



Welcome to your deck of Family STEM Cards!
 These cards are meant to be a way for the whole family to get involved in STEM and see that STEM happens everywhere!

TECHNOLOGY



HOW THEY WORK:

There are four "suits" of cards, just like a normal deck. In each suit you will find a different theme of activities - science, technology, engineering, or math

- A-4 CARDS**
students Pre-K - 2nd grade
- 5-9 CARDS**
students 3rd - 5th grade
- 10- K CARDS**
students 6th grade and older

Let us know what you think of them by contacting us and include pictures!

A PATTERNED JELLY BEANS

MATERIALS:
 • jelly beans (or other multi-colored candies)

ACTIVITY:
 Practice writing and understanding patterns using jelly beans.

- STEPS:**
- Pour jelly beans on the table and sort by color.
 - Create an *a-b-a-b-a-b* pattern, *a-a-b-a-a-b*, and *a-b-b-a-b-b* pattern together.
 Create an *a-b-c-a-b-c* pattern, *a-a-b-c-a-a-b-c* pattern and *a-b-c-c-a-b-c-c* pattern.
 - Create 3 more patterns together.
 - Take turns starting a pattern and then ask another player to finish the pattern (4 jelly beans).

HOW IS THIS TECHNOLOGY?
Computers are programmed to read complex patterns. Understanding patterns and how they work is a foundational skill for programming.



2 PB&J PROGRAMMING

MATERIALS:
 • 2 slices of bread
 • peanut butter
 • blindfold
 • jelly
 • spatula

ACTIVITY:
 Explore how specific a computer programmer must be when programming a robot to do a task.

- STEPS:**
- Choose one person to be the "robot" and one to be the "programmer", the robot puts on the blindfold.
 - Robot starts with materials in front of them and spatula in hand.
 - Programmer verbally instructs the robot to make a PB&J sandwich.

RULES:
 The programmer cannot use the words "peanut butter, jelly, or bread. The robot must follow the directions exactly as said.

FUN FACT!
The world's largest peanut butter and jelly sandwich weighed 1,342 pounds!



3 BREAK THE CODE

MATERIALS:
 • cereal box
 • construction paper
 • marker
 • scissors
 • ruler

ACTIVITY:
 Create a code breaker strip and write your own secret codes.

- STEPS:**
- Cut a 3" x 7.5" rectangle from the cereal box.
 - Make a 1" slit at the top and bottom of the rectangle.
 - Cut a 1" x 9" strip of construction paper and thread it through the slits of the rectangle.
 - On the cereal box rectangle, write letters A-M on the left and N-Z on the right.
 - On the construction strip, write the letters in any order.
 - Line the letters on the strip to the cereal box letters to reveal your code.
 - Create fun secret messages for family members to figure out!



4 BE MY GUIDE

ACTIVITY:
 Explore the concepts of algorithms by guiding someone to a destination.

- STEPS:**
- Start in a room in your house, blindfold one player.
 - Pick a different room or place to direct the blindfolded player.
 - The remaining family members will take turns giving one direction to the blindfolded player.
 - Once the player gets to the new destination they have to guess where they are. Then a new person is blindfolded and the game repeats.

ENDING QUESTION:
 Which direction is the hardest to give and follow?

GO FURTHER!
Have each family member give their direction and have the blindfolded person complete the actions after everyone has said it.



5 BACKYARD CODING

ACTIVITY:
 Explore how conditional statements work in coding.

- STEPS:**
- Assign one person to be the "Programmer", everyone else is a "Computer".
 - The "Programmer" will give a command and perform it, and the "computers" respond accordingly:

"Programmer" Commands

*If I Do This, Then You Do This.
 -If I jump, then you jump.*

*If I Do This, Then You Do That.
 -If I jump, then you sit.*

*If I Do This, Then You Do That,
 Else You Do Something Else.
 -If I jump, then you sit, else raise your right arm.*

- If the "computers" respond incorrectly they are out, last person in wins and becomes the "computer".



6 SUPERHERO CODING

MATERIALS:
 • post-its or paper squares
 • superhero
 • "obstacles"
 • "coins"
 • paper
 • paper

ACTIVITY:
 Use basic programming ideas and commands to direct the superhero from the start to the finish avoiding obstacles and collecting "coins".

- STEPS:**
- Set up your game board by laying out post-its or paper squares in a 10 x 10 grid.
 - Have one player mark a start and finish square, place "obstacles" in any box (make sure a route is still available), add "coins" for the superhero to grab.
 - A different player should write the code, one box at a time, using the commands "Forward, Turn Left, Turn Right" on paper.
 - Give the piece of paper to the first player and have them move the superhero through the course according to the commands.



7 STOP ACTION MOVIE

MATERIALS:
 • camera • toys

ACTIVITY:
 Create a 1-minute Stop Action Movie.

Stop action movies are created by putting together multiple still frame pictures. Between pictures you move the characters slightly so when put together it looks like they are moving.

GUIDING QUESTIONS:

1. What will your movie be about?
2. How do you want your characters to move? Which toys would be best?
3. Where is the best lighting for your set?

STEPS:

1. Put together your set and characters.
2. Take pictures as necessary (at least 100).
3. Use a Stop Motion software (Stop Motion Studio is FREE!) to create your movie.
4. Add narration, voiceover or music.

FIND INSPIRATION!

Wallace and Gromit, or the Box Trolls are examples of Stop Action Movies. Look up other movies or videos to understand how they work.



8 TOONTASTIC

ACTIVITY:
 Use the Toontastic program/app to create a story and bring it to life – in 3D!

STEPS:

1. Together, decide what you want your story to be about.
2. Download Toontastic.
3. Have each family member create a character for the movie.
4. Plot your story using one of Toontastic's Story Arcs.
5. Animate your movie and record your voice as narration.
6. Add music to the background. *Pop some popcorn and watch your movie together!*

ENDING QUESTION:

Which part of making your own movie was the most fun?

TIP:

If you don't have a computer or smart phone, plan a trip to the library! They have computers and tablets you can use with your library card.



9 BINARY JEWELRY

MATERIALS:
 • Binary Code • paper
 • 3 different colors • pencil
 of beads • string

ACTIVITY:

Write your names in binary code and use beads to make jewelry.

STEPS:

1. Google "Binary Code Alphabet" and write each letter and its code on your paper (ex. A= 01000001).
2. On a new piece of paper, write each letter of your name, next to it write the correct code.
3. Assign one color of beads for 0, 1 and a space.
4. Using your sheet is a guide, thread the beads on the string for each letter in your name or just your initials according to binary code.

Wear your latest fashion proudly!

ENDING QUESTION:

Why is binary code only 0s and 1s? What does that mean?



10 PROGRAMMING PICTURES

MATERIALS:
 • Graph Paper • pencils

PROGRAMMING KEY:

- ➡ Move one square forward
- ➠ Move one square backwards
- ⬆ Move one square up
- ⬇ Move one square down
- 🎨 Change to the next color
- 🟩 Fill in square with color

STEPS:

1. Have each person create a picture in a 10 x 10 square on graph paper.
2. Using the programming key, write an "algorithm" for each line. You should only use the symbols, no words.
3. Give your algorithm to a different family member with a clean sheet of graph paper.
4. Follow the algorithm to draw the picture, see if they got it right. *If they didn't, look back at the algorithm and see what might have happened.*

CONCEPT EXPLORATION:

An algorithm is a series of instructions on how to accomplish a task. Computers use algorithms constantly.



J SCRATCH!

ACTIVITY:
 Explore the website/app "Scratch" and create your own chase game.

STEPS:

1. Log onto Scratch or download the app onto a smartphone or tablet.
2. Spend some time looking at some of the projects people have made.
3. Together, design a chase game. Think about the characters you might want.
4. Work together to drag and drop code the game, how do you want your characters to move?
5. Decide how you want to earn points during your game.
6. Finish the game and take turns playing!

ENDING QUESTION:

How might you adjust your game to make it harder?

KEEP GOING!

You can use Scratch to make stories and animations as well. Try and make something else as a family! You can also try Scratch Jr. if Scratch is too hard.



Q BREAK THE RIDDLE

MATERIALS:
 • binary code alphabet • pen
 (found on google) • paper

ACTIVITY:

Use binary code to solve riddles.

STEPS:

1. Have each family member come up with two riddles and write them on a piece of paper. Don't write the answer.
2. Write the answer on a different piece of paper in binary code.
3. Cut the riddles and answers into strips and place them in two different piles.
4. Translate the answers into letters from code.
5. Pick a riddle from the pile and read it, pick the decoded answer that best fits.

ENDING QUESTION:

Do you notice a pattern in binary code?

RIDDLE!

How far can a fox run in the woods? Only halfway, otherwise it would be running out of the woods!



K TELESTORY STAR

ACTIVITY:
 Use the app "Telestory" to create a family TV show.

STEPS:

1. Download the app "Telestory" on a tablet or smartphone.
2. Choose a theme for the tv show.
3. Take turns selecting a scene, cue card, and costume. Each family member should record at least one scene for your TV show.
4. Save your TV show and share it with friends!

TV SHOW IDEAS:

Make a parody of a tv show you watch as a family, create your own reality tv show, pretend you have your own cooking show, solve a crime.

ENDING QUESTION:

How else can you combine STEM and art?

FUN FACT!

The average person in the United States will spend 15 years of their life watching TV!



greater cincinnati **STEM** collaborative

The Greater Cincinnati STEM Collaborative (GCSC) is the backbone K-12 STEM education nonprofit on a mission to create a robust STEM pipeline of diverse talent to meet the accelerating demands for STEM jobs in our regions. GCSC connects business, education, and community partners together to create hands-on learning experiences which prepare students to be the innovators and problem solvers of tomorrow.

In collaboration with schools and educators, GCSC supports the following programs:

- 3d Printers Club
- STEM Bicycle Club
- Summer of STEM
- Garden Engineers
- Game On!

To learn more about GCSC and how you can get involved, visit us at:

greater cincinnati **STEM** collaborative | greatercincystem.org | gcscstemed@gmail.com

f greatercincinnati**stem**collaborative | @GCSCSTEM | @greatercincystem