***Engineering Zone***

SC.K.P.8.1

SC.1.P.8.1

SC.2.P.8.1

SC.3.P.8.3

SC.4.P.8.1

SC.5.P.8.1



**Challenge:** Select 2 items from the MakerSpace and bring them back to your group. In your group, work together to sort the items, grouping them by similar properties.

Work as a team to design and build a tower that represents one property. Keep your property a secret so that other groups can guess your property.

**Materials:** Use any materials in the MakerSpace.

**Submission of Request for Proposals:** Write the property you chose paper and place it face down in front of your model.

***Engineering Zone***

SC.2.L.16.1 Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.

SC.4.L.16.4 Compare the major stages in the life cycles of Florida plants and animals (metamorphosis).



2, 4

**Challenge:** Show four stages of a butterfly’s life cycle using materials from the MakerSpace.

**Materials:** Use any materials in the MakerSpace.

**Submission of Request for Proposals:**

Submit a model that shows 4 stages: egg, larva, pupa and adult in order that they happen in nature.

***Engineering Zone***

SC.2.E.7.4Investigate that air is all around us and that moving air is wind.



**2**

**Challenge:** Create a toy that moves when it is pushed by wind.

**Materials:** Use any materials in the MakerSpace.

**Submission of Request for Proposals:** Show how your toy moves when it is pushed by the wind.

SC.2.L.14.1 Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions.

SC.5.L.14.1 Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.

***Engineering Zone***



2, 5

**Challenge:** Trace a human body onto a piece of chart paper. Use MakerSpace materials to create models of the brain, heart, lungs, stomach, muscles, and skeleton. Label each organ with its name and function.

**Materials:** Use any materials in the MakerSpace.

**Submission of Request for Proposals:** Submit the labeled human body model.

***Engineering Zone***

SC.K.P.12.1 nvestigate that things move in different ways, such as fast, slow, etc.

SC.K.P.13.1 Observe that a push or a pull can change the way an object is moving.



K

**Challenge:**

Make a toy that you can push or pull. Make it go fast. Make it go slow.

**Materials:**

Use the materials in your maker box.

**Submission of Request for Proposal:**

Create a toy and show the class how it can move fast and how it can move slow. Show and tell us whether it is moved by a push or a pull. Show and tell how it can move fast and how it can move slow.

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| --- | --- | --- |
| Make a Toy – Push/Pull  Suggested Length of Lesson: 59 minutes | Grade Level: K | |
| **Lesson Objective:**  Make a toy that you can push or pull. Make it go fast. Make it go slow. | **Benchmark Standard:**  **SC.K.P.13.1** Observe that a push or a pull can change the way an object is moving.  Cognitive Complexity: Level 1 Recall  **Supporting Standards:**  **SC.K.P.12.1**  Investigate that things move in different ways, such as fast, slow, etc.  Content Complexity: Level 3: Strategic Thinking & Complex Reasoning | |
| **Essential Question:**  What makes things move? *(push or pull)*  How can you make something go fast? How can you make something go slow? | **Vocabulary:**  Push  Pull  Fast  Slow | **Vocabulary Activities:**  Acting out words  Sing the words  Teach the words  Draw the words |
| **Preparation Directions:**  Provide each group with a mini-maker box of varying materials in which students could choose to construct a toy.  **Procedures:**  Instruct students to make a toy in which they are going to push or pull.  Conduct formative assessment to access student’s prior knowledge.  Introduce the request for proposal, working with students to formulate the challenge statement.  Students will work collaboratively to create and innovate using maker box materials to meet the challenge description.  Informal assessment will take place throughout the design challenge with teacher monitoring students and assessing their application with differentiated questioning. | **Materials:**  Box for maker materials  Suggested toy materials:  Cardboard from cereal box, supply box, string, yarn, straws, popsicle sticks, tape, toilet paper or paper towel tubes, empty water bottles, index cards, etc.  Engineering Design Packet  **Differentiated Questions:** | |
| **Assessment:**  Formative- Students will participate in a class discussion about toys in which they have played with that have moved and sharing whether that toy was pushed or pulled.  Summative- Students will draw the toy their group created and glue the word “push” or “pull” beneath it to finish the sentence, “The toy moves with a (*push/pull*). Students will use the toy to demonstrate movement by a push/pull and sharing whether the toy moves fast/slow. | |
| **Additional Resources:**  Vocabulary activity video <https://youtu.be/yxC6EpePnH4> | | |

SC.2.P.13.3 Recognize that objects are pulled toward the ground unless something holds them up.

SC.3.E.5.4 Explore the law of gravity by demonstrating that gravity is a force that can be overcome.

***Engineering Zone***



2,3

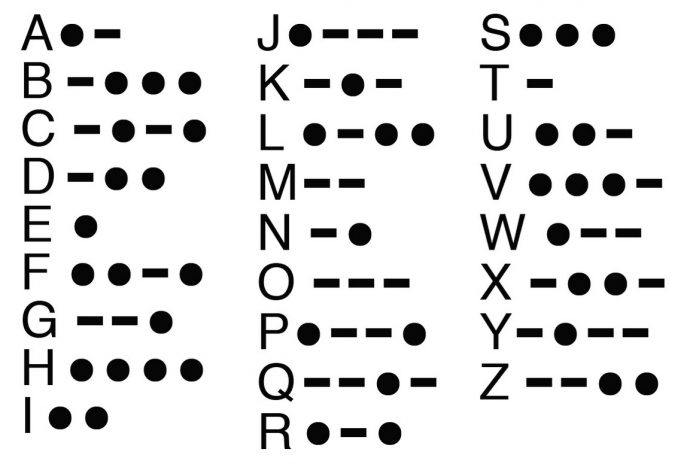
**Challenge:** Create a parachute that will slow the fall of an object.

**Materials:** Use any materials in the MakerSpace.

**Submission of Request for Proposals:** Submit your parachute device and data showing the speed of the object’s fall with and without the parachute.

|  |  |  |
| --- | --- | --- |
| Jack and the Giant  StEm Lesson  Engineering Design Challenge | Grade Level: 4 | |
| **Lesson Objective:** Students will create an instrument and a code so the giant’s wife can secretly communicate with Jack. | **Benchmark Standard:** SC.4.P.10.3  Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates. | |
| **Essential Question:**  How can you change the way strings vibrate to change the sound and create an instrument with two or more pitches? | **Vocabulary:**  Sound  Energy  Pitch  Vibrate | **Vocabulary Activities:**  Use the vocabulary when discussing the instruments. |
| **Preparation Directions:**  **Engage:**  Share the edited version of the Jack and the Giant story. This can be done as a read aloud or used in an ELA lesson.  Discuss ways the giant’s wife could have let Jack know when it was safe or unsafe to come out of hiding.  Discuss, they could have made a secret code using sounds from the harp.  **Procedures:**   1. Explain to students that they are going to make an instrument that the ogre’s wife can play to tell Jack the following things:  * Giant is awake * Giant is asleep * Hide- the giant is coming your way.  1. Show student’s the Morse code poster. Explain the dots are short sounds and the dashes are sustained sounds. This code is used to communicate. Explain that they will use high and low sounds to make a code. They will create 3 different sound combinations to represent:  * Giant is awake * Giant is asleep * Hide- the giant is coming your way.  1. Share the Request for Proposals (RfP) from Jack and the EDC planning sheet. 2. After plans are complete, give students access to rubber bands, containers, and other materials. 3. Students build instruments and create codes following the EDC model. | **Materials:**  Rubber bands of various sizes  Recycled containers  Various makerspace materials  **Sample Questions:**  How were you able to change the pitch of the rubber band?  Does a higher pitch sound vibrate faster or slower than a lower pitched sound?  Can you make the pitch higher? How?  Can you hear the difference between the pitch of each rubber band?  Is there a way you can write the code on paper so that Jack and the woman can remember them later? | |
| **Assessment:**  Students should be able to demonstrate and explain that a shorter rubber band vibrates faster and make a higher pitch sound, while a longer rubber band vibrates more slowly and makes a lower pitched sound.     1. Extend: Challenge students to write their code so that someone could play it back without having heard it. | |

**Morse Code**



**Jack and the Giant**

There was once upon a time a poor widow who had an only son named Jack. They used to be very rich, but a horrible ogre killed her husband and took their fortune.

Now all they had was a cow named Milky-White. All they had to live on was the milk the cow gave every morning, which they carried to the market and sold – until one morning Milky-White gave no milk.

“What shall we do, what shall we do?” said the widow, wringing her hands.

“Alright, mother,” said Jack. “It’s market day today, and I’ll soon sell Milky-White, and then we’ll see what we can do.”

So he took the cow, and off he started. He hadn’t gone far when he met a funny looking old man, who said to him, “Good morning, Jack.”

“Good morning to you,” said Jack, and wondered how he knew his name.

“Well Jack, where are you off to?” Said the man.

“I’m going to market to sell our cow there.”

“Oh, you look the proper sort of chap to sell cows,” said the man. “I would trade you these five magic beans for that cow.”

“Go along,” said Jack. “You take me for a fool!”

“Ah! You don’t know what these beans are,” said the man. “If you plant them overnight, by morning they grow right up to the sky.”

“Really?” said Jack. “You don’t say so.”

“Yes, that is so. If it doesn’t turn out to be true you can have your cow back.”

“All right,” said Jack, and handed him over Milky-White, then pocketed the beans.

Jack went home and showed the beans to his mother.

“What!” Exclaimed Jack’s mother. “You been such a fool! As for your precious beans, here they go out of the window. Now off with you to bed with no supper!”

So Jack went upstairs to his little room in the attic, sad and sorry he was, to be sure. At last he dropped off to sleep.

When he woke up, the room looked so funny. The sun was shining into part of it, and yet all the rest was quite dark and shady. Jack jumped up and went to the window. What do you think he saw? Why, the beans his mother had thrown out of the window into the garden had sprung up into a giant beanstalk which went up and up and up until it reached the sky. The man spoke truth after all!

The beanstalk grew up quite close past Jack’s window, so all he had to do was to open it and give a jump onto the beanstalk which ran up just like a big ladder. Jack climbed, and climbed, and climbed, and climbed, and climbed, and climbed, and he climbed until at last he reached the sky. When he got there, he found a long broad road going as straight as a dart. He walked along, and walked along, and he walked along until he came to a great big tall house, and on the doorstep there was a great big tall woman.

“Good morning, ma’am,” said Jack, quite politely. “Could you be so kind as to give me some breakfast?” For he was very hungy.

“It’s breakfast you want, is it?” said the great big tall woman. “It’s breakfast you’ll be if you don’t move off from here. My man is an ogre and there’s nothing he likes better than boys boiled on toast. You’d better be moving on or he’ll be coming.”

“Oh! Please, do give me something to eat. I’ve had nothing to eat since yesterday morning, really and truly” said Jack. “I may as well be boiled as die of hunger.”

Well, the ogre’s wife was not half so bad after all, so she took Jack into the kitchen, and gave him a hunk of bread and cheese and a jug of milk. Jack hadn’t half finished these when thump, thump, thump! The whole house began to tremble with the noise of someone coming.

“Goodness gracious me! It’s my old man,” said the ogre’s wife. “What on Earth shall I do? Come along quick and jump in here.” She bundled Jack into the oven just as the ogre came in. He was a big one, to be sure. At his belt he had three calves strung up by the heels, and he unhooked them and threw them down onto the table and said:

“Fee-fi-fo-fum,

I smell the blood of an Englishman,

Be he alive, or be he dead,

I’ll have his bones to grind my bread.”

“Nonsense, dear,” said his wife. “You’re dreaming.”

The giant took out two big bags of gold and sat down silently counting. Jack, thinking he was alone, tried to sneak out. Fortunately, the woman saw him before the giant did and hid him quickly. At last the ogre’s head began to nod and he fell asleep.

Jack then crept out on tip-toe from the oven, and as he was passing the ogre, he took one of the bags of gold from under his arm, and off he ran until he came to the beanstalk, and then he threw down the bag of gold, which of course fell into his mother’s garden. He climbed down and down until at last he got home and told his mother and showed her the gold and said, “Well, mother, wasn’t I right about the beans? They are really magical, you see.”

They lived on the bag of gold for some time, until at last they came to the end of it, and Jack made up his mind to try his luck once more at the top of the beanstalk. So one fine morning he rose up early, and got onto the beanstalk, and he climbed, and climbed, and climbed, and climbed, and climbed, and he climbed until at last he came out onto the road again and up to the great tall house he had been to before. There, sure enough, was the great tall woman a-standing on the doorstep.

“Good morning,” said Jack, as bold as brass, “could you be so good as to give me something to eat?”

“Go away, my boy,” said the big tall woman, “or else my man will eat you up for breakfast.”

Jack was so insistent that she took him in and gave him something to eat. He had scarcely begun munching it as slowly as he could when thump! Thump! They heard the giant’s footstep, and his wife hid Jack away in the oven.

All happened as it did before. In came the ogre as he did before, said, “Fee-fi-fo-fum,” and had his breakfast off three boiled oxen.

Then he said, “Wife, the hen that lays the golden eggs.” She brought it, and the ogre said, “Lay,” and it laid an egg all of gold. The ogre sat petting the chicken and Jack thought he was asleep, so he tried to sneak out and was nearly caught.

Then the ogre began to nod his head and fell asleep. Jack crept out of the oven on tip-toe and caught hold of the golden hen and was off.

When he got home he showed his mother the wonderful hen and said “Lay” to it; and it laid a golden egg every time he said “Lay.”

Well it wasn’t long before that Jack made up his mind to have another try at his luck up there at the top of the beanstalk. One fine morning he rose up early and got to the beanstalk, and climbed, and climbed, and climbed, and he climbed until he got to the top.

This time the door was open and he walked inside. The ogre’s wife saw him and silently warned him to hide.

“Fee-fi-fo-fum, I smell the blood of an Englishman,” cried out the ogre. “I smell him, wife, I smell him.”

“Do you, my dearie?” said the ogre’s wife. “I have not seen him”.

The ogre sat down to the breakfast and ate it, but every now and then he would mutter, “Well, I could have sworn –” and he’d get up and search the larder and the cupboards and everything, only, luckily, he didn’t think of the copper pot.

After breakfast was over, the ogre called out, “Wife, wife, bring me my golden harp and play music for me.” She brought it and began to play most beautifully. The music went on for a long time.

Then Jack lifted up the copper lid very quietly and got down like a mouse and crept on hands and knees until he came to the table, when up he crawled, caught hold of the golden harp and dashed with it towards the door. But the ogre was still awake!

Jack ran as fast as he could, and the ogre came rushing after, and would soon have caught him, only Jack had a start and dodged him a bit and knew where he was going. When he got to the beanstalk the ogre was not more than twenty yards away when suddenly he saw Jack disappear. When he came to the end of the road he saw Jack underneath climbing down for dear life.

The ogre swung himself down onto the beanstalk, which shook with his weight. Down climbed Jack, and after him climbed the ogre. By this time Jack had climbed down, and climbed down, and climbed down until he was very nearly home. He called out, “Mother! Mother! Bring me an axe, bring me an axe!” His mother came rushing out with the axe in her hand, but when she came to the beanstalk she stood stuck still with fright, for there she saw the ogre with his legs just through the clouds.

Jack jumped down and took hold of the axe and gave a chop at the beanstalk which cut it half in two. The ogre felt the beanstalk shake and quiver. Then Jack gave another chop with the axe, and the beanstalk was cut in two and began to topple over. Then the ogre fell down and broke his crown, and the beanstalk came toppling after.

Jack showed his mother his golden harp that had once belonged to his father, and with playing the harp and selling the golden eggs, Jack and his mother became very rich, and they lived happy ever after.

Jack needs to reclaim the riches that the giant stole from his family.

The giant’s wife will help him, but they need to communicate in secret code so the giant will not know.

You will create an instrument that can be used to play three different combinations of sounds that they can use instead of talking.

• Giant is awake

• Giant is asleep

• Hide- the giant is coming your way.

Secret Code Sounds:

Each code must contain at least 2 notes.

1. Giant is **awake**
2. Giant is **asleep**
3. **Hide**- the giant is coming your way.

Dear Students,

Jack is in search of instruments to play secret code music on. These instruments must:

1. Create a vibration which will produce a sound.
2. Be made using items commonly found in recycle bins and in classrooms.
3. Each group of 4 must produce at least 3 different pitches.
4. You must be able to change the amplitude by playing the instrument in different ways.
5. You must create and play the 3 secret codes.

All proposals must be submitted as models.

Have a musical day,

Jack

SC.4.P.10.3 Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.



***Engineering Zone***

**Challenge:** Make an instrument that the ogre’s wife can play to tell Jack the following things by playing only one note:

• Giant is awake

• Giant is asleep

• Hide- the giant is coming your way.

**Materials:** Rubber bands of various sizes, Recycled containers. Various makerspace materials

**Submission of Request for Proposals:** Submit your blueprint, model, and code key telling what each pitch means.

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| Gingerbread Man SC.1.P.8.1  StEm Lesson | Grade Level: 1 | |
| **Lesson Objective:** Students will determine which objects sink and which float. They will create a raft for the Gingerbread Man to cross the river and escape the hungry fox. | **Benchmark Standard:** SC.1.P.8.1  Sort objects by observable properties, such ~~as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and~~ whether objects **sink or float**. | |
| **Essential Question:**  Do size or weight effect a materials ability to sink or float? (No) | **Vocabulary:**  Sink  Float | **Vocabulary Activities:**  Acting out words |
| **Preparation Directions:**  Prepare tubs of water for testing items. Have a variety of materials available for students to test for sink/float and build rafts with.  Make gingerbread men from hardening clay and let them dry several days in advance.  **Engage:**  Tell or read the story of the Gingerbread Man.  **Procedures:**  Ask students if the Gingerbread Man could have escaped if he had a boat or raft. Tell students to build a raft for the gingerbread man to escape. They will need to test the materials to find out what sinks and what floats.   1. BRAINSTORM: Students should look at the available materials and discuss which to use. They can test to find out if materials float or sink. 2. PLAN/DESIGN: design a blueprint of a raft made from materials that float. 3. BUILD: Students build their rafts 4. TEST: Students place rafts in water with gingerbread man aboard and test. 5. COLLECT AND ANALYZE DATA: Students draw rafts in their notebooks and label. They should write and draw what the raft did. Did it work or does it need to be improved? 6. REFLECT/IMPROVE: Students improve their rafts using the data they collected and information they learned from seeing other groups test their rafts. 7. EVALUATE/JUSTIFY: Discuss as a class, which raft would be the best raft for the Gingerbread Man and why? | **Materials:**  Maker Space with a variety of materials  A tub, sink, or plastic box of water.  A model of a gingerbread man. (This can be made from hardening clay)  **Sample Questions:**  Do big things float?  Do small things float?  Can a heavy thing float?  Can a light thing float?  (Repeat with sink instead of float)  Students should understand the properties of sink and float are **not** connected to the properties of size or weight. | |
| **Assessment:**  Students can sort a set of materials based on whether they sink or float. | |
| **Additional Resources:** Gingerbread Man story on YouTube  [**https://www.youtube.com/watch?v=P789cpZoxlU**](https://www.youtube.com/watch?v=P789cpZoxlU) | | |

SC.1.P.8.1 Sort objects by observable properties, such as ~~size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and~~ **whether objects sink or float.**



***Engineering Zone***

**1**

**Challenge**: Test Makerspace materials and sort them by sink and float. Build a raft for the gingerbread man to escape.

**Materials**: Maker Space with a variety of materials

A tub, sink, or plastic box of water.

A model of a gingerbread man. (This can be made from hardening clay)

**Submission of Request for Proposals:** Show that your raft can carry the Gingerbread Man and float on water.

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| Gingerbread Man SC.1.E.6.2  StEm Lesson | Grade Level: 1 | |
| **Lesson Objective:**  Help the Gingerbread Man be safe near water and while on his boat. | **Benchmark Standard:** SC.1.E.6.2  Describe ~~the need for water and~~ how to be safe around water. | |
| **Essential Question**: How can we be safe when near or in water? | **Vocabulary:**  Safety  Drowning  Life vest  Float  Sink | **Vocabulary Activities:**  Acting out words |
| **Preparation Directions:**  Prepare tubs of water for testing items. Have a variety of materials available for students to test for sink/float and build life vests with.  Make gingerbread men from hardening clay and let them dry several days in advance.  **Engage:**  Tell or read the story of the Gingerbread Man.  **Procedures:**  Tell students that the Gingerbread Man has a raft is going to use it to cross the river and escape. Gingerbread Man does not know how to swim. How can he cross safely?  Discuss water safety rules that Gingerbread Man should follow.  Tell students that he should also have a life vest on whenever he is on a boat.  Instruct students to use materials that float to construct a life vest for the Gingerbread Man. Have students test their life vests to see if they will keep him afloat.   1. BRAINSTORM: Students should look at the available materials and discuss which to use. They can test to find out if materials float or sink. 2. PLAN/DESIGN: design a blueprint of a life vest made from materials that float. 3. BUILD: Students build their life vests 4. TEST: Students place life vests in water with gingerbread man. 5. COLLECT AND ANALYZE DATA: Students draw in their notebooks and label. They should write and draw what the life vest did. Did it work or does it need to be improved? 6. REFLECT/IMPROVE: Students improve their life vests using the data they collected and information they learned from seeing other groups test their rafts. 7. EVALUATE/JUSTIFY: Discuss as a class, which raft would be the best life vest for the Gingerbread Man and why? | **Materials:**  Maker Space with a variety of materials  A tub, sink, or plastic box of water.  A model of a gingerbread man. (This can be made from clay)  **Science Tools:**  **Sample Questions:**  Gingerbread Man does not know how to swim. How can he cross safely? | |
| **Assessment:**  **Students should be able to explain the following safety rules:**   1. Learn to swim 2. Swim near a lifeguard 3. Never swim alone 4. Always stay near an adult, even when lifeguards are present 5. If you are in trouble, call or wave for help 6. Follow regulations and lifeguard directions | |
| **Additional Resources:** [**http://lacoast.gov/new/Data/Ed/Coloring/water\_safety.pdf**](http://lacoast.gov/new/Data/Ed/Coloring/water_safety.pdf) | | |



SC.1.E.6.2

Describe ~~the need for water and~~ how to be safe around water.

***Engineering Zone***

1

**Challenge:** Test Makerspace materials and sort them by sink and float.

Use materials that float to construct a life vest for the Gingerbread Man

**Materials:** Maker Space with a variety of materials

A tub, sink, or plastic box of water.

**Submission of Request for Proposals:** A blueprint and a prototype of your life jacket should be submitted. Prototypes will be tested.

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| Frozen  StEm Lesson | Grade Level: 3 and 4 | |
| **Lesson Objective:**  Students will create a device to help slow the melting of the snowman. | **Benchmark Standard:** SC.3.P.9.1  Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.  SC.4.P.11.2 Identify common materials that conduct heat well or poorly. | |
| **Essential Question:**  3rd- How does heating and cooling cause water to change states?  4th- Which materials provide the best insulation to protect the snowman from heat? | **Vocabulary:**  Freezing  Melting  Heat  Solid  Liquid  Model  Data table  (Grade 4) Insulator, conductor | **Vocabulary Activities:**  Acting out words  Use words in explanation |
| **Preparation Directions:**  **Engage:**  Song and video from movie Frozen “In Summer” <https://www.youtube.com/watch?v=UFatVn1hP3o>  **Procedures:**  Explain that when summer comes Olaf will have to be transported to the north pole where it remains cold all year. An insulated container that will keep the heat out to prevent him from melting before he gets there is needed.  Students will make models of snowman containers and use ice cubes to test their effectiveness. A thermometer can be used to check the temperature rather than opening the container and letting heat in.  Once containers are built and ice is placed inside have students record the temperature every 20 or 30 minutes.  Tip: Start recording temperatures in the morning and check throughout the day. Record temperatures in a data table.   1. BRAINSTORM: Students should look at the available materials and discuss which to use. 2. PLAN/DESIGN: design a blueprint of a container. 3. BUILD: Students build their containers 4. TEST: Students test their containers with ice inside. 5. COLLECT AND ANALYZE DATA: Students draw containers in their notebooks and label. Students should record the temperature on a data table every 10 minutes for an hour. They should write and draw what the container did. Did it work or does it need to be improved? 6. REFLECT/IMPROVE: Students improve their containers using the data they collected and information they learned from seeing other groups test their containers. 7. EVALUATE/JUSTIFY: Discuss as a class, which container would be the best container for the Snowman and why? | **Materials:**  Maker Space with a variety of materials  Ice cubes  **Science Tools:**  Thermometer  **Sample Questions:**  3rd- Which materials prevented the heat from getting to the ice cube the best?  4th- Which materials insulated the ice cube the best?  How could you improve your design?  What would happen to the snowman in the summer? | |
| **Assessment:**  Explain to Olaf what happens to frozen things in summer. Convince him that he should get into the container to be transported to a colder climate. Use the following words in your explanation:  Freeze  Melt  Heat  Solid  Liquid  Grade 4- Insulator | |
| **Extension –** Place identical ice cubes on flat surfaces made of different materials including wood, metal, Styrofoam. Watch to see which ice cubes melt faster and slower. Discuss: Conductors pull in heat from the air and cause ice to warm more quickly. Insulators keep heat out better. | | |

SC.3.P.9.1 Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.

SC.4.P.11.2 Identify common materials that conduct heat well or poorly.



***Engineering Zone***

**3, 4**

**Challenge:** Create an insulated container that will keep the heat out to prevent Olaf from melting whe summer comes.

**Materials:** Maker Space with a variety of materials

**Submission of Request for Proposals:** Submit a labeled blueprint for your container, your model, and the temperature data that shows how long it kept and ice cube frozen.

SC.1.P.12.1 Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.

SC.1.P.13.1 Demonstrate that the way to change the motion of an object is by applying a push or a pull.

***Engineering Zone***



1

**Challenge:**

Make a toy that you can push or pull. Make it go fast. Make it go slow. Make it move in a straight line, zigzag, ,back-and-forth, or around and around.

**Materials:**

Use the materials in your maker box.

**Submission of Request for Proposal:**

Create a toy and show the class how it can move fast and how it can move slow. Show and tell us whether it is moved by a push or a pull. Show and tell how it can move fast and how it can move slow. Show and tell it move in a straight line, zigzag, ,back-and-forth, or around and around.

SC.2.P.13.2 Demonstrate that magnets can be used to make some things move without touching them.

***Engineering Zone***



2

**Challenge:**

Make a magnetic vehicle that can be pushed or pulled by a magnet.

**Materials:**

Use the materials in your Makerspace.

**Submission of Request for Proposal:**

Create a toy and show the class how it can be pushed or pulled by a magnet.

***Engineering Zone***

SC.2.P.13.1 Investigate the effect of applying various pushes and pulls on different objects.

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.



2, 3

**Challenge:**

Create a vehicle that can be powered by air.

**Materials:**

Use the materials in your maker space.

**Submission of Request for Proposal:**

Create a toy that can moved using air. Show and tell how air moves your vehicle.



SC.4.P.12.2 Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects move at different speeds.

***Engineering Zone***

4

**Challenge:**

Create a toy that can travel down a ramp powered by gravity. Test each toy one at a time and compare the speed of each by comparing the time it takes to travel a specified distance

.**Materials:**

Use the materials in your maker space.

**Submission of Request for Proposal:**

Create a toy that can travel down a ramp powered by gravity. Test each toy one at a time and compare the speed of each by comparing the time it takes to travel a specified distance.

SC.5.P.13.2 Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. Content Complexity: Level 2: Basic Application of Skills & Concepts

SC.5.P.13.1Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. Content Complexity: Level

SC.5.P.13.3 Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.



***Engineering Zone***

5

**Challenge:**

Create a vehicle that can travel down a ramp powered by gravity. Test each vehicle one at a time and compare the speed of each by comparing the time it takes to travel a specified distance. Investigate how adding weight to the vehicle effects its speed.

**Materials:**

Use the materials in your maker space.

**Submission of Request for Proposal:**

Create a vehicle that can travel down a ramp powered by gravity. Test each vehicle one at a time and compare the speed of each by comparing the time it takes to travel a specified distance. Collect data and use it to explain how weight affects the speed at which vehicles travel.

***Engineering Zone***



**Challenge:** Make a birdfeeder that will attract local birds so that we can see and observe them through our classroom windows.

**Materials:** Use recycled containers as the main structure. Any materials from the makerspace may be used for parts such as perches and hangers. Feeders must be safe for birds to use.

**Submission of Request for Proposals:** All proposals must be submitted as working models. Birds must be able to land on the feeder and eat from it. The feeder must be able to be hung in a tree.

***Tip****: Know what type of feet the birds you want to attract have so that you can design a landing that the birds can hold onto.*