STEAM Park Teacher Guide

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STEAM Park
Teacher Guide Introduction

Who is the material for?
The STEAM Park Teacher Guide is for preschool teachers. It is designed to help teachers develop children's science, technology, engineering, art, and math (STEAM) skills, including understanding cause and effect relationships, making predictions and observations, problem-solving, and creating representations.

What is it for?
Throughout the lessons, children will explore the world around them as they use functional elements to build interactive models.

Using the Teacher Guide, preschool teachers can facilitate exciting lessons in which children learn to think like scientists as they build models, and experiment and test ideas to answer questions such as:
- Which items will sink? Which items will float?
- What will happen if I roll the car down the ramp?
- How can I make a chain reaction?

How are the learning objectives achieved?
Throughout the lessons, strategic questions will guide children through the process of applying science, technology, engineering, art, and math skills. Furthermore, the LEGO® DUPLO® building activities will reinforce the children's creativity.

The Teacher Guide includes two Getting Started lessons designed to introduce the children to the basic ways they will be using the STEAM Park set. Introducing these activities first will give the children a solid foundation for completing the other six lessons. Subsequent lessons may be selected according to what is most relevant and appropriate for the children.

Appendix with Images
The appendix contains three types of printables: templates, graphs, and inspiration photos showing lesson-related models. The inspiration photos can be used to help the children connect to the lesson, and may also be used as building inspiration when children are constructing their own models.

Customizing to Your Class Needs
The STEAM Park lessons can be tailored to your needs and the needs of your class. One STEAM Park set can be used with up to six children at a time, working in pairs. Children need a lot of practice before they become proficient at building with a partner, and this is a good way to promote collaboration. The activities can be done in centers or stations around the classroom, or in small groups.

Lesson Structure
Each lesson is structured according to a natural learning flow called the *LEGO Education 4C Approach*, which promotes successful learning experiences. The Connect and Construct phases, which are the first two phases of each lesson, can be done in one 20-minute session. To ensure that young children are actively engaged, the Contemplate and Continue phases can be completed during a later session.

Connect
During the Connect phase, short stories and discussions will spark children's curiosity and activate their existing knowledge while preparing them for a new learning experience.

Construct
In this phase, the children will participate in a hands-on building activity. As their hands create models of people, places, objects, and ideas, their minds will organize and store new information related to these structures.

Contemplate
During the Contemplate phase, children are given the opportunity to reflect on what they have done, and to talk about and share insights they have gained during the Construct phase of the lesson.

Continue
New challenges in this phase build upon the concepts children learned previously in the lesson. These extension activities enable children to apply their newly-acquired knowledge.

Did you notice?
The science, math, and technology guidelines from the National Association for the Education of Young Children (NAEYC) have been used to develop the STEAM Park lessons. Please refer to the separate STEAM Park Teacher Guide learning grid for an overview of these education guidelines. The learning goals listed at the end of each lesson can be used to determine whether or not each child is developing the relevant skills. These bullet points target specific skills or pieces of information that are practiced or presented during each lesson.

STEAM Park Learning Grid

	Use technology such as simple gears and wheels in appropriate ways	Ask questions about science and technology related concepts	Experiment/test "what would happen if" questions	Observe and describe what happens	Role-play using figures	Make predictions	Record data using graphs	Sort and categorize object	Identify numbers, and count quantities	Pretend that the figures are performing an art, such as dance, music, or drama	Create two- and three-dimensional art that expresses their ideas	Respond to the art of others	Identify cause and effect relationships
Getting Started Functional Elements	●	●	●	●									
Getting Started Welcome to STEAM Park	●			●	●								
Ramps	●	●	●	●		●	●						
Moving on Water		●	●	●		●	●	●					
Probability				●		●	●		●				
Performing Arts										●	●	●	
Gears	●	●	●	●									
Chain Reaction	●	●	●	●									●

Getting Started
Functional Elements

The objective of this lesson is to familiarize children with the special elements in the STEAM Park set.

Learning Outcomes
Children will:
- Become familiar with the functional elements in the set
- Identify the movements of the functional elements
- Explore the idea that machines are made of moving parts

Vocabulary
function, machine, gear, turntable, hinge, cannon, dart, accordion, cart, wheel

Materials needed:
STEAM Park set (45024), inspiration photo.

Connect
- Ask the children to name some things in the room that have moving parts (e.g., toys or furniture with wheels, curtains or blinds, doors, and scissors).
- Explain that these things have a function or a job to do.
- Ask the children to identify the functions or jobs of the moving parts they have named.

Construct
- Ask the children to explore all of the bricks and elements in the STEAM Park set.
- Encourage them to use their imaginations and creativity to find all of the pieces that can be put together to make a functional or moving part.
- Consider asking questions like:
  - What are the pieces called?
  - What would happen if you put some of the pieces together?

Tip: The functional elements include: one turntable, the swing and its frame, two orange rockers, the gears, the winches with the string and hook, one cannon, two darts, the carts with wheels, two hinged bricks, and two flexible accordion elements.

Contemplate
- Encourage the children to take turns showing and telling the group how each of the functional elements works.
- Consider asking questions like:
  - How could you use this part?
  - Have you seen other parts that move like this one? Where have you seen them? What were they used for?

Continue
- Explain that a machine is made up of parts that use energy to do work.
- Ask the children to name some machines they have seen (e.g., vehicles, computers, lawnmowers, elevators, coffee makers, toasters, and bicycles.
- Ask the children to use some of the functional elements to build a machine that has a special purpose.
- Ask each child to show you how his or her machine works and to tell you what it does.

Did you notice?
Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.
- Using technology such as simple gears and wheels in appropriate ways.
- Asking questions about science and technology related concepts.
- Experimenting/testing “what would happen if” questions.
- Observing and describing what happens.

Inspiration photo (see appendix)

Getting Started

Welcome to STEAM Park

The objective of this lesson is to familiarize children with the STEAM Park set and its characters.

Learning Outcomes

Children will:

- Become familiar with the set
- Build models using the in-box building inspiration cards
- Meet the characters in the STEAM Park
- Explore the imaginary STEAM Park setting

Materials needed:

STEAM Park set (45024) (make the in-box building inspiration cards available), inspiration photo.

Vocabulary

rides, attractions

Connect

- Ask the children if they have ever been to an amusement park or a carnival.
- Discuss the things that you can see and do at an amusement park or carnival.
- Show the children the photo of the STEAM Park characters, and tell them that you are going to read a story about these characters who take care of a special place called STEAM Park.
- Read the following story aloud:

STEAM Park is a place where children and adults have great adventures. They play games, go on rides, watch interesting shows, and eat tasty foods. Parker, the park manager, wants all of the visitors to have a fun time. Making sure this special park is running well takes a lot of work. Fortunately, Parker has some good friends to help him.

Parker is very good at fixing the rides and building new attractions for the park guests. He often asks his close friends Ms. Engels and her grandson Arty for help. Arty has three friends who also like to help.

Ms. Engels is a kind person who likes to make sure everyone is safe. She loves to spend time with her grandson Arty and his friends.

Arty enjoys creating and performing. He and his friends have many interesting ideas for how to make STEAM Park beautiful and entertaining.

Arty's friend Sienna is curious and likes to experiment with ways of making faster and more exciting rides in the park. And his friend Teresa collects materials to build machines for different purposes, she is great at problem-solving. Matt has a lot of energy and wants to be involved in every activity. Sometimes he tries to take over what others are doing, but his friends help him be part of the team.

- Hold Parker up to your ear and pretend he is telling you something.
- Tell the children that Parker needs their help. Explain that a terrible storm has knocked down all of the rides, games, and food stands in STEAM Park, and that Parker needs their help to rebuild it all. Ask the children if they are willing to help.

Construct

- Give each child one of the in-box building inspiration cards and ask him or her to build the model shown.
  - The side with the green border shows an easier model and the side with the blue border shows a more difficult model.

Tip: Save time by pre-sorting the bricks for each model.

Contemplate

- Ask the children to take turns telling about the models they have built.
- Consider asking questions like:
  - What do you call the model you have built?
  - What do people do when they visit the place you have built?
  - What could you do to make it more fun for visitors?

Continue

- Ask the children to improve the places they have built or to add new places to the park. Encourage them to role-play with the figures.
- Consider asking questions like:
  - What is your favorite place in the park?
  - What could you add to give guests a better experience?

Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Using technology such as simple gears and wheels in appropriate ways.
- Observing and describing what happens.
- Role-playing using figure.

Find the building inspiration cards in the box

Inspiration photo (see appendix)

Ramps

In this lesson, children will learn about how and why things roll, and predict and measure distances using non-standard units.

Learning Outcomes

Children will:

- Observe what happens when they place objects on a ramp
- Make predictions
- Measure how far objects move
- Record data using graphs

Vocabulary

ramp, predict, prediction, observe, observation, measure

Materials needed:

STEAM Park set (45024), inspiration photos, track template (print six of these pages), graphs for recording results, pencils, glue or tape, scissors.

The Science behind the Play (Notes For Teachers)

Several factors will cause an object to roll or slide, beginning with a **force** (i.e., a push or pull) that acts on the object. **Gravity** is a force that pulls objects toward the earth or down a slope.

The shape of an object affects how it moves down a slope. Objects such as balls, which do not have corners or edges, will roll. Other objects will tend to slide rather than roll due to their shape. Size and texture determine the speed of rolling or sliding.

Connect

- Ask the children to describe what it is like to go down a slide.
- Discuss why/how people move from the top to the bottom of a slide without using their bodies to assist them. In other words, explain that people move down a slide because of gravity, which is a force that pulls objects toward the earth.
- Tell the children that you are going to read the beginning of a story about a group of people who are preparing STEAM Park for its daily visitors. You can show them the inspiration photo or use the figures to act out the scene.
- Read the following story aloud:

Inspiration photo (see appendix)

Parker, the park manager, wants to build a new ride for visitors to enjoy. He asks his neighbor, Ms. Engels, and her grandson Arty and Arty's friends Sienna and Matt to help.

"Let's build a ramp and some cars to ride down the ramp," Parker said.

"I have an idea! Let's place a line of numbers at the bottom of the ramp and guess how far the cars will roll!" Arty said.

"Great idea! We can try it out and see what works the best," Ms. Engels said.

Construct

- Tape or glue all six pages of the track template together to comprise the entire length of the track.
- Working in pairs or as a group, ask the children to take turns placing the bricks to build the two smallest ramps and the sides of the track as shown in the inspiration photo. Make sure the children place the number bricks in the right places.
- Position the smallest ramp on the track template and ask the children to take turns rolling the cars or objects down the small ramp, then try with the bigger ramp.
  - Use a pencil to mark where each car stopped. You can use different marker colors to represent the different cars or objects.
  - Show the children how to record the result of each roll on their graphs. Make sure they understand that there is a separate graph for each ramp size.

Tip: Each child should have four different results graphs, one for each ramp. This is so they can compare how far the cars or objects will roll after going down each ramp.

Contemplate

- Ask the children to predict how far a car or object will roll.
- Consider asking questions like:
  - Will it stop between numbers 3 and 4?
  - Will it roll all the way past number 10?
  - Were your predictions correct?
  - Does it become easier to predict where the car or object will stop after observing or watching what happens a few times?

Continue

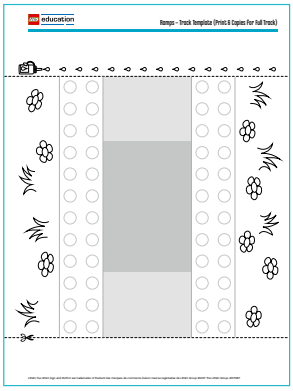
- Consider asking questions like:
  - How can you make a car go faster?
  - How can you make a car roll farther?
- Ask the children to build the large ramp that is shown on the in-box building inspiration card. (They will need to use the pieces from the smaller ramps.)
- Tell the children to test the ramp by rolling cars down it, then challenge them to build a car that rolls past the number 10.

Tip: See the image of the larger vehicle in the appendix.

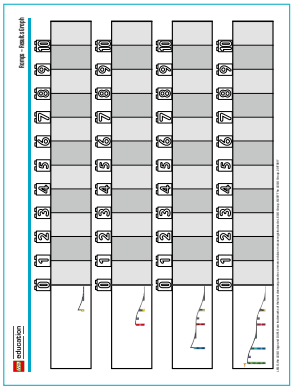
Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Using technology such as simple gears and wheels in appropriate ways
- Asking questions about science and technology related concepts
- Making predictions.
- Experimenting/testing “what would happen if” questions
- Observing and describing what happens
- Recording data using graphs



Track template (see appendix)



Result graphs (see appendix)

Inspiration photo (see appendix)

Moving on Water

In this lesson, children will learn about how and why things float, and design and test sails.

Materials needed:

STEAM Park set (45024), inspiration photos, sails template, results graph (choose the version that is most appropriate for your group and print one per child), scissors, hole punch, colored pencils or markers, a large container or sink filled with water, straws and fans (optional), lamination machine (recommended).

Learning Outcomes

Children will:

- Experiment with the idea of sinking or floating
- Learn which sail design works best for the boats in the set
- Record data using graphs

Vocabulary

characteristics, features, sink, float, sail

The Science behind the Play (Notes For Teachers)

Objects that float are **positively buoyant** and there are several reasons why they float. Objects that are less dense than water will float. **Density** refers to how close together the molecules of an object are. For example, most rocks sink in water because they are denser than water. Also, the **surface** (i.e., the outside of an object) that touches the water **displaces** it, or pushes it out of the way.

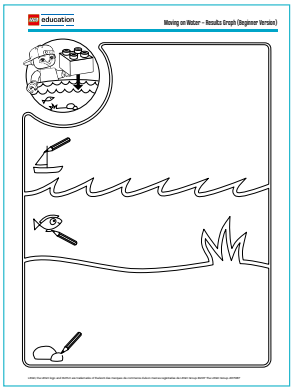
The shape of an object also affects how water moves around the object's surface. For example, the shape of a boat creates a large surface for water to push against. However, if too much weight is added to a boat, it will sink beneath the water.

Some objects are **neutrally buoyant**. This means that they sink beneath the water's surface, but they do not sink all the way to the bottom. This happens when an object's density is the same as the density of the water it is in.

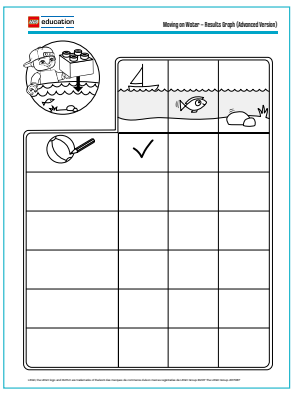
Connect

- Tell the children that you will be playing a game called sink or float.
- Explain that they will have 10 seconds to choose an item from the room and bring it to you, then set a timer or count to 10 while the children choose their items.
- As a group, sort the items into a "sink" pile and a "float" pile, then test the items in a container of water to see if the predictions were correct.
- Ask the children to look at the elements in the STEAM Park set and select some they believe will float, then test the items to see if their predictions were correct.
- Consider recording the results of the tests on one of the printable graphs.
- You might also consider asking questions like:
  - What are the characteristics or features of objects that float?
  - What are the characteristics or features of objects that sink?
  - What would happen if you place an object that sinks on top of an object that floats?

- Tell the children that you are going to read the beginning of a story about a group of people who are preparing STEAM Park for its daily visitors. You can show them the inspiration photo or use the figures to act out the story.



Results graph -beginner (see appendix)



Results graph - advanced (see appendix)

- Read the following story aloud:

Arty, Teresa, Parker, and Ms. Engels were at STEAM Park early in the morning.

Parker, the park manager, said, "I have four boats that park visitors could ride in. However, we need to find a way to make them move across the water."

"Do you have some materials we can use to make some sails?" Teresa asked.

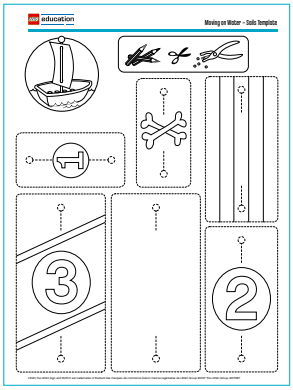
"Great idea! What about markers to make colorful designs?" Arty asked.

"Yes, I have a lot of supplies we could use! Let's get started!" Parker said.

Construct

- Encourage the children to think of ways to make boats and other floating objects move across the water.
- Show the children the inspiration photo for the "Moving on Water" lesson.
- Give the children art supplies and printouts of the sail template, then ask them to create their own sails for the boats and test them.
- Consider asking questions like:
  - How can you make the boats move without touching them?
  - What could we use to make "wind?"
  - What would happen if you placed objects in the boat?
  - What would happen if you dropped objects in the water around the boat?

Tip: Laminating the sails will make them stiffer and more durable, and using the boats without the figures makes them more stable.



Sails template (see appendix)

Contemplate

- Prompt a discussion about which sails work the best and why by asking the children to explain what happens when they use a sail to move a boat.
- Consider asking questions like:
  - Which sail makes the boat move faster?
  - What would happen if you moved the sail to a different position?
  - How far can you make the boat travel when you blow one breath of air into the sail?

Continue

- Play a game using the boats by creating an obstacle course, a relay, or a race.
  - Place the balls and muffin cup elements in the water and tell the children to navigate around or between the obstacles.
  - Another idea is to create teams and tell the children to create waves to try to sink the opposing team's boat.

Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Asking questions about science and technology related concepts
- Experimenting/testing "what would happen if" questions
- Making predictions
- Sorting and categorizing objects
- Observing and describing what happens
- Recording data using graphs or charts

Inspiration photo (see appendix)

Inspiration photo (see appendix)

Probability

In this lesson, children will learn about probability, making predictions, and recording data.

Materials needed:

STEAM Park set (45024), inspiration photos, results graph (print one per child), crayons or colored pencils.

The Math behind the Play (Notes For Teachers)

Probability is a measure of how often a particular event will happen if something is done repeatedly. For example, the *probability* of a coin coming up heads is 1 out of 2.

Learning Outcomes

Children will:

- Practice making predictions
- Record data using graphs or charts

Vocabulary

predict, probability

Connect

- Play a guessing game with the children. Tell them that you are thinking of a color, then ask them to guess which color you are thinking of.
- Consider giving clues. Clues for the color red might include:
  - The color I am thinking of is the color of a round fruit.
  - The color I am thinking of is also the color of some roses.
- When the children have guessed the color, ask how they figured it out. Explain that the more clues you have, the easier it is to guess the correct answer.
- Select a red, yellow, and blue brick from the set and place them in front of you. Tell the children that you are thinking of one of the three colors and ask them to guess which color it is.
- When they have guessed the correct answer, ask them if it was easier or harder to guess the correct color in this game compared to the last game.
- Explain that in this game, they only had three colors they could guess. However, there were no clues given.
- Tell the children that you are going to read the beginning of a story about a group of people who are visiting STEAM Park. You can show them the inspiration photo or use the figures to act out the scene.

Inspiration photo (see appendix)

- Read the following story aloud:

Arty and Teresa were visiting STEAM Park with Arty's grandma, Ms. Engels. They saw their friend Parker, the park manager, operating the Spin to Win game.

"Step right up and spin to win! Which color do you think the wheel will land on?" Parker asked.

"I think it'll land on red because red is my favorite color!" Arty said.

"I think it'll land on turquoise because there are three turquoise spaces and only one red space, one yellow space, and one blue space," Teresa said.

"Ms. Engels, will you give the wheel a spin?" Parker asked.

Ms. Engels stepped up and spun the wheel with all of her strength.

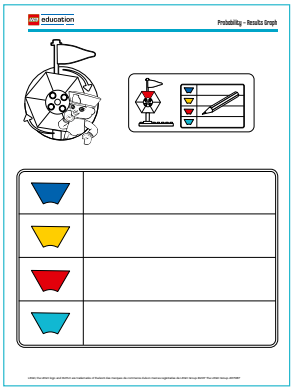
Everyone watched as the wheel went round and round many times. It slowed down and ended up on the red space.

"Yes! Red is the best!" Arty cheered.

"Choose your prize from the red shelf!" Parker said.

Construct

- Ask the children to look at the in-box building inspiration card of the wheel model and build it. Tell them that they will play a game using the wheel.
- Once the wheel is built, show the children that the flag at the top is the pointer, and ask them which color they think the wheel will land on if someone spins it.
- Explain that this is a game of chance and that no one knows for certain where the wheel will stop.
- Tell the children that they can try to predict where the wheel will stop by judging the power of the spin and the distance around the wheel, but that it is not possible to make a good prediction.
- Give each of the children one of the results graphs and ask them to take turns spinning the wheel and guessing which color the wheel will land on. After each spin, tell the children to place a mark in the box next to the color the wheel landed on.



Results graph (see appendix)

Contemplate

- After spinning the wheel several times, ask the children to look at their graphs and count how many times the wheel landed on each color.
- Consider asking questions like:
  - Which color do you predict it will land on next?
  - If you spin the wheel three times, how many times do you predict it will land on turquoise? Why?
- Explain that there are more turquoise spaces on the wheel than other colors and that this means there is a better chance or probability that the wheel will land on a turquoise space instead of one of the other colors.

Continue

- Tell the children that they will be using the wheel to play another game.
- Explain that they will take turns spinning the wheel and that each time the spinner lands on a color, everyone will choose a brick or an element that is that color.
- Tell them that the wheel will be spun five times and at the end, they will try to build a prize using the bricks they choose.

Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Making predictions
- Observing and describing what happens
- Recording data using graphs or charts
- Identifying numbers and counting quantities

Inspiration photo (see appendix)

Performing Arts

In this lesson, children will learn about different forms of art, and they will create and role-play a show.

Materials needed:

STEAM Park set (45024), inspiration photo, craft materials (e.g., construction paper, feathers, glitter, glue).

Learning Outcomes

Children will:

- Learn about different kinds of performances
- Create their own act for a show
- Present or role-play their act

Vocabulary

traditional, show, performance, recital, concert, play, gymnastic, attract, talent, theater art, variety show, act

Connect

- Ask the children if they have seen a performance, such as a puppet show, concert, or gymnastic show, then ask if they have ever performed in a dance recital, play, or concert.
- Discuss where these types of performances take place and ask the children to describe what they know about these places.
- Talk about different kinds of music and dance that come from different parts of the world (e.g., the Dragon Dance is a traditional Chinese dance that is often performed during Chinese New Year celebrations).
- Tell the children that you are going to read the beginning of a story about a group of people who are preparing STEAM Park for its daily visitors. You can show them the inspiration photo or use the figures to act out the scene.
- Read the following story aloud:

Parker, the park manager, wants to create a new show for visitors to enjoy. He asks his neighbor, Ms. Engels and her grandson Arty and Arty's friends – Sienna, Matt, and Teresa to help.

"Hello everyone, I need your help. Not very many people come to watch the show anymore. I want to create something very entertaining that'll attract a lot of visitors," Parker said.

"We could each use our special talents to create a variety show that would interest all of the visitors," Arty said.

"What's a variety show?" Matt asked.

"A variety show is a show that has a lot of different acts. For example, one act could include a song and dance, and another act could include some magic tricks," Arty explained.

"I want to perform an animal trainer act! My cat can do a lot of tricks!" Sienna said.

"I'll balance on a tightrope!" Teresa said.

"My uncle from Mexico showed me a video of a traditional mariachi song, and I'll perform it in the show," Matt said.

"This will be the best show ever!" Parker said.

Inspiration photo (see appendix)

Construct

- Ask the children to build a stage or a set for a performance.
- Consider asking questions like:
  - What do your performers need in order to do their acts?
  - What does your audience need in order to watch the show?

Contemplate

- Ask the children to use the figures to act out a performance and have them take turns watching each other's shows.
- Tell the children there are different ways to respond to a performance and discuss the appropriate ways to respond.

Continue

- Inspire the children with examples of different types of costumes, props, dance, music, and visual art from around the world. Explain that these were created by people belonging to different cultures in other parts of the world.
- Give the children craft materials and have them create backgrounds for the show and costumes for the characters (e.g., masks with feathers and glitter). Add music and lights and ask children to perform the shows again.
- You can also have the children draw pictures or discuss the different shows they have watched during this lesson or outside of the classroom.

Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Pretending that the figures are performing an art, such as dance, music, or drama
- Creating two- and three-dimensional art that expresses their ideas
- Responding to the art of others

Gears

In this lesson, children will learn about how gears work.

Materials needed:
STEAM Park set (45024), inspiration photos.

The Science behind the Play (Notes For Teachers)
Gears are a rotating part of a machine with teeth that can interlock with another gear. The design of gears makes them able to transfer **torque**, or the force that causes the rotation.

Learning Outcomes
Children will:
- Interlock gears
- Make the gears turn

Vocabulary
gears, interlock

Connect
- Ask the children to find all of the elements that spin, and explain that spinning parts can be useful.
- Tell the children gears are parts of a machine that are used to make other parts turn.
- Have the children demonstrate how the spinning elements work, then ask them to line the gears up in a row and place them so that when they move one of the gears, all of the gears move.
- Consider asking questions like:
  - Which way do the gears turn?
  - What happens when you interlock a large gear with a small gear?
  - What happens when you interlock two gears of the same size?
- Tell the children that you are going to read the beginning of a story about a group of people who are preparing STEAM Park for its daily visitors. You can show them the inspiration photo or use the figures to act out the scene.
- Read the following story aloud:

> "We need a new gate to make the park look nice and to control how many people enter the park at a time," said Parker, the park manager.
>
> "I have some large gears in my garage. My dad brought them home from his factory and gave them to me. We could use them to build a new gate," Teresa said.
>
> "Great idea! I also have some bricks and other pieces we could use," Parker said.

Tip: Interlocking gears in different ways causes them to move slower or faster and to turn clockwise or counterclockwise.

Inspiration photo (see appendix)

Construct

- Show the children the inspiration photo for the Connect phase and ask them to identify which parts of the models move.
- Ask them to build their own models of gates that open and close.

Contemplate

- Ask the children to test their gates and make improvements.
- Consider asking questions like:
  - How do you make the gate open and close?
  - Can a figure fit through the opening?

Continue

- Ask the children to create a double gate that opens from the left and right so that both sides can be opened at the same time to allow more people to move through at one time.

Did you notice?

Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

- Using technology such as simple gears and wheels in appropriate ways
- Asking questions about science and technology related concepts
- Experimenting/testing "what would happen if" questions
- Observing and describing what happens

Inspiration photo (see appendix)

Chain Reaction

In this lesson, children will learn about cause and effect by creating chain reactions.

Materials needed:

STEAM Park set (45024), inspiration photos.

Learning Outcomes

Children will:
- Identify cause and effect
- Create their own chain reactions

Vocabulary

cause, trigger, effect, chain reaction, sequence of events

Connect

- Show the children the inspiration photo and ask them to describe what they see, then tell them that it shows a model of a ride called *Free Fall*.
- Tell the children that you are going to read a story about a boy and a girl who were visiting STEAM Park.
- Explain that the story will describe a chain reaction, or a sequence of events that is caused by a trigger.
- Read the following story aloud:

Matt and Sienna decided to ride Free Fall, the scariest ride in STEAM Park. They waited in line for only a few minutes and then stepped onto the platform. The machine pulled the rope until they were at the top of the tower.

"Wow! We are way up high!" Matt said.

"I'm so excited to feel my stomach tickle! I wonder when it's going to drop us," Sienna said.

They looked at the view of the park as they waited for the fall. Then, the lever holding the rope in place moved and released it. Matt and Sienna screamed and laughed as they dropped. The platform landed on another lever and raised a flag.

"That was the best ride ever!" Sienna said.

"Let's go again!" Matt said.

- Consider asking questions like:
  - What caused the platform to drop?
  - What happened next?

Explain that the trigger to the sequence of events in the story is that the lever moved and released the rope, which caused the platform to drop. When the platform landed, it caused another event to happen, the raising of the flag. Tell the children that this sequence of events is called a chain reaction.

Inspiration photo (see appendix)

Construct

- Ask the children to work in pairs to create a chain reaction. Remind them that one event should cause another event to happen.
- Show them the inspiration photos for this lesson and ask them to think about how they could make an object move without touching it.
- Tell them that they can build separate parts of the chain reaction and then put the model together and test it.

Tip: You can find photos of individual parts of the model in the appendix and assign which part each child or pair of children should build. The chain reaction triggers could include throwing the ball, shooting the dart from the cannon, or rolling the car down the ramp. The next part of the chain reaction could include knocking over a line of dominoes, making a gear move, or making the rocking element move.

Contemplate

- Ask the children to share their chain reactions with the rest of the group.
- Consider asking questions like:
  - What was the first cause or trigger in your chain reaction?
  - What was the first event in your chain reaction?
  - What was the last event in your chain reaction?
  - Did your chain reaction turn out the way you predicted? Why or why not?

Continue

- Ask the children to combine their chain reactions to create one long chain reaction.
- Assign a place in the classroom where they can assemble the long chain reaction, then ask them to take turns setting it off and making adjustments until it works.

Tip: Have the children draw the chain reaction and number the events.

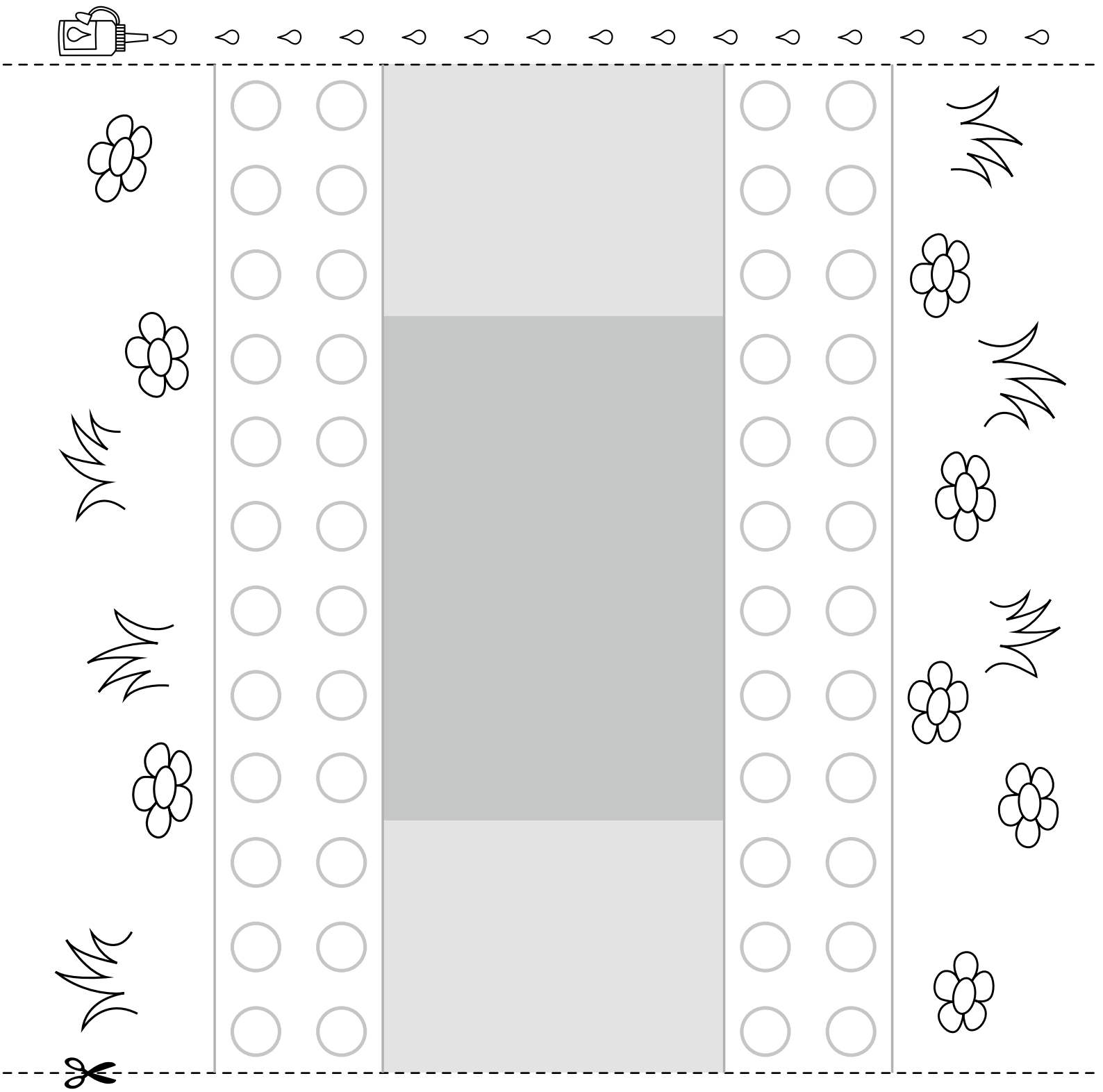
Did you notice?

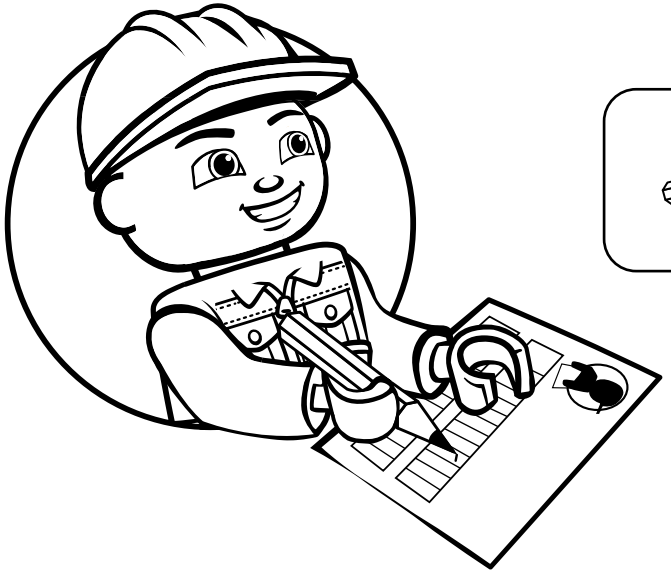
Observing the following skills can help you monitor whether the children are developing the necessary competencies in science, technology, engineering, art, and math.

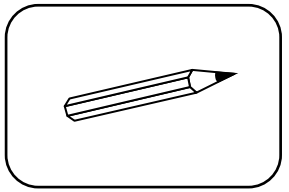
- Identifying cause and effect relationships
- Using technology such as simple gears and wheels in appropriate ways
- Asking questions about science and technology related concepts
- Experimenting/testing “what would happen if” questions
- Observing and describing what happens

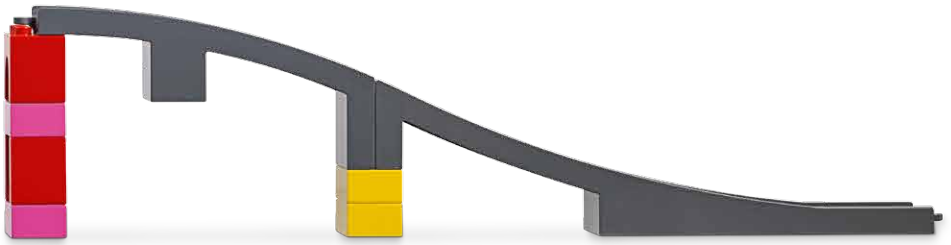
Sienna Teresa Ms. Engels Arty Matt Parker

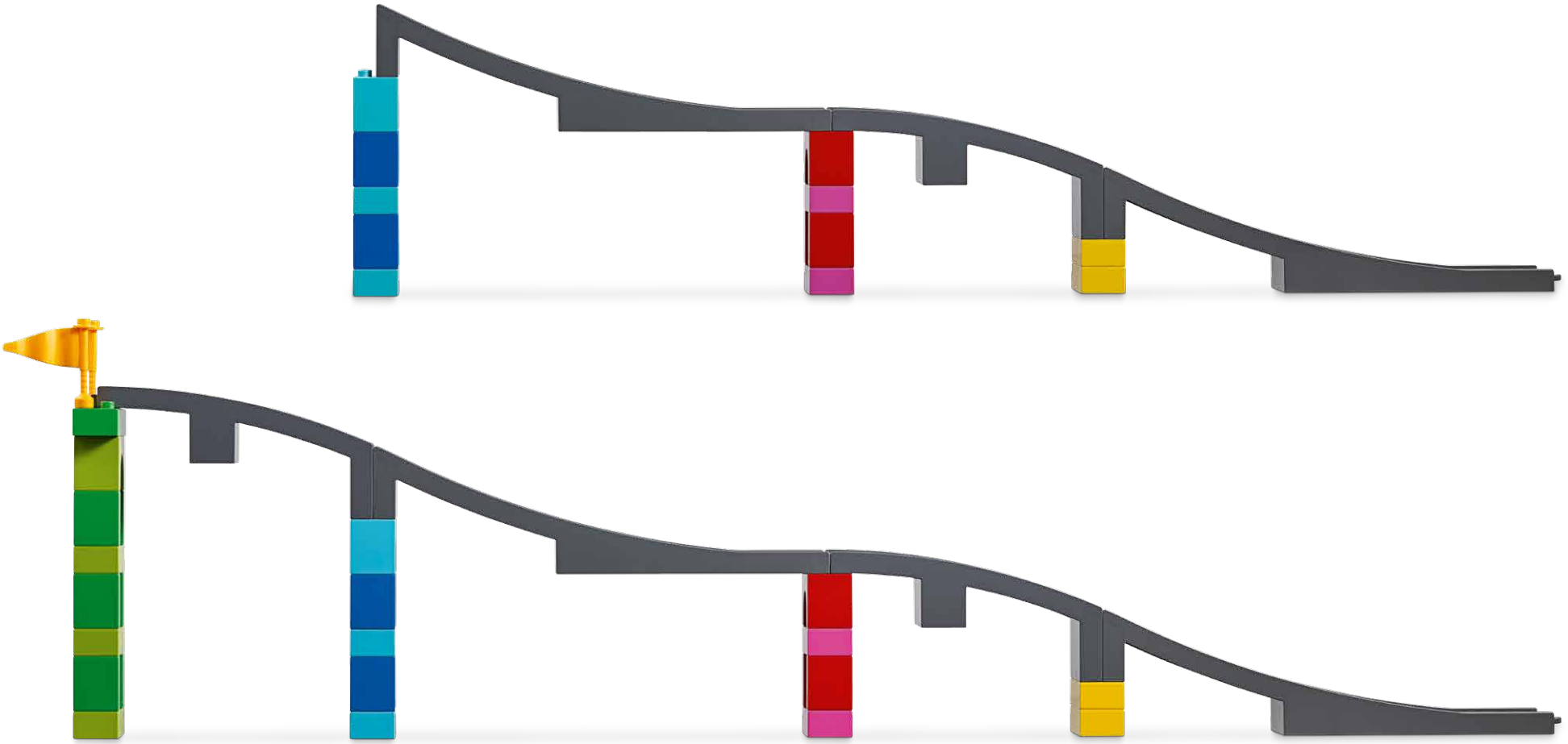
Ramps – Track Template (Print 6 Copies For Full Track)

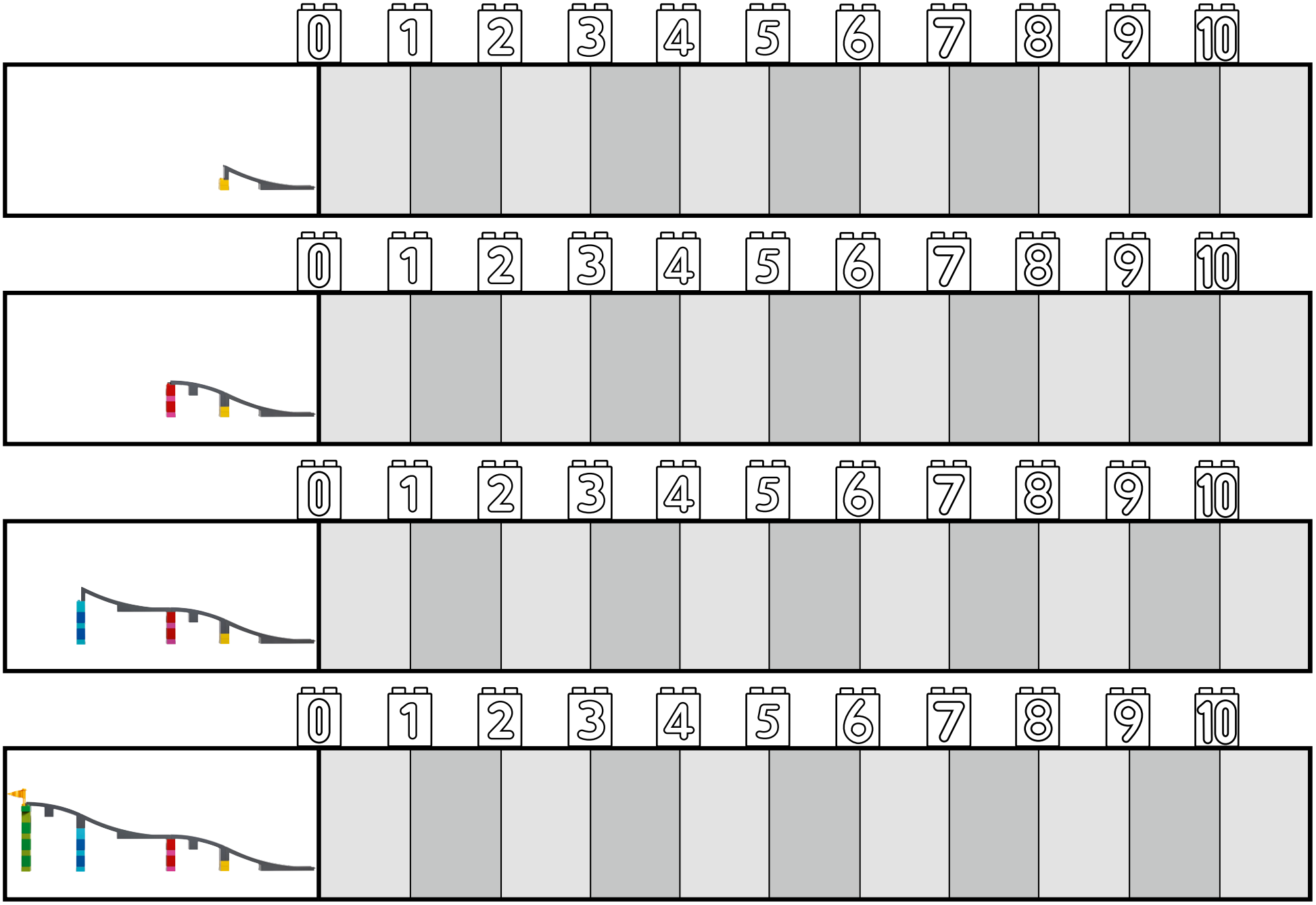


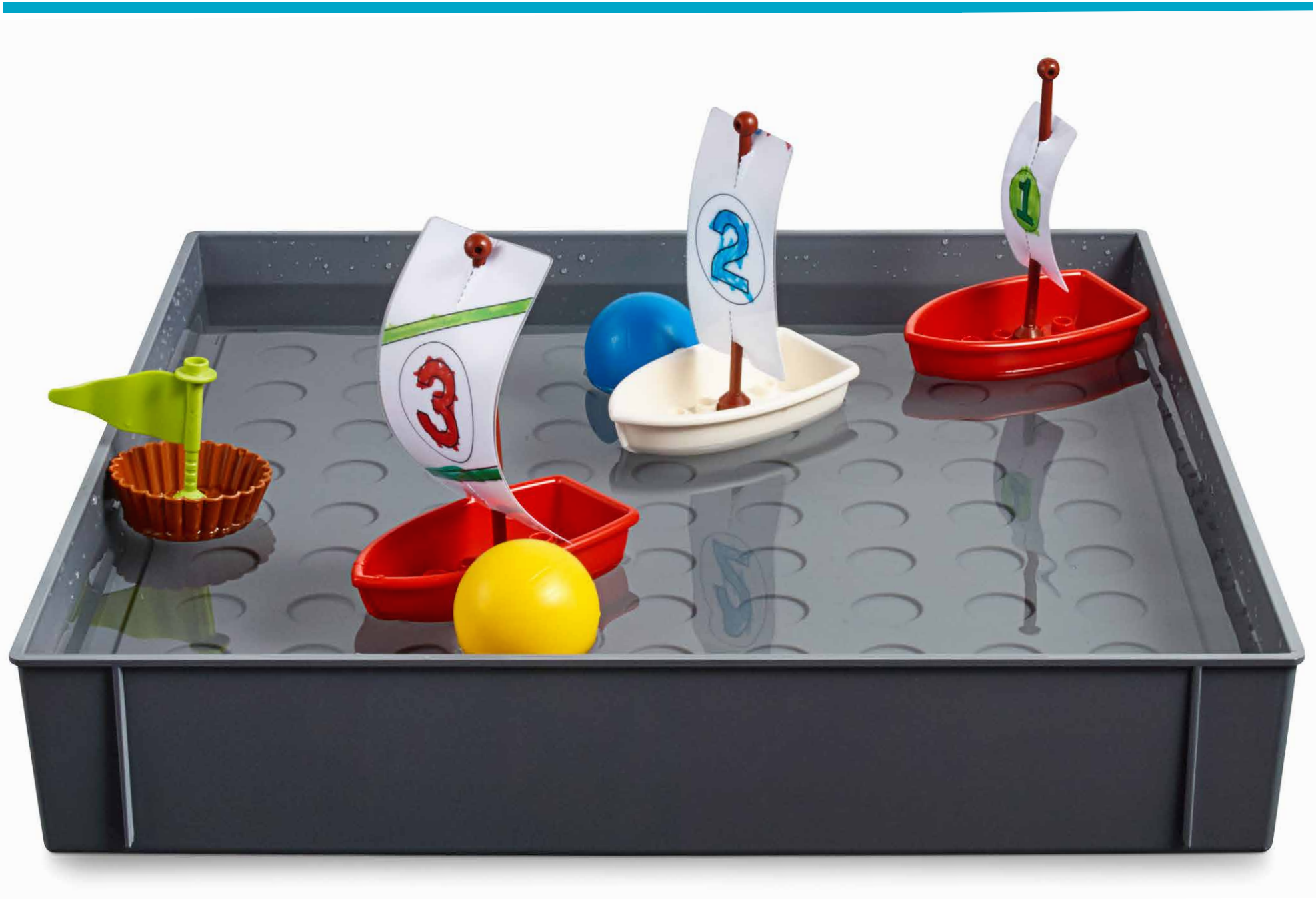


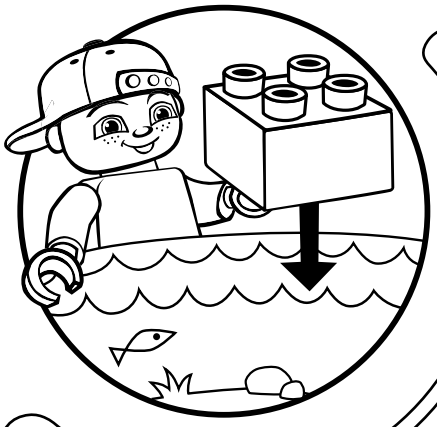


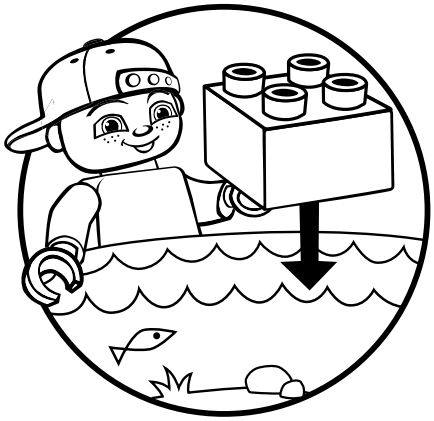


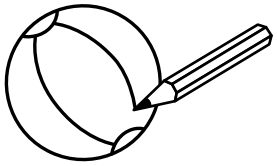


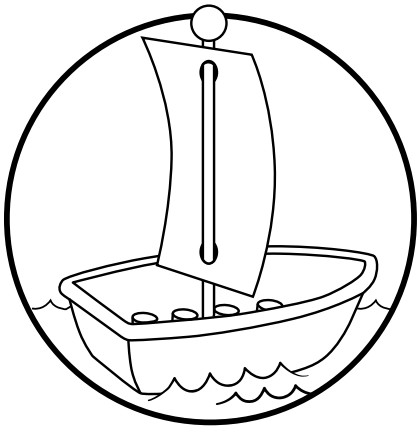


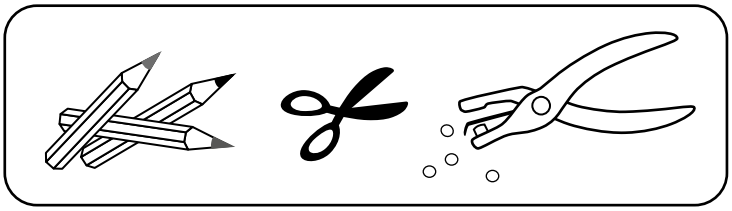


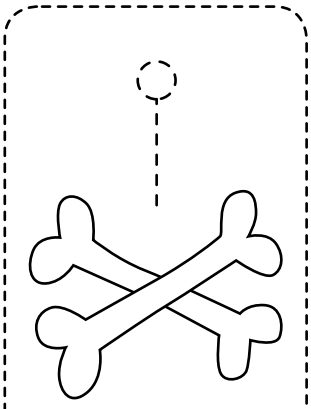


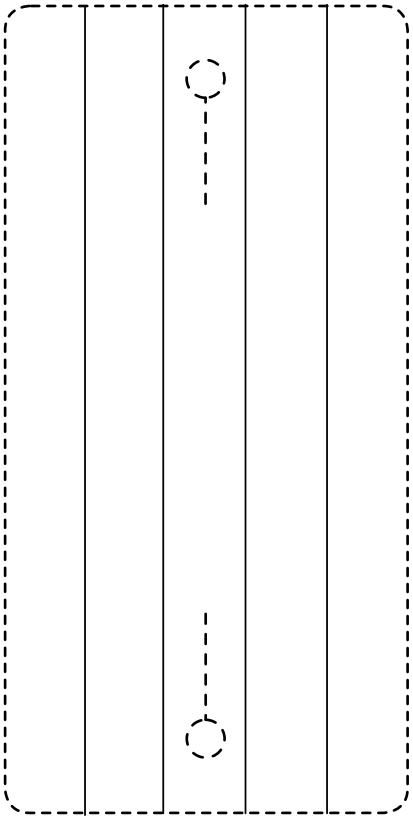


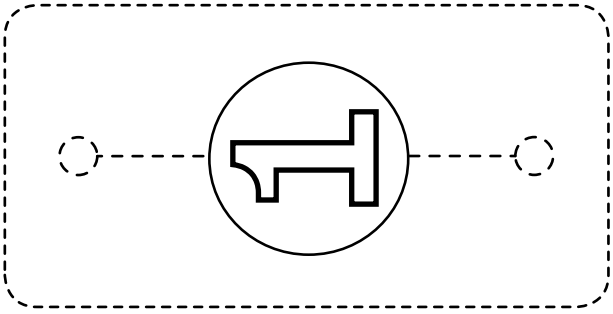
	✓		

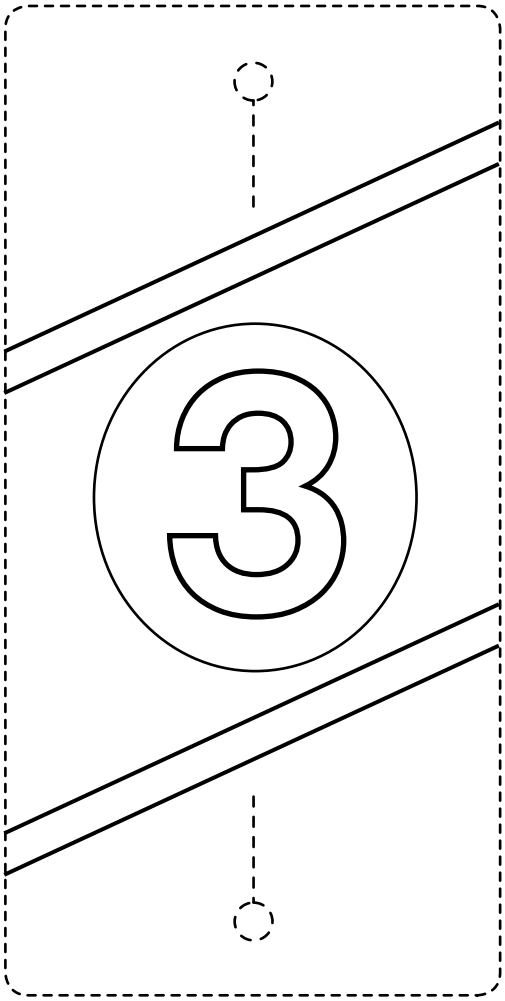


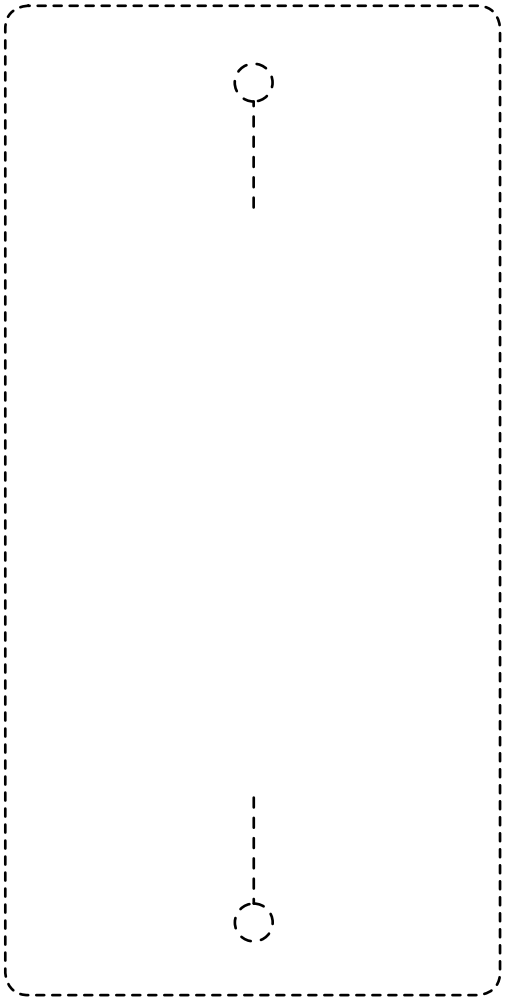


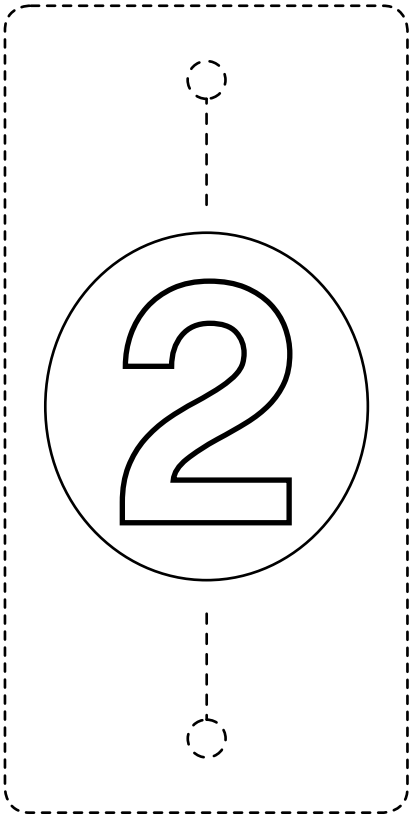


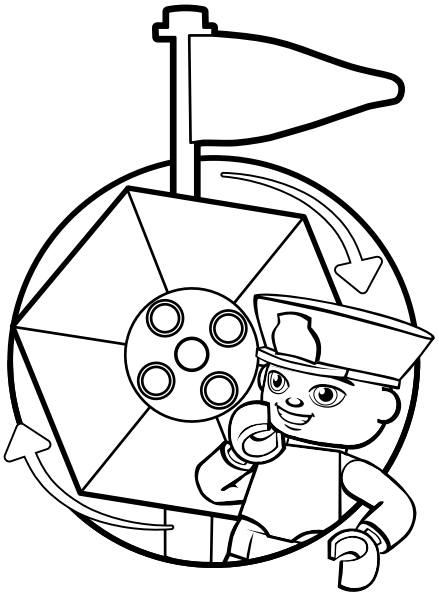


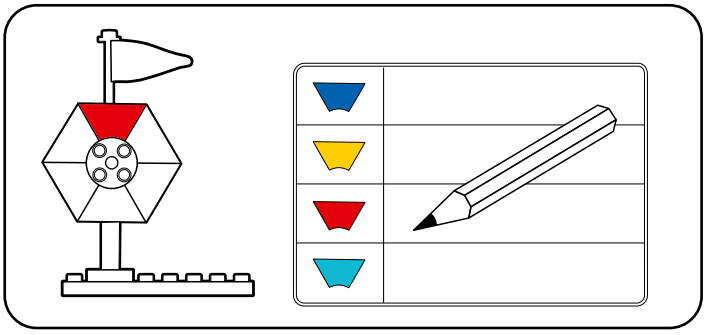


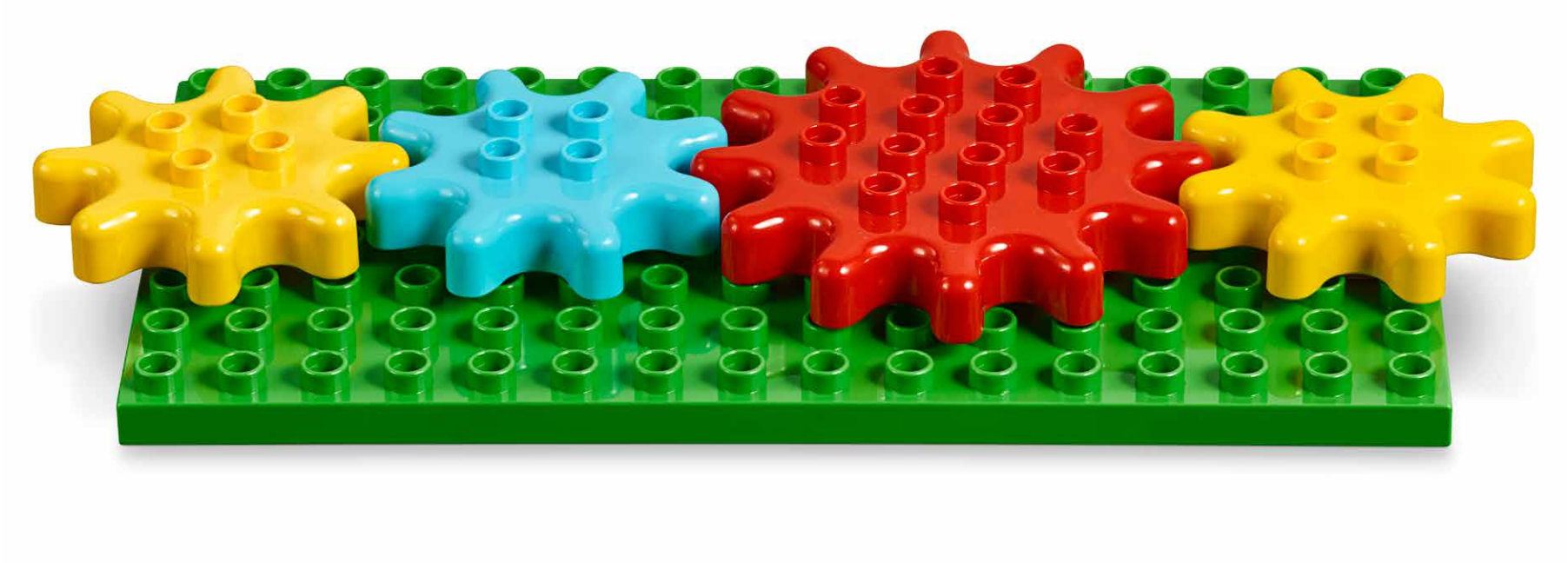


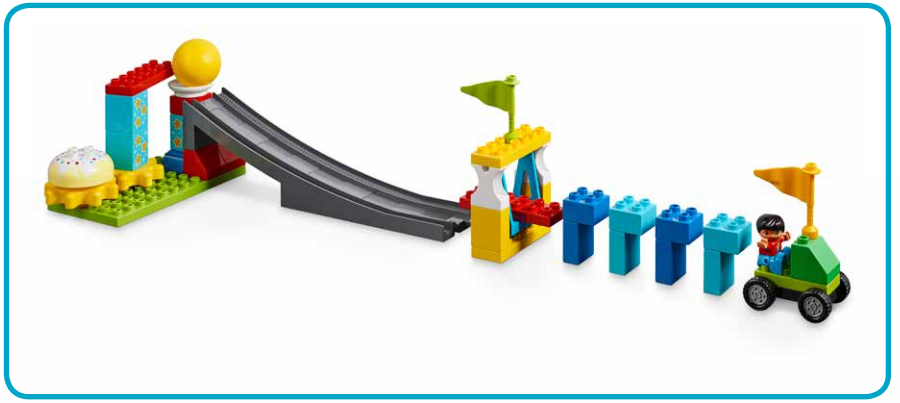


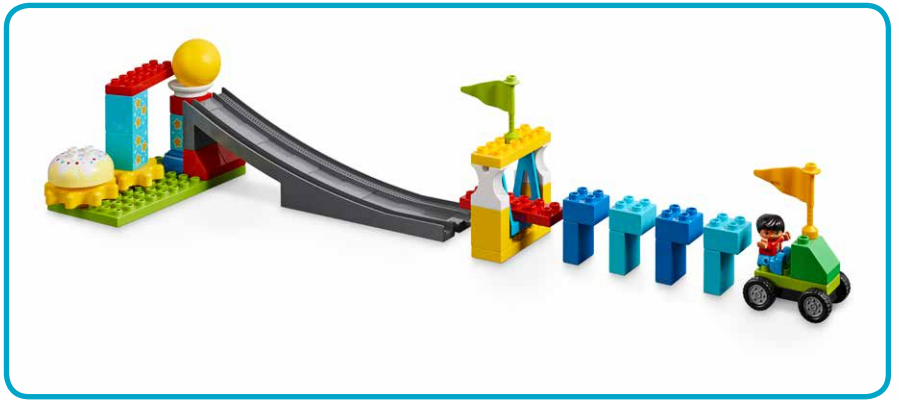




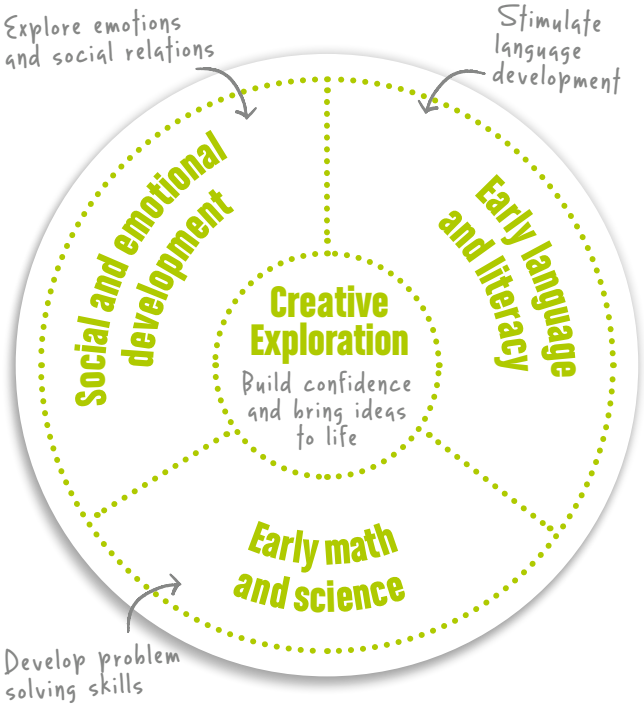








Help your preschoolers develop important skills



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