AccelerateLEARNING
THE LEADER in STEM EDUCATION

STEM
Hands-On Winter Activity Pack

Keep the learning going during the winter break

Don't let learning FREEZE!

Teachers, we get it – the days leading up to winter break are a whirlwind! Don't worry — we have you covered! We gathered a collection of engaging, hands-on activities perfect for the days leading up to winter break and throughout the holiday season.

Within this compilation, you'll discover a treasure trove of captivating activities and lessons handpicked from our diverse array of subjects—Early Childhood Education, Science, Math, Engineering, and Coding.

What's more, these activities can easily be enjoyed in the classroom or at home, using materials readily available in your household. Keep students immersed in STEM even during the holidays by completing these hands-on activities with friends and relatives!

So, let's make these moments leading up to and during the winter break an exciting journey of exploration and discovery.

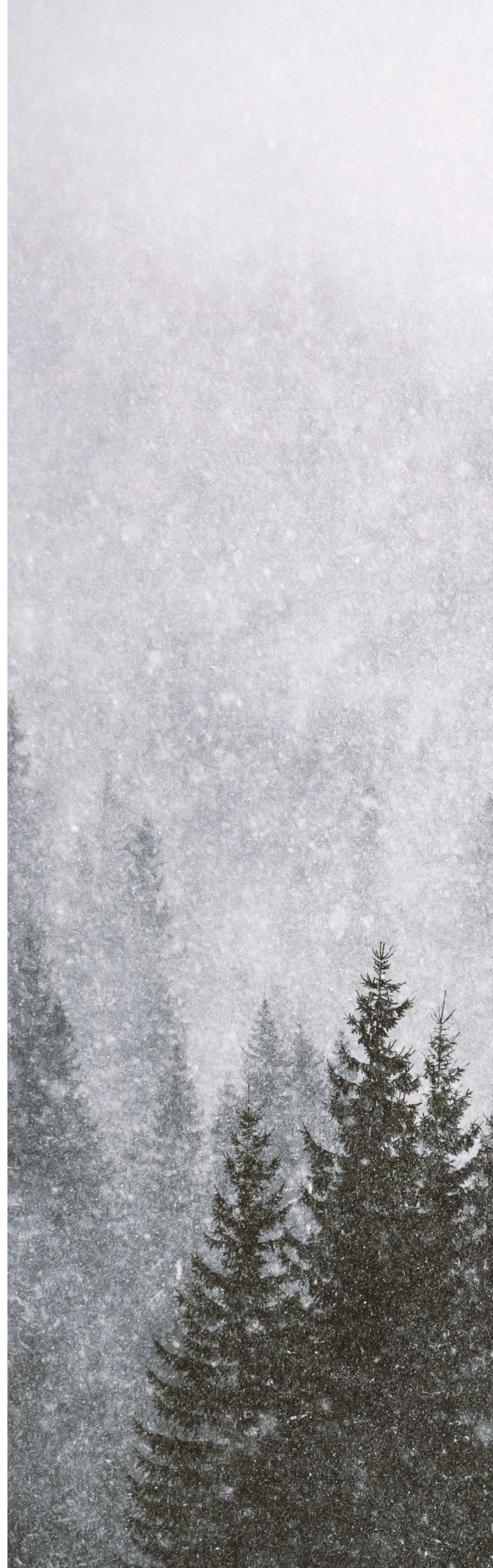
Happy Holidays!

Accelerate Learning

STEAM

EARLY CHILDHOOD EDUCATION

Climbing The Holiday Tree



Activity Summary

Build a ladder out of simple supplies so that Hoseli can climb up the tree.

Introduce your youngest learners to problem-solving, critical thinking, and engineering with this hands-on project from Kide Science!

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30 min lesson
1 activity included.

Easy Preparation
Preparation time is based on availability of supplies and setup time.

For 3-8 year olds
Beginner: Ages 3-4 **Standard:** Ages 4-6 **Advanced:** Ages 6-8
Tweak this lesson for age & ability with the "Adapt this Activity" section.

Starting The Lesson

Circle Time – Read the letter from Hoseli to introduce the story and then complete the experiment!

Circle Time

A letter from Hoseli the Robot arrives from Supraland.

In this lesson they are building a structure out of toothpicks and peas to help Hosli climb a Christmas tree.

Hello, investigators!
I'm Hoseli the Robot and I live in Supraland.

Something terrible has happened here.
The star has fallen down from the top of the Christmas tree!

I need to try and get it back on top but I don't know how.
I cannot reach!

Can you become investigators and help me find a way to climb back up?

Twinkly greetings,
Hoseli the Robot

Experiment

Climbing the Holiday Tree: How can I build a strong ladder?

Key concepts
engineering, building, maths, geometrical shapes, triangle, square

Aims during this experiment
- Practice engineering by building a complex structure
- Practice observation and interpretation by thinking: how to make the structure stable?
- Practice observing the geometrical shapes

Supplies
- Toothpicks
- Dried peas soaked in water overnight (or modeling clay)
- Hoseli paper dolls (printouts)

How to do the experiment

After reading the story say:

"Hoseli needs our help to climb back up the Christmas tree. Let's see what we could use to help him."

1. **Observe** the supplies: What shape are they? How do they feel? What colors do you see?

“How could we use these supplies to get Hoseli up the tall tree?

2. Encourage the scientists to **communicate** their ideas.
3. Start building! Support by asking questions:
   - How can we make the structure stable enough so that our friend won’t fall?
   - What should we do to help Hoseli climb higher using this structure?
4. Make **observations**: What kind of shapes can be found in the structure?
5. Admire and enjoy the many different structures!
6. Take Hoseli-paper dolls and help Hoseli climb up the tree. Encourage the scientists to show each other how Hoseli could climb up using their structure.

“Did he manage?! Wonderful!”

Experiment - continued

Scientific explanation

Building and engineering are great skills that combine your imagination and mathematical thinking. The higher the structures you build, the more the shapes matter in keeping the structure sturdy.

Triangles (a shape with three corners) are the strongest shape, and you might see these shapes in many great structures, such as bridges and towers. Other shapes you might have created in your structure are squares (with four corners), and other polygons, such as pentagons (with five corners).

Adapt the Lesson

Beginner

Help to push the toothpicks into the peas: this can be tricky for little fingers.

It is ok if these scientists don't make a standing structure: as long as they build with a purpose in mind.

Standard

Model how to make a base shape so that the structure can stand up: e.g. a square or triangle.

Develop the scientists' creativity: their structure can have whatever features imaginable!

Advanced

Challenge the scientists to combine their structures with a partner's.

What 3D shapes have they been able to create? Which 3D shapes are stronger than others?

Circle time: Reporting our findings

Gather together in a circle and **report** to Hoseli:

- Show him your structures, or take pictures of them.
- How did you get your structure to balance?
- Which was the hardest part?

My notes:

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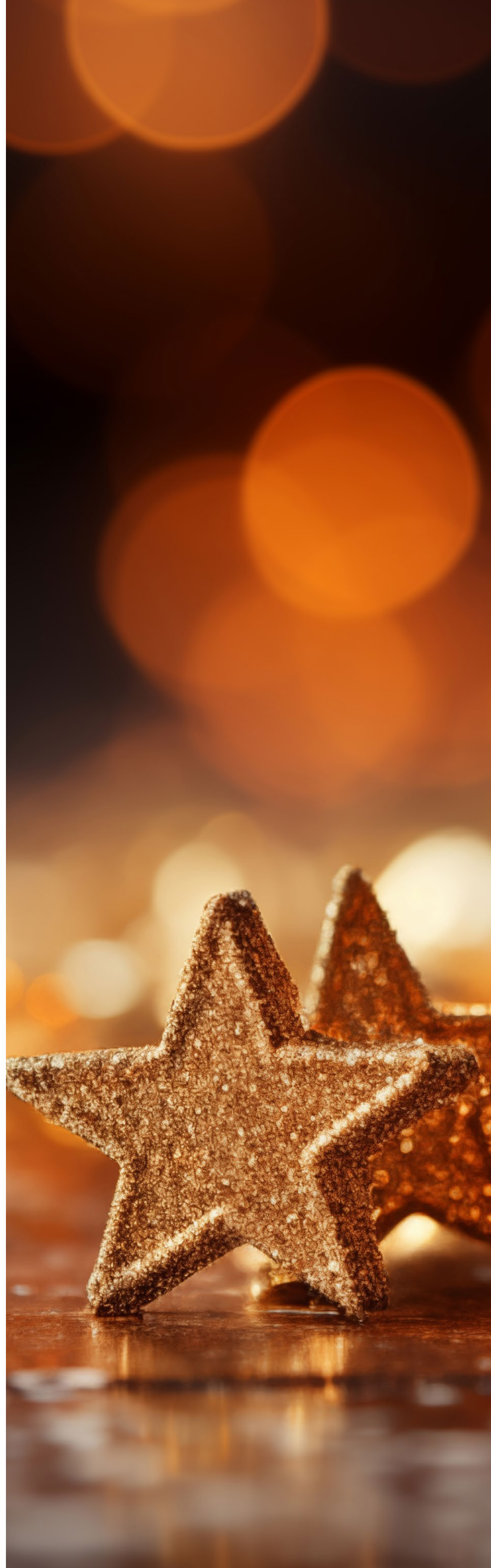
STEAM

EARLY CHILDHOOD EDUCATION

Hoesli's Holiday: A Fallen Star



Activity Summary

In this story, Hoseli discovers that the star has fallen off his holiday tree. It is all crumpled! Can your investigators help the star unfold on its own?

Introduce your youngest learners to problem-solving, critical thinking, and engineering with this hands-on project from Kide Science!

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20 min lesson
1 activity included.

Easy Preparation
Preparation time is based on availability of supplies and setup time.

For 3-8 year olds
Beginner: Ages 3-4 **Standard:** Ages 4-6 **Advanced:** Ages 6-8
Tweak this lesson for age & ability with the "Adapt this Activity" section.

Starting The Lesson

Circle Time – Read the letter from Hoseli to introduce the story and then complete the experiment!

Happy Holidays Dear Scientists!

Something terrible has happened. The star has fallen from my holiday tree!

It’s crumpled up and doesn’t look like a star anymore!
The corners are all pointing into the middle. The poor shape is hurt.

Normally I go to bed when I feel unwell. But I don’t know where a star would go to bed.

Where could it go to feel better? Could it be somewhere cold? Somewhere warm? Somewhere soft or even somewhere wet?

I need your help to make the star feel better and get back into its normal shape.

Can you help?

Seasons Greetings,

Hoseli

Hoseli’s Holidays: A Fallen Star

The objective is to practice science process skills.

Aims during the lesson:

- **Observation** of how paper changes its form in water.
- **Interpretation** of why this happens.
- **Observation:** for the features of a 2D shape of a star.
- Be **creative** and craft a magical Holiday star

Key concepts:

- Seasonal Holiday
- Star shape
- Capillary action

Oh Scientist friends, oh goodness me,
I had such a problem with the holiday tree.

The star was missing, where had it gone?
then I saw it had fallen, it looked so wrong!

Its points were all crumpled, it had parts that were sore,
Oh no, can I use it on the tree any more?

I thought really hard and I scratched my head,
What should I do? Should I put it in bed?

Entering the Science Adventure

Step into your roles as scientists and put on the role marks. Tell the story of Supraland and move to circle time.

The mystery arrives:

Hoseli discovers that the star has fallen off his Holiday Tree: it is all crumpled. The Scientists need to test different ways to get the star to unfold on its own.

My notes:

Experiment: A Fallen Star

Phase 1: Making the Star

"A star has fallen from Hoseli's Holiday tree. Now his star looks so crumpled. But what does a star look like normally?"

1. **Observe and discuss** the shape of a star: how many points does it have?
2. Work with the scientists to create their own stars:
   - Draw the star outline using a stencil or the printable template provided
   - Color the star.
   - Cut it out.
3. "But Hoseli's star was crumpled and hurt." Model how to fold each of the star's points inwards so it is all folded up. Encourage the scientists to do this with their own stars.

Phase 2: Testing the stars 'beds'

"Hoseli needs our help to find the right place for the star to rest. Where could we try to put the star so that it gets back to its normal shape?"

4. **Discuss** the scientists' ideas. What different environments might they suggest?
5. Try and find a place that's
   - cold
   - soft
   - something else that the scientists might suggest.

Try out what happens to the folded star when you place it to these places to rest.

For each new environment make a **prediction** about what might happen to the star.

My notes:

Phase 3: The Star's Water Bed

"Hoseli was also wondering if somewhere wet would help. How could we test it?"

1. **Measure** out enough water to fill the bottom of a plate so that it is 1 fingertip deep (1 cm)

2. Place the folded star onto the surface of the wate, points on top. **Observe** how it changes.

3. **Infer** why it is happening; the water is spreading through the paper as it is absorbed.

4. Celebrate fixing Hoseli's star: making it feel better. Sprinkle some glitter across the top.

5. **Conclude:** What should Hoseli do to make his star better?

6. This task could be repeated again and again, perhaps changing the size of the star or **measuring** the time it takes for each star to open.

Scientific explanation for the adult:

If you were to look at the paper very closely with a microscope, you would see that there are tiny tubes inside it. As the star sits on top of the water, the water travels through these tubes and therefore spreads through the paper. It is absorbing. As the paper becomes fuller, the water pushes beyond the folds and opens out the stars' points.

Mystery solved! Reporting to Supraland:

Gather together in a circle and contact Supraland by using energy hands.

Report to Hoseli:
- What happened to the star in each different environment?
- Which environment was the best place for the star to rest?
- What happened to the star as it rested on the water?

My notes:

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Remember how you helped me solve the mystery last time?

Oh Scientist friends, oh goodness me,
I had such a problem with the holiday tree.

The star was missing, where had it gone?
then I saw it had fallen, it looked so wrong!

Its points were all crumpled, it had parts that were sore,
Oh no, can I use it on the tree any more?

I thought really hard and I scratched my head,
What should I do? Should I put it in bed?

We tried lots of places, tested where could be best....
soon realising water was where it could rest.

Out came the corners, oh how bizarre,
who knew that water could fix a star?

Thank you dear friends.

Hoseli

A Folded Surprise

At the last lesson:

- We helped Hoseli with his fallen star.
- We observed how paper changes its form in water.

You will need:

- A large piece of paper. Minimum 20 x 20 cm / 8 x 8 inches
- Colouring items (markers, crayons etc)
- Scissors
- Something small and waterproof e.g a small wrapped candy
- A plate with water, at least 2cm deep.

1. Create the star:
   - draw a large star on the piece of paper
   - colour in the star to make it really special
   - cut it out.

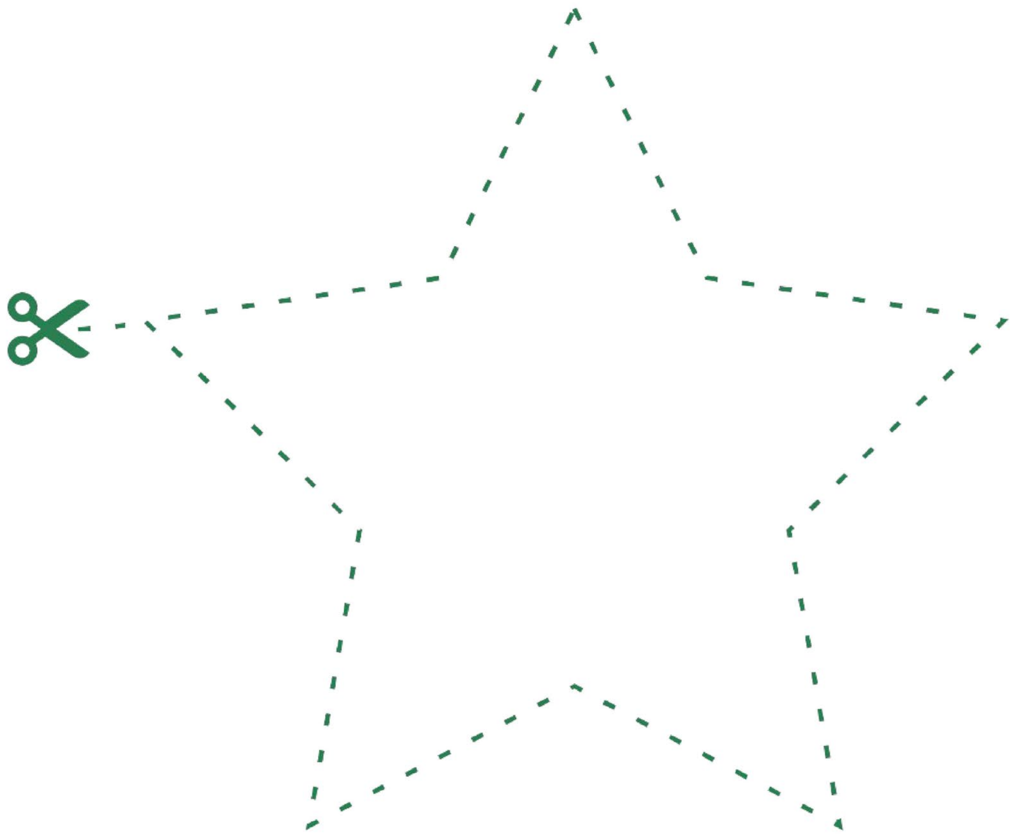
2. Fold each point of the star into the middle so that their corners touch, or slightly overlap.

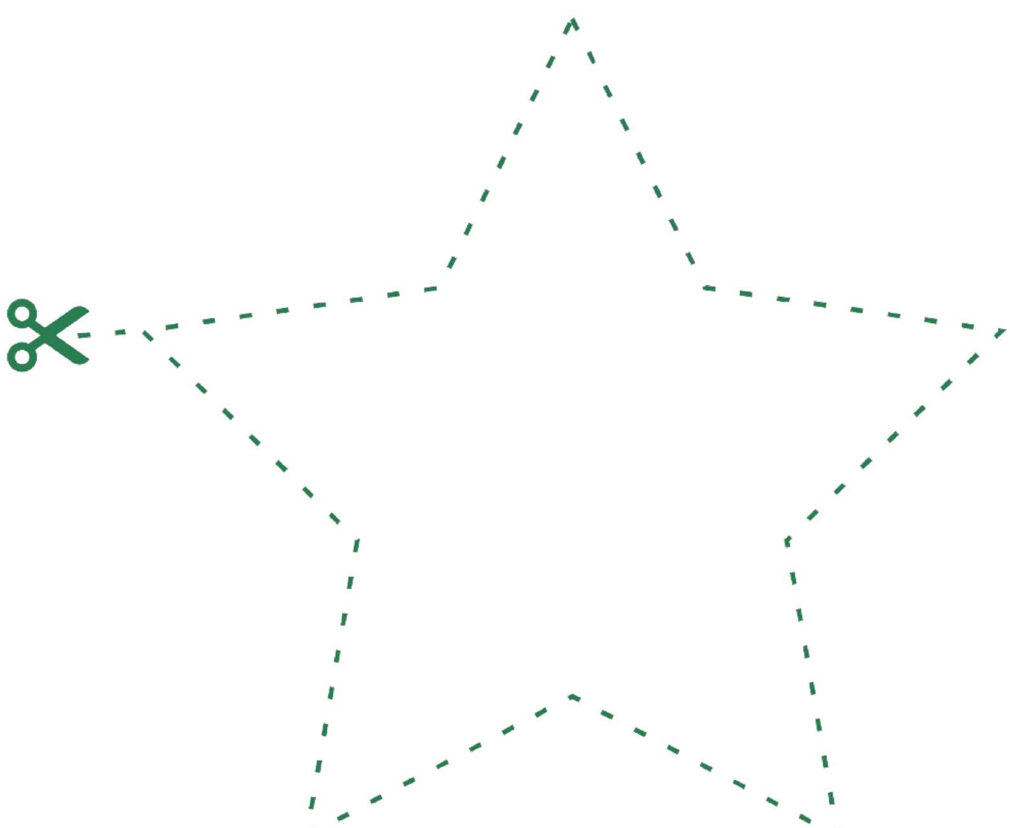
3. Open back out the points and now place a surprise gift into the middle of the star. Fold back over the star's points so that they hide the gift inside.

4. **Measure** out the water into the plate.

5. **Predict** what will happen when the star is placed on the water.

6. Call over a family member who you would like to surprise with the gift. Place the star on the water and **observe** their amazement as the star changes!





SCIENCE
ELEMENTARY

Making (and Melting) Snow Activity

Let it snow… inside! Enjoy the magic of a snowy season without the freezing temperatures. Using common household items, you will make your own snow to sculpt, learn from, and eventually let melt away. Explore the fun side of chemistry through this snowy activity.

Warning: this activity is a lot of messy fun!

For this activity you will need:

- Large plastic or glass container
- One-cup measuring cup
- Baking soda
- One tablespoon
- Vinegar

Steps:

1. Scoop one cup of baking soda into the container. Add three tablespoons of water and mix the ingredients together to make a dough. (The dough should feel like molding clay. If it's crumbling, add small amounts of water until you get the right consistency.)
2. Mold a snowman or other snow sculpture.
3. Pour the measuring cup full of vinegar over the snowman and watch what happens!

Outcomes/post-activity discussion:

1. What did the dough feel like?
2. What did the dough feel like after adding water?
3. What happened when the vinegar was poured over the snowman?

SCIENCE

ELEMENTARY I GRADE 2/3

Melting Ice Activity

Now that you've made snow, let's take the concept of water melting a step further and view it through the lens of Earth science. In this activity, students will create a model to show why water forms where it does and observe the effect of melting ice and moving water.

For this activity you will need:

- 1 Large aluminum tray (per group)
- 1 Medium-sized bowl (per group)
- 1 Globe or world map (per group)
- 1 Meter of aluminum foil (cut 1 meter per group)
- 1 Ice cube (per group)
- Water
- Paper towels

Steps:

1. Discuss with students how scientists use models to describe real-world events. Tell them that today they will create a model that shows the formation and location of different bodies of water.
2. As students work through the activity, look for teachable moments to introduce students to the following vocabulary terms. Try to point out examples of the terms as students are working so that they can connect the meaning of the word with their experiences. Encourage students to use the following words as they record and discuss their findings.
    a. Form: the shape or nature of something
    b. Water: a liquid that all living things need to survive
    c. Ice: frozen water
    d. Lake: fresh water surrounded by land
    e. Liquid: material that can flow and drip
    f. Ocean: a large body of water that is salty
    g. Pond: a small body of water with land all around it
    h. River: a body of freshwater that flows continuously toward the ocean
    i. Solid: something that has definite shape, such as a table or chairs
3. Inside the tray, students should place the bowl upside down at one end.
4. Students should shape and crinkle the foil so that it completely covers the bowl and forms a mountain with a small space on top to hold the ice cube.
5. Students should then place an ice cube on top of the mountain and observe, checking every 5 minutes until it starts to melt, then observe continuously until it is fully melted.
6. Students should draw and label their observations.

Questions to discuss with your student(s):

- What state of matter is the ice?
- What is happening to the ice?
- What state of water is the ice becoming?
- What landform does the bowl and foil represent?
- What happened to the water as it melted?
- Where did it go?
- What body of water is always flowing?
- Where does the river end?
- Which is higher up: the river or the lake (ocean)?
- How are rivers, lakes, and oceans similar and different?

Why this is important:

From rivers and lakes to oceans and glaciers, water is all around us. In fact, about three-fourths of Earth is covered in water! Learning about water in all its various forms helps students build a foundation to better understand more complex concepts like the water cycle, ecosystems, habitats, weather, and climate.

SCIENCE

ELEMENTARY I GRADE 4/5

Melting Different Materials Activity

Building off the previous activties with melting snowman and ice, this activity allows students to take their observations and hypotheses and apply it to this investigation. Here, students will melt different materials and determine whether or not a change in the physical state of matter changes the matter's total weight.

For this activity you will need:

- 1 Hot plate (per group)
- 1 Triple beam balance (per group)
- 4 4-inch aluminum pie pans (per group)
- 2 Oven mitts (per group)
- 1 Pair of goggles (per student)
- 2 Gummy candies (per group)
- 1 tbsp Shortening (per group)
- 1 small square of baker's chocolate (per group) (Baker's chocolate works the best for the activity. Other chocolate can be substituted but may not melt completely.)
- 1 tbsp Butter (per group)

Preparation:

As students work through the activity, look for teachable moments to introduce students to the following vocabulary terms. Try to point out examples of the terms as students are working so that they can connect the meaning of the word with their experiences. Encourage students to use the following words as they record and discuss their findings.

- Conserved: saved or used sparingly
- Substance: a particular type of matter with specific properties
- Matter: anything that has mass and takes up space
- Properties: physical or chemical characteristics of matter used to identify or describe a substance
- Weight: the heaviness of an object; force of gravity on mass = weight
- Conservation of matter: the principle that matter cannot be created or destroyed
- Chemical reaction: a property or characteristic of a substance that is observed or measured during a reaction in which the chemical composition or identity of the substance is changed

Safety:

Proper precautions must be adhered to when dealing with anything that might cause a burn.

Steps:

1. Give students the following instructions:
    a. Select a material, place it on an aluminum pan, and measure the weight using a triple beam balance. Record this data.

       Remember that students should not be expected to differentiate between mass and weight at this level. Some materials may not melt completely; however, the main point should be that the amount remains the same after the change happens.
    b. Set the hotplate on low so the materials melt without burning. Place the pie pan with the material in it on a hot plate, and let the substance melt. Be sure to wear goggles when heating a material on a hot plate.
    c. After the material has melted, use oven mitts (or the teacher's assistance) to transport the pan from the hot plate to the triple beam balance.

       Caution must be taken to remove the pan from the heat source as soon as the substance begins to melt. Melting will continue even after removal from the heat source, because the pan will still be hot. Excessive exposure to the heat source will cause burning and a loss of material.
    d. Measure the material's weight on the triple beam balance again. Record this data.
    e. Repeat the previous steps for each material (gummy candy, shortening, chocolate, and butter).
    f. Be sure to turn off the hot plate as soon as your group is done heating all materials.
2. Have students record their observations and measurements. Students should always record the results they get. Variables are always possible and good scientists do multiple tests. This brings up a great time to have a discussion about what could have been different about variations in their results.
3. Have students place the pie pan with melted materials aside (off the hot plate) and allow time for the materials to become solid again. This part can be completed the following day or when all materials have had time to cool.
4. Once all the materials have returned to a solid state, students should place each aluminum pan on the triple beam balance to measure the weight.
5. Have students record the weight along with their observations and measurements.

Questions to discuss with your student(s):

- What happened when we added heat to each substance?
- How did the weight before melting the substance compare with the weight after melting the substance?
- Why do you think the weight was the same after the substance melted?
- Why did the material turn back into a solid?
- Did the weight change?
- Discuss other examples of scale, proportion, and quantity that the students have previously explored.

Why this is important:

Changes in matter occur often in our everyday lives, whether that's an ice cube melting, a burning candle, or boiling chicken broth. Identifying these changes can help promote student inquiry and critical thinking toward other phenomena around them. This activity also provides a foundation for the Law of Conservation of Mass, which students will learn in the years ahead.

SCIENCE
MIDDLE SCHOOL

The Power of Water and Wind

Though Spring is far away, it's never too soon to learn about the immense power of water (or even melting snow!) and wind. In this activity, students will use stream tables to model the weathering and erosional effects of flowing water and wind over landforms.

For this activity you will need:

- Sand, approximately 720 g (per group)
- 1 Paint tray/stream table (per group)
- 1 Container, 2 L (per group)
- 1 Beaker, 500 mL (per group)
- 1 Bucket (per group)
- 1 Cup, 8 oz (per group)
- 1 Safety goggles (per student)
- Water, 2 L (per group)
- 6 Paper towels (per group)
- 1 Index card, 3" x 5" (per group)

Steps:

1. Set up each station with the following materials: a paint tray with sand, a container filled with water, a cup, and a bucket.
2. Begin class with the following questions for discussion:
    a. What are landforms?
    b. What effect do you think flowing water has on landforms?
    c. How do you think we could investigate to determine if our ideas are correct?
3. Set up your stream table as a model and show students how to pour the water gently and slowly at the top. Show them how to remove the water in the depression with their cup and put it in the bucket.
4. Guide/Monitor students through PART I and PART II of the activity.

Steps continued:

PART I

1. Place your stream table on a flat surface. You may want to put newspaper down to help with any leaks or splashes that may occur. The top incline of the paint tray will represent the land, and the depression in the bottom will represent the ocean.
2. Place a large bucket or container near the “ocean” end of the paint tray. Use a cup to carefully remove water from the ocean as it fills during the activity and pour it into the bucket.
3. Pour sand evenly onto the “land” end of the paint tray. Try not to let the sand flow into the depression at the bottom. You may need to drip water on the sand to moisten it a little so it sticks and holds together.
4. Smooth out the sand in the stream table. This is the landform. With your finger, draw a riverbed straight down the surface of the sand to the depression at the bottom.
5. Gently wave the index card above the sand and note what happens. Make sure you are wearing your goggles for this section. Draw your results.
6. Move the sand back in place and carefully fill a beaker with 300 mL of water. Gently and slowly pour the water into the riverbed channel in the sand at the top inclined part of the paint tray.
7. Repeat with another 300 mL, and then another 300 mL, pouring the water a little faster than the previous time. Remove water as needed from the “ocean” and place in the bucket.
8. Observe, draw a picture, and record what happens.
9. Repeat steps 6 and 7, but this time, make a curved riverbed in the sand. Use your finger to form a curved riverbed (curves back and forth) in the sand from the top of the slope to the bottom.
10. Observe, draw a picture, and record what happens.

PART II

1. After step 9 in Part I, allow some of the water to remain in the “ocean.”
2. Use an index card to gently cause waves to form in the “ocean” and crash onto the beach (landform).
3. Repeat, moving the index card a little more vigorously, but do not allow water to splash up over the sides of the paint tray.
4. Observe, draw a picture, and record what happened.

Questions to discuss with your student(s):

- What happened when you blew (created wind) the soil?
- What other landforms do you think could be caused by soil (sand) being moved by wind?
- What differences did you see in the stream table between the straight river and the curved river?
- What happened to the beach when the ocean waves crashed onto it?
- Which caused more erosion: small waves or larger waves?
- What does this tell you about erosion during storms that bring high waves?
- Why did we use a model instead of making real-world observations?
- What other landforms do you think have been created with moving water?
- In your river model, sediment was carried downstream by the water. What is sediment?
- When does sediment deposition occur?

Why this is important:

Erosion is considered to be one of nature's most influential forces with both beneficial and harmful effects on the environment. Aside from altering geographic landscapes and creating natural wonders such as the Grand Canyon, soil erosion can also transfer essential nutrients to aquatic ecosystems. On the other hand, erosion can also carry hazardous chemicals into the water supply or rid of nutrient dense topsoil that plants need to survive.

SCIENCE

MIDDLE SCHOOL

The Wonder of Potential and Kinetic Energy

One of the best ways to stay warm during the cold of winter is to keep your body moving. Jumping around or running in place is sure to get your blood flowing and keep you warm. In this activity, students will explore the wonder of potential and kinetic energy by completing a model of molecular kinetic energy transfer using airsoft BBs, a paper plate, and an empty plastic water bottle. Though it won't warm you up, this activity is a ton of fun and great experiment in understanding energy.

For this activity you will need:

- 1 Empty plastic water bottle with its label removed (per group)
- 24 Airsoft BBs (per group)
- 1 Paper plate (per group)

Steps:

1. Have the plates, bottles, and BBs set out so that groups can gather materials to get started.
2. Start the activity by explaining to students that they will be performing this modeling activity as a group, and have the groups gather their materials.
3. Groups should then equally split their BBs between the plate and the water bottle.
4. Have each group pick someone to hold the water bottle containing the BBs.
5. Instruct the students holding the bottles to start shaking up the BBs inside gently. All the students should observe the motion of the BBs within the water bottle compared to those on the plate. Discuss the definition of kinetic and potential energy at this point.
6. Have each group draw a picture of the bottle and BBS to show what they observe before heat transfer. They should label the matter in the bottle and "warmer temperature (more kinetic energy) and "cooler temperature (less kinetic energy).
7. Now instruct the students holding the water bottles to gently shake up the BBs again. They're going to then pour out BBs from the bottle onto the BBs on the plate. Instruct students to make sure they observe the modeling.

Steps continued:

8. Now have students draw a second illustration showing what they observe this time, during heat transfer. Remind them that we use arrows and labels in scientific illustrated models to show movement. Introduce heat and energy transfer at this time. Heat is the transfer of energy between objects of different temperatures. Energy transfer is the movement of energy from one system to another. Thermal energy, which is the energy of motion in particles, is being transferred.

9. Now instruct the students to place all of the BBs in the bottle and shake it again.

Questions to discuss with your student(s):

- If this activity is modeling matter, what could the BBs represent?
- What was different about the particles in the bottle versus the plate?
- If you were to take the temperature of the two samples, which one would be warmer?
- What was different after you shook the BBs the second time?
- Is the total amount of energy in the bottle different?
- What has more thermal energy, a pot of boiling water or a large iceberg? Discuss your answer and be prepared to answer while using your bottle and BBs to explain.

Why this is important:

Our world is full of diverse elements, mixtures, and compounds we call matter. And all matter is made of atoms or molecules that are affected by heat. Whether you're eating an ice cream sundae that's starting to melt or observing steam drifting out of a pot of boiling water, the impacts of heat and thermal energy are all around us. In turn, when we understand the properties and uses of heat, we better understand concepts like weather changes and climate, as well as how to more efficiently use and conserve heat and energy.

SCIENCE

MIDDLE SCHOOL

Holiday Bath Bomb Activity

You're supposed to relax over winter break, and you can easily do that by enjoying the nice fragrance of a bath bomb and the beautiful sight of a decorated tree. Have you ever wondered what causes a bath bomb to become so fizzy when it touches the water in the bathtub? Explore the chemistry behind how bath bombs are made and work through this artistic, creative activity.

For this activity you will need:

- 1 cup baking soda
- 1/2 cup citric acid
- 1/2 cup Epsom salts
- 1/2 cup cornstarch
- 3/4 tbsp. water
- 2 tsp. essential oil (lavender, eucalyptus, rose, orange, and lemongrass are great choices)
- 2 tbsp. oil (olive oil)
- A few drops of food coloring

Steps:

1. With the exception of the citric acid, mix the other dry ingredients in a large mixing bowl.
2. Pour the liquid ingredients into a jar with a top. Close the jar and shake.
3. Pour the liquid mixture into the bowl of dry ingredients.
4. Use your hands to mix and mold the ingredients.
5. At this point add the citric acid. There will be some fizzing.
6. Once the fizzing has stopped, place a ribbon or string in the upper middle half of your mold.
7. Snap close the mold and let dry overnight and keep or gift your new bath bomb!

Note: Sometimes it takes a few tries to get this experiment right. If your bath bomb is crumbling try again with more water in your mixture.

Outcomes/post-activity discussion:

1. What was the texture of the mixture like?
2. What happened when citric acid was added to the ingredients?
3. Have you ever seen a chemical reaction with baking soda before?
4. What do you think would happen if you opened up the bath bomb right after snapping it closed?
5. What happens to the mixture the longer you let it dry?

MATH

ELEMENTARY I GRADE 4

Compose and Decompose Unit Fractions

Explore Activity: Let's Try Some Pie!

Want to know about the most delicious way to learn about fractions? In this activity, students will compose and decompose fractions using unit fractions… and PIES! There's no better way to learn about fractions than with a slice of fresh, homemade pie.

For this activity you will need:

- 4 sandwich bags (for each pie)
- Print 1 of each of the Pie Pieces sheets (tip: laminate to reuse for future use)
- Print the Student Journal (1 per student)
- Print the Student Exit Ticket (1 per student)

Steps:

1. Print and cut out the pie pieces. Put one type of pie in each of the plastic sandwich bags.
2. There will be four serving stations, with a different type of pie at each station.
   - Serving Station 1: Cherry Pie
   - Serving Station 2: Pumpkin Pie
   - Serving Station 3: Apple Pie
   - Serving Station 4: Chocolate Pie
3. Prepare four areas of the room to be different serving stations.
4. Divide students into four groups.
5. Print a Student Journal and Exit Ticket for each student.

Click to access:

PIE PIECES

STUDENT JOURNAL ANSWER KEY

STUDENT JOURNAL

EXIT TICKET ANSWER KEY

EXIT TICKET

MATH CHAT

Procedure, facilitation points and answer key:

1. Divide students into four groups. Each student will need a copy of the Student Journal.
2. Read the following scenario:

   Ann's Bakery Shop is having a grand opening! They have baked several different pies and are handing out free samples at various serving stations. At each station, you will determine how many slices of each type of pie was handed out at the grand opening. You will use this information to see how much pie was given out.
3. Each group will start at a different serving station.
4. Give students about 10 minutes at each station before rotating.
5. When students begin, they will complete the following steps at each station:
   a. Read how many slices of pie were handed out at that station and pull that many slices of pie out of the bag.
   b. Determine how many slices make up a whole pie of that flavor in order to determine the denominator for the fractional part of each piece.
   c. Write a number sentence to show the sum of the fractional parts of each piece that was handed out.
   d. Assemble the pie pieces into as many whole pies as possible. Draw a model of the slices on the Student Journal.
   e. Write a mixed number representing how many slices of that flavor were handed out.
6. As students are working cooperatively, use the following guiding questions to extend their thinking by discussing:
   a. How many pieces are in one whole _____ pie? Answers will vary.
   b. What is the fractional part of one slice of _____ pie? Answers will vary.
   c. How many slices of _____ pie were handed out? Answers will vary.
   d. How could we find the fractional part of the number of slices of _____ pie that were handed out? We could add the fractional parts for each slice handed out to find the sum represented as a fraction.
   e. What do you notice about the fractional sum? The numerator is larger than the denominator. (Explain that this is called an improper fraction.)
   f. How many whole pies can you make with the number of slices of _____ pie that were handed out? Answers will vary.
   g. How much of the next pie do we have? Answers will vary. Students should find the fractional amount of the pieces left over after assembling whole pies. (Model for students how this can be recorded as a mixed number.)
7. After completing each station, students will complete the reflection questions on the last page of their Student Journal.
8. After the Explore, invite the class to a Math Chat to share their observations and learning.
9. When students are done, have them complete the Exit Ticket to formatively assess their understanding of the concept.

MATH

MIDDLE SCHOOL I GRADE 8

Angle Relationships Choice Board: Kitchen Connections with Gingerbread Roofs

Gingerbread house assembly and decoration is not only fun and festive but also requires a bit of mathematical thinking. In this activity, students will measure angles of a roof to determine which designs are best for a snowy area. Choice Boards are a carefully selected collection of math activities designed to support student learning in a way that promotes engagement and ownership of their learning. Who doesn't like to choose their own homework?

For this activity you will need:

- Print the Choice Board (1 per student)
- Print Activity Handouts (1 per student)
- Print the Choice Board Self-Assessment (1 per student)
- Technology (if applicable)

Steps:

1. Print a Choice Board and a set of Activity Handouts for each student.
2. Print a Choice Board Self-Assessment for each student.
3. Plan ahead for technology use. Research may be required for some activities on the Choice Board.

Procedure and facilitation points:

1. Distribute a Choice Board to each student.
2. Allow students time to examine the Choice Board and select the activities they would like to explore. In this case start with the gingerbread house activity.
3. Encourage students to attempt at least two other activities in addition to the gingerbread house one.
4. Distribute the appropriate Activity Handouts according to students' choices.
5. Upon completion of each Choice Board activity, have students complete a Choice Board Self-Assessment to evaluate their own mathematical thinking and efforts on their project.

CLICK TO ACCESS STUDENT HANDOUT(S)

ENGINEERING

ALL LEVELS

The Christmas Tree Challenge

The benefits of learning to collaborate and work toward a common goal extend far past elementary and secondary school. However, working as a team can be challenging. Use this activity to promote fun and learning through teamwork. Originally developed as a teambuilding strategy for businesses, we've added our own spin on the classic Marshmallow Challenge. In the spirit of holiday fun, we have renamed this activity the *Christmas Tree Challenge.*

To add some more holiday flair, consider coloring your spaghetti with red and green food coloring. Use yellow food coloring and sprinkles to turn your marshmallow into a star.

For this activity, each team will need:

- 20 sticks of spaghetti
- Marshmallows (avoid mini or jumbo marshmallows.)
- One yard of masking tape
- Scissors
- One yard of string
- Timer or stopwatch
- Measuring tape for measuring structures

Time allowed: 20 minutes total

Objective: To construct a Christmas tree tower as high as possible using only spaghetti and masking tape. The marshmallow star must be placed on the top of the tower. The tallest tree still standing unassisted wins.

Opening instructions: Divide the students into groups of 3. If you have an uneven number you may have a group of 4, but no more than 4 students per group. Two groups can share a table.

In the Christmas Tree Challenge, your team is going to have 20 minutes to work together to construct a Christmas tree that has a marshmallow star on the top. The team with the tallest "tree" standing unassisted will win!

Rules:

1. Your team may only use the materials provided. This includes one yard of masking tape, 25 sticks of spaghetti, and your marshmallow.
2. You may not use any other materials to assist in the support of your tower.
3. You will have only 20 minutes. Your marshmallow must be on the top of the tower when the timer goes off and your tower must be standing without any help.
4. Measure vertically, from the tabletop up.
5. You may stick masking table tape to the tabletop.
6. Spaghetti may be broken into smaller pieces. However, broken pieces may not be replaced.

20 minutes and the tallest tree wins. Remember, to keep that star on top! You may begin!

During team activity: Monitor team progress and remind tables of the rules if necessary. Completion of team activity: When two minutes remain, announce that there are two minutes remaining. Do this again at one minute. When time is called, measure the height of each team's tower. Declare a winning team.

Post-activity:

Ask the following questions:

1. What was your team's strategy in building the tower?
2. What was your role on the team?
3. What was the most challenging part of working as a team?
4. What would you do differently?
5. What did you learn from this activity?

Clean up: Bring a trash can around and pick up all the materials.

CODING

ALL LEVELS

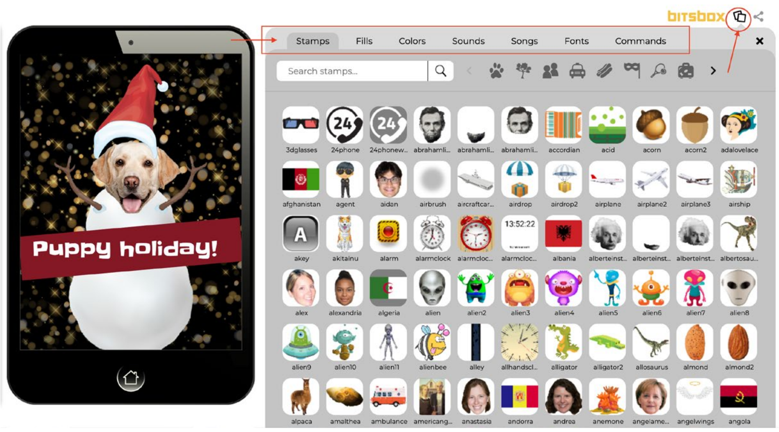
Make a Virtual Holiday Card

STEMscopes Coding, powered by Bitsbox, introduces your students to the world of coding through our easy-to-use program with embedded support. STEMscopes Coding is designed so that teachers can have a "learn-a-little, teach-a-little" mindset with engaging app-building projects.

We've designed a holiday activity where your students can build and share their very own virtual holiday cards!

CLICK HERE TO START CODING

VIEW INSTRUCTIONS ON THE NEXT PAGE



STEMscopes CODING K-12 TECHNOLOGY | POWERED BY bitsbox

Follow the steps below to learn how to code your own holiday card!

Step One

+ Visit **this link** then start typing out the code exactly as it's shown in the image on the right.

Step Two

+ Click the green play button in the middle of the page to preview your code as you go.

Step Three

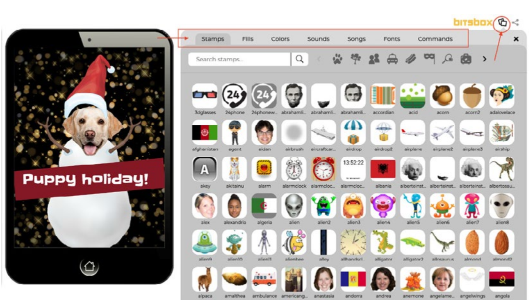
+ Use the provided example to troubleshoot any issues that arise as you type out your code. Continue to test and preview your code as you go by clicking the green play button. When you are done, press the play button to view your app.

Step Four

+ When finished, experiment with color changes, different fonts, and other adjustments to get more familiar with the code. For example, try changing 'dog15 head' to 'dog18 - head' and click the play button. What change did you notice?

Step Five

+ Now that you've gotten the hang of things, you're ready to customize your app. Explore the full library of images (stamps), backgrounds (fills), font styles, and more by clicking on the Assets icon in the top right corner of your screen, shown below.



Step Six

+ Your app is now ready to share! **But be sure to complete your app and copy the URL before you close your browser, because once you leave the web page, you won't be able to access or edit your project.**
+ To share your coded holiday card, copy the URL and paste it into an email or text. Then send it to your friends, teachers, and family and spread some holiday cheer!

AccelerateLEARNING
THE LEADER in STEM EDUCATION