Fairfax County PUBLIC SCHOOLS
ENGAGE • INSPIRE • THRIVE

STEAM

Science | Technology | Engineering | Arts | Mathematics

Ideas for engineering at-home

Continuity of Learning
Elementary School Resources

Table of Contents

STEAM: Engineering and Computer Science

Ideas Shared March 15-21, 2020

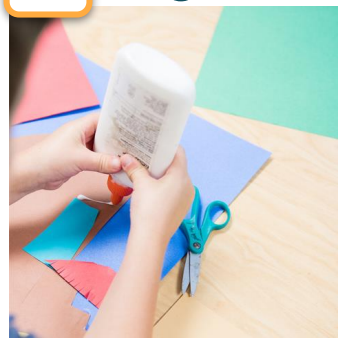
1 Engineer a Blanket Fort

Plan, create, and improve a blanket fort that you can sit in to read a book.

bit.ly/3bbxqEU

Find books to read **bit.ly/3bdrV8E**

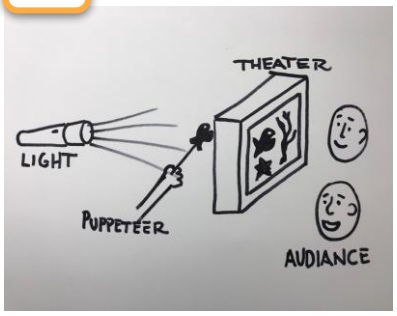
2 Engineer a Pop-up Card



Plan, create, and improve a pop-up card to give to a someone.

bit.ly/3a2L5y3

3 Shadow Puppet Theater



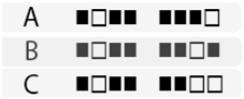
Engineer a shadow puppet theater.

bit.ly/2UnNMUh

4 CS Unplugged

Travel across a room without stepping on paper obstacles.

Create matching shape pictures.



Create a binary code bracelet

bit.ly/3diMO4j

Use links below to access these unplugged activities.

5 Scratch and Scratch Jr.

Create and learn coding with Scratch and Scratch Jr.

bit.ly/2wgPTRM

6 Code.org

Create and learn coding and explore careers with Code.org.

bit.ly/3aixZwN

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Connections to what you're learning in other subject areas

- Language Arts: reading stories
- Math: measurement
- Engineering Practices: plan, create, improve
- POG: goal directed and resilient

STEAM Activity Ideas for Continuity of Learning

Engineer a Blanket Fort

- **Plan, create, and improve a blanket fort that you can sit in to read a book.**

Materials: Pencil and paper to draw your plan for a fort
Sheets, blankets, or pillows to use to build a fort

Need an online book to read?

Borrow digital books from FCPS libraries:

- **bit.ly/38ZXbGQ**
- **bit.ly/2UnF4p3**
- **bit.ly/2U5JOAJ**

Need help logging in? Visit **bit.ly/2vkuZjY**

Directions

1. Draw a plan for your blanket fort on a sheet of paper, and label the materials and important parts of your fort.
2. Create your fort by following your plan design.
3. Try out your fort. Is it big enough to sit in? Can you comfortably read in it?
4. Now improve your fort design by making your fort more usable or comfortable.

Questions to think about:

1. How did your plan change after creating the fort?
2. How did your improvements make your fort more usable or comfortable?

SAFETY ALERT

- Before you start to build your fort, get help from an adult to choose a space that is safe and free from falling objects.
- Build your fort from soft materials such as pillows and blankets.

Engineer a Pop-Up Card

Plan, create, and improve a pop-up card to give to a family member, friend, or community member. Or, make a kind card to give to yourself.

Ask: How can I design a card that has a pop up feature?

Imagine: Explore pop-up card designs: **to.pbs.org/2AoDOLZ** Invent new designs, too.

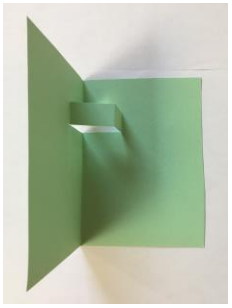
Plan: Plan how you want to create your card and what you will need. Get parent permission.

Create: Create your card.

Test: Try out your card.

Improve: What might you change to improve your card? Will you add pop up boxes in different places or sizes? Will you incorporate different geometric shapes?

Fold paper and make two cuts



Open card and push the cut part through

Invent other pop-up features, like a folded paper spring

Attach pictures or messages.

SAFETY ALERT

An adult should supervise students to use scissors safely.

Questions to think about:

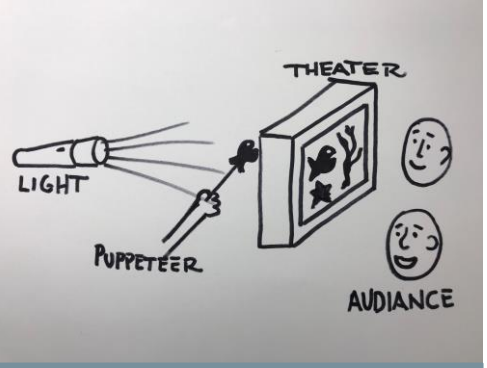
1. What strategies did you use to make your pop-up card work?
2. How did the improvements made make to your card more exciting or enjoyable?

Connections to what you're learning in other subject areas

- Art: Design
- Math: geometry
- POG: creative and critical thinker

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU



Engineer a Shadow Puppet Theater

Questions to think about:

1. What story do you want to tell?
2. What might happen at the beginning, middle, and end of your story?
3. Tell you story to a friend or family member.
4. Improve your story.
5. Create your puppet theater.

Directions:

1. **With the help of an adult**, cut out one side of the box.
2. Tape the tissue paper over the open side of the box.
3. Decide on characters for your story.
4. Use pen or pencil to draw your characters.
5. **With the help of an adult**, cut out the characters.
6. Tape the puppet to the end of the stick.
7. Hold the shadow puppet against the back side of the tissue paper.
8. Place the flashlight behind the theater.

Materials you might use:

- 1 cardboard box, such as a cereal box
- 1 sheet of tissue paper or thin paper
- Tape
- Scissors (Students, **ask an adult for help with scissors!**)
- Black marker or pen
- Flashlight
- Table
- Dark paper or thin cardboard (old cereal box)
- Sticks (like chopsticks)

SAFETY ALERT

- An adult should supervise students to use scissors safely.
- Use caution with flashlights to make sure they do not get hot
- Use a thin cardboard box, like a cereal box, to make it easier to cut.

Connections to what you're learning in other subject areas

- Language Arts: story creation and retell
- Science: light and shadows
- POG: communicator

STEAM Activity Ideas for Continuity of Learning

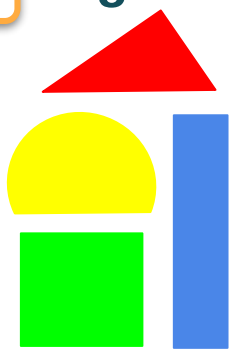
STEAM Engineering and Computer Science (CS)
Ideas Shared March 23-27, 2020

1 Paper Plane Design

Imagine, engineer, and improve paper airplanes.

bit.ly/3aji29r

2 Engineer a Tower



Explore how shapes can relate to engineering.

bit.ly/3aoDPwy

3 Space Telescope + Origami

Use imagination and #perseverance to engineer space telescopes from recyclables.

bit.ly/33PH11x

4 Code Loops to Exercise

Use MakeCode or no tech at all to program and do an exercise routine.

bit.ly/2UlEw40

5 Variables in CS

Create a madlib (no tech needed) or try hour of code Dance Party.

bit.ly/2wETuJi

6 Get Inspired by books

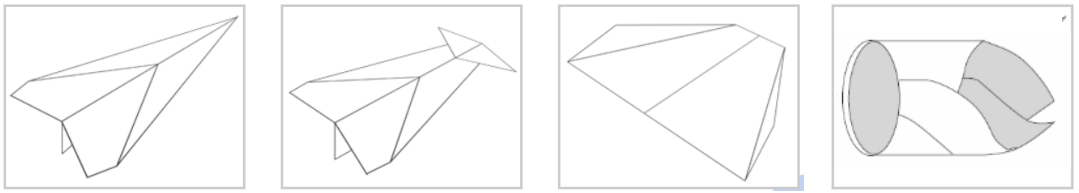
bit.ly/3bdrV8E

FCPS families can also explore these collections:

- bit.ly/38ZXbGQ
- bit.ly/2UnF4p3
- bit.ly/2U5JOAJ

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Paper Airplane Distance Challenge



Explore plane designs from:

- Smithsonian Institution: **s.si.edu/2x2Xa7M**
- NASA: **go.nasa.gov/3d9jCwv**

Smithsonian
National Air and Space Museum

Directions:

Ask: Which paper airplane design will fly farthest?

Imagine: Look at the NASA and Smithsonian paper plane designs. Which do you think might fly farthest? Why?

Plan: Select a design to try.

Create: Build a paper plane from the design you chose.

Test: Try flying your paper plane three times. Measure how far each flies and find an average distance for the plane.

Improve: What can you change on each plane to make it fly farther? Retest and measure.

Questions to think about:

1. Which plane design flew farthest? Why?
2. Which plane stayed airborne longest? Why?
3. How might a change in your design (such as changing the type of paper) affect the plane?

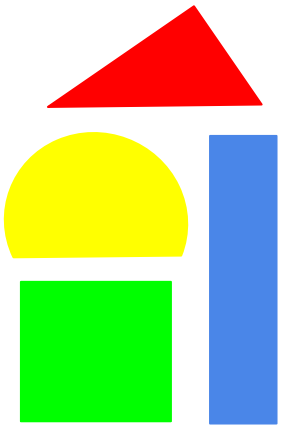
SAFETY ALERT

- An adult should supervise students to use scissors safely if students choose to use scissors.
- Be careful when throwing your paper plane. Always throw the plane at objects like a hallway or wall. Never throw at people or faces or eyes.

Connections to what you're learning in other subject areas

- Math: measurement and algorithms
- Science: gravity and air
- POG: creative and critical thinker

STEAM Activity Ideas for Continuity of Learning

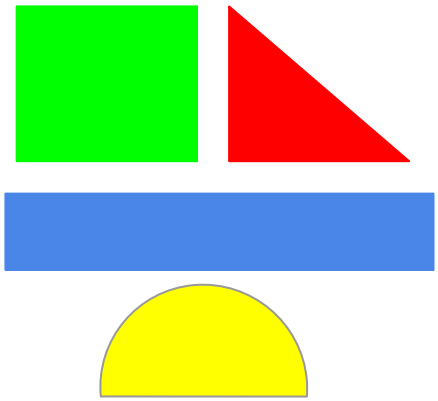


Engineer a Tower (grades pK-1)

Plan a tower made of shapes, build it, and test it to see how stable it is. Visit **ssec.si.edu/tamis-tower** to play online.

Materials you might use:

- Paper
- Pencil
- Scissors
- Color pencils (optional)
- Pillows
- Cardboard boxes



Directions:

1. Draw and cut these shapes
   - Two squares
   - Two triangles
   - Two rectangles
   - Two half circles

SAFETY ALERT

An adult should help students to use scissors safely and to select objects to stack safely.

2. Try the following challenges using the shapes you cut out. For each, shape tower you build, measure or mark on paper how tall it is.
   - ○ Use the squares and rectangles to create tower.
   - ○ Use the triangles and circles to create a tower.
   - ○ Use one of each shape to create tower.

2. Which shape tower is tallest? Predict: which might be more stable?

2. With a parent, find safe objects in your home for each shape. Examples are pillows, cushions, empty cereal boxes. Build each shape tower. What designs make your tower more stable?

Questions to think about:

1. What shapes make your home?
2. What shape do you see on a walk?
3. How might shapes help a building to be stable?
4. What ways can you improve a tower using shapes?

Connections to what you're learning in other subject areas

- Math: geometry and measurement
- Engineering Practices
- POG: goal directed and resilient

STEAM Activity Ideas for Continuity of Learning

Smithsonian
Science Education Center

Tami's Tower

Use shape to build stable towers and design like an engineer.

Connections to what you're learning in other subject areas

- Math: geometry and measurement
- Engineering Practices
- POG: goal directed and resilient

Tami's tower is an online game created by the Smithsonian Science Education Center.
Go to **ssec.si.edu/tamis-tower** to play.

Considerations:

- Parents should read the information on this page to ensure students can access resources safely and with parent permission.
- Task becomes progressively more challenging.
- ¡Ahora en español! allows families to play the game in Spanish.
- Lesson Plan Booklet provides paper based extensions.
- Alternative text is available.

Questions to think about:

1. What strategies helped you in this game?
2. When else might you use those strategies?

To explore more smithsonian education games for, go to:
ssec.si.edu/game-center

This site offers: Educational games, Apps, Ebooks

- Each game is designed with a grade level in mind (kindergarten-grade 8)
- Frequently Asked Questions provide an overview.

STEAM Activity Ideas for Continuity of Learning

An activity inspired by NASA

Engineering Activity Ideas for Continuity of Learning

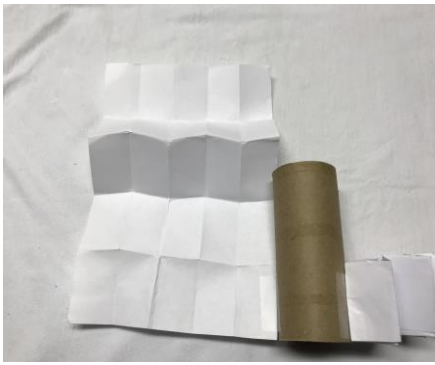
Suggested materials:

- 1 toilet paper tube
- 1 sheet copy paper
- A cylinder larger than a toilet paper tube (plastic or paper cup or a coffee mug)
- A few toothpicks
- Tape

Space Origami: Make Your Own Space Telescope! (Grades 1-6)

Hubble Space Telescope: NASA and the European Space Agency (ESA) sent a telescope into space in 1990 -- and its still taking pictures of space! Learn more about Hubble: go.nasa.gov/3duVsg0

ASK: How can I create a space telescope that will fit inside a rocket?



IMAGINE:
The telescope will need power from solar panels (your piece of paper). Solar panels cannot bend into curves. Figure out how to fold the paper to fit inside the larger cup with the telescope tube.

PLAN:
Draw a plan of how you want your telescope to look. Where will your solar panels attach? How will they unfold?

CREATE & TEST:
Build your model and check to see if it will fit inside the cup.

IMPROVE:
What worked and what didn't? How might your change your design to make your telescope solar panels deploy when launched?

SAFETY ALERT

- An adult should supervise students to use scissors safely.

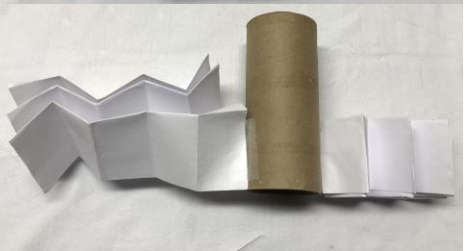
Questions to think about:

1. Mistakes are opportunities for learning. Describe how you learned from making mistakes in this activity.
2. What questions do you have that you want to explore next?
3. What ideas do you have for designing telescopes?

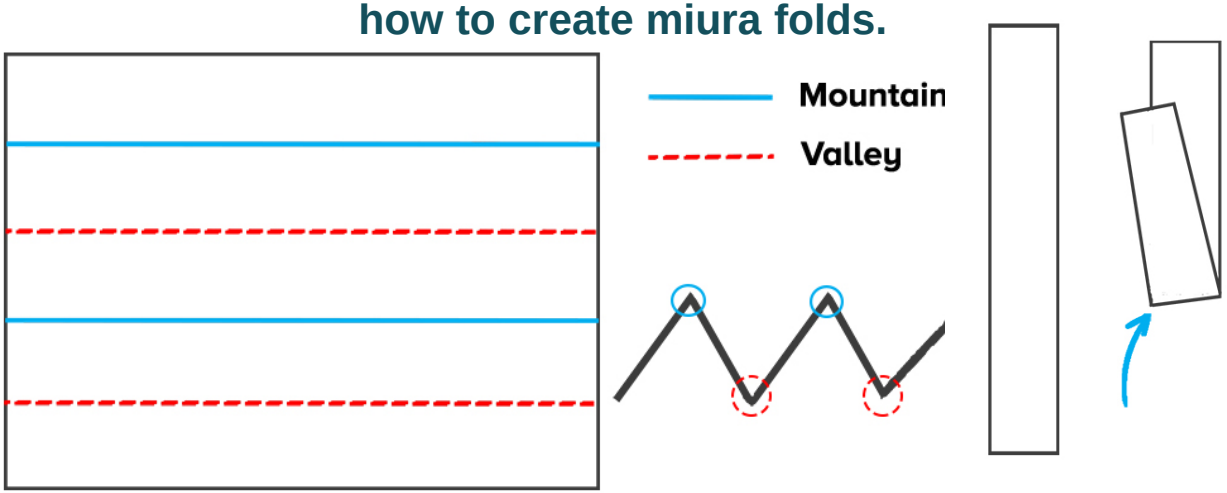
Visit www.nasa.gov/stem to explore more at-home STEM ideas.

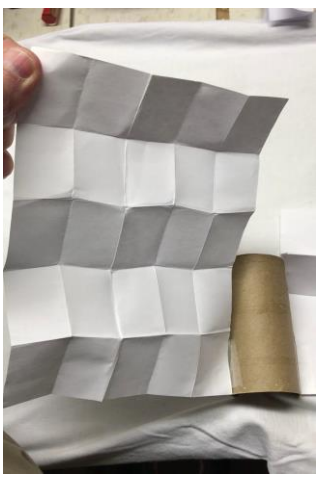
Make Your Own Miura Solar Panels for a Space Telescope (Grade 5+)

You can use these paper miura solar panels in the "Space Origami: Make your own space telescope" activity.



Visit Science Friday bit.ly/3amRXpV for tips on how to create miura folds.





FCPS families can watch a short video **bit.ly/2JlVbhq**

SAFETY ALERT

- An adult should supervise students to use scissors safely.

Questions to think about:

1. Mistakes are opportunities for learning. Describe how you learned from making mistakes in this activity.
2. What questions do you have that you want to explore next?

Explore telescopes and more:

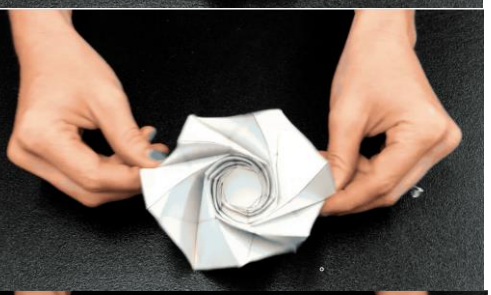
- Hubble: go.nasa.gov/3duVsg0
- Web: go.nasa.gov/2wliGyL
- More: www.nasa.gov/stem

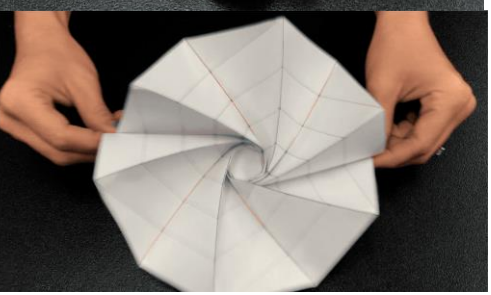
1. What ideas do you have for inventing new telescope designs?

Extra Challenging Space Origami

Make Your Own Starshade

a NASA STEM Project from jpl.nasa.gov/edu/learn/





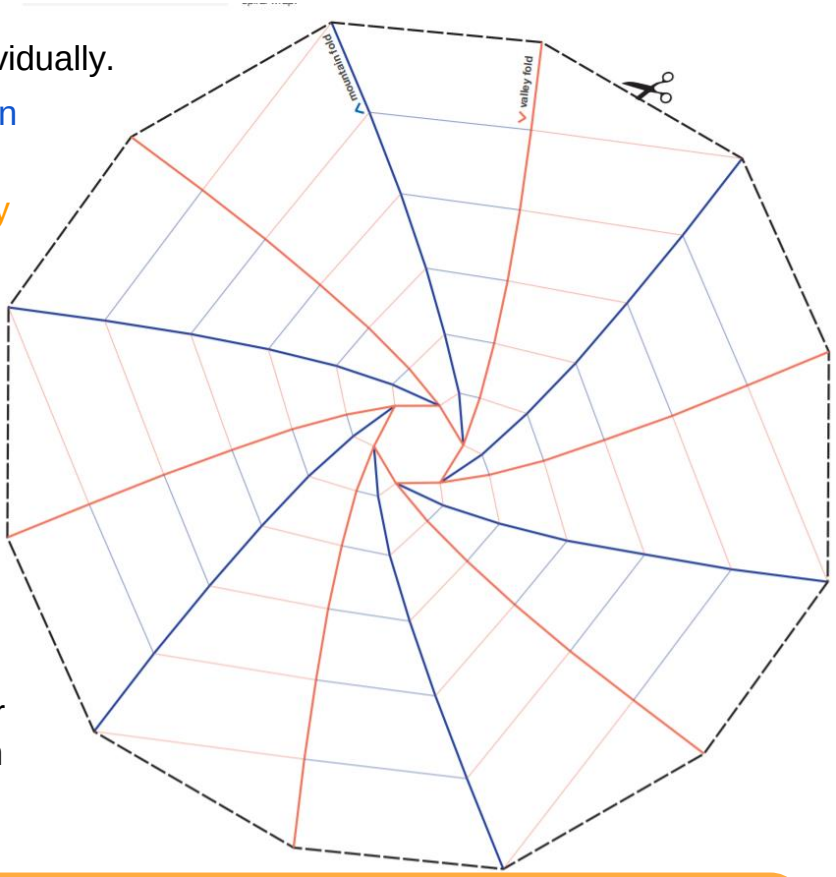
1. Draw the starshade pictured or visit **go.nasa.gov/33CcXXa** to print.

1. Cut it out along the exterior (black) dotted line.

1. Crease each fold, individually.

   Blue lines are mountain folds that point up.

   Orange lines are valley folds that point down



4. *Optional step:* Crease the lighter fold lines (Crease blue lines to point up and crease orange lines to point down)

5. Fold it. After all lines have been creased, carefully fold the major fold lines, moving from the center outwards.

SAFETY ALERT

- An adult should supervise students to use scissors safely.
- CAUTION: Do NOT use your Starshade model to attempt to block the light of the Sun!

Questions to think about:

1. Mistakes are opportunities for learning. Describe how you learned from making mistakes in this activity.
2. What questions do you have that you want to explore next?
3. What ideas do you have for designing telescopes?

Visit www.nasa.gov/stem to explore more at-home STEM ideas.

STEAM Engineering and Computer Science (CS)
Ideas Shared March 30 - April 3, 2020

1 Create a Storyboard

Pause and notice: What do you hear, see, think, feel, and wonder? Create a storyboard to communicate.

bit.ly/3aWXNPn

2 Daily Routine + Engineering

Experience how the engineering design process can spark invention.

bit.ly/34bRvZv

3 Get Inspired with books

bit.ly/3bdrV8E

FCPS families can also explore these collections:

- bit.ly/38ZXbGQ
- bit.ly/2UnF4p3
- bit.ly/2U5JOAJ

4 Explore Conditionals

Dive into conditionals (If-Then Statements) with cause and effect.

bit.ly/2Rc1CIg

5 A.I Tic Tac Toe

Organize data into patterns that even a machine could learn.

bit.ly/2RgmRJf

6 Explore Perspectives

Use a “Which One Doesn’t Belong” activity or use Scratch and Scratch Jr. to explore different perspectives.

bit.ly/2x4G1La

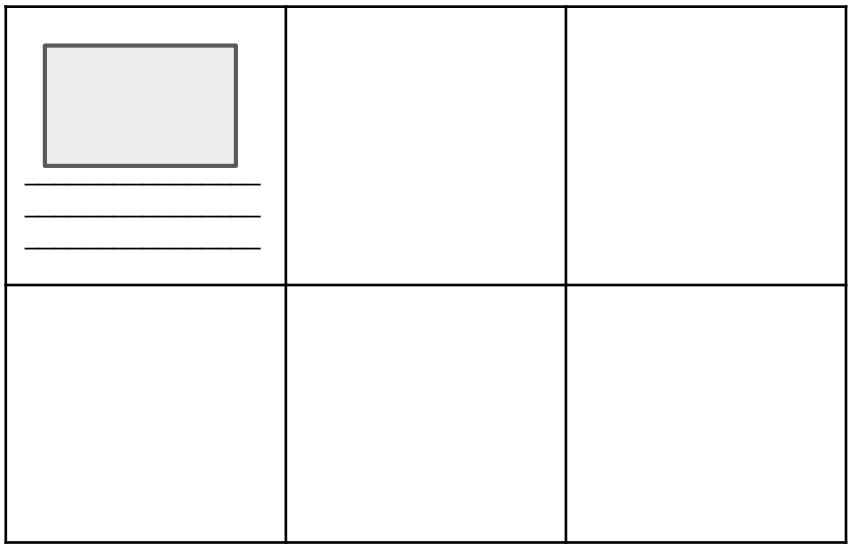
These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Create a Storyboard

With an adult, take a walk in your neighborhood. Using what you see, hear, feel and think, create a storyboard to illustrate your experience.

Materials you might use:

- Paper
- Pencil
- Ruler (optional)
- Color pencils (optional).



Directions:

1. With an adult, take a walk around your neighborhood.
2. Notice what you see, hear, feel and think.
3. Back at home, use your noticings to create a storyboard.
   - Divide a piece of paper into six sections.
   - For each section, draw a rectangle on the top and 3 parallel lines
   - Draw in what you noticed on your walk
   - Write a few words or sentences to describe.

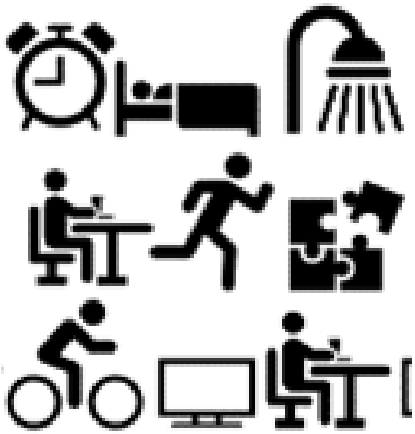
Questions to think about:

1. In what ways did your noticings inspire you to make your storyboard?
2. How can you improve your storyboard by adding detail to your drawings?
3. What sight, sounds, thoughts, or feelings might you pay attention to on your next walk?

Connections to what you're learning in other subject areas

- Language Arts: retelling and sequence
- Science: observation
- POG: creative and critical thinker

STEAM Activity Ideas for Continuity of Learning



Daily Routine

How might the engineering design process help spark new questions and inventions?

1 Ask questions about your day.
For example: How much time do I spend __? How frequently do I __? When do I have the most energy? What would happen if I changed ___? What amount of ____ is most helpful?

2 Choose a question to focus on. Example: how much water do we use?

Ask your family for ideas of ways to record information about your daily routine.
Example: calendar, table, journal

3 Make a prediction.
Example: "I think we use ___ water each day."

Collect data.
For example, record water used by each person during one day.

Reflect and clarify your question.
Example, do we use more water than I predicted?

Imagine something that you can create.
Come up with at least two ideas you could create. Example, what might I create to help save water?

4 Make a plan and gather materials.
Decide on one plan to try. Make a list of materials and a detailed drawing. Ask a parent for help choosing materials.

(cereal boxes, cans, empty milk cartons, plastic cups, sticks, etc.)

5 Create
Example: create an invention that saves water. First, ask a parent for permission.

6 Test and collect data
Example: What suggestions does my family have?

7 Reflect and ask more questions.
Example: How accurate is my data? What could I change?

8 Ask More Questions
What if everyone saved this much water?

SAFETY ALERT
- Parent permission needed.
- An adult should help students select materials and supervise students to use scissors safely.

Connections to what you're learning in other subject areas

- Science: observation and data collection
- Engineering Practices
- POG: goal directed and resilient

STEAM Activity Ideas for Continuity of Learning

Smithsonian
Science Education Center

Pick Your Plate!

(grades 4-8)

Use foods from around the world to learn about nutrition and healthy eating.

Technology Use
Students should ask parents for permission to play these games.

Pick Your Plate! is an online game created by the Smithsonian Science Education Center. Go to **ssec.si.edu/pick-your-plate** to play.

Connections to what you're learning in other subject areas

- Math: measurement and comparisons
- Health: healthy habits
- POG: goal directed and resilient

Questions to think about:

1. Compare: How do the meals from around the world compare to the suggestions on choosemyplate.gov?
   - 1 to 2 cups for fruits
   - 1 to 3 cups for vegetables
   - 3 to 8 ounce grain
   - 2 to 6 ounce-equivalent
   - 2 to 3 cups for dairy

8 ounces = 1 cup **6 ounces** = ¾ cup **3 ounces** = ¼ cup + 2 tablespoons

2. Try out other ways you can represent the nutrition in the meals from this online game. For example, you can make a graph

3. What questions about nutrition do you have? How might you investigate your questions?

To explore more smithsonian education games for, go to:

ssec.si.edu/game-center

This site offers: Educational games, Apps, Ebooks

- Each game is designed with a grade level in mind (kindergarten-grade 8)
- Frequently Asked Questions provide an overview.

STEAM Activity Ideas for Continuity of Learning

Engineering Activity Ideas for **Continuity** of **Learning**

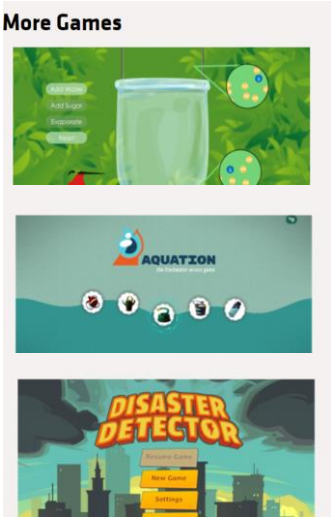
Smithsonian Science Education Center

NIH National Institutes of Health *Turning Discovery Into Health*

Students can engage in this activity from home.

Parents should read the information on this page to ensure students can access resources safely and with parent permission.

More Online Education Games and Puzzles:



Smithsonian Education Games:

- ssec.si.edu/game-center

This site offers: Educational games, Apps, Ebook

Tips:

- Each game is designed for a grade level.
- Frequently Asked Questions provide an overview.
- Some games are available in Spanish.

NIH Games and Puzzles for Kids:

- kids.niehs.nih.gov/games/

This site offers: brain teasers, puzzles, riddles, and songs.

Tips:

- Songs and Riddles appropriate for primary grades.
- Brain teasers and puzzles appropriate for upper elementary.

Considerations:

- Teacher or parent review of the resource is recommended.
- Purchases are not required.

Questions to think about:

1. What strategies helped you in each activity?
2. When else might you use those strategies?

STEAM Engineering and Computer Science (CS)
Ideas Shared April 13 - April 17, 2020

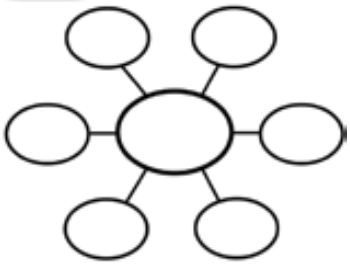
1 Experiment with Color


Image : Museums Victoria

Engineer a top or spinner using paper and a penny. Then test different colors and patterns.

bit.ly/3bk6Fys

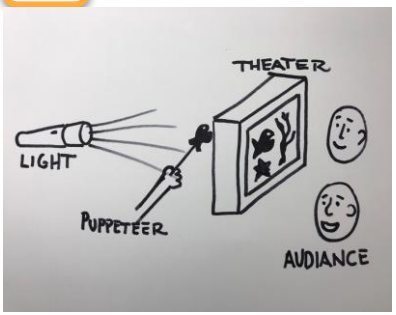
2 Systems Thinking Strategies



Explore how systems thinking helps people solve problems and create.

bit.ly/2XZgs9B

3 Shadow Puppet Theater



Engineer a shadow puppet theater.

bit.ly/2UnNMUh

4 Mapmaker. Mapmaker. Make Me a Map!

CS UNPLUGGED

Explore how algorithms might connect to maps.

bit.ly/2VF9B2f

5 Treasure Hunting, Creating Art, and Hand Washing with Algorithms

Three, fun unplugged activities for creating step-by-step algorithms.

bit.ly/3eyla3N

6 Double It: Math Modeling

Connect math packet activities to computer science and practice decomposing problems..

CS UNPLUGGED

bit.ly/2yvmALG

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Image : Museums Victoria

Use the “SEE-THINK-WONDER” strategy for the photograph above.

Connections to what you’re learning in other subject areas

- History and cultural exploration
- Engineering Practices
- Art Design and Color
- POG: Creative and Critical Thinker

For more information on tops check the FCPS Library Database:

worldbookonline.com/student-new/#/article/home/ar561350/topS

STEAM Activity Ideas for Continuity of Learning

Tops and Spinners

Tops and Spinners are found in many different countries. They date back to ancient times and have been found in tombs and pyramids. Many cultures use tops as children’s toys, but scientists have used them to study light and color effects.

Pirinola - Latin America
Dreidel - Israel
Beigoma - Japan
Bambaram - India

MATERIALS:

- Thin cardboard, cardstock or paper.
- Circular pattern
- Pennies
- Markers
- Scissors
- Glue

Follow the steps of the Engineering Design Process to create your own tops! Use another piece of paper for your ideas and plans.

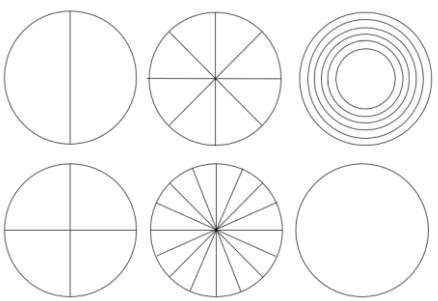
ASK: How can I build a top or an optical-illusion spinner?

I**MAGINE:** What optical effects can I create as the top spins? Think about pattern and color. Come up with several different ideas to try.

PLAN: Draw your plan explaining how your spinner will be put together, and what materials you will use. Use an overturned cup or compass to draw your circle. Create your colored decorations.

CREATE & TEST: Follow your plan to build your spinner. Cut a small slot in the center for the penny to fit. Glue the penny into the center if necessary. If you are using glue, be sure to allow enough time for the glue to dry.
Try your spinner. How did the spinning pattern look different from the stationary pattern?

IMPROVE: How can you make your spinner better? What other designs can you create?



SAFETY ALERT
An adult should supervise students to use scissors safely.

Use the “SEE-THINK-WONDER” strategy for the photograph above.

Connections to what you’re learning in other subject areas

- History and cultural exploration
- Engineering Practices
- Art: Design and Color
- POG: Creative and Critical Thinker

For more information on tops check the FCPS Library Database:

worldbookonline.com/student-new/#/article/home/ar561350/topS

STEAM Activity Ideas for Continuity of Learning

Tops and Spinners

ASK: How can I build a top or an optical spinner?

IMAGINE: Sketch two ideas you have. Find out more about tops and spinners:

PLAN: Draw your plan. How will your top go together? List your materials.

CREATE & TEST: Trace and cut a circle. Cut a small slot in the center of the circle and glue the penny into the slot.

IMPROVE:

How was the spinning pattern different from the stationary pattern?_____

_____

What worked? _____

What didn’t work? _____

What will you change?_____

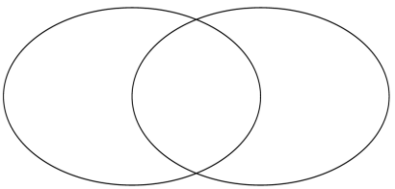
Systems Thinking

Systems are everywhere. Schools, cars, businesses, toys, nature, and families are all systems because they have parts that work together.

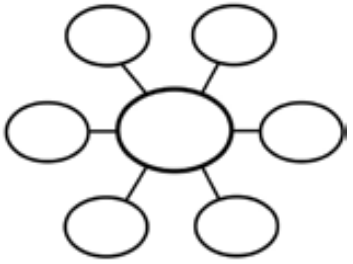
1. Look around your home and choose 5 things.

2. Choose one or more of the options below. Note: the first option is for younger grades. Each option is more and more complex.

- ☐ Group the items by something they have in common: color, shape, size, or purpose.
- ☐ Use a Venn diagram to compare and contrast the items



- ☐ Create a mind map to describe how the items might work together for a common purpose.
- ☐ Add yourself to your mind map. What are the ways you might interact with this system.



Engineers and computer scientists make mind maps and models of systems, too. Thinking about systems can help you to see a problem differently, ask new questions, and imagine new solutions.

Think about the systems in your home. Identify the parts that make up each system and how those parts interact. Ask questions, and see if your questions spark new ideas. Share your thinking with your family.

Connections to what you're learning in other subject areas

- Math and Science Comparisons
- Engineering Practices
- POG: Creative and Critical Thinker

STEAM Activity Ideas for Continuity of Learning

STEAM Engineering and Computer Science (CS)
Ideas Shared April 20- April 24, 2020

1 Create with Recyclables

Use engineering practices and recyclables to create paper beads or a marble run.

bit.ly/2RQ08ns

2 Trash Grabber

Engineer a trash pick-up device using recyclables to help clean our planet.

bit.ly/3ascMQ3

3 Rock Art

Create rock art to integrate math and engineering design practices.

bit.ly/34ZmWX9

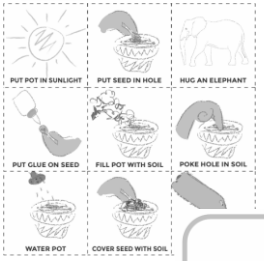
4 If Then Recycling

Explore what you can recycle. Then, help teach others how to recycle using if-then “conditionals”.

CS UNPLUGGED

bit.ly/2Komvwb

5 Plant a Seed



Continue your Earth Week celebration by planting a seed and watching it grow.

CS UNPLUGGED

bit.ly/2VT5lql

6 Terrarium

Continue your Earth Week celebration by creating a terrarium.

bit.ly/2VT5lql

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Wearable Accessories (ages pK-6)

Happy #FCPSEarthWeek! We can help the Earth when we 'Reduce, Reuse, Recycle.' Let's create art, accessories, or a wearable item using recycled materials in your home.

Ask and Imagine. What would you like to create? How might you create it?

Plan. List the recyclable materials you want to use. Write out the steps you will follow. Ask a parent for permission.

Create and Test. Make your wearable item. Ask a family member for feedback.

Improve. What might you do different next time?

Possible Materials:

- toilet paper roll,
- scraps of paper, newspaper, magazines
- scissors
- pencil or pen
- glue or tape
- yarn or string

SAFETY ALERT

An adult should supervise students to use scissors safely.

Connections to what you're learning in other subject areas

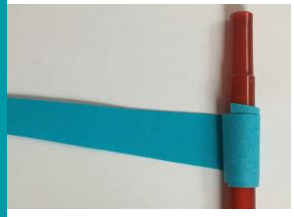
- Math: shapes, angles
- Creative and critical thinking
- #FCPSEarthWeek
- Art: Design
- Engineering Practices

Find activities like this in packets mailed to FCPS students **April 20**, 2020.

bit.ly/2Xgq0MU

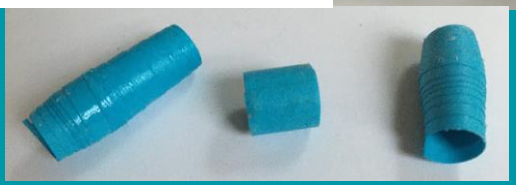
How to Make Paper Beads

Step 1. Cut paper into strips. ***Math connection:*** *Practice shapes. Cut out quadrilaterals and triangles.*



Step 2. Wrap paper around a pencil or pen.

Step 3. Glue the end of the paper .



TP Bracelet

Step 1. Cut a toilet paper roll.

Step 2. Decorate. Example: Wrap with string. Glue on paper.

Upcycled Marble Run Challenge (ages 2-6)

Happy #FCPSEarthWeek! We can help the Earth by 'Reducing, Reusing, and Recycling.' Let's reuse recycled material to create a marble run.

Use the engineering design process today.

Ask: Which materials will create interesting and effective paths for a marble to run through?

Imagine: Brainstorm some designs for your marble run. Explore designs from discovere.org: bit.ly/3bmRYuF

Plan: Draw and label your design. Include measurements. List materials.

Create: Ask a parent for permission. Then, build your marble run.

Test: Release a marble into your marble run three times. Notice how the marble moves. Does it move the same way every time?

Improve: How might you change your marble run design? Will your changes make the marble run more consistent or interesting. Will you improve a different characteristic? Retest and measure.

Possible Materials:

- thin cardboard (cereal boxes, toilet paper or paper towel rolls)
- marble (dry bean, small ball or spherical rock)
- newspaper or magazine
- scissors
- glue or tape
- ruler

SAFETY ALERT

An adult should supervise students to use scissors safely.

Questions to think about:

1. Which part(s) of the Engineering Design Process helped you to be creative, think critically, or solve problems?
2. What are some reasons it is important to Reduce, Reuse, and Recycle materials?

Connections to what you're learning in other subject areas

- #FCPSEarthWeek
- Science: kinetic and potential energy
- Art: Design
- Engineering Practices
- Creative and critical thinking

Find activities like this in packets mailed to FCPS students **April 20**, 2020.

bit.ly/2Xgq0MU

Connections to what you're learning in other subject areas

- #FCPSEarthWeek
- Engineering Practices
- Art: Design
- Creative and critical thinking: parts and purpose strategy

Find activities like this in packets mailed to FCPS students **April 20**, 2020.

bit.ly/2Xgq0MU

Create a Trash Pick-Up Device

Design a grabber using materials around the house to help pick up trash for Earth Day. The grabber should allow you to pick up trash and place it in a bag without ever touching it.

Use the engineering design process today.

Ask: How can I design a device to pick up trash?

Imagine: With an adult, take a walk outside. Take notes on the trash you see. Brainstorm two ideas that you and your family could use to pick up the types of trash you see. Explain your ideas to another person.

Plan: List the materials you will use from recyclables you have at home. Draw a plan for your device. Label the **parts** of your device. Write the **purpose** of each part and how the parts work together.

Possible Materials:

- Paper and pencil for drafting ideas
- Ruler for labeling and measuring.
- Recyclables for building.
- Color pencils, scissors, and tape

Create: Ask a parent for permission. Then, build your device.

Test: Try your device on objects at home.

Improve: What can you change to make your device work better? Change your design and test again.

SAFETY ALERT

An adult should help students to collect appropriate recyclables, and use scissors safely.

Questions to think about:

1. How did thinking about the **purpose** of each **part** of your design help you to think creatively and to create today?
2. How did explaining your idea to another person help you improve?
3. How might you create other devices to care for the environment?

Connections to what you're learning in other subject areas

- #FCPSEarthWeek
- Engineering Practices
- Art: Design
- Creative and critical thinking: parts and purpose strategy

Find activities like this in packets mailed to FCPS students **April 20**, 2020.

bit.ly/2Xgq0MU

Trash Pick-up Device

ASK: How can I design a device to pick up trash?

IMAGINE: Sketch two ideas you have. Find out more about trash and recycling.

PLAN: Draw your plan. Label each **part** and describe its **purpose**. How will your device go together? List your materials.

CREATE & TEST: With a parent, build and test your device.

IMPROVE:

What worked? _____

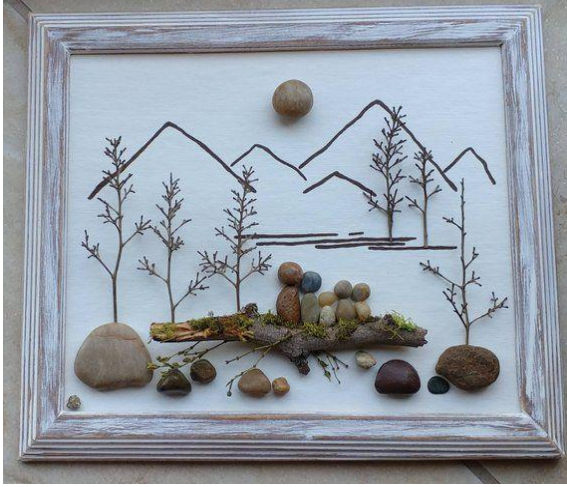
What didn't work? _____

What will you change?_____

What step in the design process helped you think creatively? _____

Rock Art

Design a piece of artwork or family portrait using items found in nature and then make a graph showing the different items used in your artwork.



Use the Engineering Design Process:

Ask: How can I make a picture using things from nature?

Imagine: With an adult, take a walk around your neighborhood. Collect small stones and other natural items of different shapes. Look carefully at the shape of the stones you've collected. How can they be combined to make a picture? ***Math connection:*** *Practice shapes: rectangular prism, sphere, cube, quadrilaterals, triangles.*

Plan: Place the stones and other items on your paper. Try out different combinations.

Create: Once you pick a design, glue the rocks to your paper. Draw additional parts in pencil. Then, darken pencil lines with marker.

Test: Are your rocks and other items sticking to the paper?

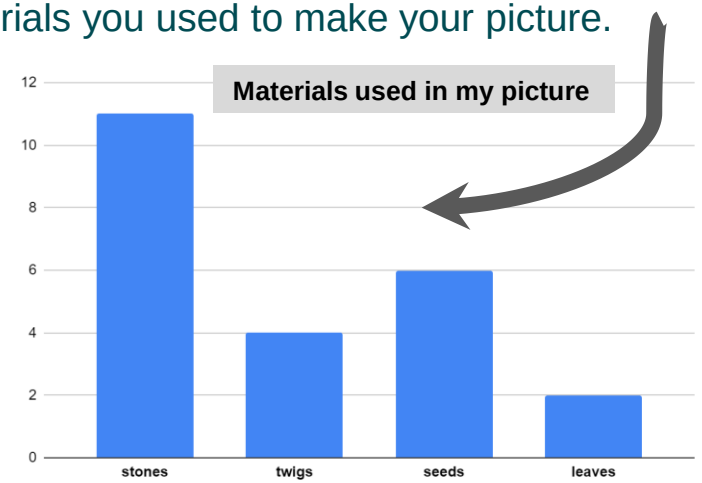
Improve: What types of materials did you use? Make a bar graph of the different types of materials you used to make your picture.

MATERIALS:

- Paper plate for background
- Small stones/gravel
- Natural items
- Markers
- Scissors
- Glue

SAFETY ALERT

An adult should supervise students to use scissors safely.



Connections to what you're learning in other subject areas

- #FCPSEarthWeek
- Math shapes & graphs
- Art composition
- Engineering design

Find activities like this in packets mailed to FCPS students April 20, 2020.

bit.ly/2Xgq0MU

Connections to what you're learning in other subject areas

- #FCPSEarthWeek
- Plant responses
- Life cycle
- Observations
- Cause and effect

Learn more about terrariums at climatekids.nasa.gov/mini-garden

Find activities like this in packets mailed to FCPS students **April 20**, 2020.

bit.ly/2Xgq0MU

Design a Terrarium (ages K-8)

Continue #FCPSEarthWeek by planting seeds and watching them grow. You can engineer a terrarium to grow your seeds.

Ask. How can you design a plant terrarium? A terrarium is a home for plants.

Imagine. With an adult, collect dirt and plants or seeds.

Plan. List the recyclable materials you want to use. Write out the steps you will follow.

Be creative and use the materials you have.

Create and Test. Ask a parent for permission and help. Make your terrarium and plant your seed.

Improve. How might you change your design to meet each plant's unique needs?

Possible Materials:

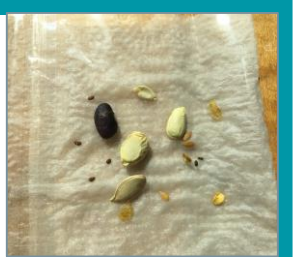
- soil (can be from outside)
- plants or seeds
- clear container (plastic bottle, tupperware, jar)
- paper towel
- water

SAFETY ALERT

An adult should help students gather materials safely.

How to Make a Terrarium

Step 1. Place seeds on a wet paper towel. Fold towel to cover seeds. Put in a clear bag or container near a window.



Step 2. Add dirt to your container. Leave an opening for air to move.

Be creative. Many different containers will work.

Step 3. Observe your seeds sprout into plants. Then, move the plants to the soil in the terrarium.

Seeds you might find at home:

Strawberry

Apple

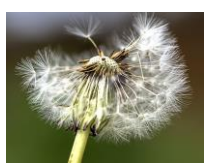
Pepper

Garlic

Dried beans

Sunflower seeds

Squash



Dandelion

STEAM Engineering and Computer Science (CS)
Ideas Shared April 27- May 1, 2020

1 Ask Questions

Creative and critical thinkers, engineers and computer scientists all ask questions. Create a sensory bag or go on a shape walk and ask questions.

bit.ly/35eG5op

2 Perspective Taking

How might you tell a story from another point of view? Interview a family member to listen to their perspectives or write with If-Then patterns mindmapping.

bit.ly/3f51lkT

3 Engineer a Pop-up Card

Plan, create, and improve a pop-up card to give to a someone.

bit.ly/3a2L5y3

4 Set a Goal + Have Fun

Goal setting can be fun! Especially when your goal is to dance and exercise. Try a See 10 Do 10 Challenge by creating an algorithm.

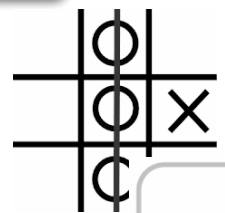
bit.ly/2SjL0iC

5 Superhero

Who is a superhero in your life? Create a flip book about them or code an animation to celebrate your Superhero.

bit.ly/2VNJcR7

6 Design a Game



Design a game to play or make a step-by-step list of strategies to win a game you like to play then test out your rules.

bit.ly/3aRs80F

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Set a SMART Goal for this week!

Specific: The goal should be clear. Explain your goal to a family member or a friend.

Measurable: There should be a way to measure your progress or know that you have reached your goal.

Attainable: The goal should be something you can achieve.

Realistic: The goal should be something practical that you can realistically achieve. Think about solutions to barriers you may face.

Timely: The goal should have a time frame.

Use the questions below as a guide to help set a SMART goal for the week.

- What needs to be done this week?
- How will you measure your achievements?
- Do you foresee any potential barriers?
- What are the solution(s) to those barrier(s)?

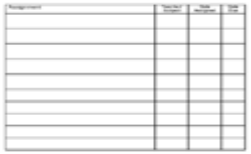
Looking for ideas? You can set goals around learning strategies in packets mailed home:

Make a **schedule** for your day.

Set a timer for focused work time.

Use arts to **express my feelings**.

Schedule brain breaks and **exercise**.



Break long tasks into smaller parts.

Connections to what you're learning in other subject areas

- PoG: Goal-Directed and Resilient
- Language Arts: Writing
- FCPS Academic and Career Planning

Find activities like this in packets mailed to FCPS students **April 27**, 2020.

bit.ly/2Xgq0MU

Take a SHAPE walk! (PK-2)

Next time you go for a walk with your family, pay special attention to the shapes you see in nature.

MATERIALS:
- Paper
- Pencil
- Ruler
- Glue
- Crayons

Create a picture using your shapes.

- Bring paper and pencil on your walk.
- Draw the shapes you see.
- When you get home, use a ruler to trace over your shapes to make the sides smoother. Make lots of copies of your shapes in different sizes.
- Cut out your shapes.
- Color your shapes with crayon, marker or pencil.
- Use your shapes to make a picture.
- Add in any extra lines or borders with a pencil or marker.

Questions to think about:

1. What shapes do you notice?
2. How often do you see the same shapes?
3. Are the shapes big or small?
4. How many sides, corners, or vertices does each have?
5. What picture did you make with your shapes?

Connections to what you're learning in other subject areas

- Science: observation
- Math: shapes
- Art: forms, drawing
- Questioning skills

Can you find these shapes around you?

- Square
- Triangle
- Circle
- Rectangle
- Rhombus

Asking questions helps us become creative and critical thinkers.

Ask questions while you go on your walk. Start your questions with how, how many, who, what, when, where, why.

Find activities like this in packets mailed to FCPS students **April 27**, 2020.

bit.ly/2Xgq0MU

Take a SHAPE walk! (Grades 3-6)

Next time you go for a walk with your family, pay special attention to the shapes you see in nature. Artist Paul Cézanne used this idea in his paintings.

"Everything in nature is formed upon the sphere, the cone and the cylinder. One must learn to paint these simple figures and then one can do all that he may wish." -- Paul Cézanne

Create a picture using your shapes.

- Bring paper and pencil on your walk.
- Draw both the two-dimensional and three-dimensional shapes you see.
- When you get home, make copies of your shapes and cut them out. Or, find recycled materials that represent your shapes.
- Color your shapes with colored pencils, paint or markers.
- Use your shapes to make a picture or 3D sculpture.
- Use pencil or marker to add in extra lines or borders.

MATERIALS
- Paper
- Pencil
- Ruler
- Glue
- Colored pencils
- Recycled materials

Questions to think about:

1. What shapes do you notice?
2. Do the shapes show reflection or rotation?
3. Are examples of translation evident?
4. How many sides, corners, or vertices does each have?
5. What sculpture did you make with your shapes?

Asking questions helps us become creative and critical thinkers.

Ask questions while you go on your walk. Use these words or phrases in your question: why, how, how many, who, what, when, where, If...then…, always, sometimes.

Connections to what you're learning in other subject areas

- Science: observation
- Math: shapes
- Language arts: writing
- Art: sculpture
- Questioning skills

Can you find these shapes around you?

- Triangles (acute, obtuse, right)
- Quadrilaterals (rhombus, trapezoid, parallelogram)
- Cube
- Sphere
- Cone
- Cylinder
- Rectangular Prism

Find activities like this in packets mailed to FCPS students **April 27**, 2020.

bit.ly/2Xgq0MU

What's in the Bag? (PK-2)

Have you ever tried to tell someone about something you have seen or found? What if you could have them touch and feel it?

MATERIALS:
- Paper bag
- Objects to hide in the bag -- may be things from outside or inside.

Create a sensory bag.

- Find an object and put it in a bag. Ask for parent permission first.
- Have someone else reach into the bag and touch the object. Remember, the person cannot look in the bag.
- The person should try to describe what they feel. Then, they can ask questions to guess what the object might be.
- Your answers to questions should be "Yes" or No."
- Switch roles, and have another person place a secret object in the bag and you ask questions.

SAFETY

An adult should help students to choose safe objects for their sensory bag.

Connections to what you're learning in other subject areas

- Science: observation with 5 senses
- Language arts: vocabulary
- Questioning skills

Questions to think about:

1. What words can you use to describe what you feel in the bag?
2. Does the item in the bag make a sound?
3. Is there a smell to the object?
4. How many questions did each person ask before they identified what is in the bag?

Asking questions helps us become creative and critical thinkers.

Find activities like this in packets mailed to FCPS students **April 27**, 2020.

bit.ly/2Xgq0MU

Change your point of view...

Do you enjoy reading the *Percy Jackson* series of books or *The Hunger Games* series? Maybe it's *Green Eggs and Ham*, or Eve Bunting's *Fly Away Home.* What do these books have in common? They are all written in first person. That means the story is told from the author's point of view. This allows us to get inside the narrator and see events from their perspective.

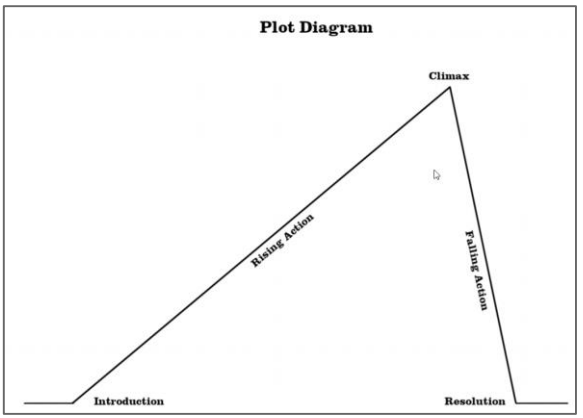
Remake a book from a different point of view.

Select a first-person book you've read and enjoyed. Choose one of these two options:

1) Select another character and rewrite the story from their perspective. Imagine telling *Green Eggs and Ham* from the point of view of Sam.

2) Try writing the story in third-person. This is where the narrator describes the characters and action as if looking on. Think of *Harold and the Purple Crayon.*

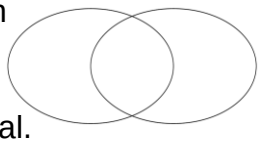
- Identify the parts of the story. Use a plot diagram if it helps.
- Rewrite the main events from this new point of view.



Reflection Questions

- Which story did you choose?
- Which point of view did you select?
- How is the story different than the original?

A venn diagram can help you compare and contrast your story with the original.



- Does the plot change in your revised story? How?

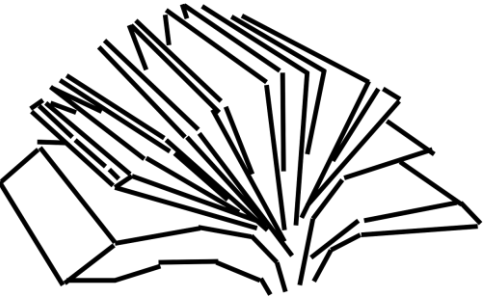
Extension:
Using a piece of paper, create a folded mini-book. Re-write and illustrate your book. Or, animate your story in scratch.mit.edu

Connections to what you're learning in other subject areas

- Language Arts: writing
- **PoG:** Considering other **perspectives** is an important skill in all subject areas.

Find activities like this in packets mailed to FCPS students **April 27**, 2020.

bit.ly/2Xgq0MU



Engineer a Flip Book

Make a flip book to show a pattern or process from a topic you are studying, something you observe in nature, or one of your favorite things.

Example book topics:

- Evaporation or the water cycle,
- Plant germination,
- Coding
- Cooking
- Or even your daily routine!

Materials you might use:

- Paper
- Pencil
- Glue stick
- Color pencils or markers

Directions:

1. Plan your book: what pattern, movement, process, or change will you draw? How will you sequence the drawings in your flip book?
2. Fold a piece of paper into six parts,
   If you want your book to have more than six pages use more sheets of paper.
3. Cut along the folds.
4. Stack the rectangles.
5. Glue one end of the rectangles together to create a book.
6. Wait for the glue to dry.
7. Draw a picture near the same spot on each page. Make each new image just a slight variation of the previous.
8. When done, flip the pages to see the images move.

SAFETY ALERT
An adult should supervise students to use scissors safely.

Questions to think about:

1. In what ways does your flip book represent a pattern?
2. How might you improve your flip book?
3. How might you use your flip book to tell a story?

Connections to what you're learning in other subject areas

- Language Arts: writing
- Patterns or processes (can connect to any subject area)

Find activities like this in packets mailed to FCPS students **May 4**, 2020.

bit.ly/2Xgq0MU

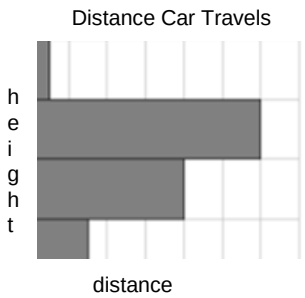
STEAM Engineering and Computer Science (CS)
Ideas Shared May 4 - May 6, 2020

1 What's Your Story

Share your story in a creative way. In the process, you'll practice the POG skills that we use in STEAM and Computer Science!

bit.ly/2WBazg6

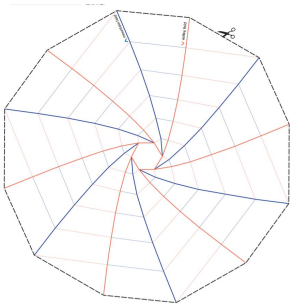
2 Data Ramp Activity



How far can your raceway design make a model car go? Let's see your creativity while you collect data.

bit.ly/35BIxpb

3 NASA Space Origami



Make your own space telescope, miura solar panels, or starshade using origami.

bit.ly/2WfEv2p

4 Exercise and Code

Code a loop of moves without tech. Or, code a virtual microbit to roll a random number. Then do that number reps of any exercise or dance move.

bit.ly/35Fb8Kk

5 Madlibs

Explore variables by creating your own madlib story to share with family or friends.

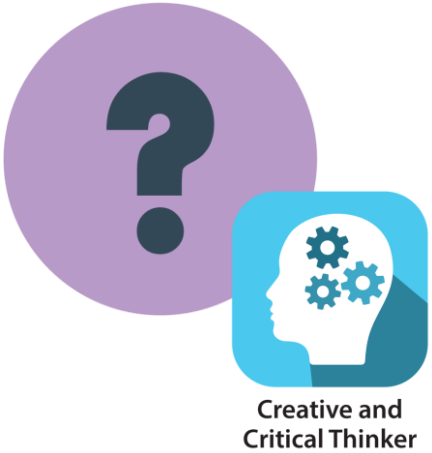
bit.ly/2WDbAVg

6 Coding Exploration

Use your imagination and explore creative coding platforms such as code.org and scratch.

bit.ly/2wgPTRM
bit.ly/3aixZwN

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**



What's Your Story? (grades 3-8)

Think about the best three (or more) things that you did during the past week and create something that would share YOUR news with others outside of your home! You might create an article, an animation, a radio segment, a video show, or a series of imaginary social media posts.

How does this connect to STEAM? Through storytelling, you practice the Portrait of a Graduate skills that help you think critically and creatively and communicate effectively.

Ask questions

Questions to clarify your thinking:

- What makes you say that?

Questions about other points of view:

- How would_____ view this?
- What would someone with the opposite opinion (or experience) think?

Organize Your Thinking

Strategies you use to organize your thinking for a story are also helpful strategies in engineering design: sequence, mind maps, cause and effect.

How to Make a Storyboard

1. Sequence your ideas. What happens first, second, next?
2. Divide a piece of paper into six sections.
3. Draw a picture in each section and describe it.

You can use this to create a radio, video, or theater skit of your story.

How to Make a Flip Book

1. Tape, staple, or glue small pieces of paper together. Wait for the glue to dry.
2. Draw a picture near the same spot on each page. Make each new image only slightly different from the previous image.
3. When done, flip the pages to see the images move.

How to Make an Animation

1. Explore Scratch Tutorials: **bit.ly/3d2GAnZ**

1. Then, create in **scratch.mit.edu**

Question to think about: What questions and ways of organizing your thinking helped you to tell your story today?

Connections to what you're learning in other subject areas

- Language Arts
- PoG: Communication
- PoG: Creative & Critical Thinking
- Questioning
- Perspectives
- Cause and Effect
- Sequence

Find activities like this in packets mailed to FCPS students **May 4**, 2020.

bit.ly/2Xgq0MU

Cardboard Raceway! (pK-8)

Newton's first law of motion lets us know that every object in motion will stay in motion unless another force acts upon it. Let's test this out! Build your own adjustable cardboard ramp to see how different amounts of potential energy affect speed and acceleration. Measure the distance a toy car travels.

Directions:

Ask: How can I design a cardboard racetrack to make a car (or other rolling object) travel the farthest distance?

Imagine: Think about materials you can use for your ramp. What can you use? How long does it need to be? What different heights should you test?

Plan: Make a plan for what your track should look like.

Create: Build your racetrack and find a car to use.

Test: Try out your track. Measure the distance it travels. Test and record distance traveled for each starting height at least 3 times. Change the starting height of the track and re-test. Find the average distance the car travels at each height.

Improve: What worked in your design? How did you improve your design to make your tests more consistent?

Questions to think about:

1. Which starting height made the longest travel? Why?
2. What happened as the potential energy increased?
3. Why does the car stop rolling? Review Newton's first law of motion.

MATERIALS:

- Cardboard
- Tape
- Toy car (or anything else that rolls -- be creative!)
- Grid paper

SAFETY ALERT

An adult should supervise students to use scissors safely.

Connections to what you're learning in other subject areas

- Science: speed, velocity, acceleration, experimental design, potential energy
- Math: data analysis and graphing
- PoG: Creative and Critical Thinking
- Engineering Practices

Find activities like this in packets mailed to FCPS students **May 4**, 2020.

bit.ly/2Xgq0MU

Cardboard Raceway! (7th and 8th grade)

ASK: How can I design a cardboard racetrack to make a car travel the farthest distance?

IMAGINE: What materials can I use to build a track? How long should it be? What can I use to adjust the height (potential energy) for multiple trials?

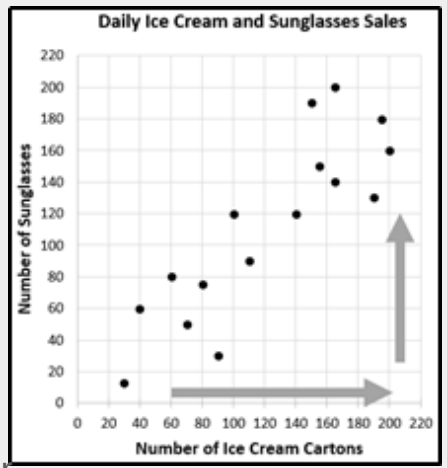
PLAN: Draw a plan for your racetrack.
Make a list of the materials you will use.

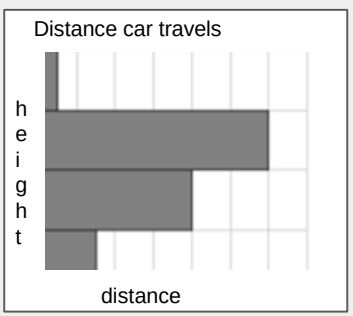
CREATE: Build your racetrack.

Height (m)	Distance (m)

TEST: Try out your track. Record your data in a stem-and-leaf plot. (right).

1) Transfer your data from your stem-and-leaf plot to a scatter plot on a sheet of grid paper. Place distance (**d**) on your horizontal scale (x-axis), and starting height (***h***) on the vertical scale (y-axis). (That would be a measure of potential energy.)
2) Use a different color for each test height. Your should decide on your own heights to test.
3) Calculate the mean (average) distance the car travels for each ramp height. (Each height is a different color.)
4) Display your average data on a bar graph.





IMPROVE: Use your data to improve your raceway design. What characteristics of your track can you change to make the car travel farther?

Connections to what you're learning in other subject areas

- Science: speed, velocity, acceleration, experimental design, potential energy
- Math: data analysis and graphing
- PoG: Creative and
- Critical Thinking
- Engineering Practices

Find activities like this in packets mailed to FCPS students **May 4**, 2020.

bit.ly/2Xgq0MU

Questions to think about: **1.** How does each graph or representation of data help me to see patterns? **2.** How might you design a test to see if the trends are always true? Do taller ramps always have faster acceleration? Do taller ramps always cause cars to travel farther? **3.** At what point does increasing the starting height (potential energy) result in the car NOT travelling as far? Why might this occur?

STEAM Engineering and Computer Science (CS)

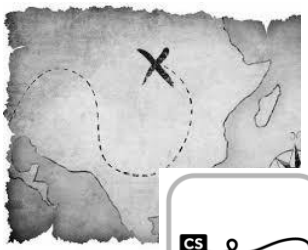
Ideas Shared May 11 - May 15, 2020

1 Bridge on a Budget

Who can build the strongest bridge using the least amount of materials?

bit.ly/2zHhQTP

2 Treasure Hunt



Ready for a Treasure Hunt? Use computer science and imagination to create a treasure map or an obstacle adventure.

bit.ly/362pNPD

3 Get Inspired by books

bit.ly/3bdrV8E

FCPS families can also explore these collections:

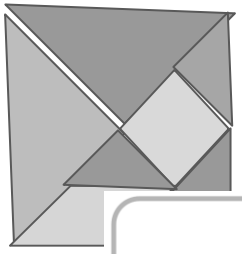
- bit.ly/38ZXbGQ
- bit.ly/2UnF4p3
- bit.ly/2U5JOAJ

4 Superhero

Who is a superhero in your life? Every day is a good day to celebrate our heros! Create a flip book about them or code an animation

bit.ly/3cBaDn1

5 Decomposing



Decomposing helps us create art and music, achieve goals, solve math problems, expand our vocabulary and more. Give it a try!

bit.ly/2T7EmfI

6 Map it Out

Where have you been spending the most time? Map it out and practice abstraction and critical thinking skills.

bit.ly/2T6MEV6

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Bridge on a Budget

We need bridges to help us travel. Bridges can be big, small, really expensive, less expensive. Civil engineers practice their designs before they construct their finished bridge: **With $1 of materials, design a bridge that can reach across a 30 cm gap and hold at least two toy cars. The more weight it can hold, the better!**

ASK: How can I design the strongest bridge with a $1.00 budget?

IMAGINE: Think about your resources. How strong is one piece of spaghetti? How wide does the bridge need to be to fit a toy car?

PLAN: Create a detailed plan drawing (with measurements). List each material and its cost. Is your total cost less than $1? Share your plan and ask for permission to build.

MATERIAL	COST
Spaghetti	$0.01 per piece
White glue	$0.25 bottle
Tape	$0.10 per foot

(If you don't have spaghetti, roll up thin strips of scrap paper to make "paper spaghetti," or use materials you do have.)

CREATE: Build your bridge and let the glue dry.

TEST: Do you cars fit? Find a way to add more weight a little bit at a time (try coins). How much weight does your bridge hold? Will it hold more money than it costs to build?

IMPROVE: Now that you've made one bridge -- and broken it -- make another! Think about what worked and what didn't. Consider the questions below.

Questions to think about:

1. What worked to make the bridge strong?
2. Where did the bridge break? Why there?
3. Can I make my bridge stronger and cost less?
4. Which material worked best, glue or tape?
5. What different idea will you try next time?

MATH CHALLENGE: 5th-8th grades: Your budget is $5.00, but each piece of pasta costs $0.07. Can you create an algebraic formula with a variable ***p*** that will give you your pasta cost?

Connections to what you're learning in other subject areas

- Math: budgeting, decimal addition
- Science: force, motion, energy
- Social Studies: great inventions
- PoG: Creative & Critical Thinker
- PoG: Goal Directed and Resilient

Find activities like this in packets mailed to FCPS students **May 11**, 2020.

bit.ly/2Xgq0MU

Bridge on a Budget

This example bridge uses 60 pieces of pasta for a total cost of $0.85.

Connections to what you're learning in other subject areas

- Math: budgeting, decimal addition
- Science: force, motion, energy
- Social Studies: great inventions
- PoG: Creative & Critical Thinker
- PoG: Goal Directed and Resilient

Find activities like this in packets mailed to FCPS students **May 11**, 2020.

bit.ly/2Xgq0MU

ASK: How can I design the strongest bridge with a $1.00 budget?

IMAGINE: Sketch two ideas you have. Find out more about bridges.

PLAN: Draw your plan. Label each **part** and describe its **purpose**. How will your device go together? List your materials. Calculate your cost.

CREATE & TEST: With a parent, build and test your bridge.

IMPROVE:

What worked? _____

What didn't work? _____

What will you change?_____

What step in the design process helped you think creatively? _____

STEAM Engineering and Computer Science (CS)
Ideas Shared May 18-22, 2020

This summary page will be updated at the end of the week of May 18-22 to include bit.ly links to daily tweets highlighting each activity:

Coming Soon:

- Career Exploration
- Using simple machines to engineering a sculpture that moves
- Using #CSinFCPS patterns and generalizations to solve problems
- Puzzles -- Engineer a jigsaw or decode a cipher
- Engineer a pop up thank you card or an encrypted thank you card

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Uncover New Interests, Hobbies, and Career Possibilities (Grades 6-12)

What are some of your favorite things? Can you remember the first time you tried that activity and what made you interested in it? What kind of work do you imagine yourself doing when you grow up? Trying new things can spark new interests. When is the last time you tried something new?

Try these activities to explore career fields and interests:

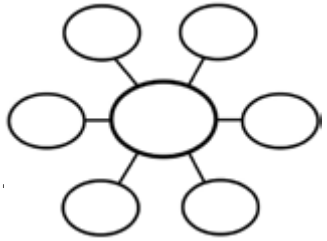
1. Interview someone about their career interests.

Plan: Who will you talk with? What questions will you ask them? Can you think of questions that would tell you about their perspective of their job? Here are a few examples:

- What skills help you in your job?
- How do you use the Portrait of a Graduate Skills? www.fcps.edu/about-fcps/portrait-graduate (pictured right)
- What education and training did you need?
- What is one challenging thing about your job?
- What do you find rewarding in your job?
- What other interests do you have?

2. Create a mindmap:

Organize your ideas in a mindmap. You might group ideas into categories of things you'd like to try.



3. Explore more resources:

- Virginia Career View **bit.ly/35SPq2S**
- FCPS Naviance **bit.ly/2YT3N8u**
- Engineering Careers **bit.ly/3dG65vG**
- Tech Pathways **mypathway.tech/**
- ONET **onetonline.org/** **and** **bit.ly/3BBEFPL**

Portrait of a Graduate

Communicator

Collaborator

Global and Ethical Citizen

Creative and Critical Thinker

Goal Directed and Resilient

Connections to what you're learning in other subject areas

- Portrait of a Graduate (POG)
- Academic and Career Planning
- Language Arts: Interviews

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

Uncover New Interests, Hobbies, and Career Possibilities (Elementary grades)

What are some of your interests? Can you remember the first time you tried that activity and what made you like it? Can you imagine doing what you like for a job? Trying new things can spark new interests.

.

Try these activities to explore jobs and interests:

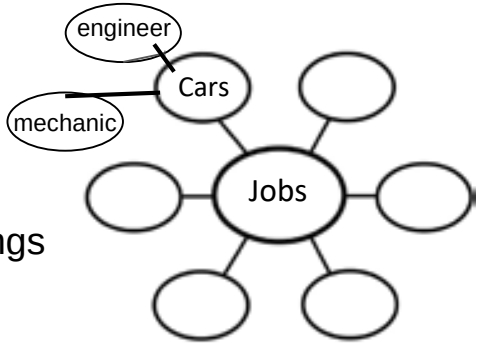
1. Interview someone about their job

Plan: Who will you talk with? What questions might you ask them? Here are a few examples:

- What interests do you have?
- What is your job and how do you do it?
- What do you like about your job?
- What are things in your job that surprised you?
- If others tried your job, what would they like?
- In what ways are you a good communicator in your job? How about a good collaborator? How do you go about solving problems?

2. Create a mindmap:

Organize your ideas in a mindmap. You might group ideas into categories of things you'd like to try.



3. Explore more resources by grade level:

- Virginia Career View **bit.ly/35SPq2S**
- Portrait of a Graduate Connections: www.fcps.edu/about-fcps/portrait-graduate (pictured right)

Portrait of a Graduate

Communicator

Collaborator

Global and Ethical Citizen

Creative and Critical Thinker

Goal Directed and Resilient

Connections to what you're learning in other subject areas

- Portrait of a Graduate (POG)
- Academic and Career Planning
- Language Arts: Interviews

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

FCPS students can watch a video:

bit.ly/3cs4wRZ

Connections to what you're learning in other subject areas

- Science: simple machines (*incline plane, pulleys, levers, screws, and more*)
- Math: measurement
- Language arts: parts of a story

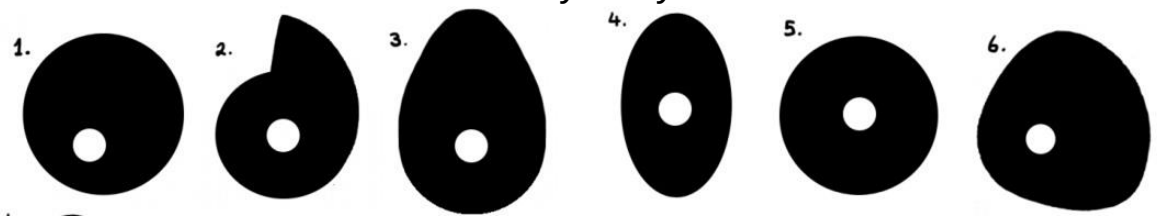
Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

Thanks to Erin Fortenberry of Ravensworth ES for this idea!

Cardboard Automata

Make a kinetic sculpture that can bounce or spin! Use what you know about simple machines to make your sculpture move in different ways. Automata have been used to make animated toys and sculptures. Different shaped "cams" (pictured below) make different motions. Which ones will you try?



Directions:

Ask: How can I make a cardboard sculpture move?

Imagine: Think about simple machines and how they work. Which ones will I need in my automata? How will they change motion from rotation to up/down?

Plan: Select the motion you want and draw your plan.

Create: Build your automata. Get help from an adult.

Test: Try out your automata. Are the "simple machines" doing their job?

Improve: What can you change to make your automata work better? Retest. Can you add another moving piece?

Questions to think about:

1. Which simple machines did you include in your design?
2. How did you change from rotation to up/down motion?
3. How might a change in your design (such as changing the shape of your "cam") affect the motion?

MATERIALS:

- Cardboard box
- Flat cardboard
- Straws
- Skewers
- glue

Be creative to use supplies you have

SAFETY ALERT

- An adult should supervise students to use scissors safely if students choose to use scissors.

FCPS students can watch a video:
bit.ly/3cs4wRZ

Connections to what you're learning in other subject areas

- Science: simple machines
- Math: measurement
- Language arts: parts of a story

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

Automata

ASK: How can I make a cardboard sculpture move?

IMAGINE: Sketch two ideas you have. Find out more automata and how cams work::

PLAN: Draw your plan. How will your sculpture move? Which cams will you use? List your materials.

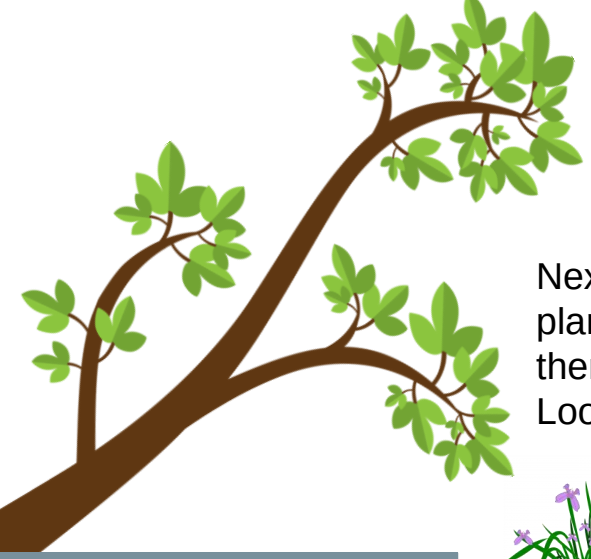
CREATE & TEST: Trace and cut a circle. Cut a small slot in the center of the circle and glue the penny into the slot.

IMPROVE: Did your sculpture move they way you thought it would? Can you try some different shapes to make it move in other ways? _____

What worked? _____

What didn't work? _____

What will you change?_____



Secret Formula of Plant Patterns

Next time you go out for a walk with our family, look carefully at the plants around you. How are they arranged? Did someone plant them in a pattern? What kind of pattern could it be?
Look at the plants below and see if you can figure out the pattern:

Now look more carefully at a flower or stem of a plant. Can you find a number pattern for the rows of petals or leaves? How do the numbers change? If you look at more than one bud of the same kind of plant (like the lily at right), are the number patterns the same? How many petals per row? How many rows per flower? How many flowers per stem?

Using your knowledge of the pattern you have found in the flowers or stems, **draw a detailed picture of a flower or plant**. Include number patterns in your drawing. Then, explain the number patterns to a parent or relative.

UPPER GRADE CHALLENGE:
Many trees hide a secret formula. Look carefully at trees and how the branches are arranged and grow. Can you apply a number pattern to how the branches and leaves are arranged? Can you make connections to a Fibonacci sequence? Where else do you see this same sequence in nature?"

Connections to what you're learning in other subject areas

- Math: number patterns; Fibonacci sequence
- Science: observation, plant classification, plant life cycle
- PoG: Ethical and Global Citizen

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

Secret Message Thank You

Can you create your own secret code (also called a cipher)?

Computer scientists use ciphers to protect our information by *encryption*. Computer programs can encrypt information so only the person with the *decryption* key can access the data. Three example ciphers:

Caesar Cipher

Messages with the Caesar cipher shift the alphabet left or right to assign a new letter to the original. For example, a two-letter shift may have "a" written as "c." So "cat" would be written in code as "ecv."

A B **C** D E F...
A B **C** D **E** F...

Random Letter Cipher

Instead of shifting the whole alphabet, we can randomly assign letters. Random letter ciphers must have the key, and both sender and recipient must have the same key for this type of code to work.

Sample Key: E = Z
D = B

Book Cipher

A book cipher uses the page, line, and number where a word appears in a book. The key is that both sender and recipient must have the same edition of the same book. For example, in the first printing of the book *Holes*, page 110, line 25, word 5 is "schoolhouse."

- Choose a cipher or invent your own. Then, use your code to write a **Thank You** note to someone in your home or your community.
- Along with this page are directions on how to make a pop-up card. Can you add the pop-up elements to your message card? Is there a way for you to incorporate the key to your code into the moving elements of your card?
- Make sure to include the key to the code (maybe write it out on the back of the card) so the person receiving the note can figure out what you are saying.

SAFETY ALERT

An adult should supervise students to use scissors safely.

Materials:

- Colored paper
- Scissors
- glue

Connections to what you're learning in other subject areas

- Math: patterns; geometry
- Language Arts: non-fiction writing
- Art: Design
- Computer Science: encryption
- PoG: Communicator

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU

STEAM Engineering and Computer Science (CS)
Ideas Shared May 26-29, 2020

This summary page will be updated at the end of the week of June 1-5 to include bit.ly links to daily tweets highlighting each activity:

Activities included on the next pages:

- What robots can you design? Get inspired with this video bit.ly/p8choiceboard Use #CSinFCPS to decompose compound machines. Explore robotics careers.
- What solutions can toys inspire? See how a whirligig inspired a low-cost paper device to test for malaria and save lives.
- Use music and #CSinFCPS to journal about how you feel throughout the day
- Write an encouraging message to yourself or someone else. Pop-up card and cipher code message instructions included.

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

Dreaming Up Droids

Photograph courtesy of Sodexo

DESIGN A ROBOT TO SOLVE A PROBLEM: Robots are all around us! They help by doing jobs to make our lives easier. There are robot vacuum cleaners, delivery services, and even deep space explorers! Design a robot that could solve a problem or do a job that is important to you. If you have watched this video: **bit.ly/p8choiceboard** and completed the design challenge from this week's Choice Board, you have brainstormed, planned, designed, and refined your robot idea. Using the same simple shapes, can you build a model of your robot using engineering practices?

Directions:

Ask: How can I use simple shapes to design and build a complex robot that can do a job important to me?

Imagine: Imagine three tasks my robot might do. Pick the two best, and sketch out the designs using shapes.

Plan: Select the best design and create a detailed plan. Include measurements and a list of materials.

Create: Build a model of the robot.

Test: Review your robot design and construction. Are the shapes integrated into your robot design?

Improve: What can you change to make your robot work better? Are there additional shapes you can add?

Questions to think about:

1. Which shapes did you include in your design?
2. How did you change your design from your original drawing to your plan?
3. How might simple machines help your robot work?

MATERIALS:

- Cardboard boxes/tubes
- Flat cardboard
- Straws
- Paper
- Glue/tape

Be creative to use supplies you have

SAFETY ALERT

- An adult should supervise students to use scissors safely if students choose to use scissors.

Connections to what you're learning in other subject areas

- Science: simple machines, motion
- Math: Geometry
- Engineering Practices
- Art Design and Color
- POG: Creative and Critical Thinker

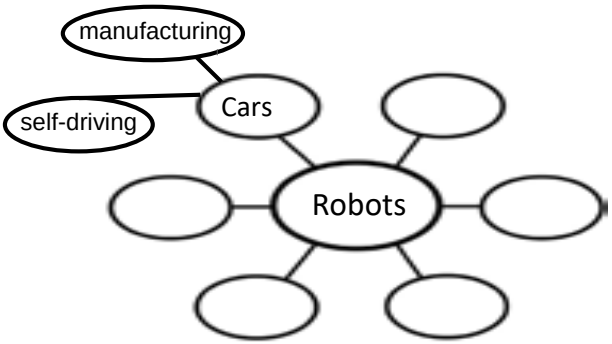
Find activities like this in packets mailed to FCPS students **May 26**, 2020.

bit.ly/2Xgq0MU

Robotics Career Exploration

How might robots be part of a career? Try these activities to explore careers that connect to robotics.

1. Brainstorm: Where have you seen robots? What industries or jobs might have people create, program, or operate robots? Create a mind map to make your thinking visible.



2. Explore: How the National Academy of Engineering's Grand Challenges bit.ly/2ZLSYPQ. What ways might robotics connects to careers? Add new ideas to your mind map.

3. Explore more resources by grade level:

K-12

- Computer Science in FCPS: bit.ly/CSinFCPS
- Virginia Career View bit.ly/35SPq2S
- Portrait of a Graduate Connections (pictured right) www.fcps.edu/about-fcps/portrait-graduate

Grade 3-10: National Geographic Robot Game bit.ly/3bS4CkQ (no login needed)

Middle and High School

- Engineering Careers bit.ly/3dG65vG
- ONET bit.ly/3BBEFPL
- Job Posting bit.ly/2XgEgg that show academic requirements and certifications needed

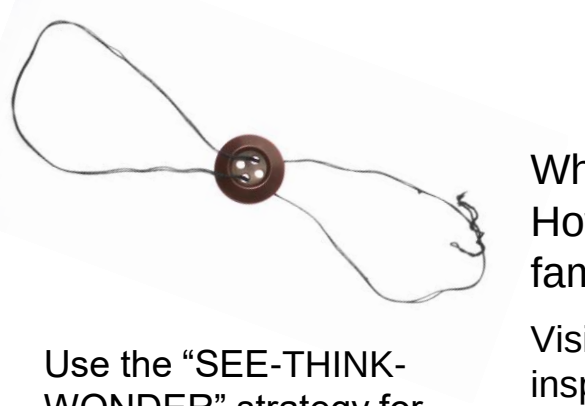
There are many more resources you can explore to learn more about robotics careers. Have fun exploring!

Connections to what you're learning in other subject areas

- Portrait of a Graduate (POG)
- Academic and Career Planning

Find activities like this in packets mailed to FCPS students **May 18**, 2020.

bit.ly/2Xgq0MU



Use the “SEE-THINK-WONDER” strategy for the photograph above.

Toy-Inspired Inventions

What inventions might you create from playing with toys? How might your inventions make life easier for you, your family, your community, or the globe?

Visit stanford.io/3gagCBw to see how a spinning toy called a whirligig inspired bioengineers to invent a life-saving paper centrifuge. A centrifuge is a machine that spins so quickly it can separate a mixed liquid into parts.

ASK: What real world problem might you want to learn more about? Talk with a friend or family member to brainstorm ideas. Explore more global challenges: bit.ly/2UeG6Vd.

IMAGINE: What invention might you create? Think about your toys to spark your imagination.

PLAN: Draw, measure, and label your plan. Make a list of materials. Get parent permission.

CREATE & TEST: Create your invention and show someone how it work.

IMPROVE: What changes might you make? What ideas might you want to explore next?

Connections to what you’re learning in other subject areas

- Science: Physics
- Math: Measurement
- Engineering Practices
- POG: Creative and Critical Thinker

Find activities like this in packets mailed to FCPS students **May 26**, 2020.

bit.ly/2Xgq0MU

A Real World Example:

JANUARY 10, 2017

Inspired by a whirligig toy, Stanford bioengineers develop a 20-cent, hand-powered blood centrifuge

Stanford bioengineers have developed an ultra-low-cost, human-powered blood centrifuge. With rotational speeds of up to 125,000 revolutions per minute, the device separates blood plasma from red cells in 1.5 minutes, no electricity required.

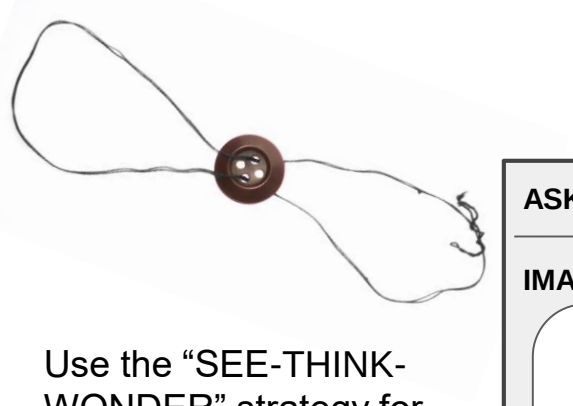
Build Your Own Whirligig:

Materials: 2 feet of string & a large button (or paper cut into a circle)

Step 1: If using a button, thread the string through two holes. If using paper, have an adult help you put two small holes for the strings near the center of the disk.

Step 2: Tie the string into a loop and move the button to the center.

Step 3: Place your index fingers into each side of the loop, then gently swing the button in a circle. Move your hands in and out to keep the button spinning.



Use the “SEE-THINK-WONDER” strategy for the photograph above.

Connections to what you’re learning in other subject areas

- Science: Physic
- Math: Measurement
- Engineering Practices
- POG: Creative and Critical Thinker

Find activities like this in packets mailed to FCPS students **May 26**, 2020.

bit.ly/2Xgq0MU

Toy-Inspired Inventions

ASK: How might I use recycled materials to create an invention?

IMAGINE: Sketch two ideas you have. Use toys to spark your imagination:

PLAN: Draw your plan. What are the different parts of your invention. How will they work together?

CREATE & TEST: WIth parent permission, create and test your invention..

IMPROVE:

How does the invention you built help to solve a problem?_____

_____

What worked? _____

What didn’t work? _____

What will you change?_____

Mood Journaling through Music

How do you feel during different parts of the day? Are there patterns that you notice in how you feel? Journaling can help us reflect and understand our emotions and express our thoughts in writing.We can also journal through music.

Engineer a music journal.

Ask: How might I engineer a music journal that captures my different feelings throughout the day?

Imagine: Possibilities for connecting music to feelings. Will you create new music, make a playlist, create an animation that plays music using scratch.mit.edu

Plan: *If you are engineering a journal, instrument, or animation,* write out you plan and materials you need, share it with your parents, and get permission to create

Create: List the emotions you feel throughout the day. Think of songs that encapsulate your feelings, or create songs that represent your feelings. Share your song list with someone and tell them why you chose each song.

Improve: *If you engineered a journal, instrument, or animation,* what would you like to change or create next?

Expressing Feeling through Music

Musicians capture emotion through:

- Tempos (fast/slow)
- Instruments (brass, percussion, and more)
- Dynamics (loud/soft)
- Lyrics
- And more!

Connections to what you're learning in other subject areas

- Music
- Social and Emotional Learning
- Metacognitive Self-Awareness
- Language Arts: Tone, Mood, and Emotions

Optional

- Computer Science: Coding
- Science: Amplitude and Pitch

Find activities like this in packets mailed to FCPS students **May 26**, 2020.

bit.ly/2Xgq0MU

Questions to think about:

1. How did journaling and finding music today make you feel?
2. How did you use your imagination to think about new ideas?

STEAM Engineering and Computer Science (CS)
Ideas Shared June 1-5, 2020

This summary page will be updated at the end of the week of June 1-5 to include bit.ly links to daily tweets highlighting each activity:

Coming Soon:

- Engineer a time capsule.
- Environmental FCPS Get2Green data and mathematics
- Retweet: highlights of the #CSinFCPS and #FCPSSTEAM

These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

STEAM Engineering and Computer Science (CS)
Ideas Shared June 8-12, 2020

This summary page will be updated at the end of the week of June 1-5 with a highlight of each activity:

Coming Soon:

- Create a cartoon to include in your time capsule and turn it into an animation. Retweet: some CS of the activities that we've posted to highlight POG, patterns, #CSinFCPS and #FCPSSTEAM, and creating cards for for yourself or others.

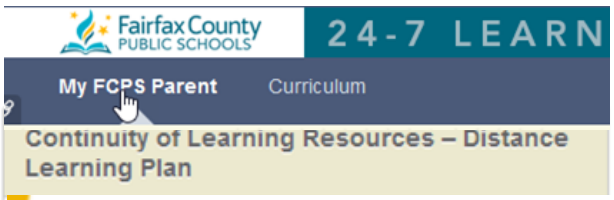
These activities connect to the distance learning packets mailed home to FCPS Students and Families **bit.ly/2Xgq0MU** and posted on FCPS 24-7 **bit.ly/2WE9GN**

How FCPS Families and Students Can Access More Learning Resources

Step 1

Log into **FCPS 24-7 Learning** fcps.blackboard.com/webapps/login

Visit **bit.ly/2WE9GN** for directions.



Choose a course
Your school may have more links to choose.

Elementary Resources

Middle and High School Resources

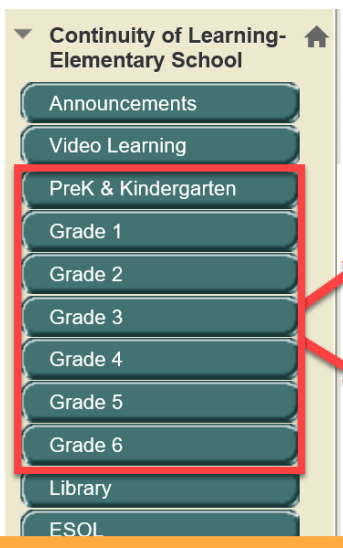
Step 2

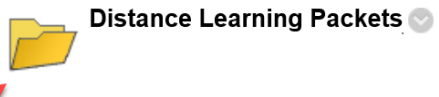
Explore resources in the elementary, middle and high school links.

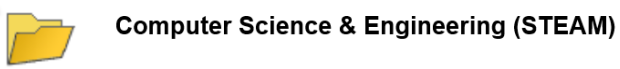
Note: images below show where distance learning packets are located and where to find computer science and STEAM resources.

Click the left edge of the screen to open the menu

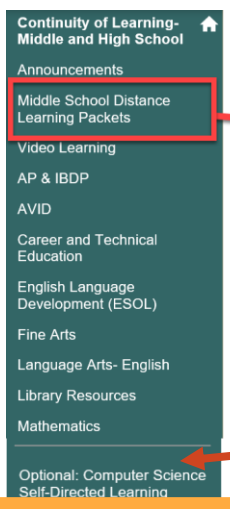
Elementary Resources

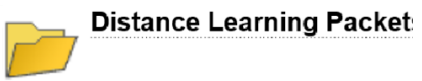






Middle and High School





Optional:
Computer Science Self-Directed Learning