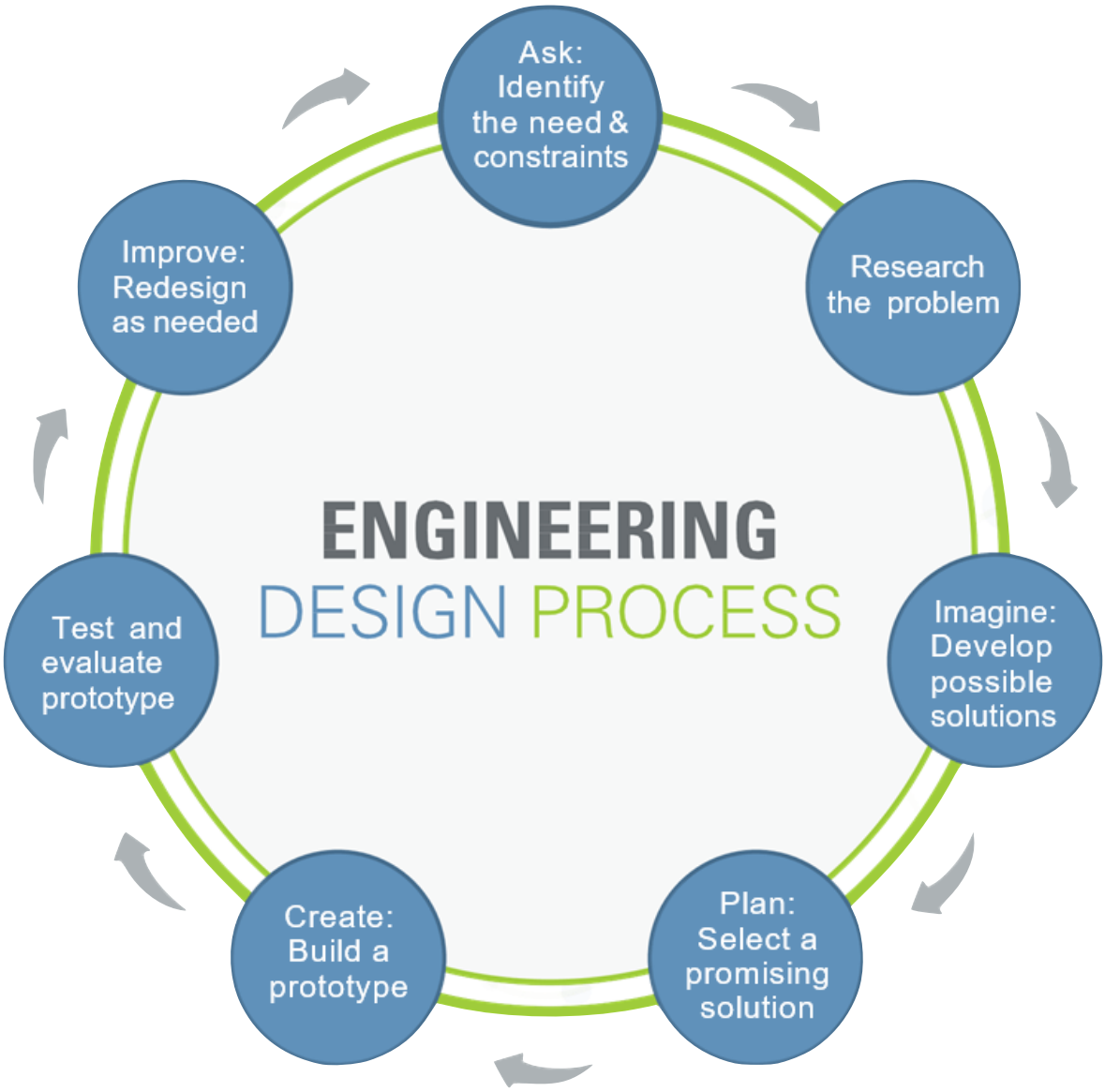
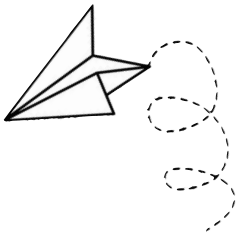
10 Days of Design Thinking Challenges to try at Home (using Recyclables)



Ask an adult to help you find recyclables and complete these (optional) challenges at home.

Design Challenge #1 - Paper Airplane



Design a paper airplane to fly the farthest.

Suggested Materials: paper, tape, scissors, ruler/yard stick/measuring tape

Plan:

- Sketch and label your design ideas on a piece of paper.
- What materials will you use? What design will you try?
- Label your sketch with the materials that you might need.

Build your first prototype.

Test your design. Make improvements if you can. Try different versions.

After you try your own design, you can try other versions of a paper airplane by following the step-by-step instruction links below…

Step-by-step Instructions:
https://www.diynetwork.com/made-and-remade/learn-it/5-basic-paper-airplanes

https://www.artofmanliness.com/articles/how-to-make-the-worlds-best-paper-airplanes/

Reflect:
What design features worked the best?
What improvements did you need to make?
How far did your airplane fly?

Design Challenge #2 - Musical Instrument

Design a new musical instrument.

Suggested Materials: cardboard rolls, dried rice or beans, plastic bottles cups, paper clips, coins, rubber bands, small boxes, spoons, tape, scissors

Plan:

- Sketch and label your design ideas on a piece of paper.
- What materials will you use?
- Label your sketch with the materials that you might need.

Build your first prototype.

Test your design. Does it make the sound you were trying for? Make improvements if needed. Create a variety of instruments if you can.

Play your instrument to a song you already know. Can you compose a new song? Play it for someone. Create a new dance to go with the song.

To see many examples of recyclable instruments try the link below…

Additional Information: https://kinderart.com/art-lessons/music/easy-make-musical-instruments/

Reflect:
Which materials made the best sounds?
What improvements did you need to make?

Design Challenge #3 - Newspaper Fort

Design a newspaper fort.

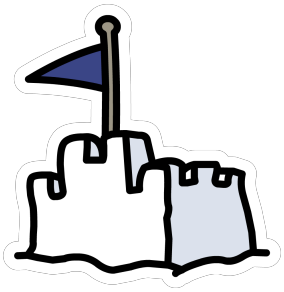
Suggested Materials: newspaper, tape, yard stick/measuring tape

Plan:

- Sketch and label your design ideas on a piece of paper.
- What materials will you use?
- Label your sketch with the materials that you might need.

Build your first prototype.

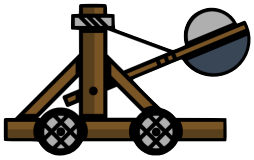
Test your design. Can you fit inside your fort? Does it stand alone? Make improvements if needed. Try out different designs.



Additional Information:
https://modernparentsmessykids.com/play/

Reflect:
What design features worked the best? Which shapes were the strongest?
What improvements did you need to make?
How tall or large was your fort?

Design Challenge #4 - Mini Catapult



Design a catapult that can launch a cotton ball or pom pom ball.

Suggested Materials: craft sticks, tape, cotton ball/pom pom ball, rubber bands, spoon or plastic bottle cap, ruler/yard stick/measuring tape

Plan:

- Sketch and label your design ideas on a piece of paper.
- What materials will you use?
- Label your sketch with the materials that you might need.

Test your design. Make improvements if you can. Try out different versions.

After you try your own design, you can get help by following the step by step instruction link below…

Step-by-step Instructions:
https://www.wikihow.com/Make-a-Mini-Catapult

Reflect:
What design features worked the best?
What improvements did you need to make?
How far did you launch your cotton ball?

Design Challenge #5 - Spaghetti Tower

Design the tallest spaghetti tower possible.

Suggested Materials: uncooked spaghetti, string, tape, scissors, marshmallow or something else to balance on the top of tower

Plan:

- Sketch and label your design ideas on a piece of paper.
- Consider different designs that will support a marshmallow on top

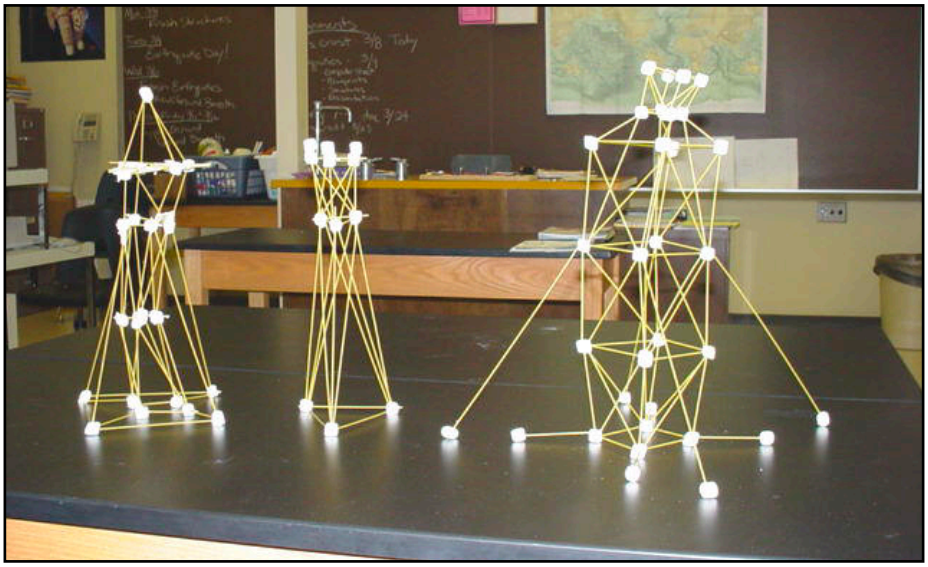
Build your spaghetti tower.

Test your design. Does it support the weight of a marshmallow on top? Make improvements if you can. Test again.

Full Challenge Directions:
https://tinkerlab.com/spaghetti-tower-marshmallow-challenge/

Alternative Challenge: use mini marshmallows, gum drops, or something similar to connect the spaghetti noodles. Also toothpicks can be substituted for spaghetti with these smaller, sticky connectors. Try to build a large tower or structure.

Reflect:
What design worked the best?
What improvements did you need to make?
How tall was your tower or structure?



Design Challenge #6 - Helpful Invention

Design a new invention that will help make the world a better place.

Suggested Materials: any clean recyclables that you are allowed to use at home, any art supplies that you have at home: tape, scissors

Plan:

- Brainstorm some ideas that might improve our world. Choose one.
- Sketch and label your design on a piece of paper.
- Think: What materials will you use to build the prototype?
- Label your sketch with the materials that you might need.

Build your first prototype.

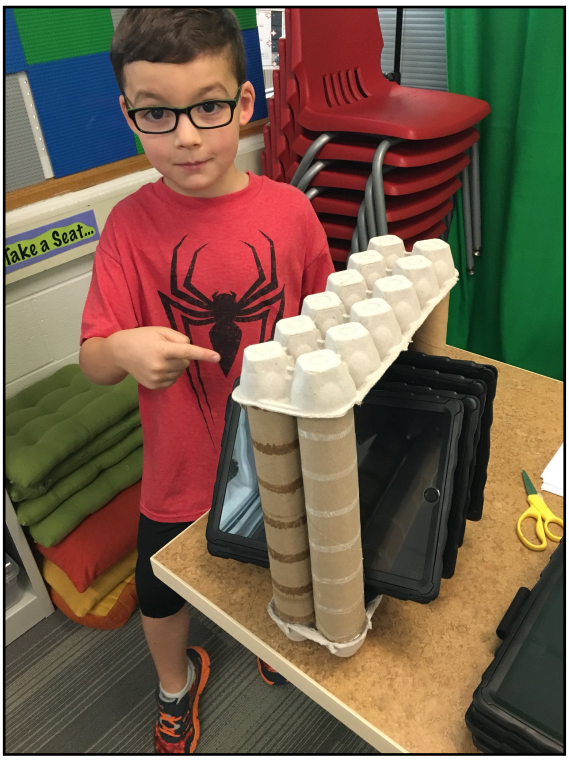
Evaluate: think about your design. Do you think it will improve or help someone at school or in your home? Make changes if needed.

Share your design idea with someone else at home. What do they like about your invention? Ask them if they have any suggestions for how your invention could be improved.

Additional Information: https://www.positive.news/society/youth/childrens-inventions-to-make-the-world-a-better-place/

Reflect:
What do you like best about your design?
What improvements did you need to make?
What other types of inventions would you like to work on?

This student created an iPad carrier for his teacher so she would have an easier time carrying them from place to place. →



Design Challenge #7 - Float a Boat

Design a boat that floats on water when weight is added.

Suggested Materials: aluminum foil, pennies (or other small weighted objects), a container or a sink filled with water

Plan:

- Sketch and label your design ideas on a piece of paper.
- What materials will you use?
- Label your sketch with the materials that you might need.

Build your first prototype.

Test your design. Does it float? Make improvements if needed. Try adding one penny at a time to your boat. Can you think of a way to improve your design so that it might hold more weight?

Additional Challenge Idea: try creating a boat using different types of materials (cardboard, styrofoam, etc). What design features work best?

Full Lesson Directions: https://pbskids.org/fetch//parentsteachers/activities/act/act-floatmyboat.html

Reflect:
Which materials worked best in your design?
What improvements did you need to make?
How many pennies was your boat able to hold without sinking?

Design Challenge #8 - Cups, Cubes, and Sticks

Design the tallest cup tower possible

Suggested Materials: plastic cups, wooden cubes or blocks, craft sticks

(It's still fun to just build with cups if that is all you have at home)

Plan:

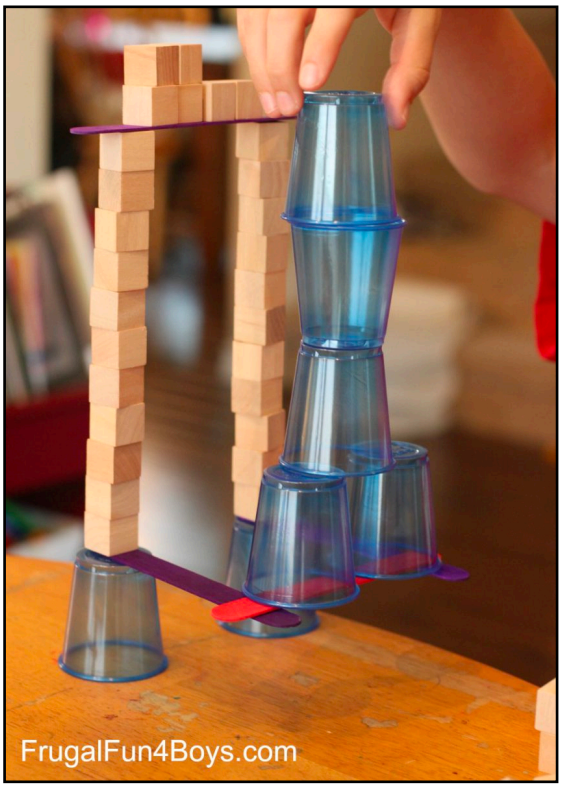
- Sketch and label your ideas on a piece of paper.
- Consider different designs with the materials that you have.

Build your tower (building on the floor is a good idea).

Test your design. Does it stand up without support? Make improvements if needed.

4 Additional Challenges using Cups, Cubes, and Sticks:
https://frugalfun4boys.com/4-engineering-challenges-kids/

Reflect:
Do you think your design was creative?
What improvements did you need to make?
How tall was your tower or structure?



Design Challenge #9 - Create with Code

Celebrate the Hour of Code any time of the year!

Suggested Materials: iPad (or any type of mobile device) or computer

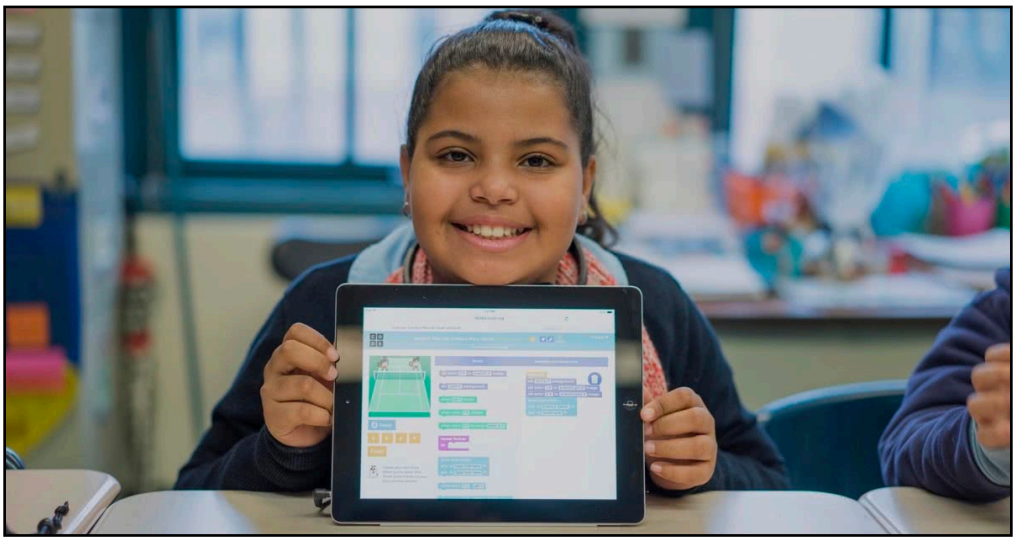
Plan:

- Go to the free APS website: https://tinyurl.com/apscodes
- **Choose** your level of coding skill (beginner or intermediate)
- **Practice** coding by completing the code.org activities on the website.

Information about the Code.org website:
With Hour of Code students complete simple puzzles by designing small sequences of computer code. Hour of Code uses Blockly, an easy to use coding platform that uses snap-together blocks to represent lines of code. Hour of Code now offers several different one hour, modules that fit with different ages and interests. Hour of Code can be completely self led, as new concepts are explained with instructional videos. The videos on the APS site are not housed on YouTube so they can be watched on APS student devices.

Reflect:
What did you learn from the coding activities?
What did you find challenging?
Why do you think it is important to learn how to code?

#CodeAllYear



Design Challenge #10 - Paper Obstacle Course

Design a paper obstacle course for toy cars

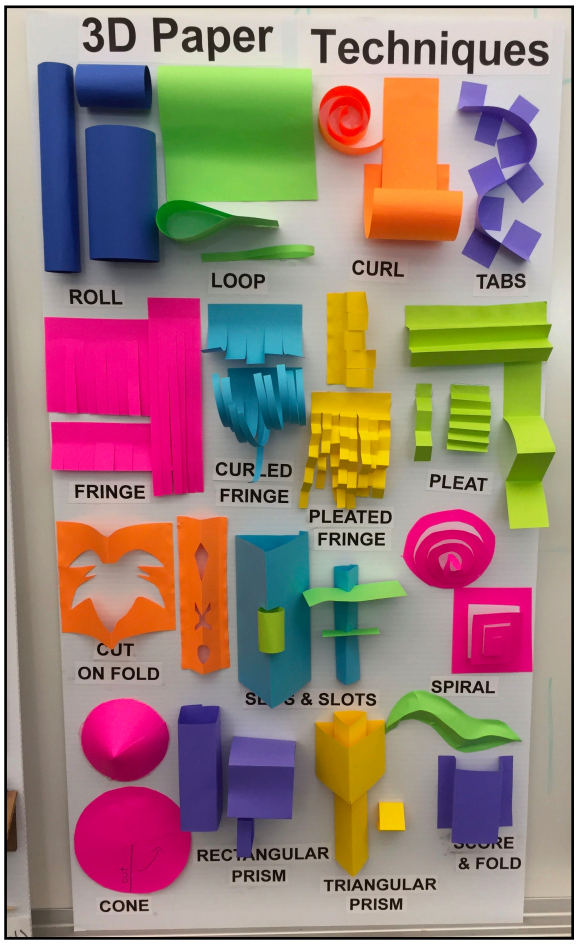
Suggested Materials: large piece of paper for the base, strips of construction paper, scissors, tape or glue, toy car

Plan:

- Sketch and label your design ideas.
- Consider different ways to make paper into 3D shapes.
- Can you include a bridge or tunnel?

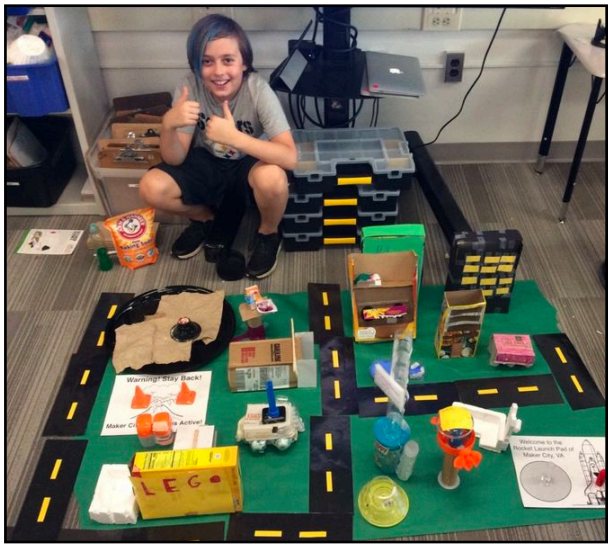
Build your obstacle course by attaching your 3D paper strips to a large piece of paper in interesting ways.

Test your design with a toy car. Make improvements if needed.



Reflect:
What paper techniques worked the best?
What techniques were tough to create?
What improvements did you need to make?

Alternative Challenge: design a mini city instead by making buildings (out of cardboard boxes) and streets. Sketch and label a map of your city before you begin.



More Resources for STEAM Learning Activities at Home:

These lessons should be done with the help of an adult.

Instructables Projects for Kids: https://www.instructables.com/living/kids/projects/

Science Projects for Kids: http://www.sciencefun.org/kidszone/experiments/

Fun Food Recipes to Try with Kids: https://tinyurl.com/recipes4kids

Make a Scribble Bot: https://www.makerspaces.com/how-to-make-an-art-bot/

Make Slime: https://sciencebob.com/make_slime_with_borax/

Dancing Raisins: https://www.giftofcuriosity.com/states-matter-dancing-raisins-experiment/

Make a bouncy ball: https://sciencebob.com/make-your-own-bouncy-ball/

Color Mixing Coffee Filter Butterflies: https://buggyandbuddy.com/chromatography-butterflies-separating-colors-in-markers/

Step by Step Instructions for Origami Projects: https://www.origamiway.com/paper-folding-crafts-step-by-step.shtml

Pasta Car Racers: https://pbskids.org/designsquad/topbuilder/2/