

BUILD A PIG HOUSE

LARISSA CRAWLEY, OCT
P/J, NIPISSING
UNIVERSITY



Grade One

Strands: A: STEM Skills and Connections
& D: Structures and Mechanisms

Topics: STEM Investigation and Communication Skills &
Materials, Objects and Everyday Structures



EXPECTATIONS

PLEASE NOTE:

I have included grade one expectations from both Strand A: STEM Skills & Connections, and Strand D: Structures & Mechanisms as this activity has natural links to both.

This activity could be used on its own as a STEM challenge in any classroom, or could be used as a performance task within a unit. The complexity of the task can be made more difficult or less complex depending on the student level of readiness and what the teacher hopes to assess. The length of time this activity takes can also be extended to allow for richer design and build brainstorming among groups.



EXPECTATIONS

OVERALL EXPECTATIONS:

I am including these overall expectations, as this is a **big picture** activity that encompasses many specific expectations.

- ★ A: use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures
- ★ D: demonstrate an understanding that objects, including structures, have observable characteristics and are made from materials with specific properties that determine how they are used

SPECIFIC EXPECTATIONS:

- ★ A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems
- ★ D2.4 describe observable characteristics of various everyday objects, including structures, using qualitative information gathered through their senses
- ★ D2.5 describe purposes of everyday objects, including structures
- ★ D2.6 identify properties of materials that enable the objects made from them to perform their intended function

MATERIALS

This is a great activity to begin a discussion around reusing and repurposing materials, so consider asking your class to bring in various materials from home 2 weeks before this activity is planned. For example, old towels, t-shirts, plastic bags, popsicle sticks, old cereal boxes, etc. Students will have fun gathering materials, learn to reuse and be excited to build their house!

- ★ Three Little Pigs Book (of your choice)
- ★ Fairly powerful fan (I taped a printed wolf face on the fan for dramatic flair!)
- ★ Watering can with “rain” spout & water
- ★ Materials for building: options include popsicle sticks, plastic bags, wax paper, cardboard, cardstock, masking tape, straws, string, scraps of fabric like towels or old t-shirts, tin foil, newspaper, tissues, cotton balls, etc. Try to vary materials.
- ★ Stuffed animal pig (see if a student has a stuffed animal they would like to bring in!)
- ★ Large trays or foam board (this is not absolutely necessary but I gave groups a tray to build on for easy transport.)
- ★ Extension cord (may be needed depending on your classroom)



BRIEF DESCRIPTION

Students will work in groups of 3-5 to create their own house to keep their pig safe from the Big Bad Wolf! Hype your students up and add some dramatic flair by telling them the Big Bad Wolf is coming, and it looks like a storm may be rolling in! They will be given the task of building a house for their pig that **MUST** keep the pig safe, dry and warm. Giving students this specific criteria helps them to think of what materials they might select to accomplish this. Students will have a variety of different materials to pick from. When groups finish, it is time to test! Have groups make predictions about whether they think the pig will be safe, dry and warm in each house. Take a vote with a show of hands and record together. A stuffed animal pig is placed inside the completed homes. The teacher directs a fan (the Big Bad Wolf) at each house and pours water (the rain) on each house. The pig is then removed and felt by a member of another group to determine if the pig was kept safe, dry and warm. Talk about what worked and did not work so well as a class.



This is a fun activity sure to keep your students engaged and motivated. I feel that this makes for a well-rounded introduction OR conclusion to the Structures and Mechanisms area of the grade one curriculum. It reinforces the idea that structures are made of all different materials and these different materials have a specific purpose within the structure. The knowledge students gain from this activity allows for rich scientific discussion once the activity is completed.

STEP-BY-STEP PROCEDURE

Before you begin: Teacher sets up a “materials table” where different materials are collected and organized. Read *The Three Little Pigs* together if you have not already.

1. Introduce the task: Tell students that today they will be building a home for their pig. Dramatize and explain that the Big Bad Wolf is coming and a storm is rolling in! Show them the fan and the watering can.
2. Introduce success criteria: Students must build a home to keep their pig safe, dry and warm. Project this or have this written on the board for students to refer to.
3. Split the class up into groups no larger than 5. Ask groups to select a person who will be the materials captain and visit the materials table for the group. Groups members will be able discuss and add their input as to what the materials captain selects.
4. Give the class 30 minutes to pick their materials and build their house. Be sure to give 5-minute time reminders to keep students on track. Materials captain can return to the materials table at any time.
5. Clear a wide open area where houses can be safely tested by the fan and water. Seat students in audience format.
6. Select a group to begin the experiment. Have the group briefly verbally explain to their classmates a little bit about their house, what it is made of and why. Then place the stuffed animal pig inside the house.
7. Take a vote to get student predictions and record together on the whiteboard/Smartboard (see Recording Device slide).
8. Test each groups house by directing the fan (wolf) at the structure and pouring water (rain) over it. Do this separately (see Safety Concerns slide). Ask a student from another group to feel the pig to observe and feel whether the pig is safe, warm and dry. Repeat with each group.
9. Record what actually happened and discuss results together.

MEDIA TO SUPPORT LEARNING

Introduce or remind your students (depending on where this activity is in a unit) of the properties of materials. Here's are two short videos to help. This may also give you some ideas of short experiments to run in the classroom in the days leading up to this activity.






Bronwyn. (2011, May 24). *Properties of Materials* [Video]. YouTube. <https://www.youtube.com/watch?v=TzR9fXL-Obo>



Joy, A. (2020, May 11). *Properties of Materials* [Video]. YouTube. <https://www.youtube.com/watch?v=AhrZ7bTwQ54>

If this activity comes at the end of a unit, you may have anchor charts up that students can refer to for structure and material-related terminology. If not, you may display images on a projector/Smartboard. These are not absolutely necessary but can be helpful. Below are examples of images that may help to remind students of the properties of materials, and why we use certain materials:

Properties	Example	Using our Science Vocabulary to Explain our Thinking
Rigid/Hard/Strong		A table is rigid so it can hold things on top. If it was flexible everything will fall. Can you think of other rigid materials? What other objects need to be rigid?
Flexible		A shoe is flexible so I can put my foot in and I can walk. It would be VERY difficult to walk in rigid shoes. Can you think of other flexible materials? What other objects need to be flexible?
Transparent		A bus shelter is transparent so passengers can see the bus coming. Glass also keeps rain and snow from coming in. What other materials are transparent? What other objects need to be transparent?









Opaque		My pants are opaque so people can't see through them. What other materials are opaque? What other materials need to be opaque?
Repel		My winter boots repel water. When I walk in the winter weather, snow and water can not come in. What other materials repel water? What other objects repel water?
Absorbs		This sponge absorbs water so I can wash things. What other materials absorb water? What other objects absorb water?
Soft		My pillow is soft so I can sleep comfortably at night. What other materials are soft? What other objects are soft?
Rough		Sandpaper is rough. It helps to scrap things down. What other materials are rough? What other objects are rough?

Chart to be used as an example only. Sourced from:
Objects and Materials. (n.d.). Mrs. Genua's Grade 1 Class.
<https://mrsgenuasclass.weebly.com/objects-and-materials.html>

RECORDING DEVICE

Introduce recording devices to your class by verbally asking the class what their predictions are. Have students raise their hands to indicate if they think the house being tested will keep the pig safe, dry and warm, or not. Record their responses on a table like this projected onto or drawn on a whiteboard or Smartboard. My class was learning to count by 5's so we used tally marks.

Group #	The pig will be safe, dry and warm 	The pig will NOT be safe, dry and warm 	What actually happened? 
1	/// // III	///	The pig was safe, dry and warm
2	/// //	/// II	The pig was safe, dry and warm
3	/// // /// I	I	The pig was crushed by the roof, he was not safe
4	/// I	/// // II	The pig got wet, he was not dry

EXPLANATION OF SCIENCE

Students learn that a structure is not only an object. It is a framework made up of different materials. Those materials are chosen for specific reasons because of their specific properties. Students also learn that structures serve an important purpose in daily human life, with the most important structure to a grade one student being a home. Students learn that the structure of an object is linked to the purpose of that object. Through experimentation and investigation, students observe which materials were best for the desired structure and outcome & distinguish between materials and their properties. Students are also introduced to environmental conditions such as wind and rain, and how these conditions affect structures.

A house that will keep the pig safe, dry and warm from the Big Bad Wolf and the rain will need to use a variety of materials to create a suitable structure. Students need to understand the properties of materials and how to use these materials to create a strong stable structure.

- ★ A house that keeps the pig **warm** will likely have some kind of soft insulation or absorbent materials, like fabric, tissues, or cotton balls.
- ★ A house that keeps the pig **dry** will likely have water-repellent materials such as plastic bags, masking tape roofs, or wax paper.
- ★ A house that keeps the pig **safe** will likely use rigid, strong and durable materials like popsicle sticks and corrugated cardboard. A strong structure may also have a wide base or even use structurally strong shapes like triangles.

SAFETY CONSIDERATIONS

- ★ Use caution and select materials that are not related to known allergies (for example, do not include anything like balloons or gloves due to latex allergies and ensure that students do not bring packaging that may have contained peanuts or nuts).
- ★ Ensure students are not placing materials in their mouths and ensure materials available are not choking hazards - nothing small.
- ★ Ensure the area where the houses will be tested is clear of hazards like cords or chairs.
- ★ Unplug the fan from the outlet right after each test is completed. Physically move the fan away from the testing station. This is extremely important as this activity involves water.
- ★ Ensure that the fan being used does **not** have exposed blades. (This would be extremely uncommon in a school). Ensure the fan is in good working order.
- ★ Have students remain seated in an audience formation at least a few feet back from the testing table while houses are being tested. Water may make floors slippery so be sure to go over what is expected of students' behaviour before the testing begins.
- ★ Have multiple towels standing by ready for clean up. Clean up any water on the floor and table in between each test.

MANAGEMENT CONSIDERATIONS

- ★ Keep groups to a maximum of 5 members. You want all students to be involved and any more members than 5 does not allow *all* students to equally participate in the designing and building.
- ★ Make sure to go over expectations for student behaviour before beginning this activity. Students must be aware of the safety considerations.
- ★ Instead of giving groups materials at their tables/desks, create a “materials table” in the classroom where one student from each group can visit to pick up materials. This will keep both the room and students organized, and create better time management.
- ★ Ensure that students understand that we all have the same materials to pick from and that we do not have to hoard materials. Tell students “only take what you really need”. This will prevent students from trying to grab *all* the popsicle sticks, for example.
- ★ Consider asking for a volunteer from an older grade to help with clean up in between tests. This would be a great volunteer opportunity for a grade 8 student.
- ★ Create a clear and designated audience area where students will sit to view the testing.

ADAPTATIONS

As this lesson is mostly hands-on and verbal in nature, it is accessible for all students. I did this in a grade one Special Education class with no modifications. However, some adaptations may include:

Learning Environment: If you are limited with space take the class outdoors to do testing on a rainy and windy day. Discuss how when we control the variables vs. when the variables are out of our control, the results of experiments may change.

Available Materials: The beauty of this activity is that it can be done with almost any kind of materials from anywhere, even from your backyard. Materials can be substituted as needed. For example, don't have access to a fan? Try a hair dryer. No popsicle sticks, try wooden skewers or sticks collected from a nature walk.

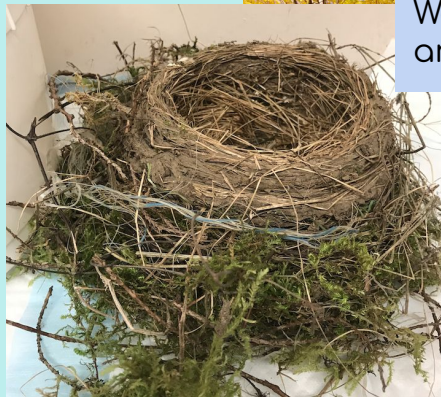
Learners with different needs: Plan to spend a few minutes with each group, as they build and design, to make sure everyone is on the right track. Something as simple as struggling with tape can set students back but can be solved in seconds. Plan ahead and create groups that you know will benefit students. If you have Multi Language Learners who speak the same language, for example, place them together in a group.

In an advanced class: Teach students how to create their own recording instrument, such as a table, by giving them their own piece of paper with a clipboard. Create the table together. Encourage students to write their **predictions** down before testing and **results** after testing.

EXTENSIONS

Take the class from indoor to outdoors and explore structures in nature (D2.4 & D2.8). What structures exist in nature? What are they made from? Who or what creates these structures? For what purpose? Do animals live there?

When having students deconstruct their pig homes after the experiment, begin the conversation about the kind of waste and recycling that has been created (D1.1 & D1.2). What can we recycle? How can we reuse? What can we save from the materials we used today? What goes in the garbage bin and what goes in the recycling bin? Can anything go in a compost bin? (If using materials from nature). Sort together.



We even found a few animal homes!

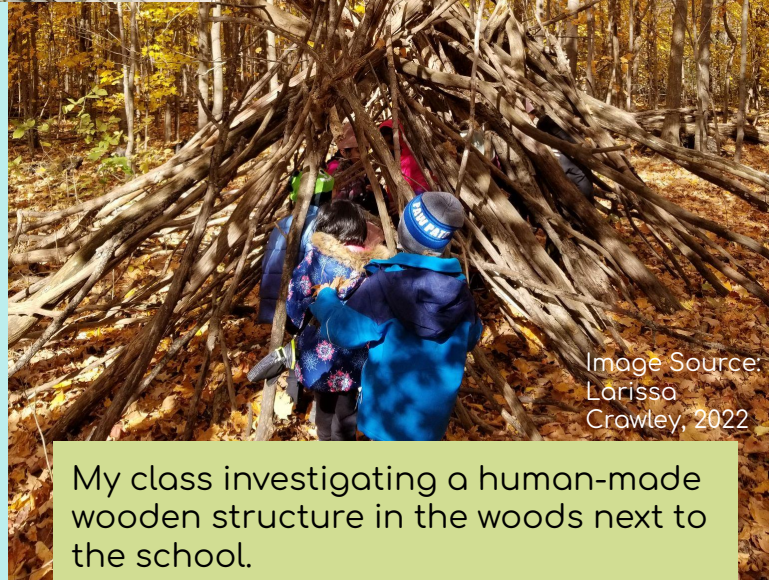


Image Source:
Larissa
Crowley, 2022

My class investigating a human-made wooden structure in the woods next to the school.

EXTENSIONS CONT...

Have students write a journal entry about how their pig house held up using correct terminology such as rigid, flexible, experiment, repel, etc. (A1.5). Encourage students to talk amongst their friends while writing to further strengthen their scientific language. What went well? What might you do differently? Did everything go as you planned?

Ask students to make connections between the properties of materials and the clothing that we wear in different seasons (E2.5 & 2.6). Why do we wear snow pants? Do they keep us dry when we play in the snow? What kind of material is an umbrella made of? What about our bathing suits? How do they dry so quickly? How do other animals prepare for the season changes? (For example, a bear adds extra fat before hibernation to withstand cold temperatures).

When assessing if the pig was kept warm, safe and dry by the groups' houses, begin the conversation about basic needs for humans and some animals, like warmth and shelter. Talk about the differences between the conditions animals live in and humans. (B1.2, B2.2, B2.6 & E2.5) Do real pigs live in houses? Do they sleep on beds? Why not? Why do humans live in structures? What would happen if we were outside in the rain and cold for a night? How can we show care to animals while leaving them in their natural habitat?

EXTENSIONS CONT...



To extend the learning even further, consider planning an authentic, experiential learning experience outside of the classroom in your local area!

As this class is in Brampton, a tour and presentation at Sawmill Sid's Wood Recovery Center in Mississauga would be a wonderful learning experience. Sawmill Sid's believes in environmentally responsible use of wood from forest to product, while honouring Canada's environment. Sawmill Sid's also believes in giving back by repurposing wood such as turning old wood into Buddy Benches for schools and parks, and creating displays for science centers and museums ([D1.1](#), [D1.2](#)).



Images from: Sawmillsid.ca



EXTENSIONS CONT...



Images from:
Sawmillsid.ca



Bringing students to the Wood Recovery Center in Mississauga would give students an understanding of how many Canadians rely on wood products for a variety of structures and how we can continue to build with wood while being responsible stewards for the environment. Students would hear from a variety of people who operate important forestry, manufacturing and recovery practices, and see a variety of wooden structures being designed and assembled. Students see how the materials we harvest from nature are processed and prepared for use in human made structures, and how this can be done sustainably. Students also learn about how to repurpose what would otherwise be “waste” ([D1.1](#), [D1.2](#), [D2.3](#), [D2.8](#)). An experiential learning trip like this would also have many links to other subject areas, such as social studies.

CROSS-CURRICULAR CONNECTIONS

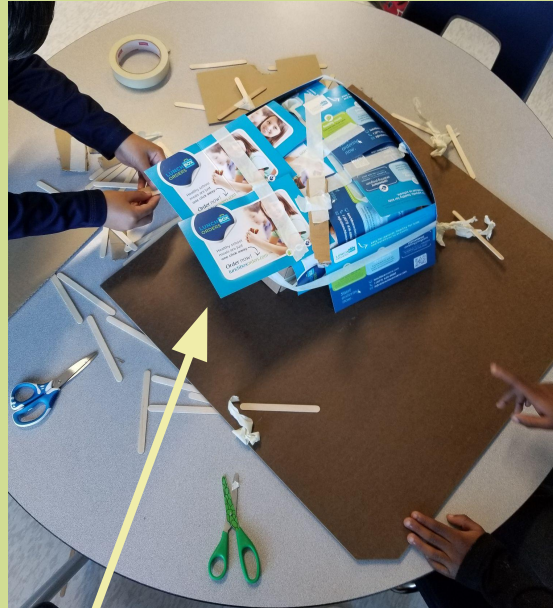
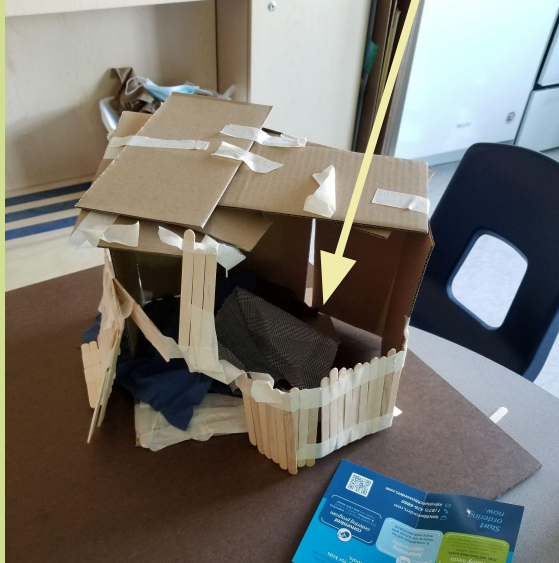
Cross-Curricular Connections may include:

- ★ In Dramatic Arts, act out the story of *The Three Little Pigs* in groups and present your group's version.
- ★ In Math, count how many materials each group used and compare. Did using more or fewer materials make the houses stronger? If there were different-shaped houses (triangle, rectangle, square) explore which shapes were the strongest. In a more advanced class, give each group a set amount of "money" to spend on materials. For example, a popsicle stick costs 5 cents. Groups must budget accordingly.
- ★ In Visual Art, become an architect and design your own functional *and* beautiful home with geometric shapes or an element of design of your choice.
- ★ In Health and Physical Education, select a person to be the Big Bad Wolf and set up pylon houses where "pigs" are safe.
- ★ In Language Arts, have students write their own version of *The Three Little Pigs*. What are the three houses made of in your version? Read *Wangari's Trees of Peace* by Jeanette Winter and discuss the importance of sustainability, and what we can do in the present to make meaningful change locally.



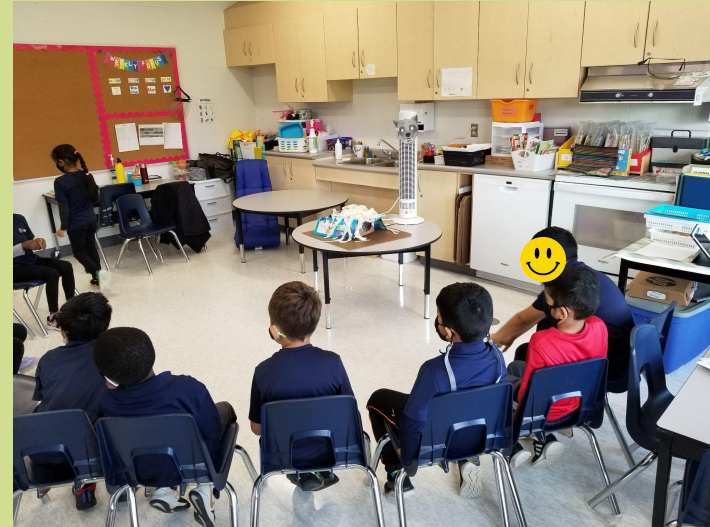
MY CLASS EXPERIENCE:

Each group made one house and selected their own materials. This group even thought to include windows for their pig to see out and a bed.



This group created an awning over the front porch to keep the pig "extra dry" while pig gets some fresh air.

The class sitting in a circle in audience formation waiting in anticipation to test their houses together. Notice the large clear area for testing.



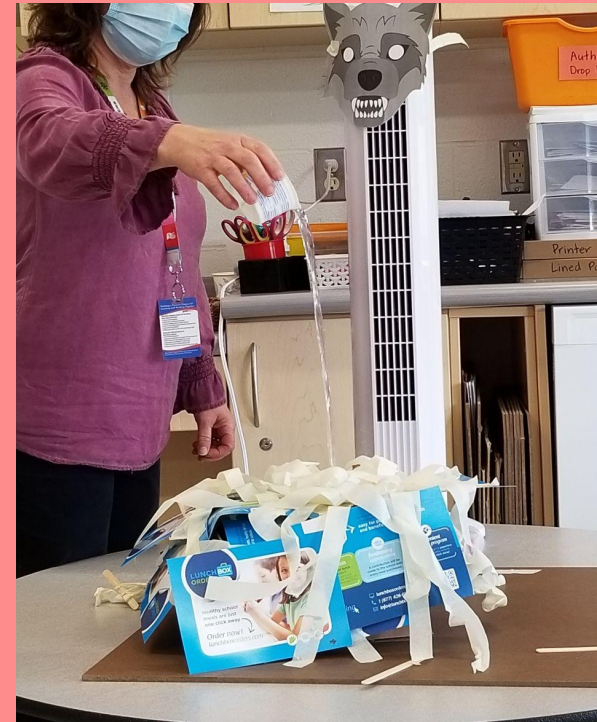
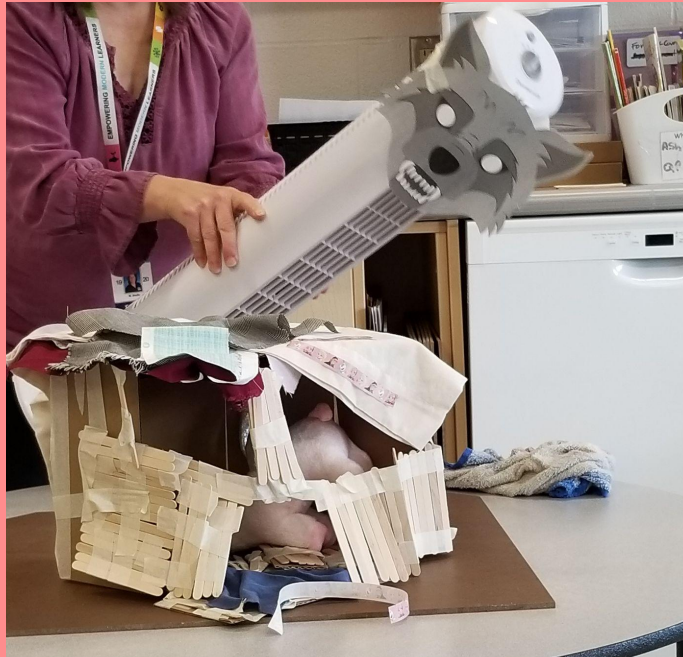
CONTINUED

The Big Bad Wolf (fan) trying to blow the houses down...



Students loved placing the stuffed pig inside their houses.

Image Source: Larissa Crowley, 2022



The "rain" trying to dampen the pig's spirit to no avail as the masking tape roof repelled water.

REFERENCES

Bronwyn. (2011, May 24). *Properties of Materials* [Video]. YouTube. <https://www.youtube.com/watch?v=TzR9fXL-Obo>

Cruickshank, L. & Lamers, A. (2022) *The Three Little Pigs Experiment*. Nipissing University.

Halliwell-Phillips, J. (1890). *The Three Little Pigs*. Compass Publishing.

* (There are now so many versions of this story in rotation, feel free to pick the one you love).

Joy, A. (2020, May 11). *Properties of Materials* [Video]. YouTube. <https://www.youtube.com/watch?v=AhrZ7bTwQ54>

Mrs. Stocks' Grade One Special Education class at Dolson Elementary School in Brampton, ON.

Objects and Materials. (n.d.). Mrs. Genua's Grade 1 Class. <https://mrsgenuaclass.weebly.com/objects-and-materials.html>

Recycling Activities - Fun Lesson Plan, Reduce, Reuse, Recycle, Kids Science. (n.d.).

<https://www.sciencekids.co.nz/lessonplans/earth/recycling.html>

Sawmill Sid. (2015, October 5). *Sawmill Sid*. <https://sawmillsid.co/>

The Science Behind The Fairytale (Structures & Mechanisms) | STAO. (n.d.).

<https://stao.ca/resource/the-science-behind-the-fairytale-structures-mechanisms/>

The Ontario Curriculum, Grades 1-8 Science and Technology. (2022). Curriculum and Resources.

<https://assets-us-01.kc-usercontent.com/fbd574c4-d936-0066-a0c5-849ffb2de96e/a6136d61-3120-43f0-94a3-5859e0319382/The%20Ontario%20Curriculum%20Grades%201%E2%80%938%20Science%20and%20>

*All clipart images featured taken from Google Slides system clipart. Classroom pictures taken by me in 2022.

RESOURCES FOR TEACHERS

Chart of Properties and Examples of Materials

<https://mrsgenuasclass.weebly.com/objects-and-materials.html>

Epic Read-Aloud Unit on Structures and Materials

<https://www.getepic.com/collection/25276/materials-and-structures>

Materials and Their Characteristics Video from Youtube.

<https://www.youtube.com/watch?v=AhrZ7bTwQ54>

Properties of Materials Experiment Video from YouTube.

<https://www.youtube.com/watch?v=TzR9fXL-Obo>

Science Teachers' Association of Ontario - Teacher Resources.

<https://stao.ca/resource/structures-structures-everywhere/>

<https://stao.ca/resource/shaping-structures-for-sustainability/>

Read Aloud Books about Structures and Materials

How Things Are Made by Oldrich Ruzicka

The Most Magnificent Thing by Ashley Spires

Iggy Peck, Architect by Andrea Beaty

Rosie Revere, Engineer by Andrea Beaty

Not A Box by Antoinette Portis

Wangari's Trees of Peace by Jeanette Winter