SPARK SHOP

ACTIVITY GUIDE

Discover Engineering In Your Favorite Things To Do
WHAT INSPIRES YOU?

Hi! We’re SparkShop, a team of engineers that teach 4th & 5th graders. We filled this booklet with activities that can help you build skills that engineers use everyday, based on things you do for fun!

We want to provide customized activities that are perfect for you, so let’s learn more about you:

How do you like to spend time outside of school?

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Our suggestions are grouped by activities you like and may already be doing.

But don’t limit yourself! Now is a great time to explore new things you’ve never tried before — you never know when you’ll discover a secret talent or new passion.
Now, reflect on your skills and strengths.

**List 3 or more of your strongest skills**

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**List 3 or more skills you want to improve**

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Each activity in this booklet has symbols next to it that indicate which **skills** they help you build:

- ![Research](image)
- ![Communication](image)
- ![Prototyping](image)
- ![Logic](image)
- ![Problem Solving](image)
- ![Collaboration](image)
- ![Leadership](image)
- ![Sketching](image)
- ![Science/Math](image)
- ![Entrepreneurship](image)
- ![Creativity](image)
- ![Technology](image)

Let’s see how what you love can help you grow!
IF YOU LIKE BUILDING

You can try:

PLAYING 3D PICTONARY

Look up the rules for Pictionary. Instead of drawing, shape the objects out of Play-doh or clay to help your team successfully guess what you're building.

TAKING SOMETHING APART

With adult permission and supervision, take something apart using tools. Notice all of the pieces that come together to create something new.

FOLLOWING CREATOR GUY

Build along with Creator Guy on YouTube as he makes awesome inventions out of cardboard.

UPCYCLING

Rescue something from the garbage or recycling bin and give it a new life as something useful.
IF YOU LIKE COMPUTERS

We recommend:

**TINKERCAD**

CAD is Computer Aided Design. TinkerCAD lets you design in 3D!

**SWIFT PLAYGROUNDS**

Learn and practice coding on a tablet or computer in this game built by Apple.

**SCRATCH**

This coding language teaches you to design your own games and stories.

**TYNKER**

Use this coding platform to design websites, mod Minecraft, and make your own games.

**MINECRAFT**

Minecraft is a great place to practice 3D design, learn material properties, and collaborate with others!
IF YOU LIKE EXPLORING

If you’re stuck at home, have a virtual adventure on these sites:

**MUSEUM OF NATURAL HISTORY**

Google “Smithsonian Virtual Tour” and click on the first result. Click on any topic to explore an exhibit about science and nature!

**NATIONAL AIR FORCE MUSEUM**

Google “Air Force Museum Exhibits” and click on the first result. You can choose to take the virtual tour (under “Featured Links”) or browse planes (under “Exhibit Areas”). Which plane is the most interesting to you? How might military planes look in the future?

**AQUARIUM LIVE CAMERAS**

Google “Monterey Bay aquarium live cam” and click on the first result. Click on any one of the animals or habitats to watch them live. Draw a picture of one of the animals you observe.

**SPACE CENTER HOUSTON**

With adult permission, you can download the Space Center Houston app to a smartphone and immerse yourself in life in space!
IF YOU LIKE FOOD & COOKING

You can try to:

PERFECT A RECIPE

Challenge yourself to make the perfect sandwich. What ingredients should you use? How much of each ingredient do you need? Record your process!

EXTRACT FRUIT DNA

On YouTube, search “Banana DNA Experiment” and watch the video posted by AskABiologist. With the help of an adult, conduct the experiment using household equipment to extract DNA from bananas, strawberries, or kiwis. Record your results by taking notes or photos.

RECREATE YOUR FAVORITE SNACK

Google “Gourmet Makes” and click on the first result. Watch a video that features food you like. Then, try your own Gourmet Make! With adult supervision, do some research online and try to recreate your favorite store-bought snack in your own kitchen.
IF YOU LIKE MAKING ART

You should try to:

CREATE A “FOUND OBJECT” SCULPTURE

Find objects around your house that aren’t being used. Combine them into a new shape to create something beautiful, then put it on display!

PRACTICE 3D DRAWING

Challenge yourself to sketch increasingly difficult 3D objects. Start with squares, cylinders, and pyramids. Work your way up to sketching objects around you, like a chair or toy.

PRACTICE MULTI-VIEW DRAWING

Engineers use multi-view drawings to sketch complex 3-dimensional shapes in 2 dimensions. Create your own by making multiple drawings an object from different viewpoints. Here's an example:

BONUS: TINKERCAD

Design in 3D using a computer at tinkercad.com
IF YOU LIKE MUSIC

You should try:

**MIXING MUSIC ON INCREDIBOX**

Head to incredibox.com and try the web version of their interactive sound mixer. Combine different beats and noises to create complex songs, unlocking mini videos along the way.

**INVENTING AN INSTRUMENT**

Use objects around your home to create a new type of instrument.

**BUILDING A DIY SPEAKER**

Google “Craft Train DIY Speaker” and click on the first result. These speakers work by amplifying sound waves! Use materials around your house to build your own DIY smartphone speaker or make a larger one for a tablet.
IF YOU LIKE PERFORMING

You should try:

**PITCHING AN INVENTION**

Share your invention idea with family or friends and have them give feedback or pitch back to you. Raise the stakes by deciding who to invest in (with pretend money of course).

**CREATING PROPS FOR A PLAY**

Set design is an important part of any performance! Create a set out of cardboard, fabric, paper, or any other materials you have laying around your house.

**SCRIPTING A COMMERCIAL**

Write and perform a cheesy infomercial for something in your house. If you're really serious, film it on a smartphone or computer.
IF YOU LIKE PLAYING OUTSIDE

You should try to:

BUILDING AN OBSTACLE COURSE

Use found materials or things around your home. Enlist the people (or pets!) in your home to see who can complete it the fastest!

INVENTING A SPORT/GAME

Stuck inside? Tired of your old games? Invent a new activity that works within your constraints, or limits. If you need inspiration, look up how basketball was invented!

CALCULATING PERSONALIZED STATS

Evaluate yourself as an athlete by running a simple experiment and analyzing the data. For example: How fast can you run down the block? How many free throws can you make in 10 attempts? See if you can improve your statistics over time.

GARDENING

Find a window-sill, porch, or space in your yard to grow a garden. It could be a houseplant, flowers, or produce! Draw pictures or take notes to track the growth of your plant(s).
IF YOU LIKE READING

We recommend the books below.

ABOUT ENTREPRENEURSHIP

The Lemonade War By Jacqueline Davies
The Toothpaste Millionaire by Jean Merrill

ABOUT INVENTION & INVENTORS

Calling All Minds: How to Think and Create Like an Inventor by Temple Grandin
Girls Think of Everything: Stories of Ingenious Inventions by Women by Catherine Thimmesh
I Wonder Why Zippers Have Teeth (And Other Questions About Inventions) by Barbara Taylor
How We Got To Now: Six Innovations that Made the Modern World by Steven Johnson

ABOUT ENGINEERING & SCIENCE

The Popular Clone by M. E. Castle
The Way Things Work Now by David Macauley
Rosie Revere’s Big Project Book for Bold Engineers by Andrea Beaty
Astronaut Aquanaut: How Space Science and Sea Science Interact by Jennifer Swanson
How to Code a Sandcastle by Josh Funk
IF YOU LIKE TV & MOVIES

Try watching something in these categories:

ABOUT INVENTION
Shark Tank (abc.com, YouTube, Hulu)
Cloudy With a Chance of Meatballs (Amazon, YouTube)

ABOUT SPACE EXPLORATION
Apollo 13 (Hulu, Amazon, YouTube)
Hidden Figures (Amazon, YouTube)
October Sky (Amazon, YouTube)

ABOUT TECHNOLOGY
Spare Parts (Vudu, Amazon, YouTube)
Big Hero 6 (Disney+, Amazon, YouTube)
WALL-E (Disney+, Amazon, YouTube)
Spy Kids (Netflix, Amazon, YouTube)

ABOUT BUILDING
Lego Masters (fox.com, Hulu)
The Boy Who Harnessed the Wind (Netflix, Amazon)
IF YOU LIKE WRITING

You can:

INTERVIEW AN ENGINEER

Talk to an engineer/inventor in your life or (with adult permission) send your questions to AskAnEngineer@sparkshop.org

WRITE ON THE TOPICS BELOW

- Think about a problem the main character faces in your favorite book. Re-write the ending with the silliest invention they could have made to fix their problem.

- Write a how-to guide to teach someone else how to make or build something.

- Think of something you use every day that someone once invented. Write a story about what life would be like if this invention didn’t exist?

- Write a short story about an inventor who creates something that turns out a little differently than they planned.
IF YOU LIKE YOUTUBE

We recommend the channels:

**HOW IT’S MADE**
Short documentaries showing how everyday objects are manufactured.

**HYDRAULIC PRESS CHANNEL**
See stuff getting crushed and learn how objects break.

**CREATOR GUY**
Build along and make inventions out of cardboard.

**KIDS INVENT STUFF**
Two funny adults build creations invented by kids.

**CHICKADEE ENGINEERING**
Chickadee, a little girl, makes things with help from her dad.

**CRASH COURSE KIDS**
Watch these videos, especially the engineering ones, to learn about science topics for 5th graders.