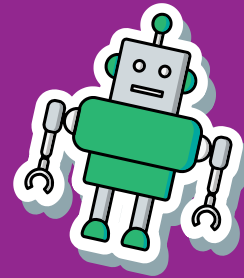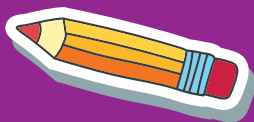# the GENIUS of PLAY™

It's more than play!

STEAM Playbook

Welcome to The Genius of Play's "STEAM Playbook"!

Play is how kids learn the skills they need for success in school and in life, and STEAM—which stands for Science, Technology, Engineering, Arts, and Mathematics—is no exception. Whether it's making a structure out of toothpicks and marshmallows, experimenting with food colors, soap, and milk, or practicing math while pretend shopping, play provides endless opportunities for kids to relate STEAM to the world around them and explore abstract concepts in a hands-on, fun, and highly engaging way.
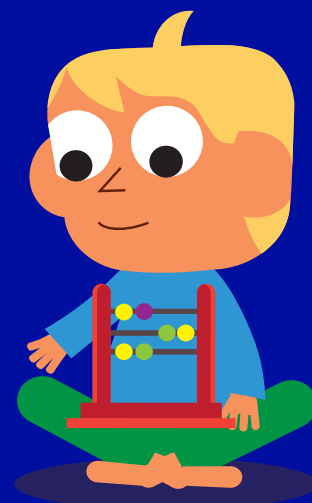
"The STEAM Playbook" features a collection of play ideas and ready-to-use activities to help you spark a child's interest in these important subjects. Every play idea includes tips for making the activity simpler or more complex, so you can easily modify it depending on the child's age. Best of all, they are easy to set up and use common materials you can easily find around the house. For more play ideas, visit www.thegeniusofplay.org and follow @GeniusofPlay on Facebook and Instagram.

Enjoy the Playbook — it's time to go full STEAM ahead!

The Genius of Play Team

What's Inside

Play Ideas

Coloring & Activity

Rainbow Milk

STEAM Focus: Science (For Ages 5+)

Combine science and visual art to create these colorful rainbow sheets that will look great displayed on the walls in your family room or your child's bedroom!

RECIPE FOR FUN:

Step 1: Working close to a sink, make sure your paper fits into the tray before moving to the next step, (but don't leave it in the tray yet).

Step 2: Pour a thin layer of milk into the tray, enough to completely coat the bottom.

Step 3: Add the food coloring in drops around the tray. Pick different colors each time for new design results!

Step 4: Add drops of dish soap on top of the food coloring drops and watch the magic begin. Observe how the food coloring moves around in the milk to create a rainbow effect.

Step 5: Use cotton swabs to swirl your colors.

Step 6: Place your paper sheet on top of the milk, press down, and quickly pull it out to set aside on a towel to dry.

Step 7: Let it dry! (After a few days of drying the paper won't smell from milk anymore!)

MODIFICATIONS:
To simplify, an adult can carry out steps 1-4 while the child focuses on observing and describing what happens. The adult and child can work together to complete steps 5-7.

To add complexity, encourage children to make a hypothesis (or prediction) about what will happen before carrying out each step. They should then make an observation and decide whether their hypothesis was correct or not. Extend this experiment further by trying different variations, such as comparing results with fat free milk, whole milk, and cream!

Impact Craters

STEAM Focus: Science (For Ages 7+)

Actively explore astronomy and math concepts as you learn about the Moon's geography through curiosity and hands-on play!

RECIPE FOR FUN:

Step 1: Ask kids to think about what the moon's surface looks like. Tell them that many of the features we see on the moon's surface are "impact craters," or holes formed when objects like asteroids or comets smashed into the lunar surface. Explain that they will be making their own impact craters today! Then, like lunar geologists, they will be measuring and documenting the craters.

Step 2: Pour flour in the bottom of the baking pan and spread it out to an even depth (about 1″ deep). Then, use the sifter to sprinkle just enough cocoa powder to cover the surface (less than 1/8″ deep).

Step 3: Ask your child to categorize each ball's size (i.e., tiny, small, medium, large, extra-large) and record their size. Then, ask them to pick a height (we suggest 3 feet) from which to drop the balls and record that height. All balls should be dropped from that height.

Step 4: Have kids take turns dropping the different sized balls in the flour/cocoa powder mix, noting the results.

Step 5: Together, measure the diameter of the "impact craters" from each of the different sized balls and record the results.

Step 6: Ask kids to document what their "lunar surface" looks like by drawing or coloring a picture of the impact craters they created.

MODIFICATIONS:

To simplify, encourage children to have fun exploring how to create impact craters using the balls without worrying about recording measurements or results.

To add complexity, drop different sized balls from different heights or the same ball from different heights and see what happens. Kids can also toss the balls into the pan from different angles to see how the trajectory of the object would change the impact crater.

Coders and Robots

STEAM Focus: Technology (For Ages 5+)

Children and adults will have fun pretending to be robots while exploring foundational coding concepts—all without any computers or screen time!

RECIPE FOR FUN:

Step 1: Explain to your child that we use coding to give instructions to computers and devices like robots. Code (also called a "program") is a list of directions telling these devices what to do. During today's game, you will give each other real-life coding instructions!

Step 2: Show the cards you prepared. Explain that each card represents a different coding instruction. Hold up each directional card one at a time and ask your child to act it out. For example, if you hold up the "Forward" card, they should take one step forward, and so on.

Step 3: Next, show the "Begin" and "End" cards. Explain that every program must start and end with these cards. If you forget one of these cards, your code won't work! Create a simple line of code such as: Begin, Forward, Backward, End for children to act out.

Step 4: Now, it's time to play! One person will be the Coder and the others will be the Robots. Using the cards, the Coder will create lines of code for the Robots to act out. Coders should try creating codes with a certain goal in mind like getting the Robots to walk to a specific place in the room. If their code doesn't work the first time, encourage them to problem solve until they get it right!

Step 5: Rotate until every player gets a chance to be the Coder.

MODIFICATIONS:

To simplify, just focus on the instructions in Step 2. Play this game like you would play Simon Says (you can call it "Coder Says"), with the Coder giving just one instruction at a time for the Robots to follow.

To add complexity, create additional instructional cards, such as Spin, Jump, Pause, or any other actions you can think of. You can also add in obstacles throughout the room that the Robots need to avoid to make the coding process more challenging!
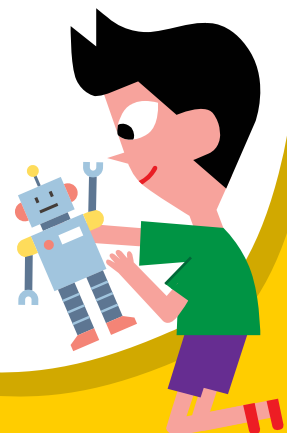
INGREDIENTS:
• Scavenger hunt checklists for each child (see Step 1)
• Pencils
• Paper

PREP TIME:
3-5 minutes

Technology Scavenger Hunt

STEAM Focus: Technology (For Ages 5+)

From automatic doors and televisions to cell phones and computers, technology is a big part of your child's environment. Have fun discovering the different types of technology around your home or community with this interactive scavenger hunt!

RECIPE FOR FUN:

Step 1: Before starting, adults should write out a scavenger hunt checklist for each child that lists different types of technology. To get started with a simple scavenger hunt, list the following:

• Technology that uses batteries
• Technology with a screen
• Technology that works automatically
• Technology that helps make food

Step 2: Explain to children that "technology" is any tool or device created by humans to make life easier. Tell your children that together, you'll be going on a scavenger hunt to find different types of technology around your home. Distribute the checklists and a pencil or pen to each child.

Step 3: Encourage children to search for an item for each category on the checklist, checking them off as they go. If they find more than one item for a category, they should write additional check marks that you can count together at the end of the hunt.

Step 4: After the hunt, discuss the different types of technology you found. What category was most common and which was harder to find?

MODIFICATIONS:

To simplify, create a visual scavenger hunt checklist with images of easily recognizable technology you might find around your house, such as a computer, a cell phone, or a television. Children can work on matching the picture to the device in their home.

To add complexity, create a longer scavenger hunt that includes technology as well as items that naturally appear in nature like plants. After the scavenger hunt, have children categorize the items they found as either human-made or natural objects. Children can also use a digital camera (or phone/tablet camera) to take pictures and document each item they find on the scavenger hunt!

Marshmallow Sculpture

STEAM Focus: Engineering (For Ages 5+)

Little engineers can connect toothpicks, straws, and marshmallows to create a one-of-a-kind work of art.

RECIPE FOR FUN:

Step 1: Using a pair of safety scissors, cut the plastic straws into a variety of lengths.

Step 2: Encourage kids to experiment by connecting the toothpicks and straws with the marshmallows to make a 2D shape like a square or a triangle. Ask them to observe what works best. HINT: Toothpicks may work better with mini marshmallows while straws may work better with large marshmallows.

Step 3: Next, ask them what other types of structures they can build. As they work, encourage them to "try something different" (examples below) to overcome any problems they encounter. This open-ended exploration is a great way to investigate STEAM concepts.

- Build a two- or three-level structure (i.e., a bridge)
- Build a structure using only one shape (i.e., only triangles)
- Create a structure that can hold a piece of paper or a sturdier structure to hold a toy car

MODIFICATIONS:
To simplify, provide children with just one size of marshmallows and either pre-cut straws or toothpicks to experiment with. As they get comfortable creating sturdy structures, add more variation in size and materials.

To add complexity, work to create a tall structure out of the materials. The weight of larger marshmallows can make it more challenging to build higher structures and short toothpicks can limit the number of mini marshmallows that that kids can use. Encourage your kids to discover the limitations of these materials and suggest they look around the house for alternative items to add to their marshmallow structures.

Tower Building

STEAM Focus: Engineering (For Ages 4+)

Little architects will have fun putting their building and planning skills into practice as they engineer replicas of their favorite towers from around the world!

RECIPE FOR FUN:

Step 1: Discuss what a tower is and why we have them.

Step 2: Show children pictures of different towers and ask them to choose their favorite one to re-create. Children can work individually or in pairs.

Step 3: Using the picture as a guide, encourage children to build a replica of the tower they have chosen using any of the materials available. Remind them that engineering can be a repetitive process; sometimes we have to try things more than once to get it right! They should ask the following questions as they build:

- Does my structure resemble the tower I am replicating?
- Is my tower sturdy?
- How can I improve my tower?

Step 4: Children can share their towers with one another or with a parent/caregiver, explaining what tower they used as their inspiration and why they chose it. Encourage children to share their process building the tower and not just their final product. For example, what materials did they use? What challenges did they face?

MODIFICATIONS:

To simplify, children can create any tower they imagine, rather than trying to replicate an existing tower.

To add complexity, encourage children to begin with blueprinting a plan for their tower before building. Their blueprint should show what their tower will look like, what materials they will use, and any other notes to guide their building process.
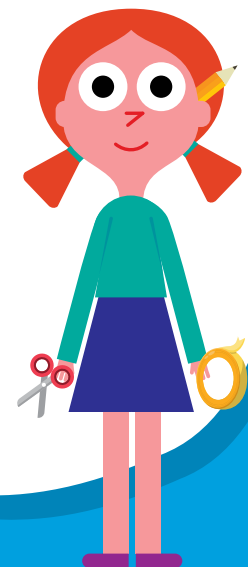

INGREDIENTS:
Any building materials you choose will work for this activity, such as:
- Recyclables (toilet paper tubes, cardboard boxes, etc.)
- Tape/glue/safety scissors (if using recyclables or paper products)
- Building blocks
- Modeling clay
- Pictures of different towers or access to a phone/computer to search for images (i.e., the Eiffel Tower, the Leaning Tower of Pisa, the Space Needle, etc.)

PREP TIME:
3-5 minutes

Let's Go Shopping

STEAM Focus: Math (For Ages 5+)

Going shopping provides a wonderful opportunity for interactive math explorations with children of all ages!

RECIPE FOR FUN:

Step 1: Have kids sit with you at the table to make a shopping list. As you read off your items, ask them to find each item in the store circular. Depending on their age, they can cut out the item's picture and glue or tape it to paper or they can create their own list by writing down items that they want to shop for. This is also opportunity to practice spelling and writing!

Step 2: Before you leave for the store, ask your child to estimate the total cost (in dollars and cents) for everything on the list and write down that estimation.

Step 3: Ask your child to bring their shopping list with them when you visit the store together. As you put items into the cart, remind them to write down the cost next to each item.

Step 4: When shopping for fruits and vegetables, take the opportunity to use the produce scale. Tell your kids how many pounds of produce you wish to purchase and have them estimate how many pieces of each fruit or vegetable you will need to get to the desired weight.

Step 5: Before you check out, let your child examine the full cart and estimate how many bags it will take to pack all the items. Use this opportunity to discuss the different weights of various items.

Step 6: When you are home, give your child the receipt so they can check off each item and see how close their estimation was to the total amount.

MODIFICATIONS:
To simplify, help your child create a short shopping list (2-5 items). At the store, they can help you locate and weigh items. Before checking out, help them match and count the items on their list with the items in the cart.

To add complexity, share your grocery budget with your child. Ask them to subtract their estimated total from your budget. If the estimation is under budget, ask how much money will be left over. If the estimation is over budget, ask your child to help figure out which items to remove from the list. You can also provide coupons and encourage children to think about how much items on the list will cost when the coupons are applied.

INGREDIENTS:
• Large number of different coins
• Large bowl
• Tablespoons
• Paper
• Pencil

PREP TIME:
0-3 minutes

What's The Scoop?

STEAM Focus: Math (For Ages 5+)

Financial literacy is an important component of STEAM learning and a building block for future life skills. This is a fun and educational game for kids and adults to play together!

RECIPE FOR FUN:

Step 1: Put a large number of different types of coins in a bowl. This is a great opportunity to open your kids' piggy banks or that large jar of saved coins.

Step 2: Before anyone starts scooping, determine how many rounds to play. Each player begins by taking turns scooping out one tablespoon of coins at a time.

Step 3: After each round, players must count the total value of their coins and record their total coin values on paper. You may wish to do one practice round, reviewing the value of each type of coin before keeping track of scores.

Step 4: The player who has the largest value of coins at the end of each round gets a point. At the end of the final round, players add up their earned points. The player with the most points wins!

MODIFICATIONS:

To simplify, use all pennies instead of a mix of coins. As children get more comfortable with counting and coin recognition, add in nickels, then dimes, and so forth.

To add complexity, create new rules that assign points to each type of coin. Try assigning one point for pennies, two points for nickels, three points for dimes, and five points for quarters, or try playing rounds identifying a different coin that doesn't get any points at all.

Science and Technology Word Search

the GENIUS of PLAY
It's more than play!
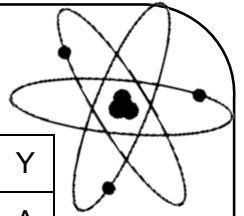
W	T	H	X	B	B	R	Y	G	Q	Z	K	U	A	M	Y	R	W	X	Y
U	H	X	O	R	B	A	C	T	E	R	I	A	U	V	T	C	I	P	A
J	T	M	Y	W	M	A	X	I	A	E	S	O	S	R	I	E	L	K	C
N	S	V	L	R	R	G	A	D	G	E	T	S	U	C	C	L	G	B	C
T	A	L	B	A	T	T	E	R	Y	E	C	N	D	X	I	L	N	X	G
M	S	R	E	B	O	S	Q	T	N	R	E	C	K	D	R	S	H	T	J
B	S	U	G	W	W	F	I	R	H	Z	S	E	N	U	T	I	Y	P	J
H	C	Y	J	R	O	J	E	M	M	J	N	C	O	S	C	R	W	H	N
V	I	G	J	Z	V	T	G	X	E	J	I	A	I	M	E	B	O	I	P
C	E	O	V	G	N	T	D	T	T	H	W	P	T	W	L	V	D	K	B
Z	N	L	Y	I	S	T	N	A	L	P	C	S	A	O	E	A	F	B	U
P	C	O	N	A	D	H	A	Z	Z	M	K	U	V	P	O	Y	Z	N	A
G	E	N	R	E	H	T	A	E	W	L	K	P	O	L	U	G	A	N	R
L	O	H	J	E	V	G	P	Y	W	S	L	D	N	R	F	O	Q	K	S
X	T	C	B	I	S	U	A	B	G	T	H	W	N	U	Q	L	A	O	G
L	H	E	M	L	K	E	E	W	H	R	O	T	I	L	I	O	Y	L	K
I	A	T	G	K	C	D	A	C	S	D	E	H	K	G	G	I	B	W	J
H	N	E	C	K	K	X	S	R	L	S	O	N	H	K	U	B	G	V	X
E	Q	H	R	C	I	P	W	C	C	F	Y	T	E	D	N	R	P	B	W
J	X	Y	Z	C	L	N	O	Y	G	H	X	K	V	V	L	C	Y	U	Q

Words are hidden forwards, backwards, diagonally, up and down.
Circle each word in the puzzle until you find them all.

BACTERIA	CHEMISTRY	GADGETS	LIGHT	SCIENCE
BATTERY	DOWNLOAD	INNOVATION	PHYSICS	SPACE
BIOLOGY	ELECTRICITY	INSECTS	PLANTS	TECHNOLOGY
CELL	ENERGY	INTERNET	RESEARCH	WEATHER
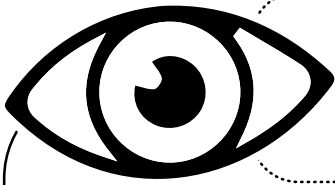
ANATOMY WORD MIX

Use the mixed-up letters to create
the real anatomy related words!

Mixed-Up Letters	Real Word Answers
1. MAR	1.
2. OEBN	2.
3. GNUL	3.
4. ERTHA	4.
5. EINYDK	5.
6. RAIH	6.
7. EEY	7.
8. DBOLO	8.
9. EEHTT	9.
10. VLRIE	10.
11. BIR	11.
12. UMLSCE	12.
13. OETNSKEL	13.
14. ENOS	14.
15. TFEE	15.
16. REFNGI	16.
17. AINBR	17.
18. NEKE	18.
19. ENIPS	19.
20. ULDSEHOR	20.

IN THE STUDY ROOM

the GENIUS of
PLAY™
It's more than play!

4+2=__

3+5=__

3+7=__

1+3=__

2+2=__

1+6=__

4+3=__

1+1=__

3
+2
___

5
+3
___

2+2=__

3+1=__

7+2=__

7+2=__

2
+6
___

2
+5
___

5+1=__

4+5=__

6+3=__

3+3=__

2+2=__

2+1=__

3+1=__

2+2=__

8+1=

4+6=__

2+7=__
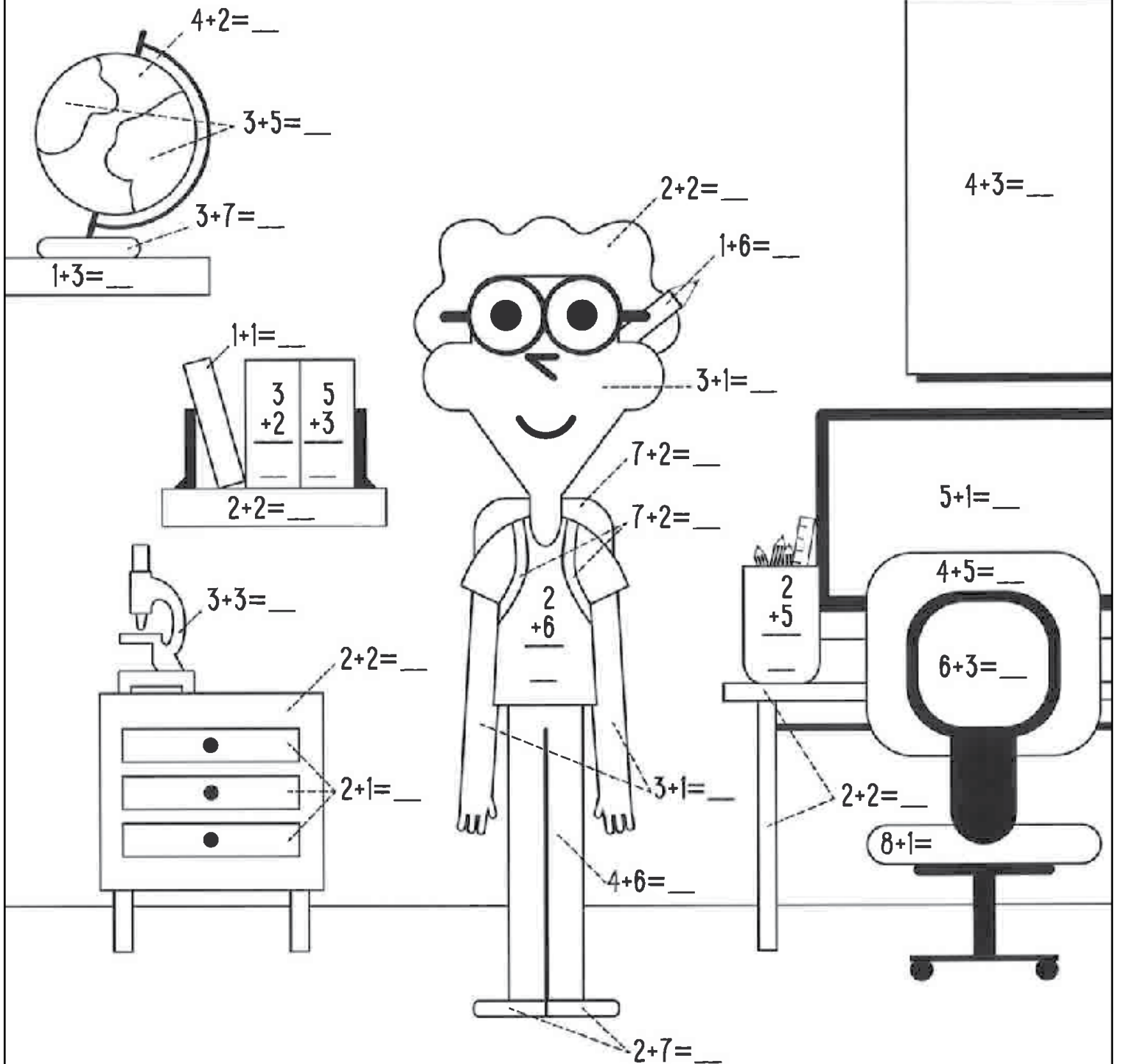
Color the formula with:

The sum of 2 – Pink
The sum of 3 – Orange
The sum of 4 – Brown

The sum of 5 – Purple
The sum of 6 – Light Blue
The sum of 7 – Yellow

The sum of 8 – Green
The sum of 9 – Red
The sum of 10 – Dark Blue

CONNECT THE DOTS
ROBOT

1. 50. 48. 47.
49.
2. 46.
3. 45.
4. 44.
6. 5. 43. 42.
7. 41.
8. 40.
9. 39.
10. 38.
11. 12. 36. 37.
13. 35.
24.
14. 15. 23. 25. 33. 34.
16. 26. 32.
22.
17. 21. 27. 31.
18. 30.
19. 20. 28. 29.
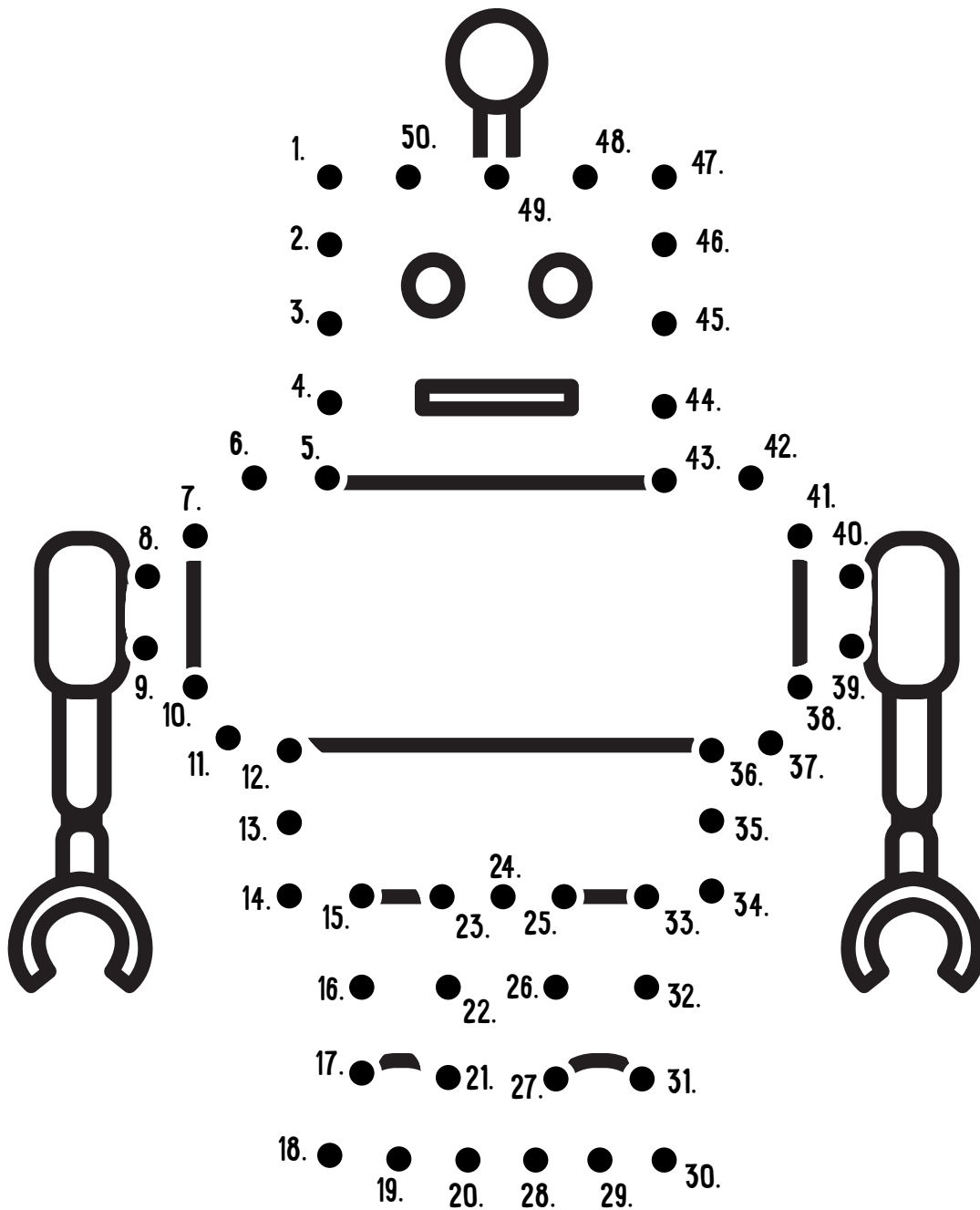
CONNECT THE DOTS
BUTTERFLY

the GENIUS of
PLAY™
It's more than play!
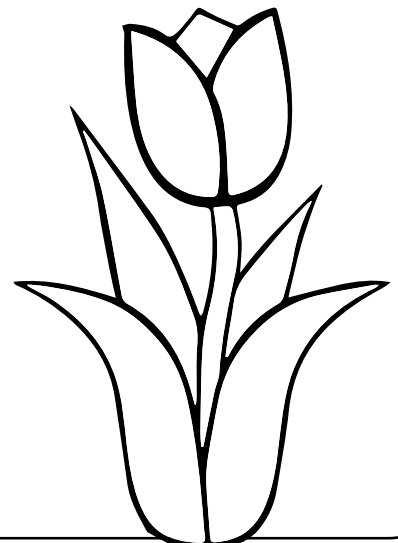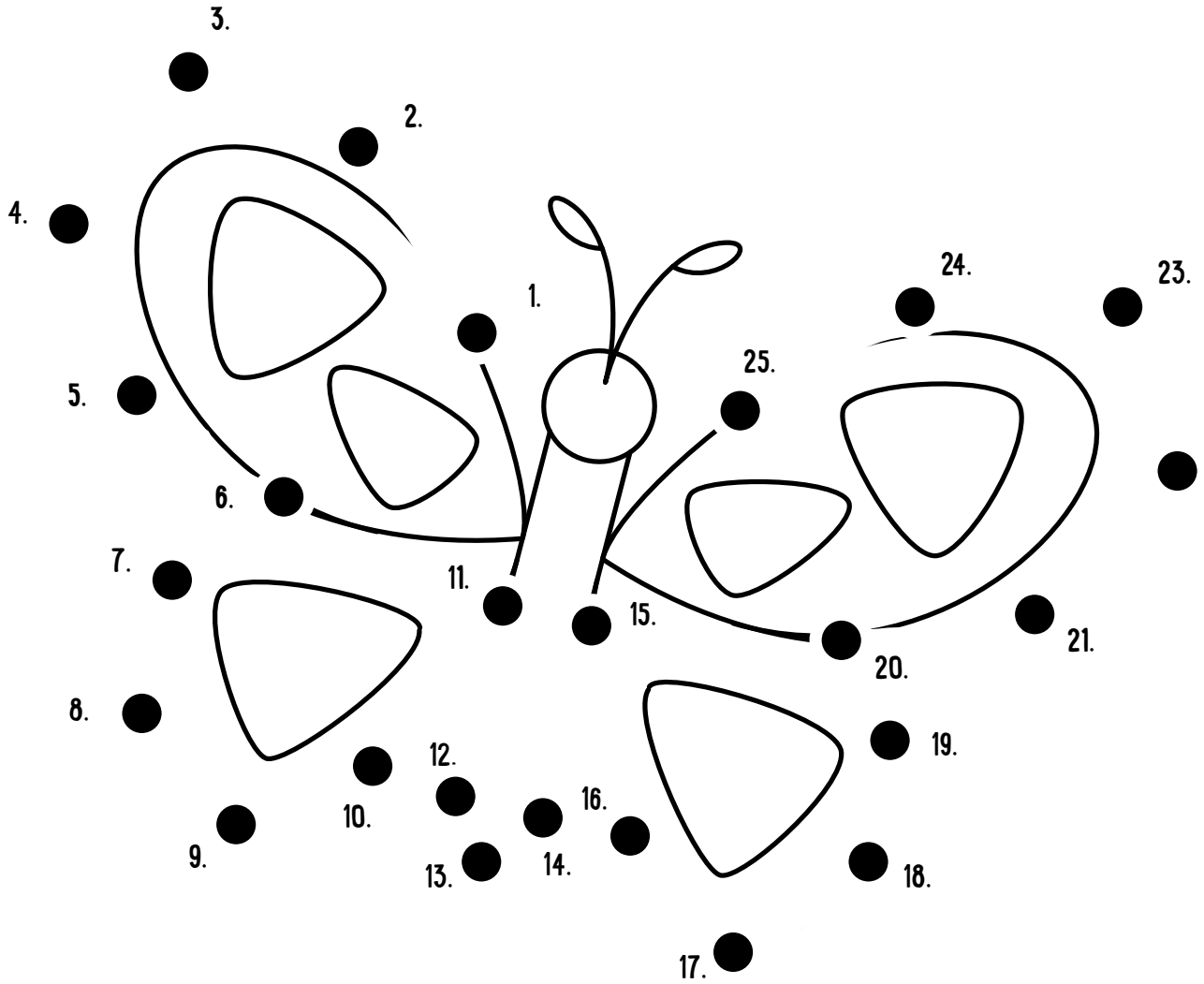
3.

2.

4.

1.

24.

23.

5.

25.

6.

7.

21.

8.

19.

12.

10.

16.

9.

13.

14.

18.

11.

15.

20.

17.

S T E A M

SCIENCE TECHNOLOGY ENGINEERING ARTS MATH
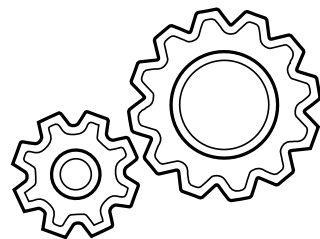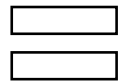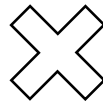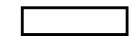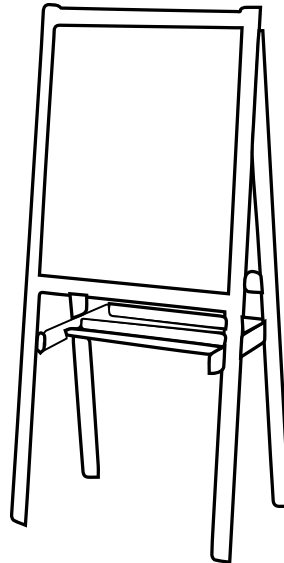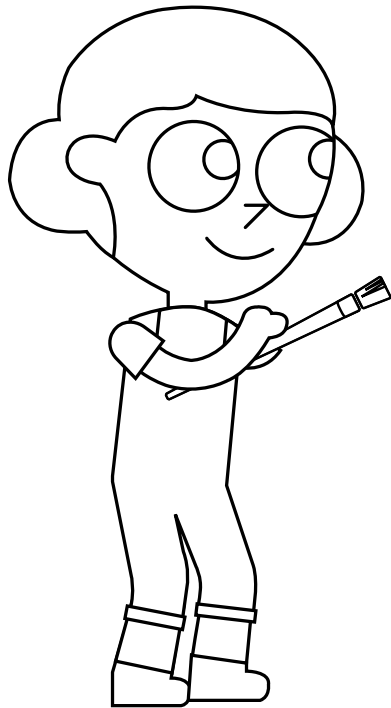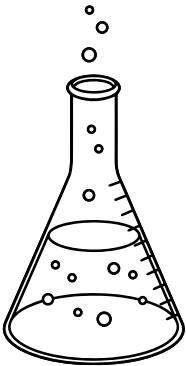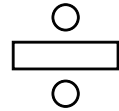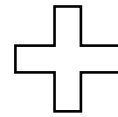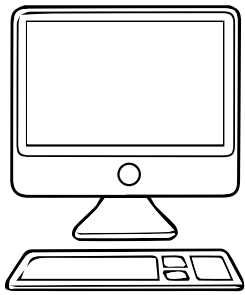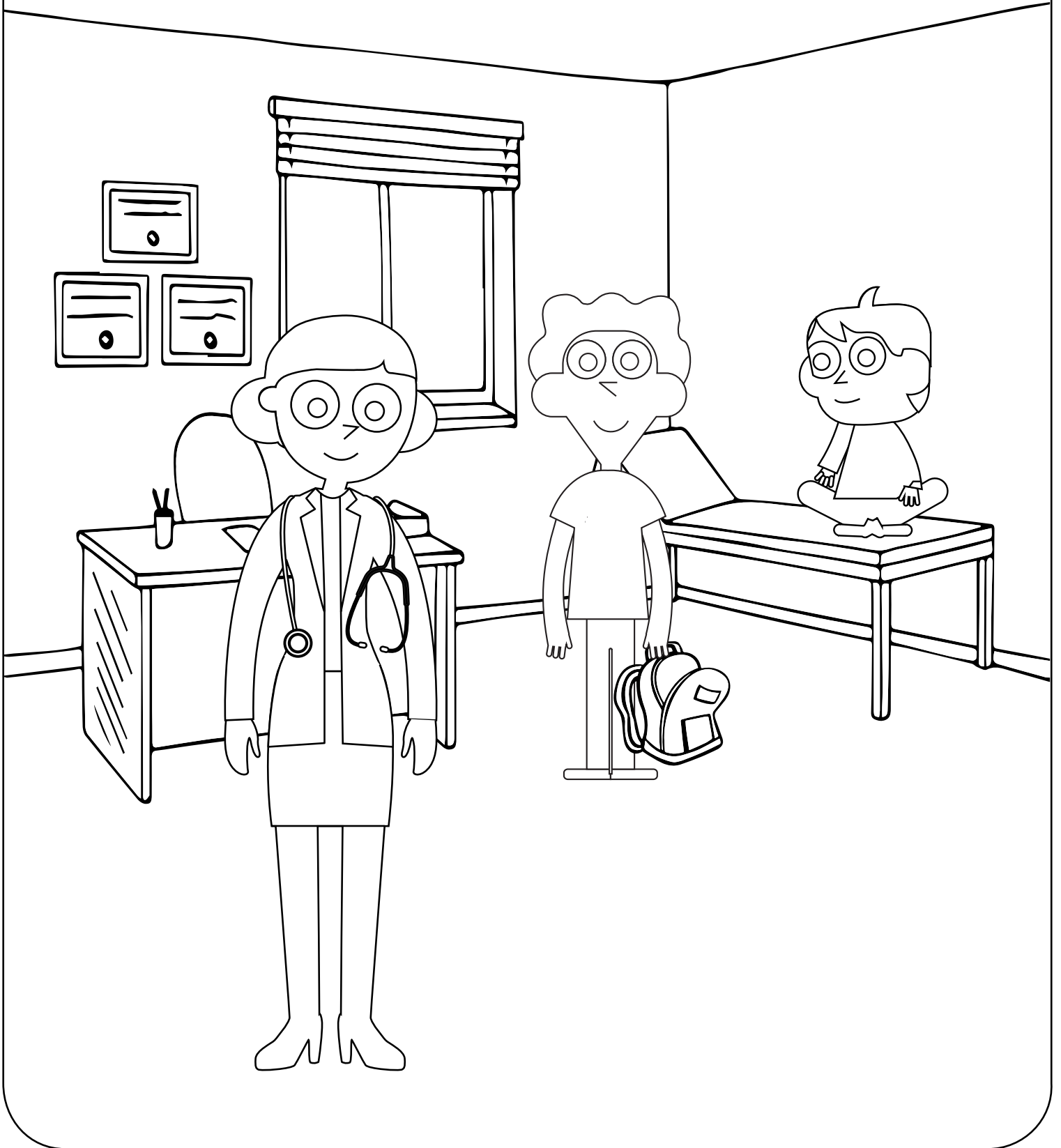
the GENIUS of
PLAY™
It's more than play!

the GENIUS of PLAY™

It's more than play!