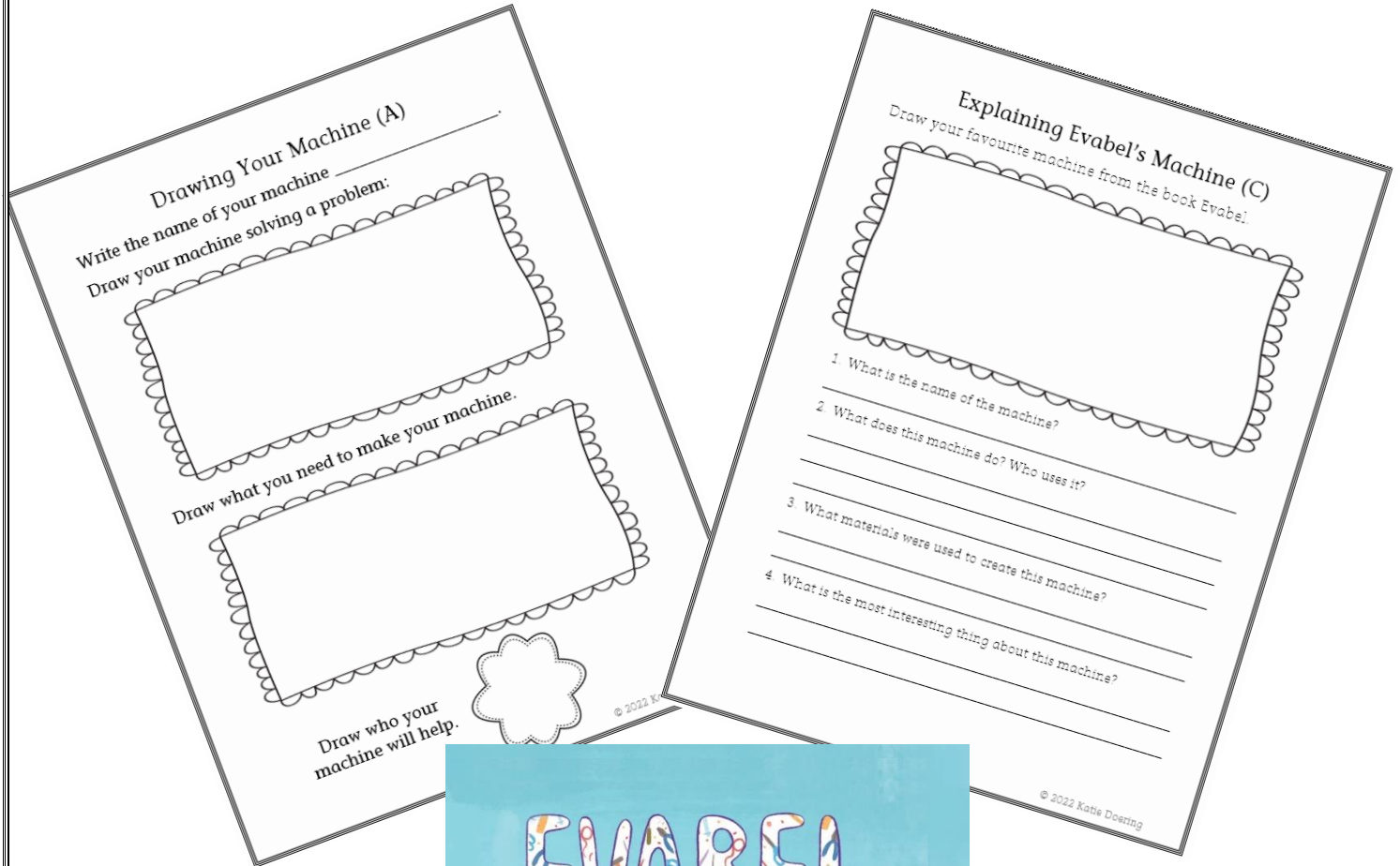
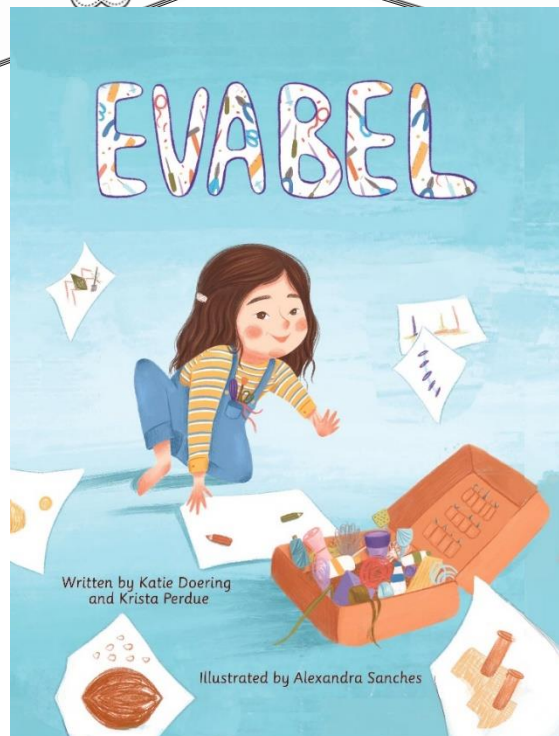


SCIENCE TEACHING RESOURCES



Created by author and educator Katie Doering, this guide contains lesson plans and differentiated worksheets that connect to Ontario Curriculum Science expectations and CCSS Language Standards.



About the Author

Katie Doering is an educator who has taught students from preschool to university level. Highlights of her career include:

- establishing a private school for children with medical needs and their siblings; teaching and leading for nearly two decades in this setting
- completing her PhD in Curriculum, Teaching and Learning, with a thesis focussed on inclusivity in children's literature
- teaching undergraduate and graduate courses at various universities within Canada focused on literacy, creative arts and inclusive education
- co-authoring the children's picturebook Evabel to increase the representation of children with cancer in literature and normalize illness experiences

Using This Resource

Each lesson is set up in the following way:

- Background – This section provides information that the educator may require in order to successfully teach the lesson, such as definitions, descriptions and references to curriculum topics.
- Lesson – This section provides suggestions for how to lead the lesson including interactive activities, guiding questions and ways an educator can check for children's understanding.
- Worksheets/Activities – This section provides suggestions for follow-up activities to respond to the lesson.
 - When included worksheets are labelled from A-C or A-D and progress with difficulty.
 - In some lessons, there are additional worksheets labelled A1-C1 or A1-D1. These worksheets have been designed for children who are currently experiencing illness.

Questions/Comments

Thank you for so much downloading this product from my site. If you, your child, or your students are enjoying it, please get in touch with your feedback. Similarly, if you have any questions about this resource, please feel free to contact me at katie.doering@utoronto.ca.

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Thank You!

Science and Technology Lesson Plans

Activity One – Explain a Machine

Background – At the beginning of the story (pages 1-2), we see a wide variety of machines that Evabel has created. It is not clear the purpose of each machine. The purpose relies upon children’s imaginations!

The machines on pages 1-2 are made from different materials including plastic, rubber, wood and yarn. Different materials have different properties that allow them to perform tasks. For example, rubber is waterproof and doesn’t tear easily. This makes rubber an appropriate material for car tires.

Lesson – Show the children the first two pages of Evabel. Choose one of the machines and ask children to brainstorm the following questions:

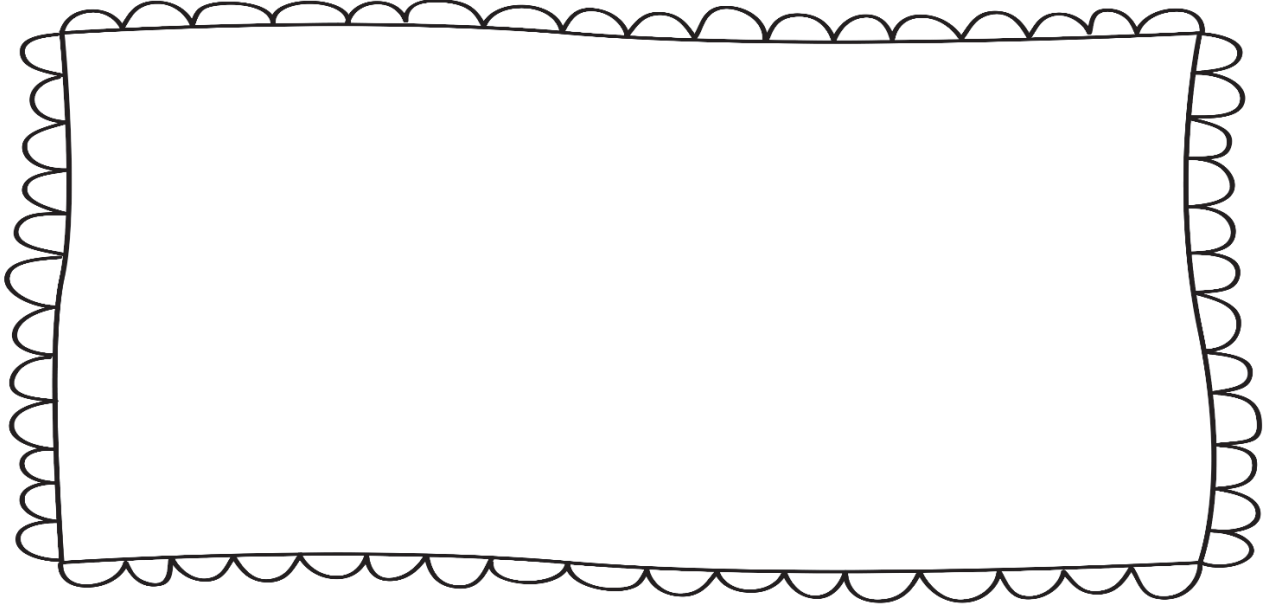
- What do you think is the purpose of this machine? How would you use it?
- Why do you think Evabel created this machine?
- What would you call this machine?
- What materials did she use to make this machine? (If you have not studied materials before, it would be a good idea to share samples of different materials with the children to help them answer this question. Samples will also help children better understand their properties).

Activities/Worksheets - Explain to children that today they will use their imaginations to think about how Evabel may have used one of her machines. Open the book to the first two pages. Ask children to choose another machine on one of these pages and do one of the following:

- Work together with a partner and create Evabel’s machine from recycled materials. Afterwards present the machine to the group explaining its name and purpose.
- Work in small groups to create replicas of the machines with your bodies. After all groups have finished, have each group present their machine explaining its name and purpose.
- Complete one of the worksheets below, drawing or writing about a machine.
 - Drawing Evabel’s Machine (A)
 - Writing about Evabel’s Machine (B)
 - Explaining Evabel’s Machine (C)

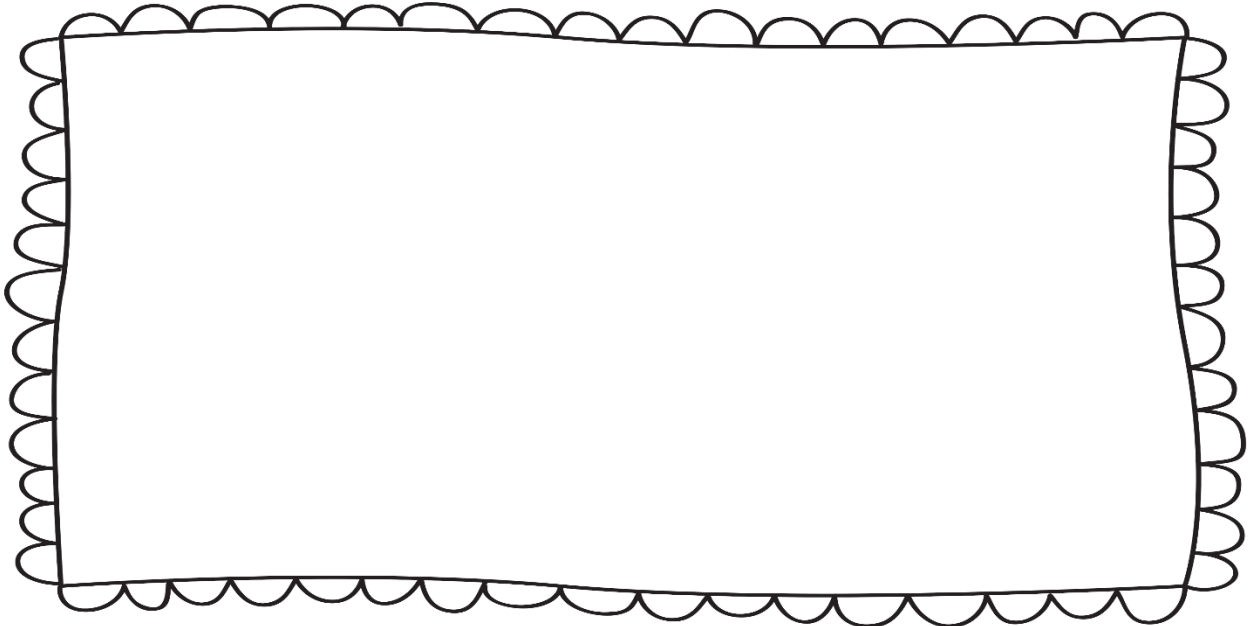
Drawing Evabel's Machine (A)

Draw your favourite machine from the book Evabel.



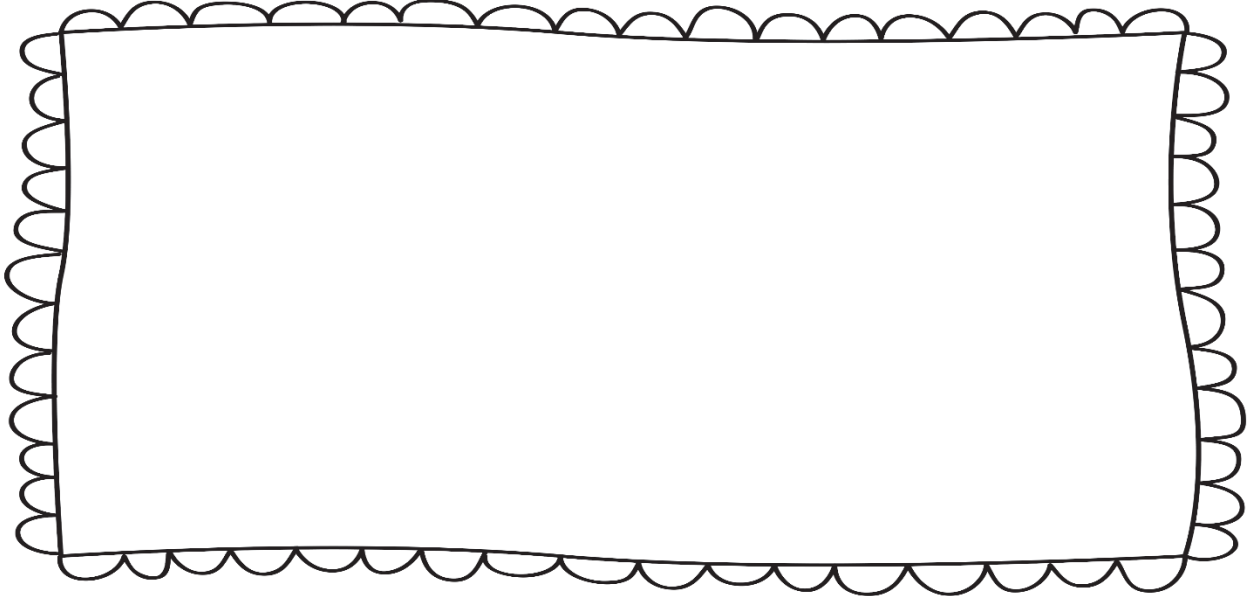
What is the name of the machine: _____

Draw someone using Evabel's machine.



Writing About Evabel's Machine (B)

Draw your favourite machine from the book Evabel.



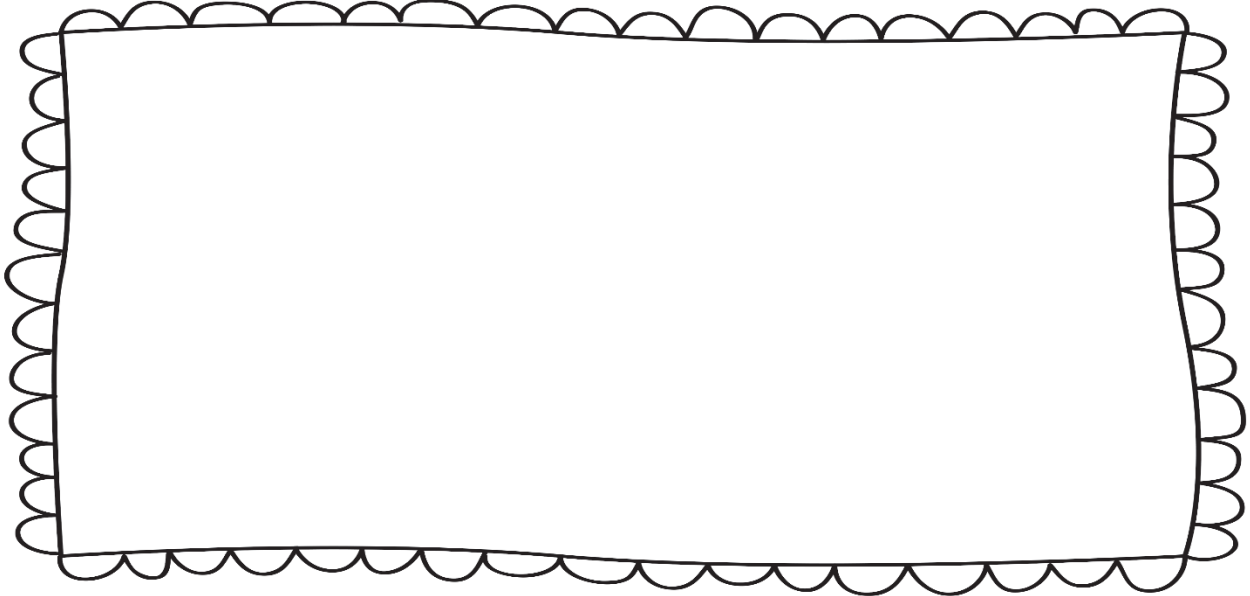
1. What is the machine called?

2. What does the machine do?

3. What is this machine made of?

Explaining Evabel's Machine (C)

Draw your favourite machine from the book Evabel.



1. What is the name of the machine?

2. What does this machine do? Who uses it?

3. What materials were used to create this machine?

4. Why do you think Evabel chose to use these materials to create her machine?

Activity Two – Design a Machine

Part One

Background – Evabel enjoys solving problems with her tinkering. She creates things to help make peoples’ lives easier. For example, she creates a robot to help her teacher with her marking. She creates a mailbox that opens and says thank you when the mail carrier delivers the mail. She creates a machine that automatically ices cupcakes for the town baker. Not only is she a gifted inventor, but she also cares about making a difference in her community.

Lesson – Review some of the machines that Evabel created in the story, discussing their purpose and who they helped. Emphasize the dual role of Evabel’s inventions – solving problems and helping others. Ask the children the following questions:

- What are some problems in our classroom/hospital room/house that we would like to solve? (Record responses)
- What kinds of machines could we create to solve these problems?
- Have children turn to a partner and discuss: Have you ever wanted to make a machine to solve a problem you or someone in your family has had? What was the problem?

Explain to children that they will now have an opportunity to create their own machines using recycled materials or depending on the availability/access to resources other items! Note that online apps such as could be used here.

Activities/Worksheets - To start the planning process, they will answer the following questions either using a worksheet, expressing orally to an educator or through an audio/video recording:

- What will your machine be called?
- What problem will it solve?
- What materials do you need to create your machine? Why?
- Who will your machine help?

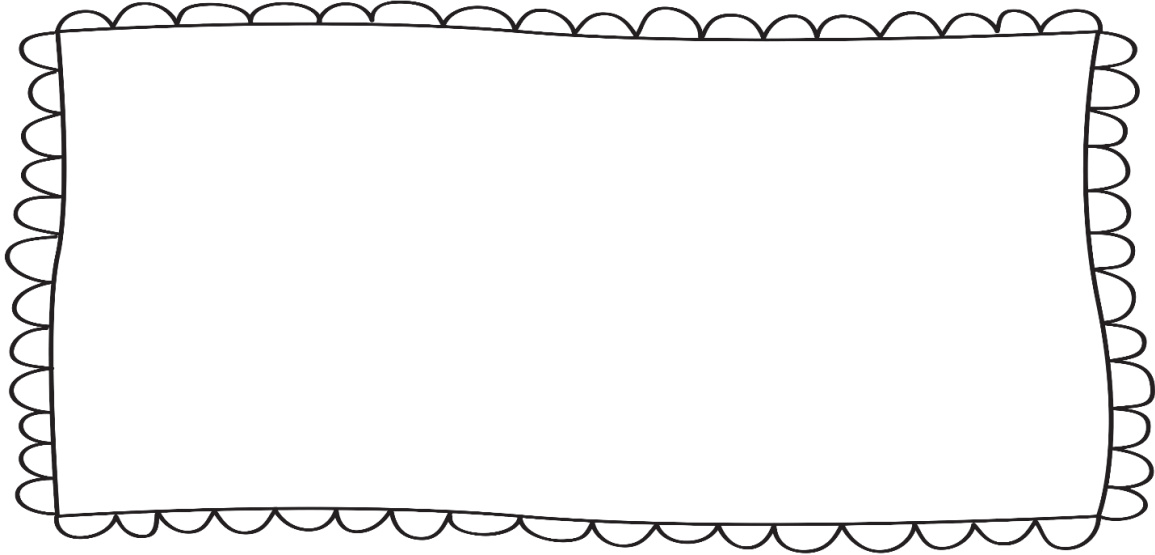
Worksheet List

- Drawing Your Machine (A)
- Writing about Your Machine (B)
- Explaining Your Machine (C)

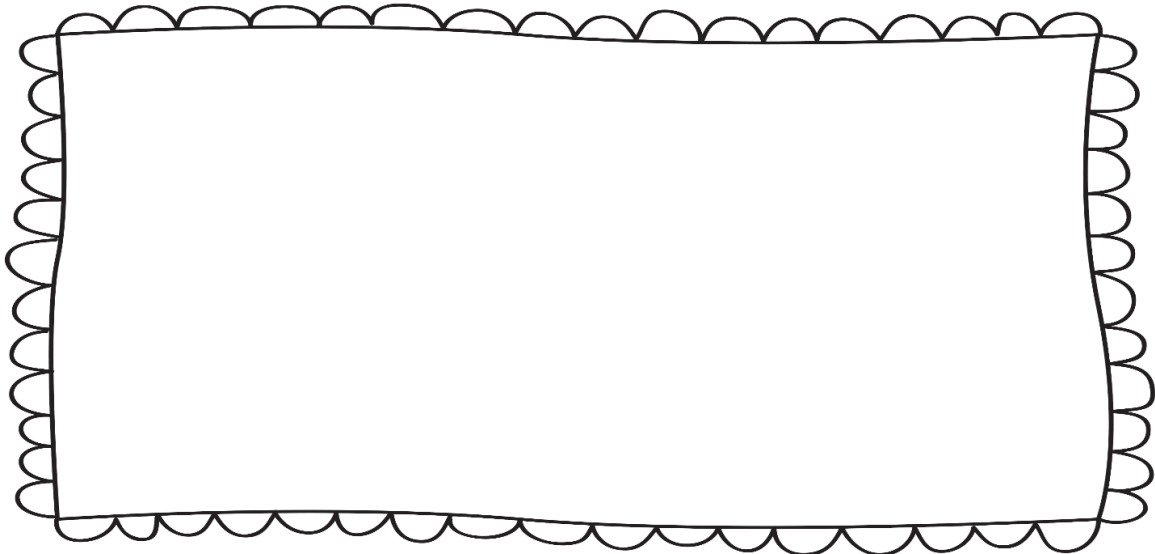
Drawing Your Machine (A)

Write the name of your machine _____.

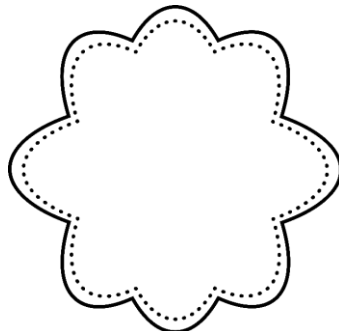
Draw your machine solving a problem:



Draw what you need to make your machine.



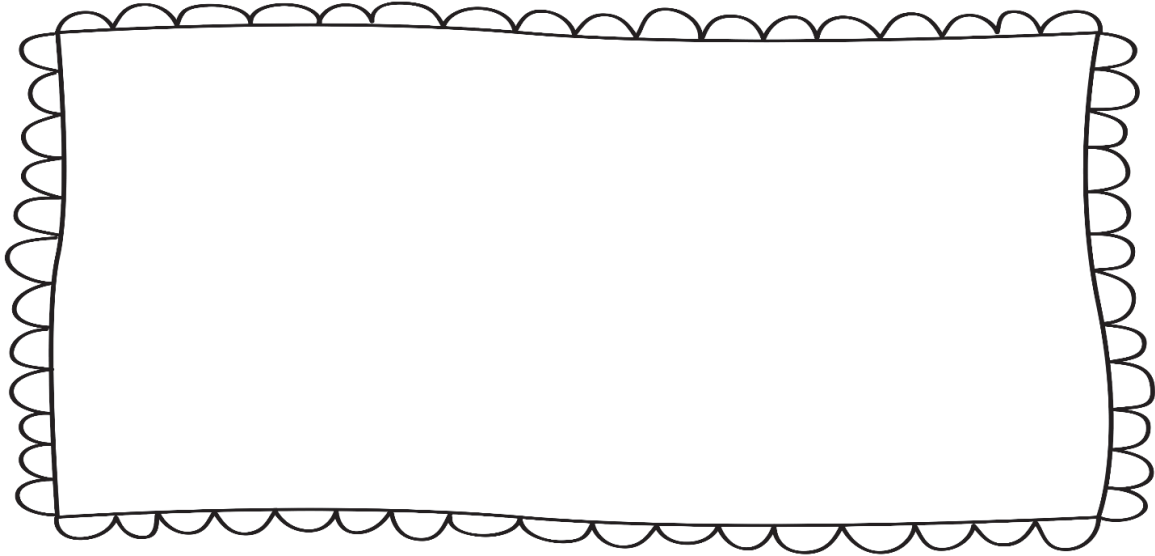
Draw who your machine will help.



Writing About Your Machine (B)

Write the name of your machine _____.

Draw your machine.



Who will use your machine? _____.

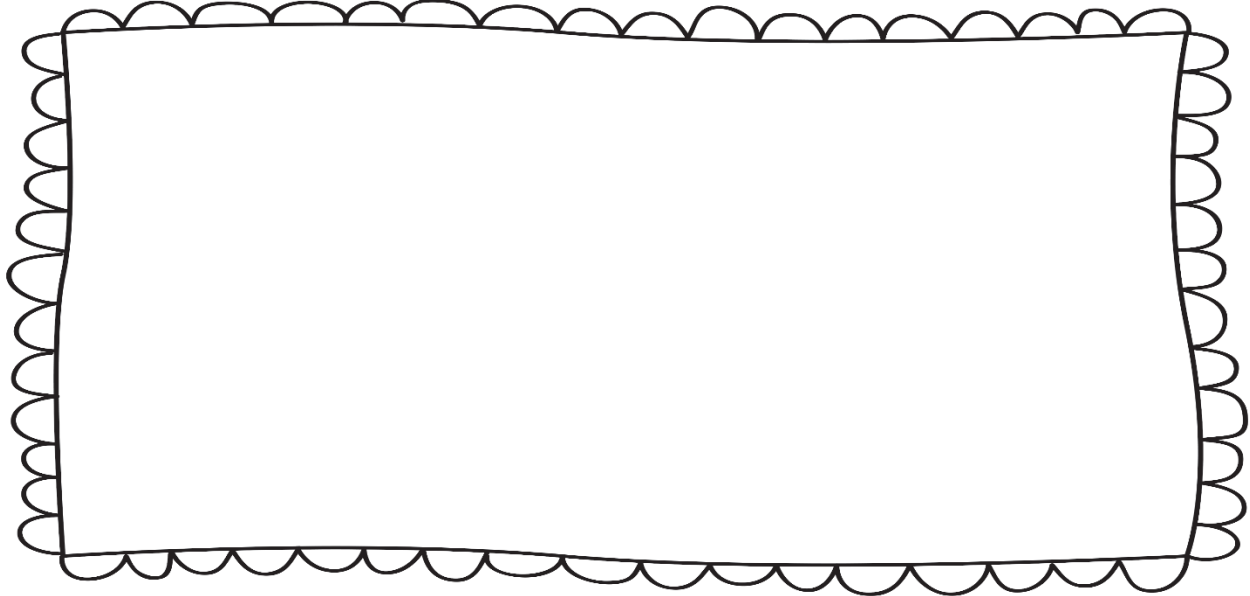
What problem will your machine solve? _____

Draw or list the materials that you will need to make your machine?

A large rounded rectangular box for drawing or listing materials.

Explaining Your Machine (C)

Draw your machine.



1. What is the name of your machine?

2. What problem does your machine solve? Who will use it?

3. Make a list of the materials you will need to create your machine.

4. Why will you use these materials to create your machine?

Part Two

Background – Evabel loves to tinker, but making improvements to or creating new machines takes a lot of hard work and perseverance. It is likely not everything will turn out the way it was intended or imagined. Talking in advance about the challenges children may face will improve their ability to cope.

Lesson – Explain that over the next few days we will be working on creating our machines, BUT before we can start this process, it is important to discuss what to do if things go wrong. Many tinkerers like Evabel were not successful the first time they tried to create their machine/product, but they did not give up! They kept going even when they got frustrated.

Talk about some of the challenges that different inventors/innovators have experienced. Here are some facts that could be shared with the children:

- Thomas Edison (inventor of the lightbulb) – It took him over 1000 tries to create the lightbulb.
- Sir James Dyson (inventor of Dyson vacuum) – It took him 5,126 tries to create the vacuum.
- Jane C. Wright (pioneering cancer researcher) – Jane persevered to have chemotherapy accepted as an accessible treatment for cancer, not just an experimental procedure for some individuals. The drug she pioneered and used to promote widespread use of chemotherapy is still used today.
- Dr. Patricia Bath (ophthalmologist, inventor) – Patricia experienced discrimination as a Black female who wanted to become an eye doctor. She persevered becoming an ophthalmologist and an inventor. She invented a device called the Laserphaco Probe that doctors use in eye surgeries to treat serious conditions which can cause blindness.
- Ralph Braun (CEO of Braun Corporation, inventor) – Ralph, known as the “Father of the Mobility Movement” created a wide variety of inventions to help individuals with disabilities get around more easily including a motorized scooter and the first accessible minivan. When Ralph was starting out as an inventor, he worked out of his parents’ garage using anything he could find to create his inventions. His hard work and perseverance paid off as he was able to start his own company to help others.

Indicate that making something takes a lot of hard work and perseverance. We need to be prepared for moments of frustration, when things do not work out the way that we wanted.

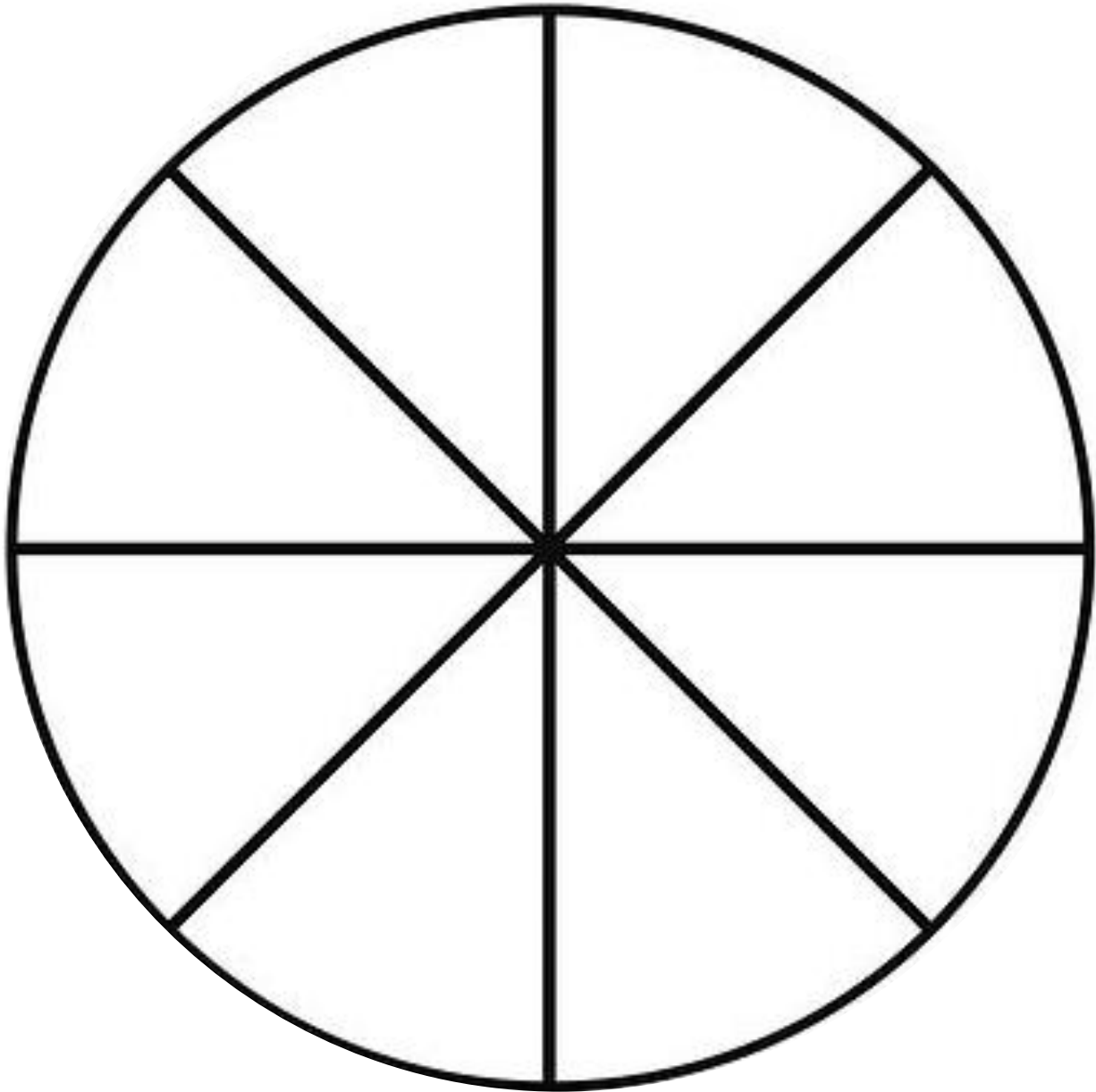
Activities/Worksheets - Hand out the worksheet to all children or create one big wheel at the front of the room that everyone will be able to see. Brainstorm

together as a class what they can do if they get frustrated. Here are some suggestions:

- take deep breaths
- stop and count to 10
- take a movement break (e.g. do stretching or jumping jacks)
- drink some water
- blow bubbles

If you created one big wheel, replicate it on the worksheet below, and provide a copy to each student for next class.

What To Do If I Get Stuck/Frustrated/Tired



Part Three

Background – Creating is a lot of fun, but it can also be frustrating! Talking to children about the experience of creating and persevering can help facilitate their success.

Lesson – Explain to children that they will now create their machine using the materials they listed on their planning sheet, or expressed orally through a conversation/recording.

Before beginning the activity, provide students with a copy of the wheel created the previous day. Remind children that if they get frustrated, they should refer to the wheel providing some options to help them calm down.

Indicate that at the end of the session they will share their machines and also talk about if they used their wheel to help them.

Closure – Have children share their machines and their process of working through frustration. Here are some guiding questions that can be asked during the sharing process:

- What is the name of your machine?
- What problem does your machine solve?
- Who will your machine help?
- What materials did you use to create your machine?
- Why did you choose these materials?
- What challenges did you experience when creating your machine?
- How did you work through these challenges?
- What is the most interesting part about your machine?

Debrief the sharing experience.

If you are willing to share the machines created, send them to katie.doering@utoronto.ca. I would love to see them, and provide feedback.