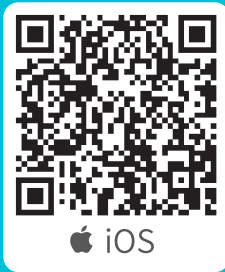**Find more ideas here.**

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CREATING
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makerzoid

SMART ROBOT
MANUAL

Content

APP Download   APP icon

CHAPTER 1 INTRODUCTION

1. APP Introduction

APP Download   APP icon

① Scan the QR Code

② APP store-search "makerzoid"
 IOS

② APP store-search "makerzoid"
 Android

1 APP Download

The APP includes different robot kits, you can choose the kit you have purchased

2 Choose the Robot Kit

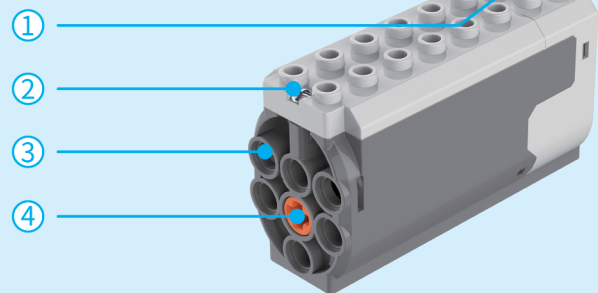It teaches you how to build a robot

3 Build a robot

Please scan the QR code to enter our website:
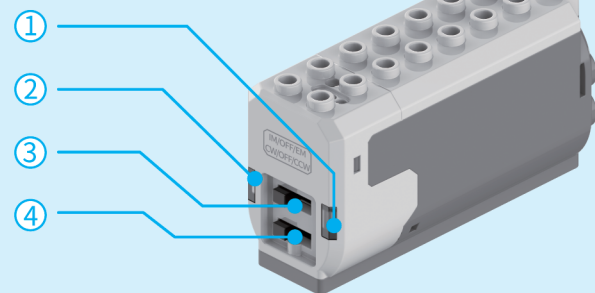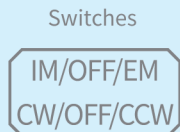www.makerzoid.com

2. Motor

◯ The Front

1. Sensor Port
2. Blocks Contact Area
3. Pins Connection Port
4. Motor Output Port

① ② ③ ④

◯ The Back

1. CCW(Counterclockwise) Light(Red)
2. CW(Clockwise) Light(Green)
3. "IM/EM" Switch
4. "CW/CCW" Switch

Switches

IM/OFF/EM
CW/OFF/CCW

① ② ③ ④

Battery Installation Instructions

◯ Non-rechargeable batteries cannot be charged.
◯ Rechargeable batteries should be charged under adult supervision.
◯ Used batteries should be removed from the product.
◯ The power terminals should not be short-circuited.

◯ Batteries of different sizes or old/new batteries cannot be used together.
◯ The toy cannot be connected to over one power source.
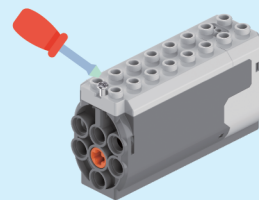◯ Batteries should be inserted with the correct polarity.

How the motor works

◯ According to the Electromagnetic Induction, the electrified wire rotates under the force in the magnetic field (As pictured on the right).
◯ The motor turns electric energy into kinetic energy enpowering and activating the robots.
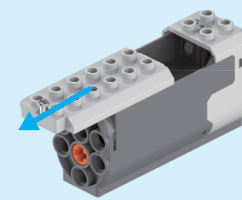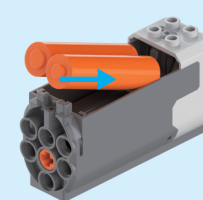
N

Electric Brush

S
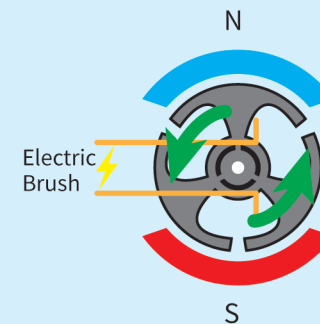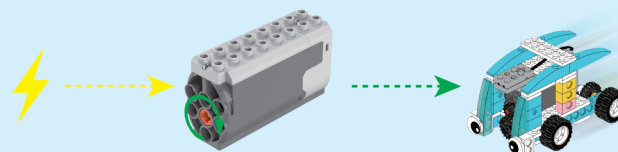
How to insert the batteries

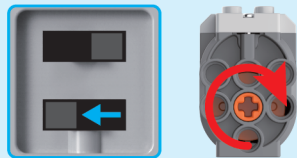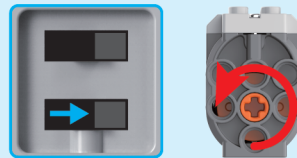| ① Romove the screw on the cover	② Remove the cover on the motor	③ Insert 2 AAA batteries (NOT included)	④ Push back the cover and the screw
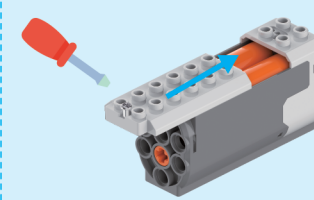
EM (Electric Mode)

CW(Clockwise)	CCW(Counterclockeise)	OFF
Motor functions clockwise in EM	Motor functions counterclockwise in EM	Motor is off in EM
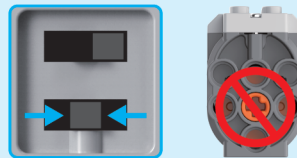
IM (Intelligent Mode)

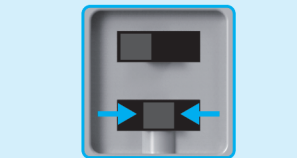| CW(Clockwise)	CCW(Counterclockeise)	OFF
Motor functions clockwise in IM	Motor functions counterclockwise in IM	Motor is off in IM
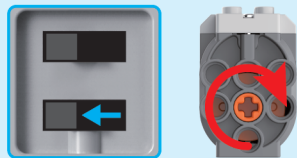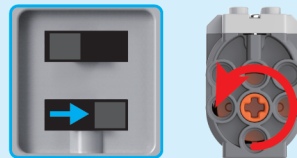
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3. Distance Sensor

1. Introduction

○ The Infrared Distance Sensor judges distance and obstacles through the infrared light.Interference of infrared light from other sources, e.g a very bright room, will affecting the detection range of the sensor.

○ The two small "eyes" on the sensor are used for transmitting and receiving the infrared.

1. Infrared strength   4. Infrared emission

2. Logical Decision   5. Joint

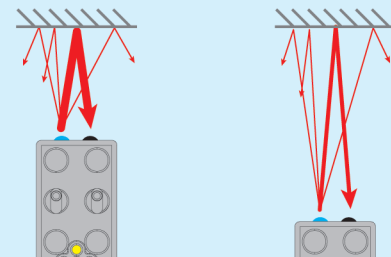3. Infrared reception

⑤

① ② ③ ④

Connect to the motor
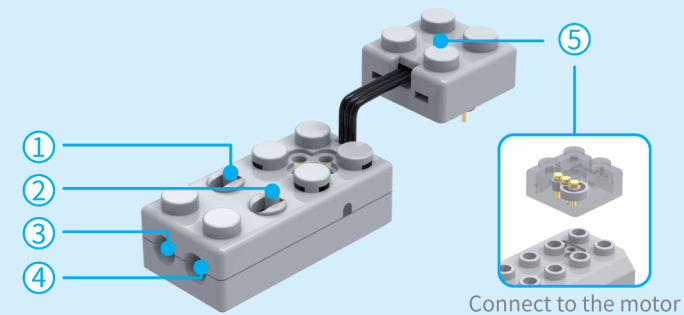
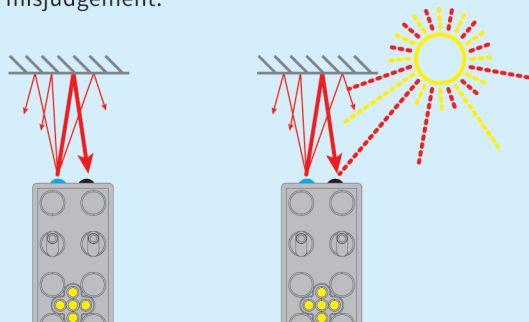### 2. How the sensor works

Emitting Infrared   Receiving Infrared
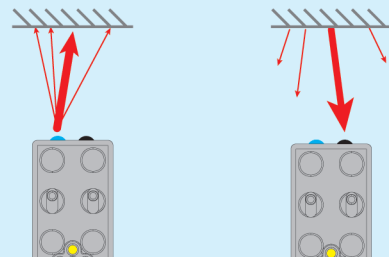
3. Measure the distance

○ Measure the distance between the object by the strength of the infrared received.

4. Influence of the sunlight

○ Sunlight contains strong infrared light which will affect the insensity of the infrared light received by the sensor and cause its misjudgement.
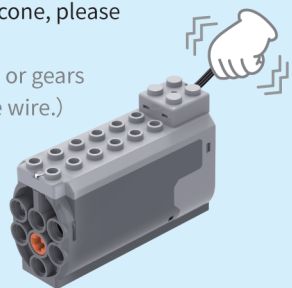
5. Color reflection

○ Color of the object will affect the strength/weakness of the reflected light.

The darker the color, the weaker the reflected light.

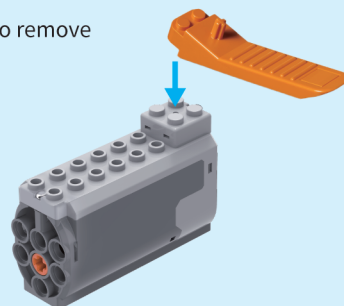The lighter the color, the stronger the reflected light.
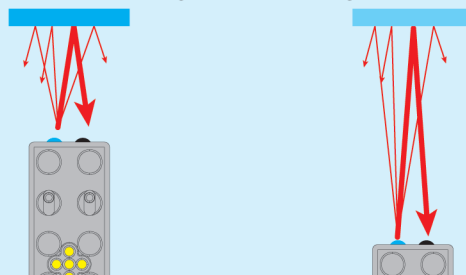
6. Disassembly

○ The sensor is made of silicone, please do not pull it out.
（Squeezing it with blocks or gears may cause damage to the wire.）

○ Please use a splitter to remove the sensor.

Choose Mode：
Logical Decision

Motor stops after the sensor detects of an object.
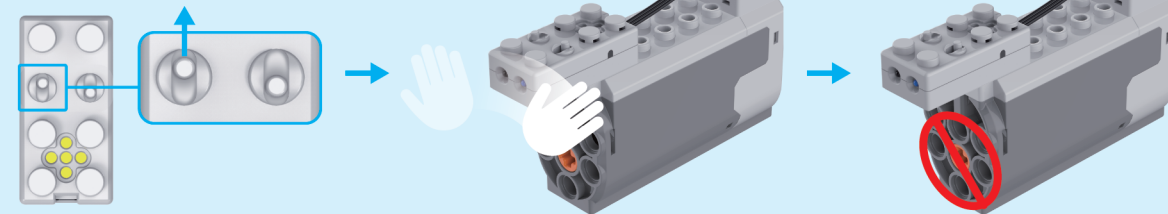
Motor starts after the sensor detects of an object.
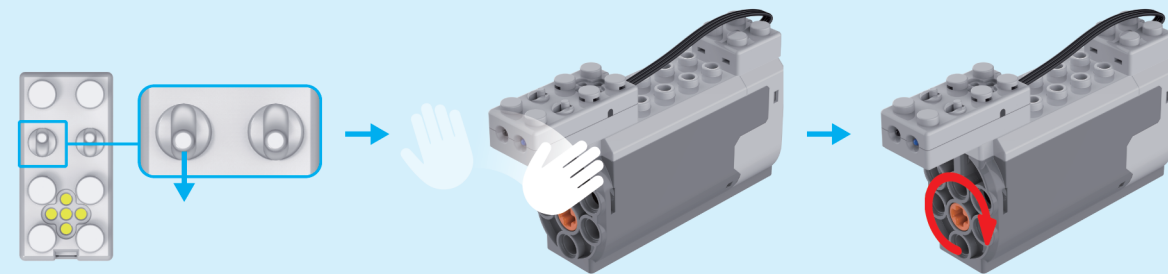
Choose Mode:
Infrared Strength

Strong
Strong infrared makes it easy to detect an object.

Weak
Weak infrared weakens the sensity to detect an object.
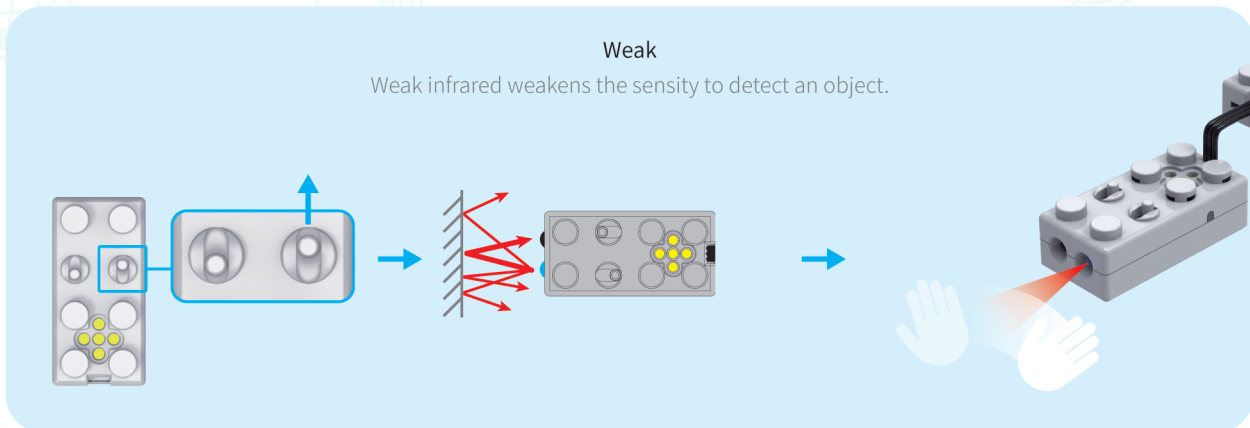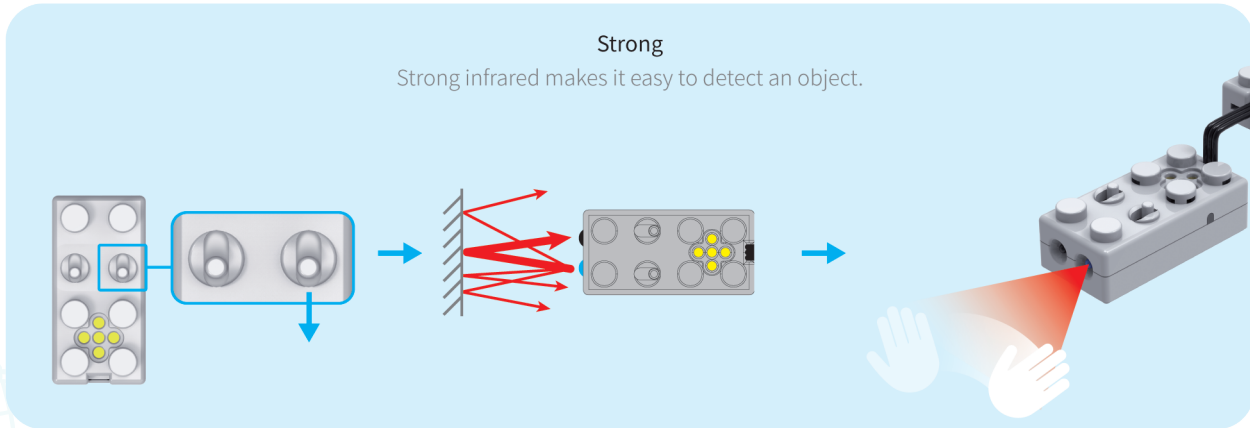
4 Light Sensor

1. Introduction

○ The light sensor, also known as photoresistor, is the kind of sensor that could detect the strength of the light surroundings with the components inside. The stronger the light, the weaker the resistance.

○ The car LED light module is a perfect example of using the light sensor to automatically control the light to be on or off.

1. Strenth Adjustment   3. Sensor

2. Logic Adjustment   4. Joint

① ② ③ ④

Attach to the motor

2. How it works

Object emits lights

Sensor receives them
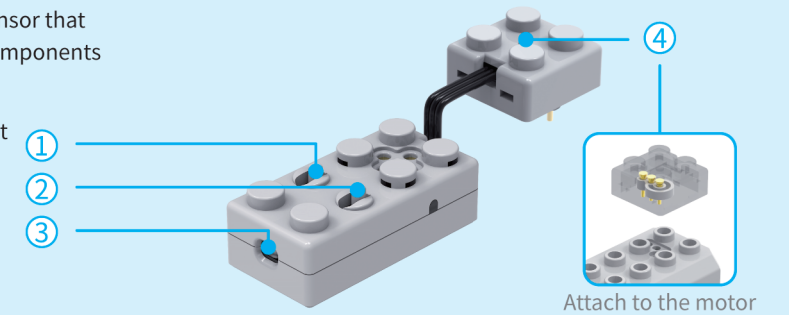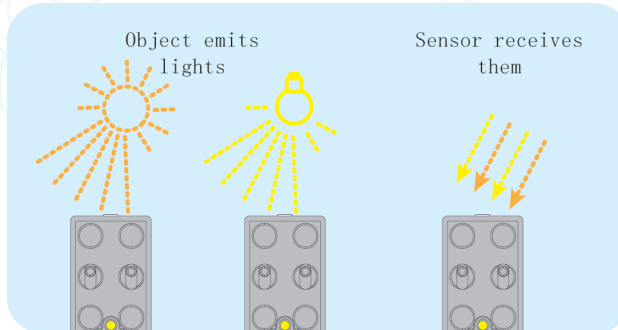
3. Sense the lights

○ Determine if there are lights according to the sensor.

Bright

Dark
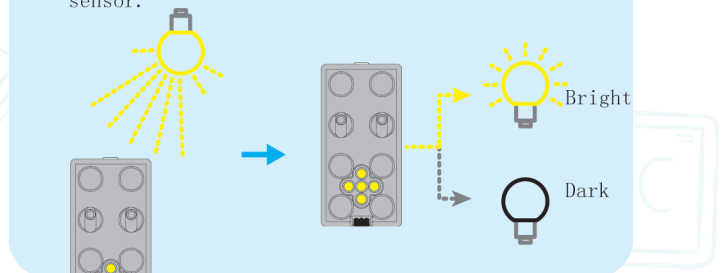
Choose Mode：
Logic Adjustment

Motor stops after the sensor detects of the light.
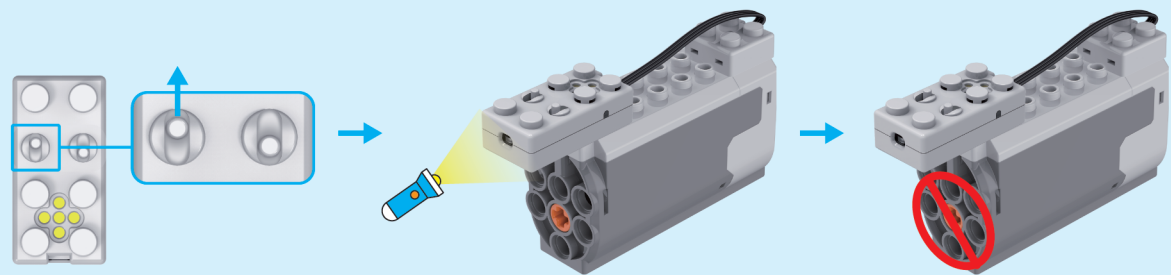
Motor starts after the sensor detects of the light.
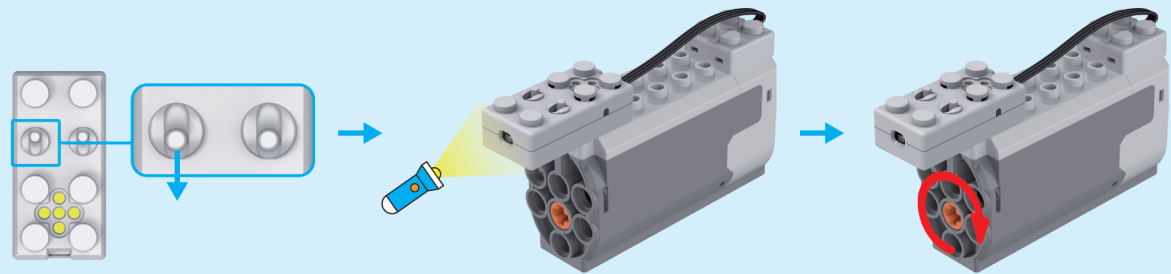
Choose Mode：
Light Strength
Adjustment

Strong
Easier to detect the light
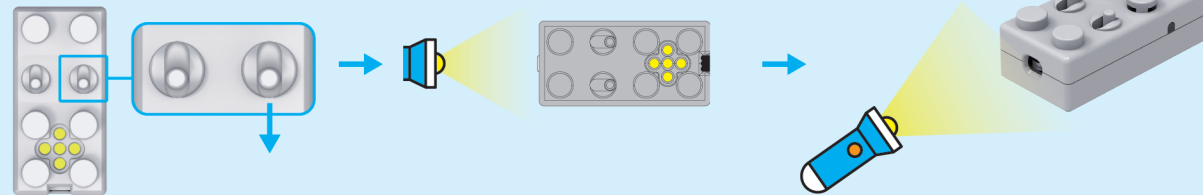
Weak
Weak sensity to detect the light
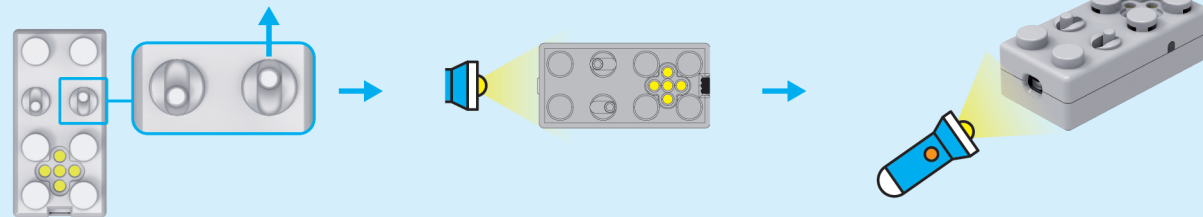
CHAPTER 2 BASIC KNOWLEDGE OF ROBOT PARTS

1. The Unit Size

| Beam | Sheet | Cross Shaft | Pin | Shaft Sleeve | Half Shaft Sleeve | Convex Beam | 0.5 unit | 1 unit | 5 unit | 6 unit |
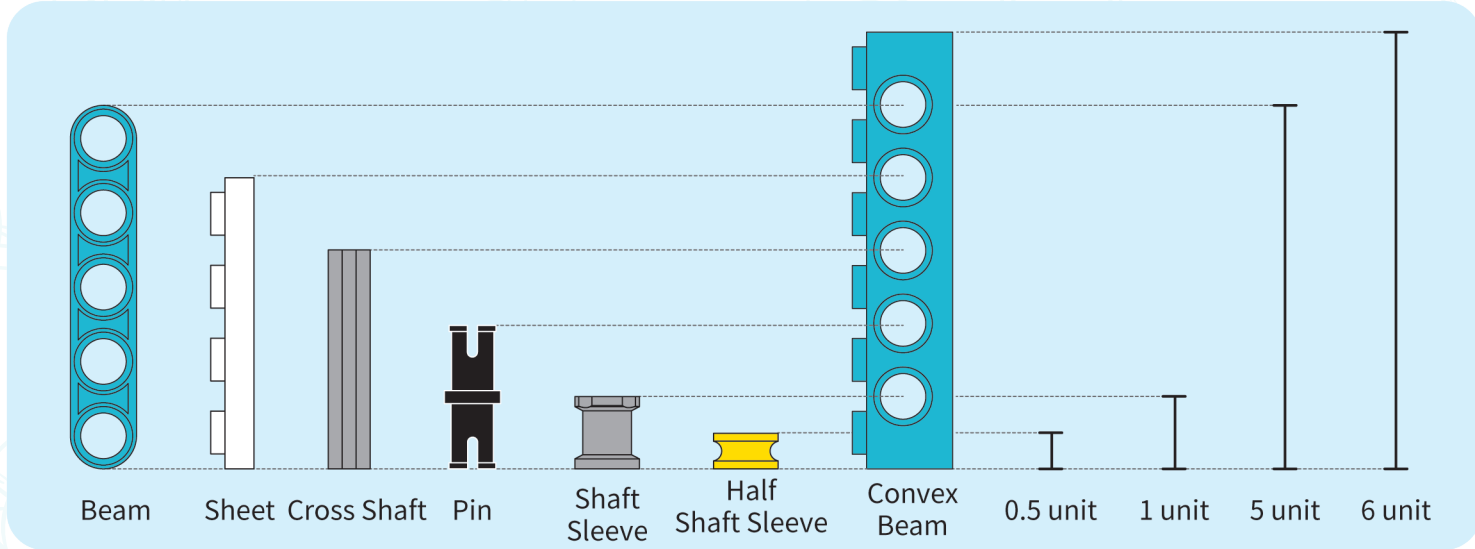
○ 1 unit = 8mm. Generally the width, height, length of the parts are integral multiples of the size of the unit .

Example: 4   The part is called convex beam. Its length is 4 unit and width is 1 unit.

12

The height of the beam and brick

○ Height of the beam(or brick)=1.2 unit=9.6mm
Height of 1 beam(or brick)=Height of 3 sheets
Height of 1 sheet=0.4 unit=3.2mm

1.2 unit

0.5 unit   1 unit   1.2 unit

1 unit   1.2 unit

0.4 unit 1.2 unit
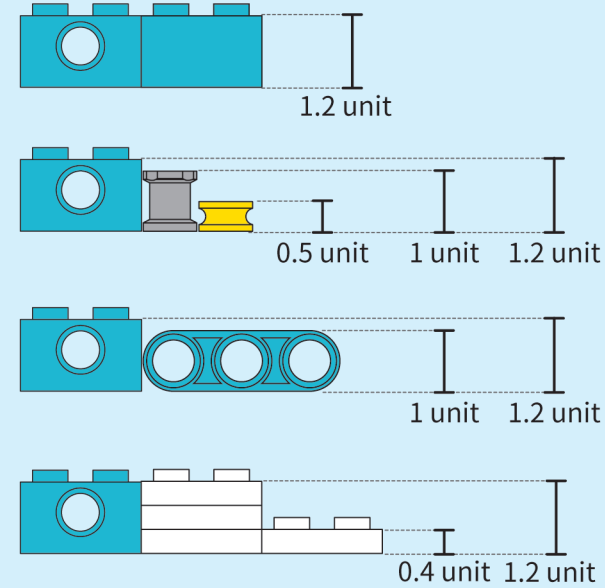
Hamburger Structure

○ Height of 2 beams(or bricks) piled up is 2 unit.
The distance between two holes is 1.2 unit.
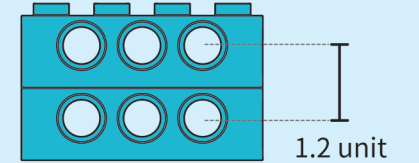
1.2 unit

○ Height of 2 beams(or bricks) + 2 sheets piled up = 3.2 unit. Distance between two holes is 2 unit.
(2 sheets should be in the middle)

2 unit

13
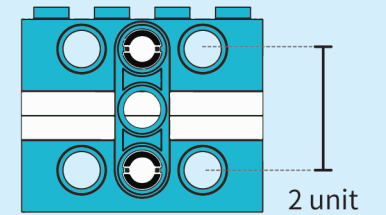
Size Reference List - Shaft

2	
3	
4	
5	

6	
7	
8	
10	
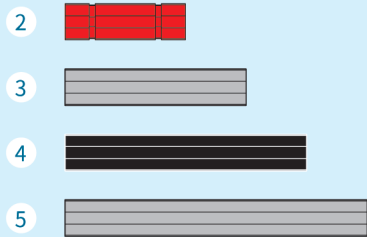
Size Reference List - Plate

| 1x2 | |
| 1x4 | |

| 1x6 | |
| 1x12 | |
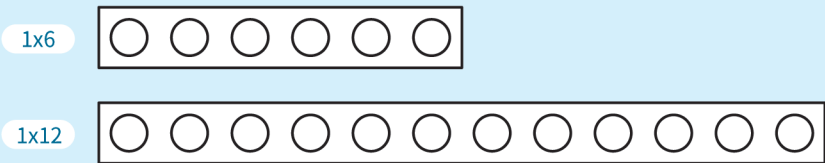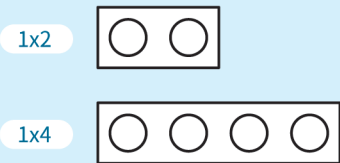
NOTICE

When you receive the product, please read the contents on the "Parts List" first. Understanding the shapes of various parts and confirm the number of the parts received according to the list would be highly recommended. The tutorials will be much easier to understand afterwards. (Colors of the parts you see on the illustrations may be different from the actual ones due to the need for production batches or display. Please distinguish different parts based on their shapes. If there are any parts missing, please contact customer service.)

2 The Difference Between Bricks

1. Difference between pins

Half pin	1.5 unit	The half part of it is combined with a 0.5 unit accessory.
Grey pin	2 unit	It has little friction with the hole, so it's easy to rotate.
Black pin	2 unit	It has great friction with the hole, so it's mostly used for fixation.
Half pin shaft(loose)	2 unit	The pin of it has little friction with the hole, so it's easy to rotate.
Half pin shaft(tight)	2 unit	The pin of it has great friction with the hole, so it's mostly used for fixation.
Long half pin	3 unit	It has little friction with the hole, so it's easy to rotate.
Long pin	3 unit	It has great friction with the hole, so it's used for fixation.

2. Difference between gears

8-teeth gear		Combined with 24-teeth gear to achieve a triple acceleration or deceleration.
12-teeth gear wheel		Mostly Used to change the direction of axis hole's motion.
12-teeth gear		Combined with 20-teeth gear to achieve acceleration or deceleration.
20-teeth gear wheel		Mostly Used to change the direction of axis hole's motion.
20-teeth gear		Combined with 12-teeth gear to achieve acceleration or deceleration.
24-teeth gear		Combined with 8-teeth gear to achieve a triple acceleration or deceleration.
2M worm		Mostly used to combine with gears to achieve acceleration or deceleration.
1x4 gear strip		Mostly used to combine with gears in reciprocating motion.

3. Difference between sleeves

| Shaft sleeve | | Mostly used to steady the parts in the cross shaft in 1 unit. |
| Half shaft sleeve | | Mostly used to steady the parts in the cross shaft in 0.5 unit. |

4. Universal joint

| Universal joint | | Mostly Used to change the direction of axis hole's motion. |

3 Use Skills

1. Interlock

Lock with one block — Easily come off — Lock with two blocks to make it firmer
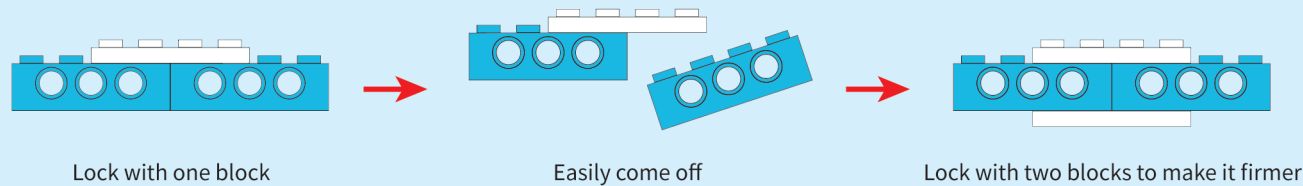
2. Two points determine a straight line

⭕ Connected with a pin makes it rotatable.
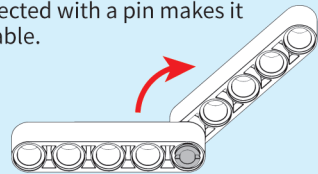
⭕ Connected with two or more pins makes it steady.
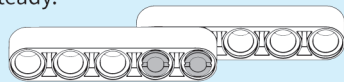
3. Detach the blocks

⭕ As picture 1, sheets are tightly attached. Put one piece of convex beam on each side as picture 2. Sheets could be detached easily by pressing out the two convex beams simultaneously.

1   2   3
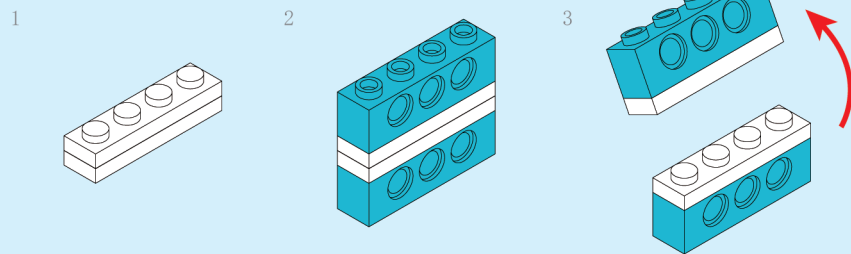
4 Disassembly Skills

Introduction of the splitter

⭕ Based on the principle of leverage, the splitter is designed to be easily used to disassemble parts.

1.disassembly point

2.cross shaft disassembly point

3.convex parts disassembly point

Tips for disassembly

1. Disassembly point

⭕ As pictured, aim at the gap between the parts and push in the splitter.

Don't bite on the blocks.
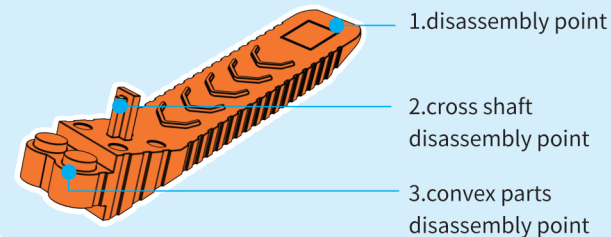
2. Cross shaft disassembly point
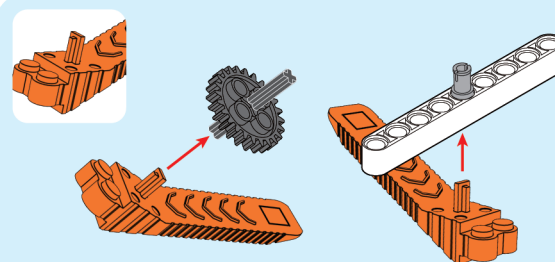
⭕ As pictured, aim at the bottom of the shaft with the cross shaft disassembly point and push gently in case the shaft drops out.

3. Convex parts disassembly point

⭕ Aim at the bottom or top of the convex parts with the disassembly point and press it accordingly as pictured.

Intelligent Car
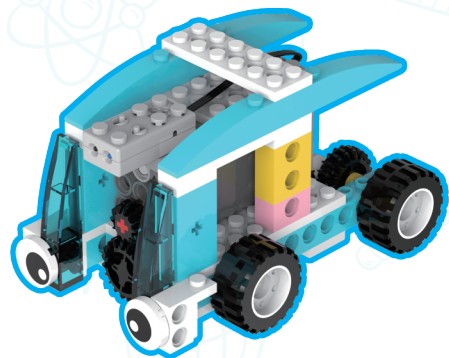
Scenario:

Hey guys, have you ever seen an automatic car?

An intelligent car can drive and stop automatically with computer, AI and Automatic Control technology.

Would you like to build your own intelligent car?
Let's do it together!
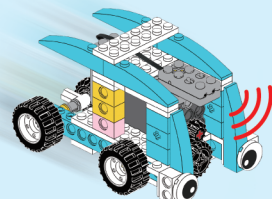
Knowlege:

Comparison of gear acceleration and vertical engagement structures

Gear Deceleration Structure

Drive wheel is the small one. Engaged wheel is the big one.

The number of my teeth is 8 more than the Drive wheel's.It goes a round leading me goes 3/5 round, so my speed is slower but power is stronger.

① ②
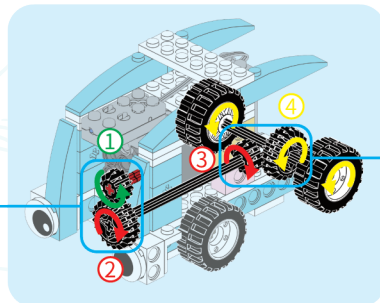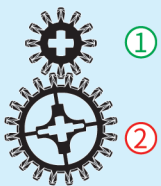
Vertical Engagement Structure

Vertical engagement means gears rotate on two vertical surfaces. The direction of force changes when the direction of rotation changes.

① ② ③ ④
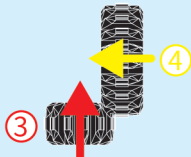
Intelligent Car

★ ★ ★ ☆ ☆

Build:

Hey guys, please follow the steps to build the intelligent car with your fastest speed. You will find something interesting and useful!
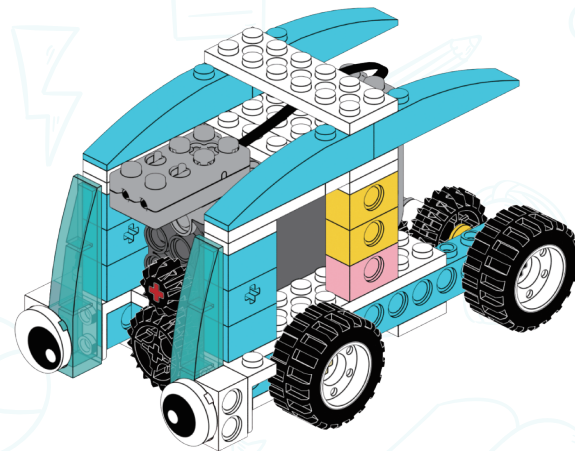
Target:
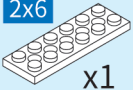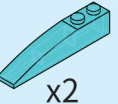
1. Learn about the gear vertical drives theory when building the car.
2. Learn how to set the car move forward and backward.
3. To achieve the goal that the car can move and stop automatically in front of obstacles with the distance sensor.

01 8 x1 x1 x1 x1

1:1

02 12 x2 x2

03
10 x1 x1 x1 4 x2

1:1

05
x4 x4 x2
x4

04
2x8 x2 2x6 x2

06
x1 x1 x1

07
x2 x2 x4 x2

08
x2 x2 x4

09
2x6 x1 1x6 x1 x1

10
1x4 x2 x4
x2

11

2x6
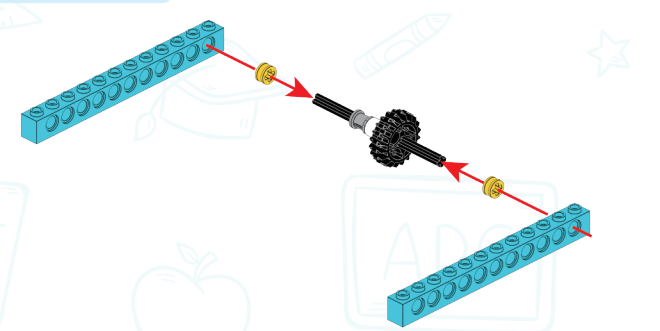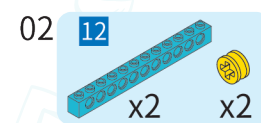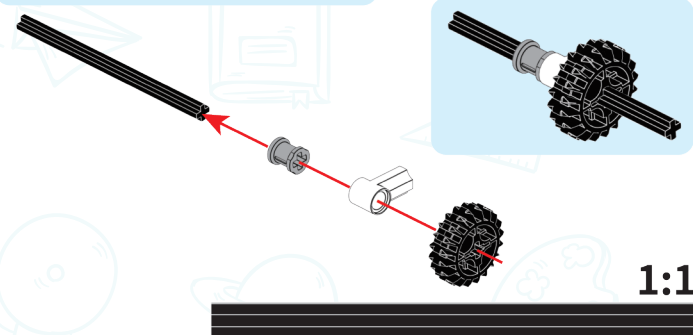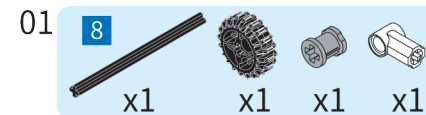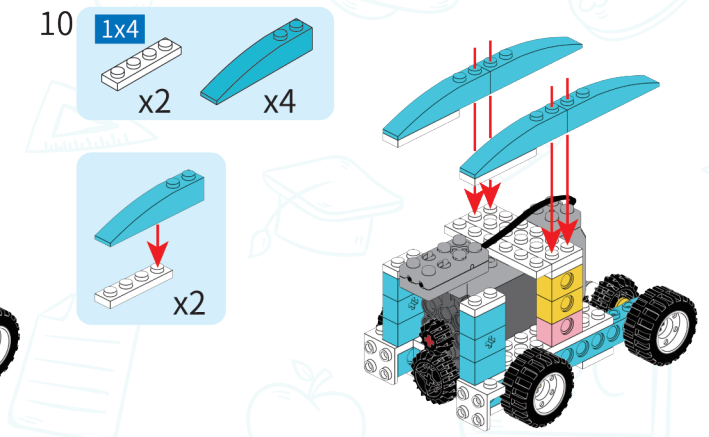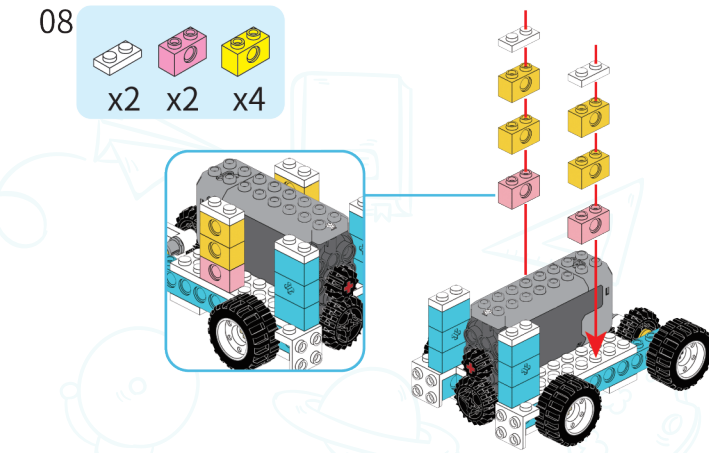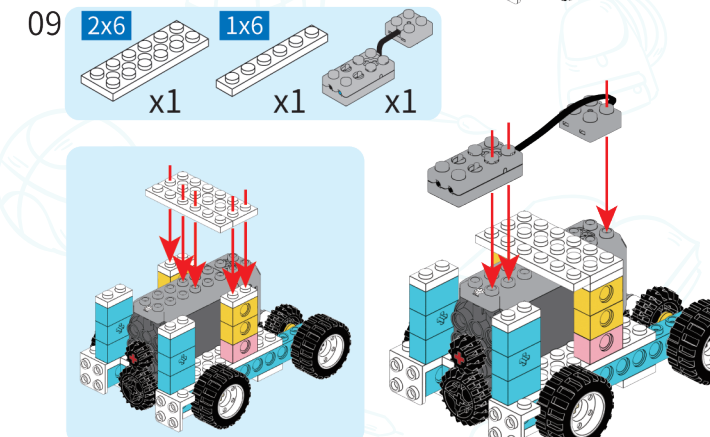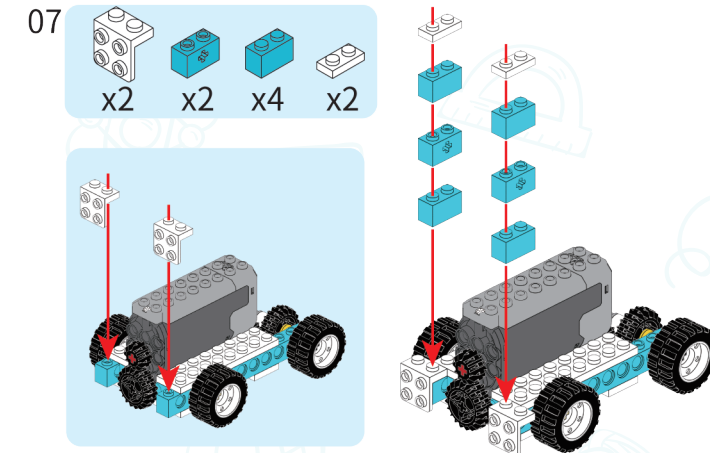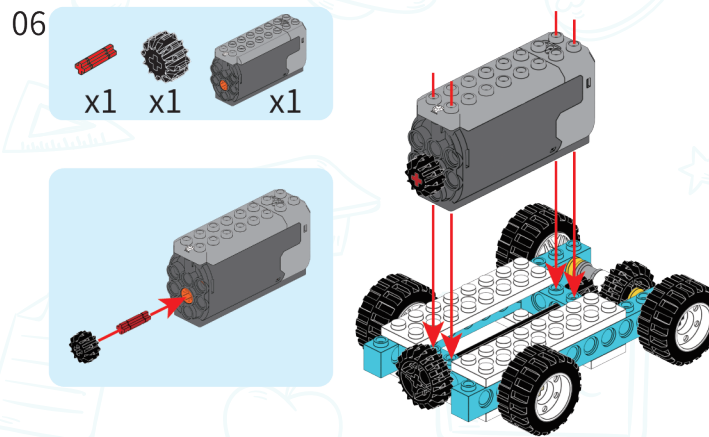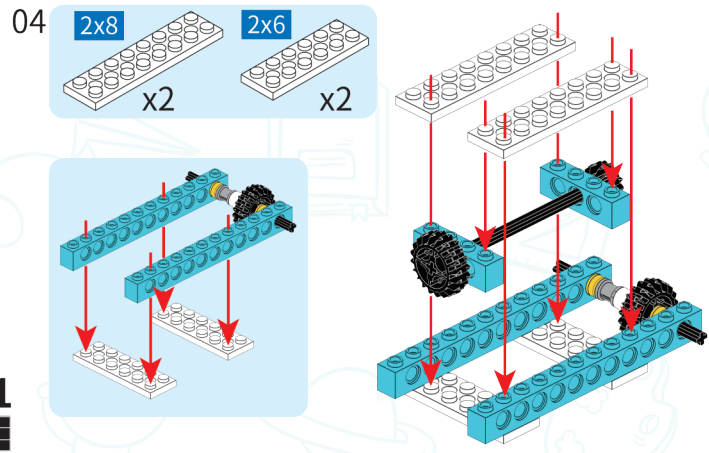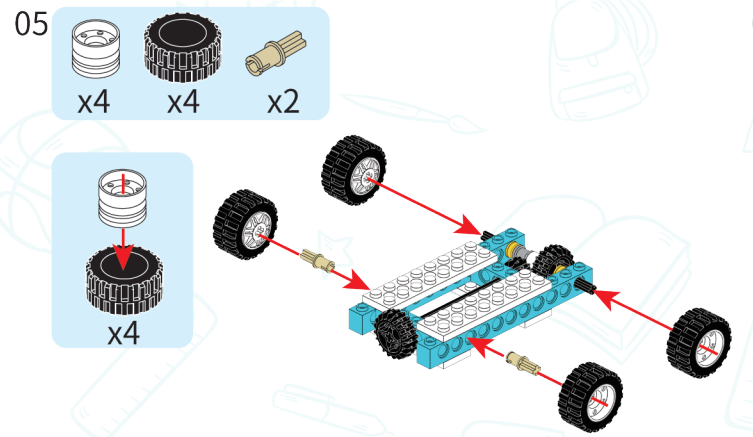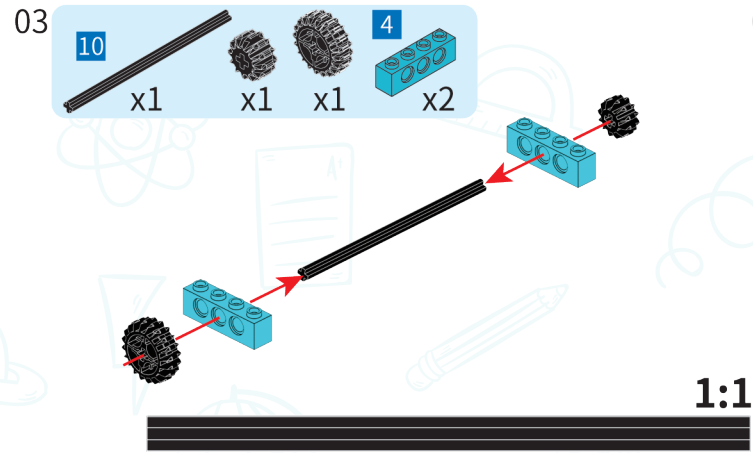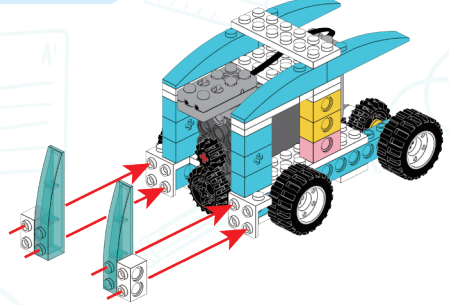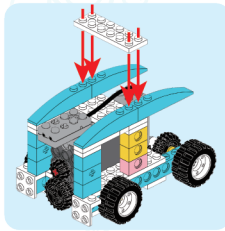
x1 x2 x2
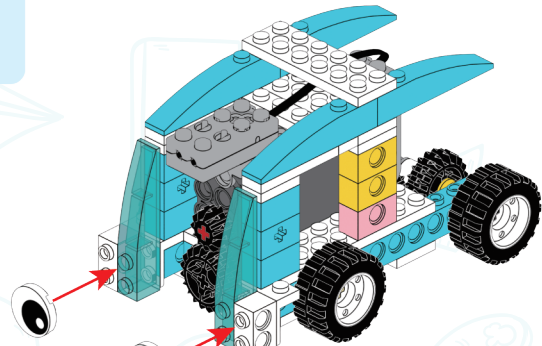
Play:

The intelligent car is done now. Please have some fun!

Test and play:
Turn on the motor switch to EM. Turn it to CCW and see how the car works.

12

x2
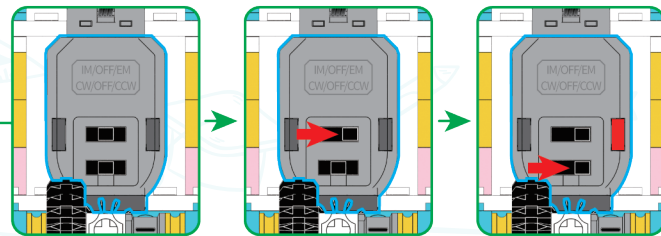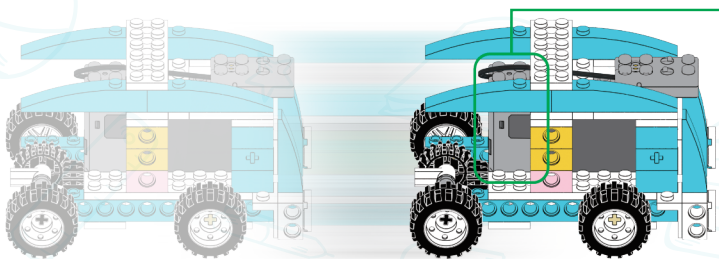
Now we are going to do some coding on the car and make some magic together.
First, we set the sensor to "Stop when detecting obstacles" mode as pictured. Then switch the motor to IM and CCW.
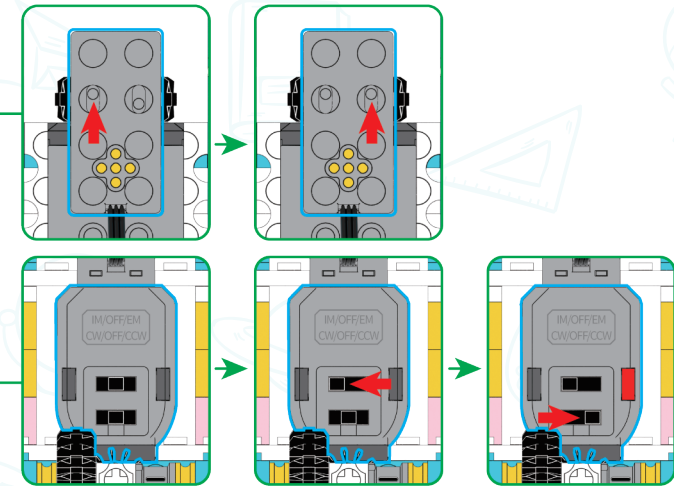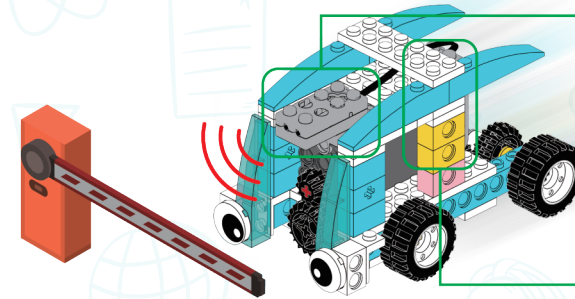
When the program is being executed,the car will starts. It will stop in front an obstacle and start again after the obstacle is gone.

⭘ Programming Flowchart

Analysis of how the program works.

Start → Detect the path → Obstacle → YES → Stop
                                    → NO → Go
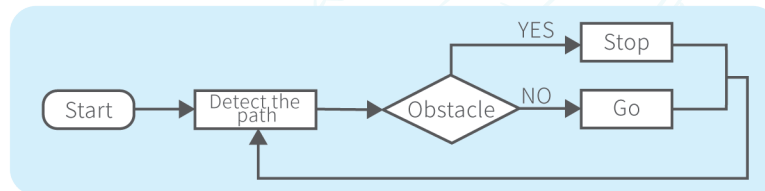
⭘ Create:

Do you know how to adjust the distance sensor after learning the Programming Flowchart?
Please try to adjust the sensor to "Start when detecting obstacles".
When the car detects an object in front, it will start going.
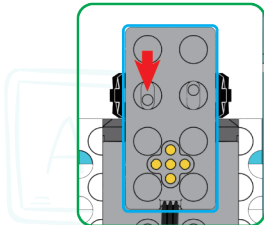
Intelligent Barrier Gate
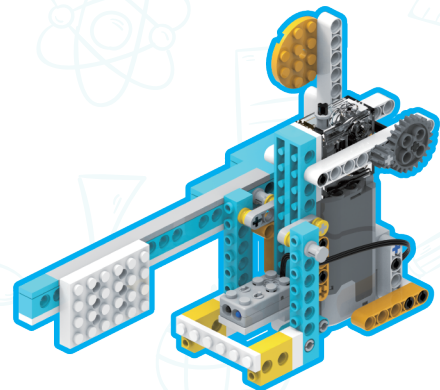
○ **Scenario**

Barrier gate is quite usual in our life. Have you ever seen one like this before?

When a car approaches the barrier gate, the gate keeping anyone out will lift up automatically. When the car leaves, the gate will fall back to its original position.
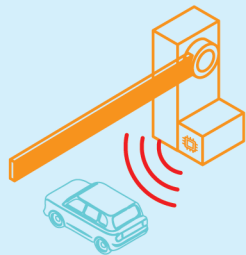
Now let's build an intelligent barrier gate together!
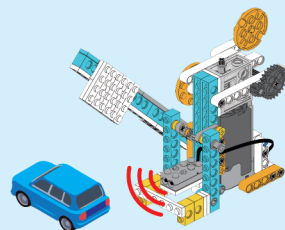
○ **Knowledge**

Cam Mechanism and Hard Lever

Cam Mechanism
Cam and follower mechanism is a pair of higher links that are used to move links spontaneously or periodically.

- Mount
- Follower
- Cam
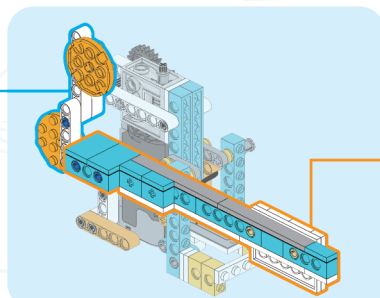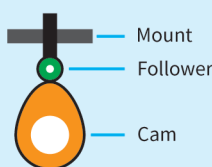
Hard Lever
Lever with a longer effort arm than the resistance arm is called labor saving lever.
e.g scissors, chopsticks, barrier gates.

Resistance Arm

Effort Arm
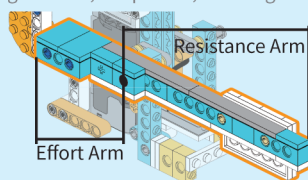
Intelligent Barrier Gate

★ ★ ★ ★ ☆

○ **Build:**

Hey guys, please follow the steps to build the intelligent barrier gate with your fastest speed. You will find something interesting and useful!
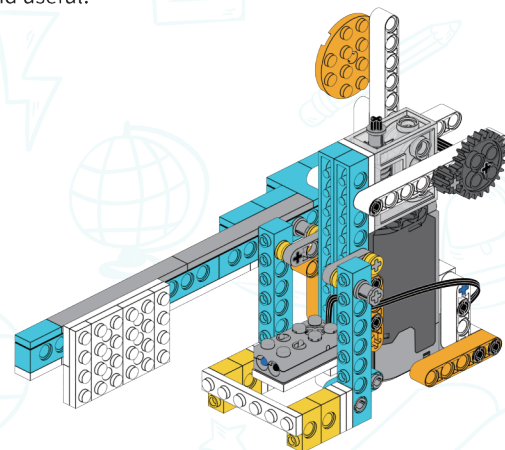
○ **Target:**

1. Learn about the intelligent gate system.
2. Learn about the theory of lever.
3. Use the cam and lever combination to control the gate.
4. To achieve the goal that the gate can lift up and down automatically with the distance sensor.

01

x1   x1   x1   x1   x1

6

1:1

02

5

x1   x1

1:1

03

2x4 x1   12 x2

04

9 x2   x2   x1

x2

05

8 x1   x1

1:1

x1

06

5 x1   x1   7 x1   x2   x1

07

x2   x2   x2

08

5 x2   x2   x4

09

10

x1   2x4 x1

11 x1

12 x1 x1 x2 x2

13 x1 x1 x2 x2

14 4 x1 x2 7 x1 x1 x1

1:1

15 x1 3 x2 x1

1:1

16 8 x2 x1

17 1x6 x1 x4 x4

18 1x6 x1 x3 4 x1 x2 6 x2

2x6 x2
2x4 x2
1x4 x2
x2

4
x2
x2

x1
x2
x2
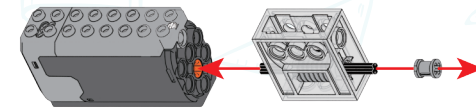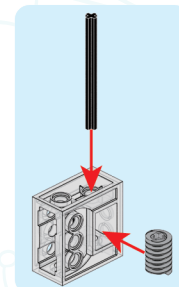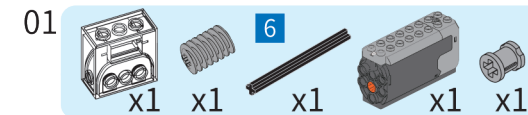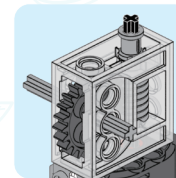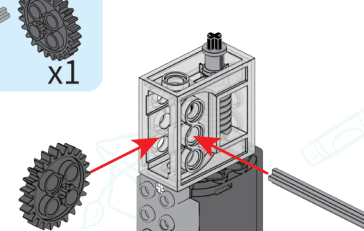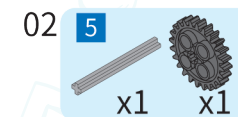
1x4
x2
x2
x1
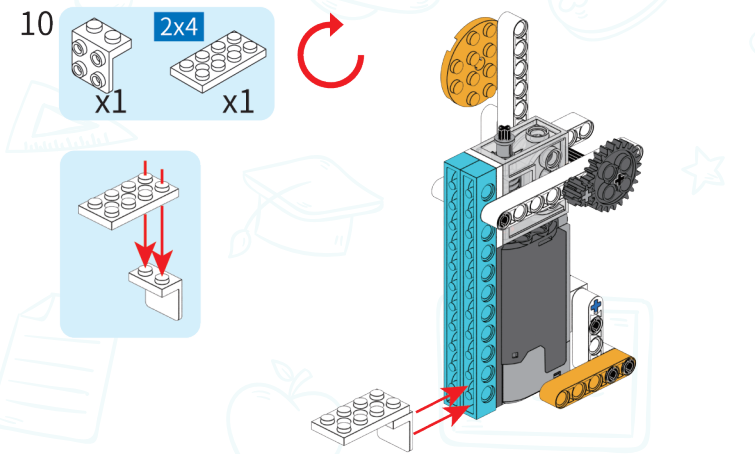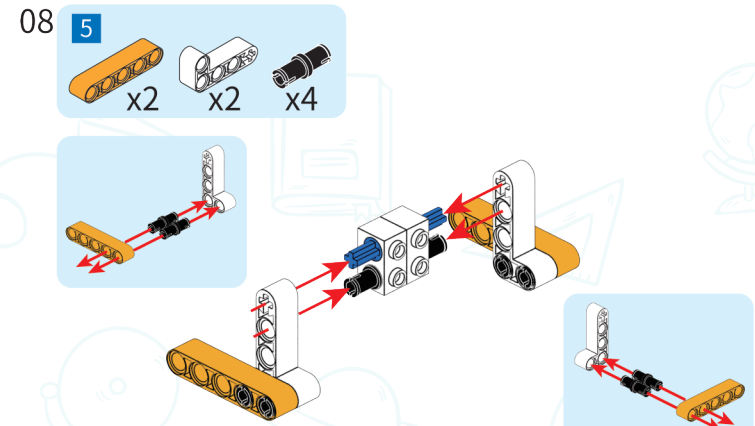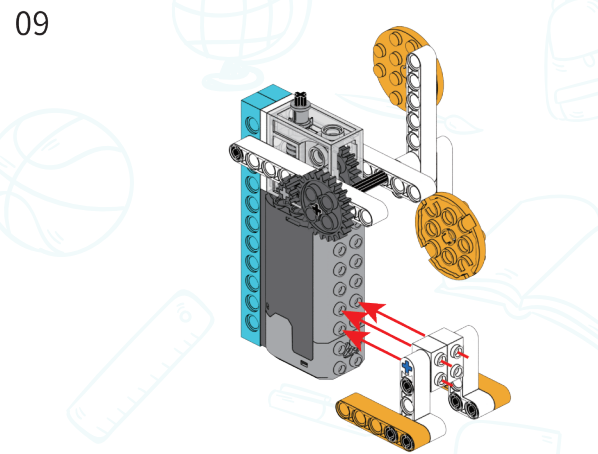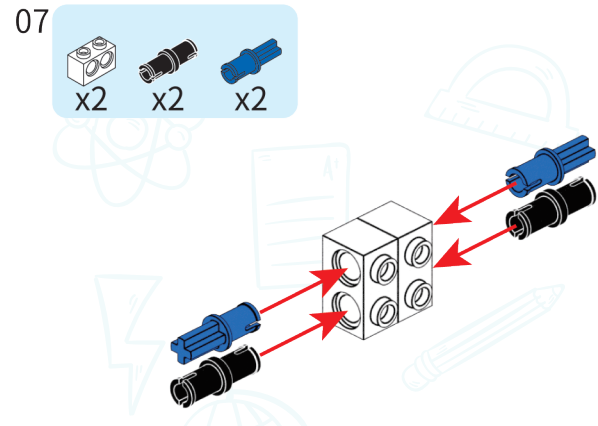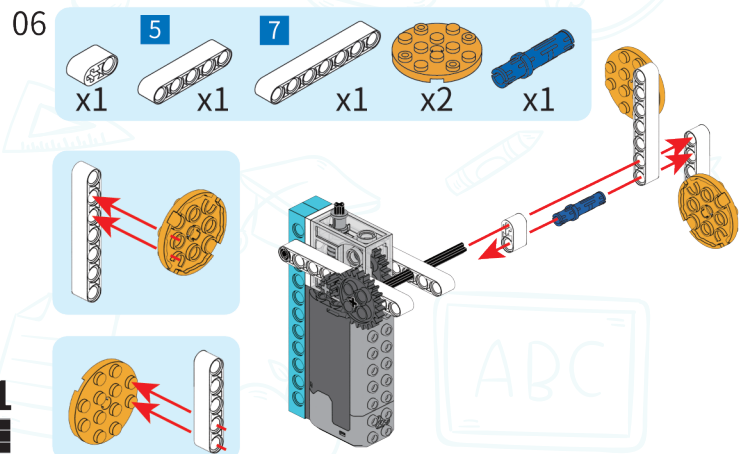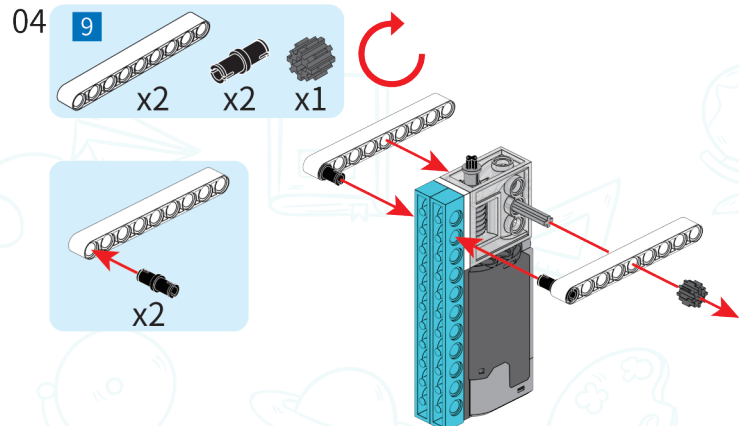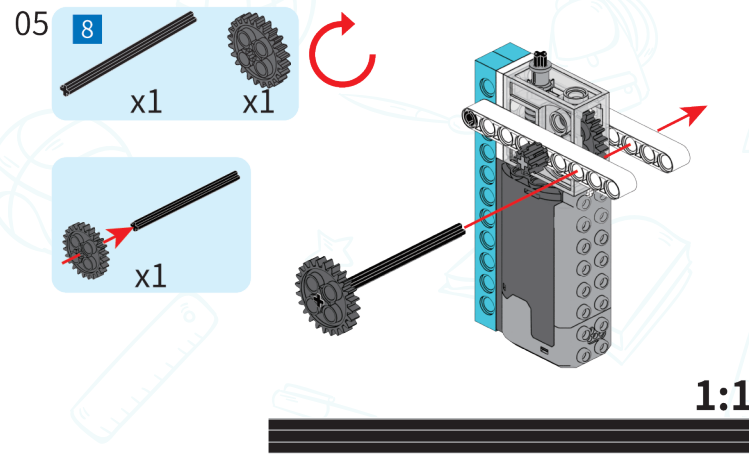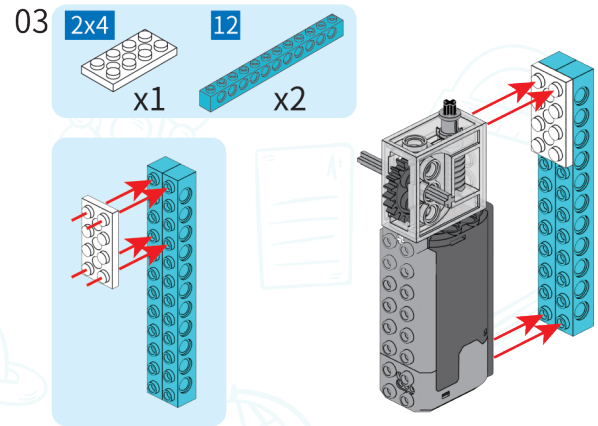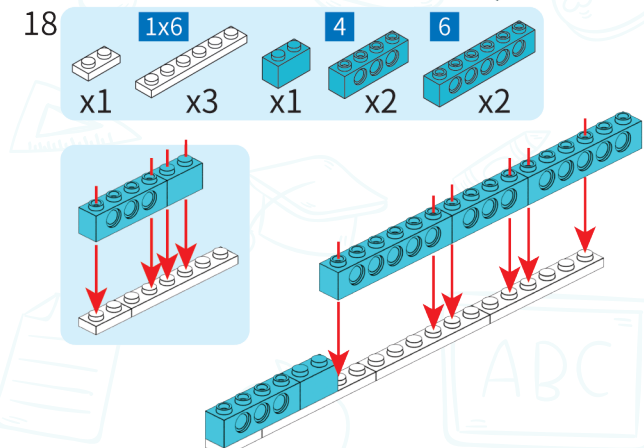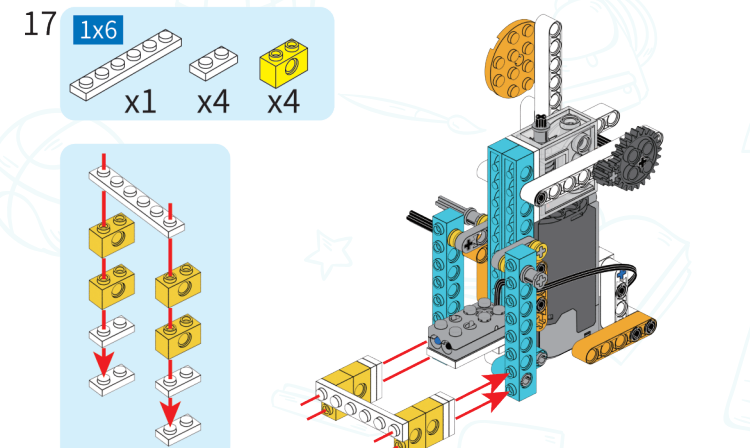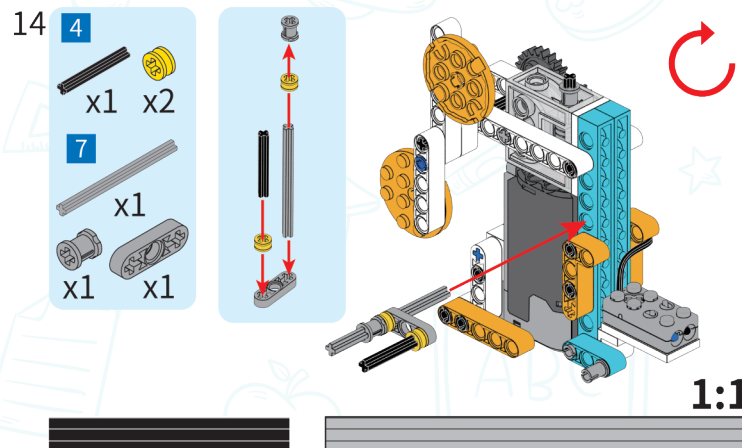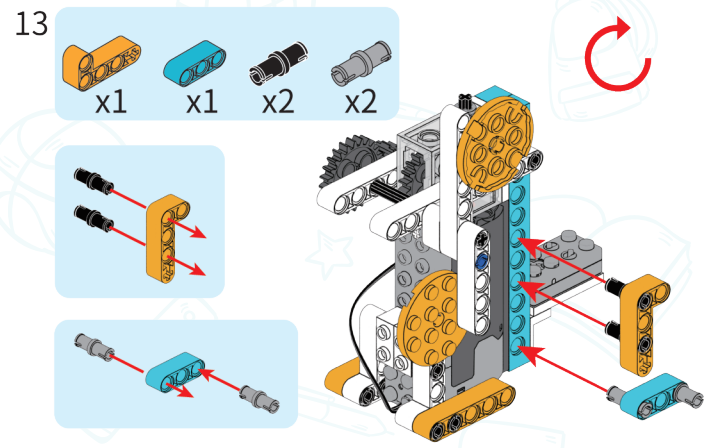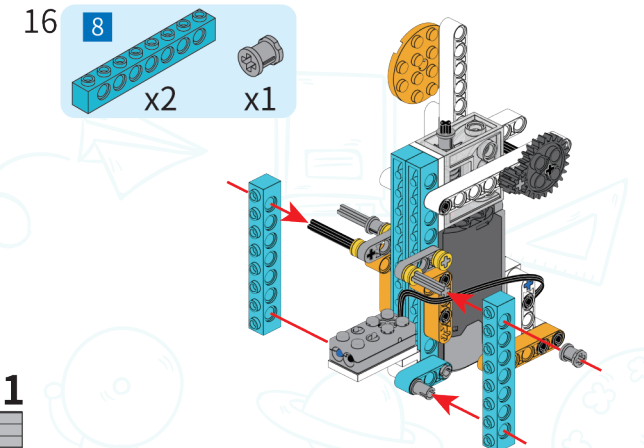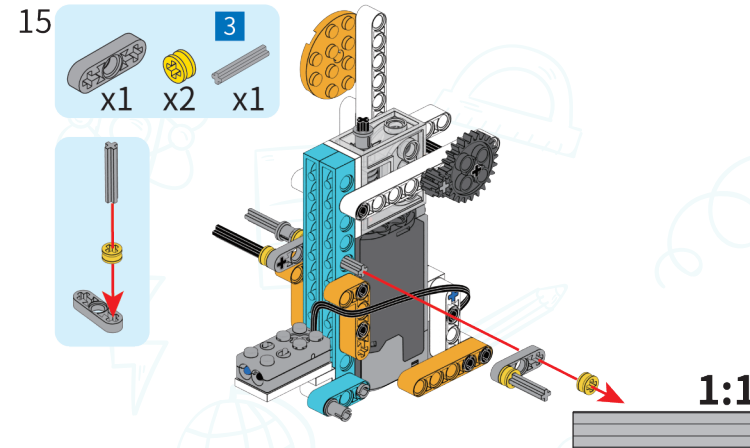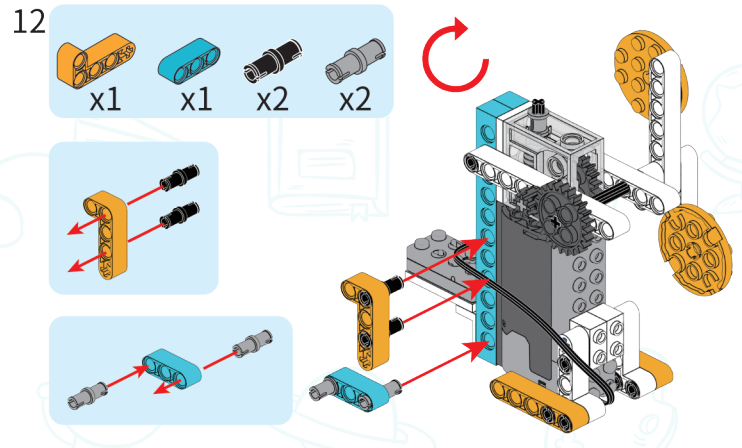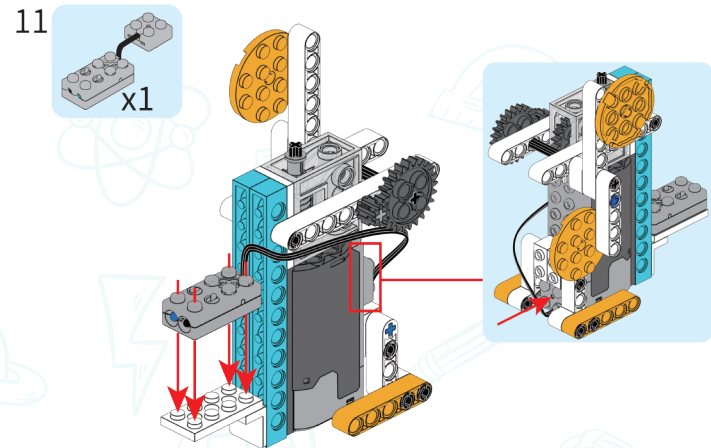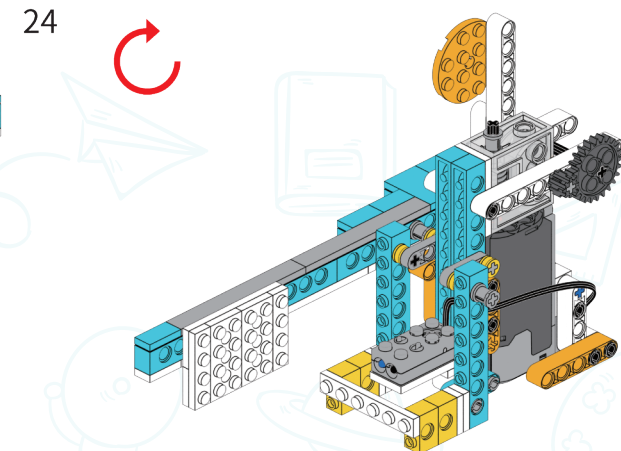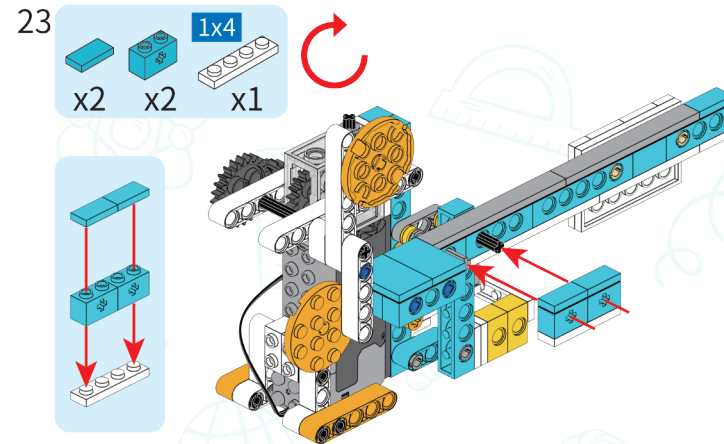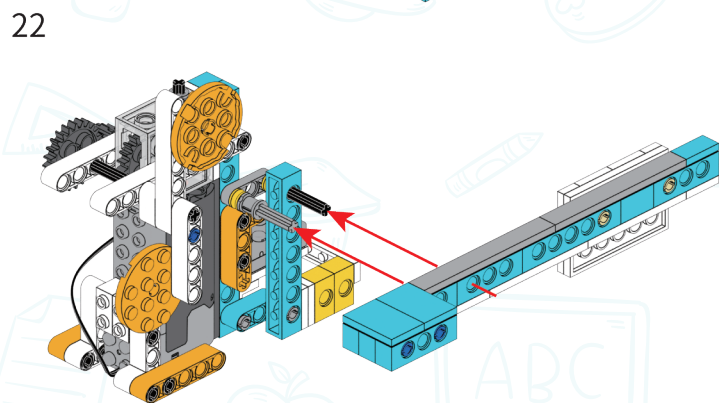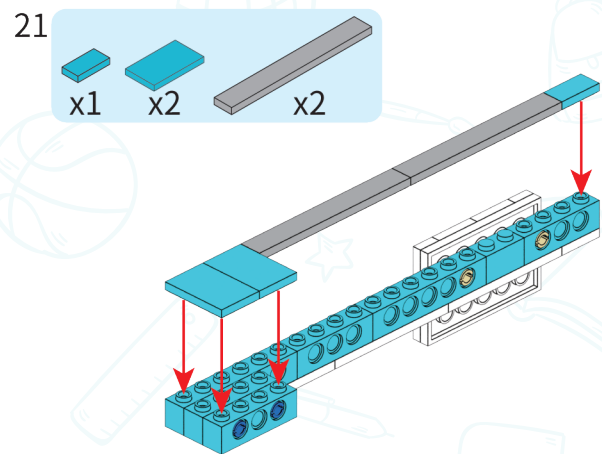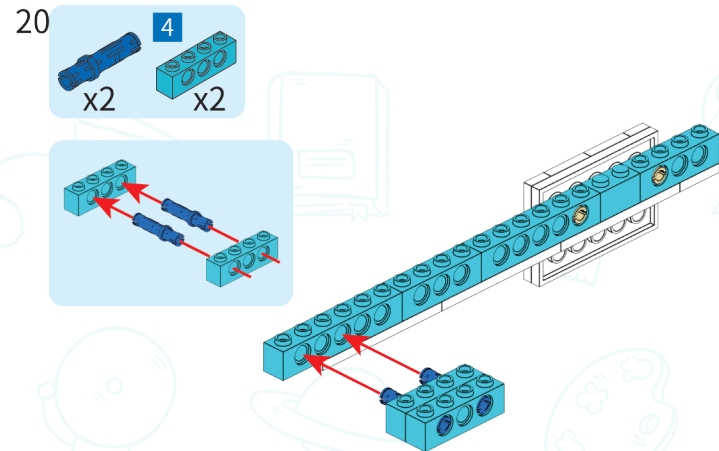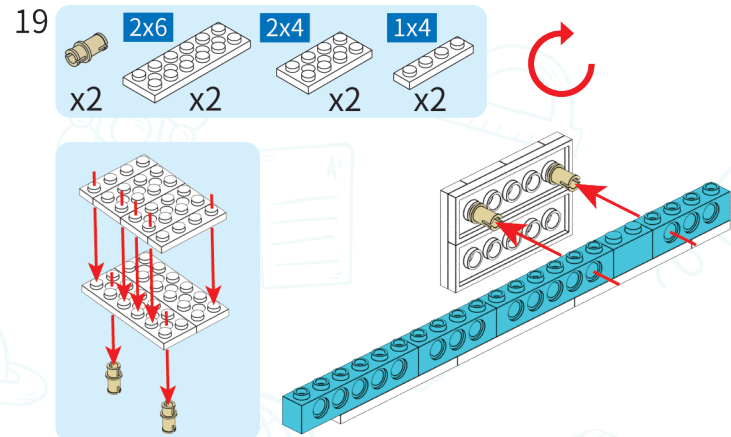
Play:

Now the intelligent gate is done. Let's have some fun!

Please turn the switch to EM and CW to see how it works.
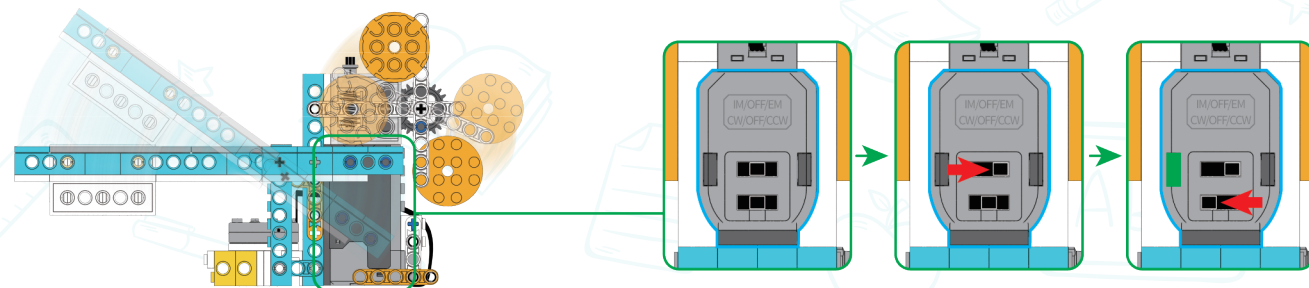
Now we are going to do some coding on the gate and make some magic together. First, we adjust the distance sensor to "Start when detecting an object" mode as pictured. Then switch the motor to IM and CW.
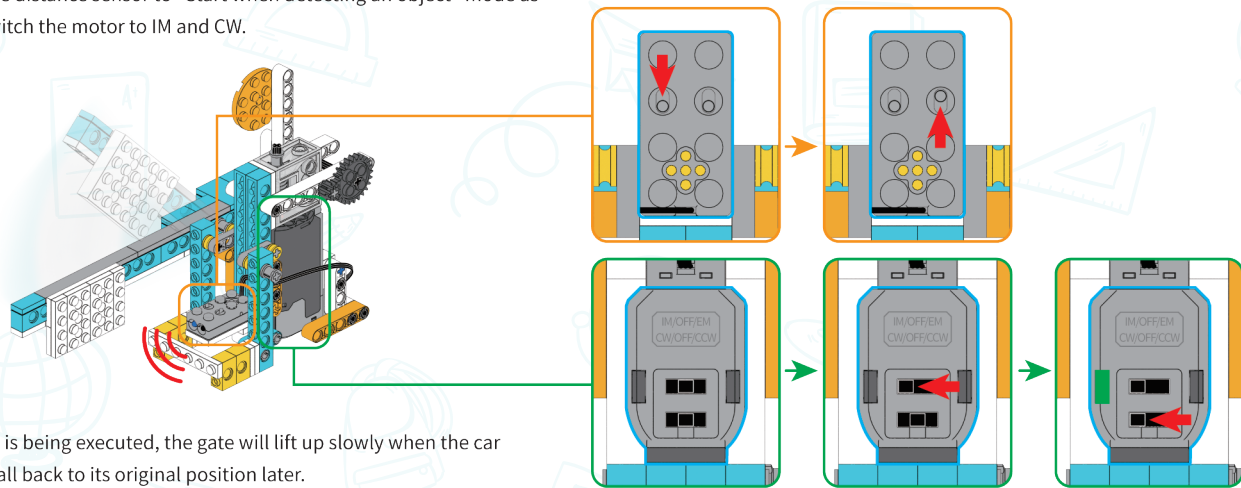
After the program is being executed, the gate will lift up slowly when the car approaches and fall back to its original position later.

◯ Programming Flowchart

Start → If a car approaches → YES → Lift up → Car goes through

If a car approaches → NO → Stop → Fall back
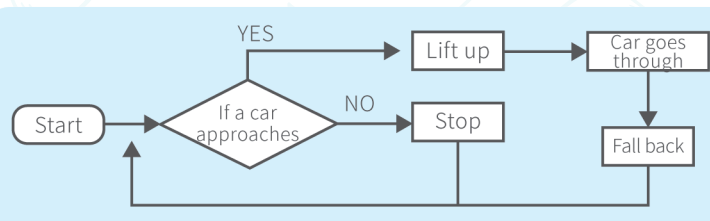
◯ Create：

Do you know if there are any ways to make the gate lift up faster? Please try to replace the drive and engaged wheels with the 12-teeth gear and 20-teeth gear wheel to see if it's faster.
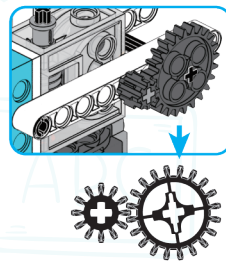
Farmer
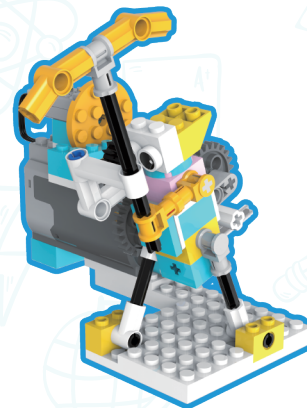
◯ Scenario：

Have you ever seen a farmer before?

For centuries, farmers are extremely deligent at working in the wild to grow some vegetables and make a living.
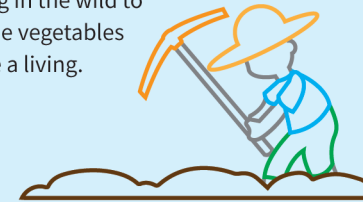
Do you want to have your own deligent farmer? Let's build one together!
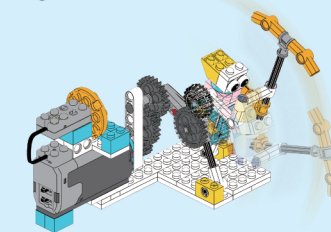
◯ Knowledge：

Cam Mechanism
Cam and follower mechanism is a pair of higher links that are used to move links spontaneously or periodically.

Mount
Follower
Cam
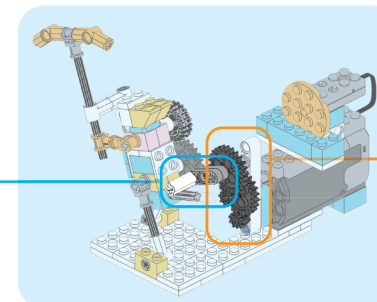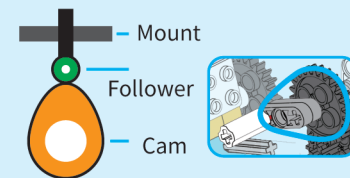
Level-2 Gear Deceleration Structure
Two gears with different sizes combined with other gears on the same axis makes them a typical level-2 deceleration or acceleration system.

Axis
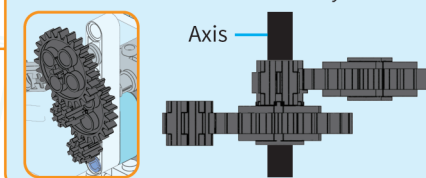
Farmer

★ ★ ★ ☆ ☆

○ Build：

Hey guys, please follow the steps to build the farmer with your fastest speed. You will find something interesting and useful!
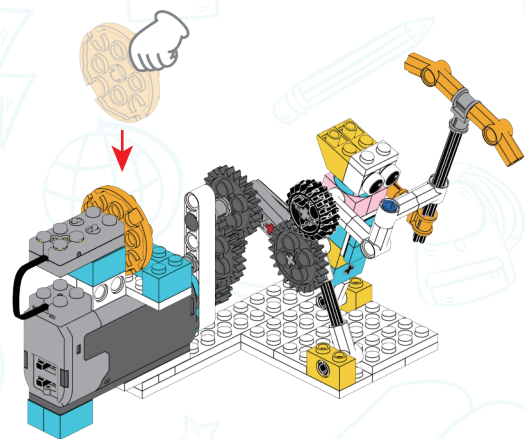
○ Target：

1. Learn about how the farmer works.
2. Learn about the level-2 gear receleration structure.
3. Understand the logic behind the farmer's action.

01 [7] x1 x1 x1 x1 x1

02 [4] x1 x1 x2 x1 x1

1:1

03 x1 x1 x1

04 x1 x1 x2 x2 x1 x1

05 2x6 x2 x1 x1

06 2x4 2x6 2x8 x2 x3 x2 x1

1x4

x2   x2

2x4

x2   x2

x2   x2   x2   x1   x2   x2   x2   x1

3

x2   x1   x2   x1

1:1

4   5

x2   x1   x3   x2   x2   x1   x1

x2   x1   x1   x3

5

x1   x1

x2   x1

1:1

3

x2   x1

8

x1   x1

x1   x1

1:1

1:1

15

x2 x1
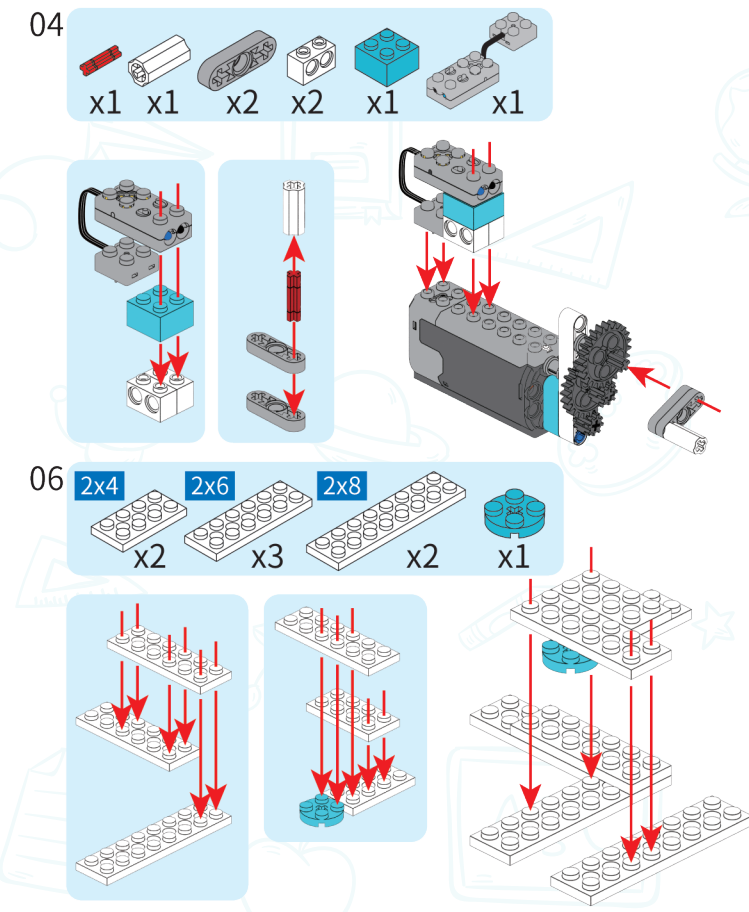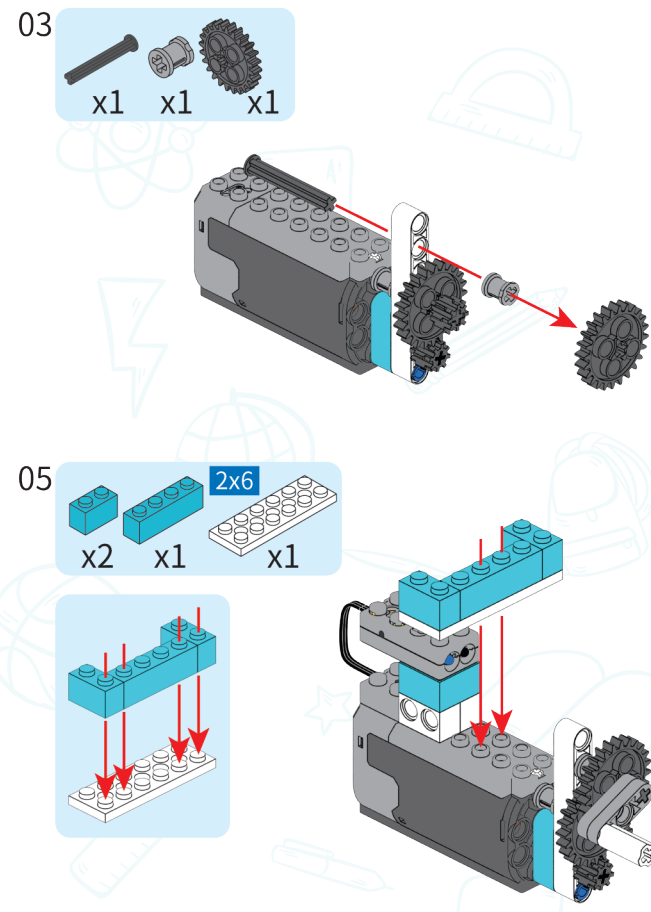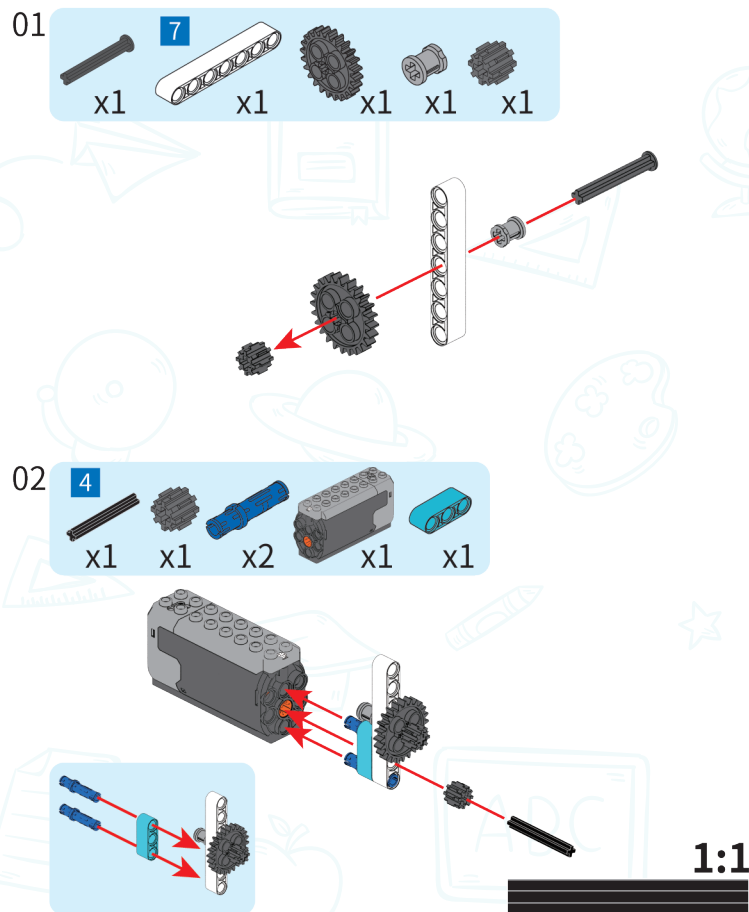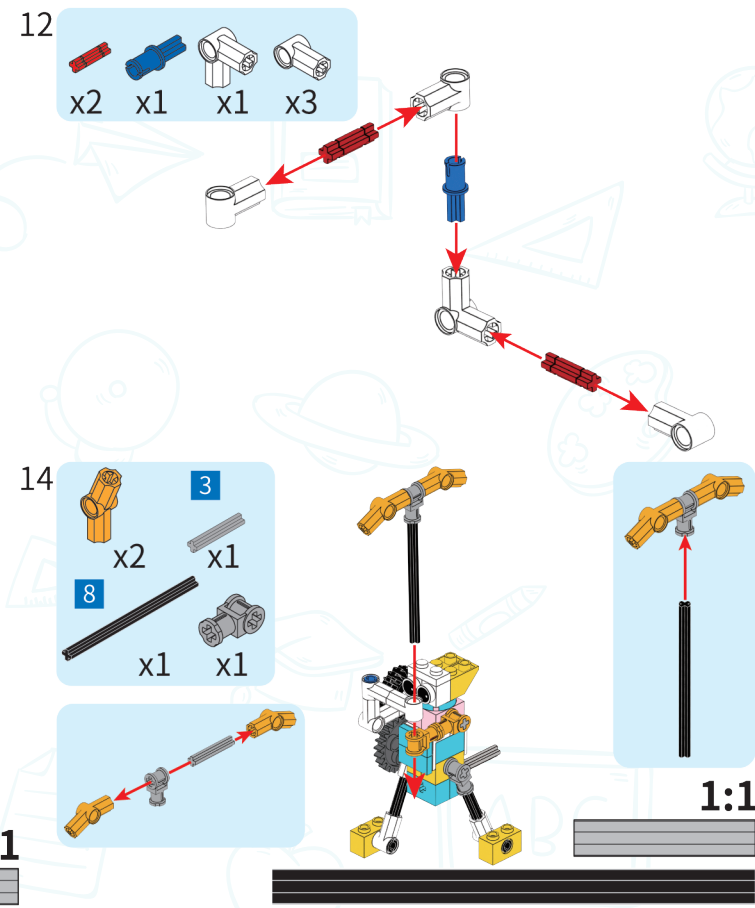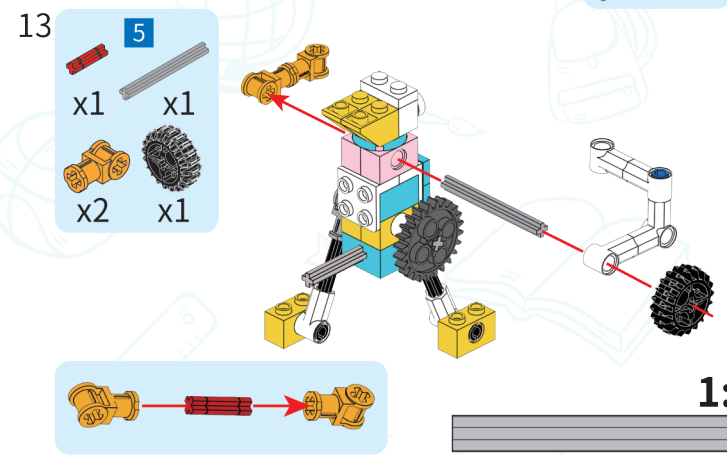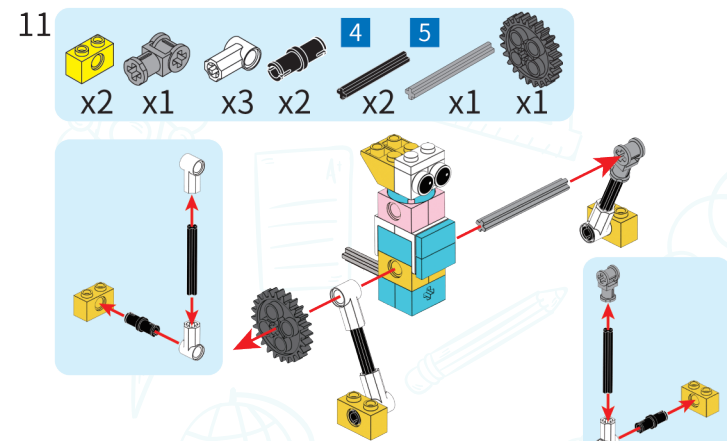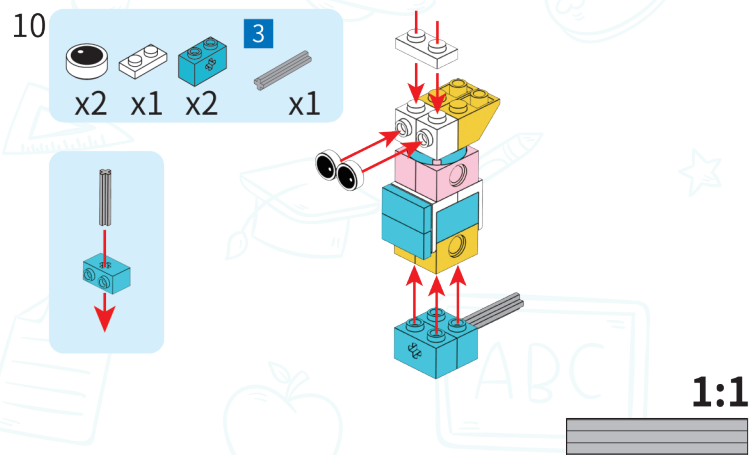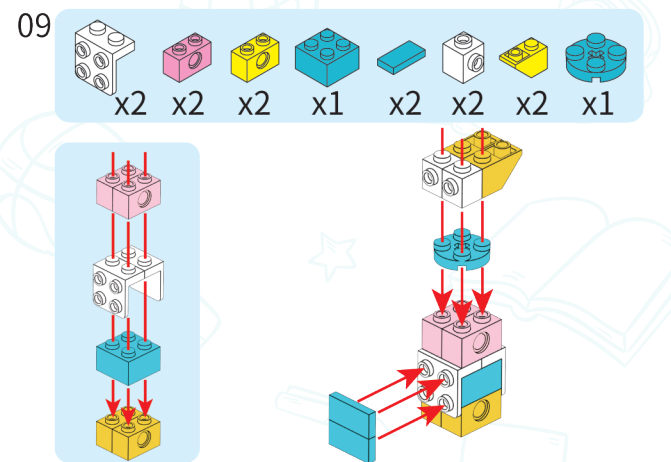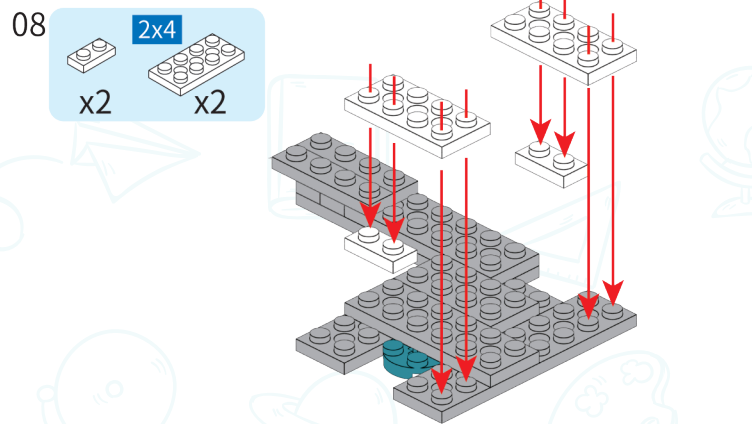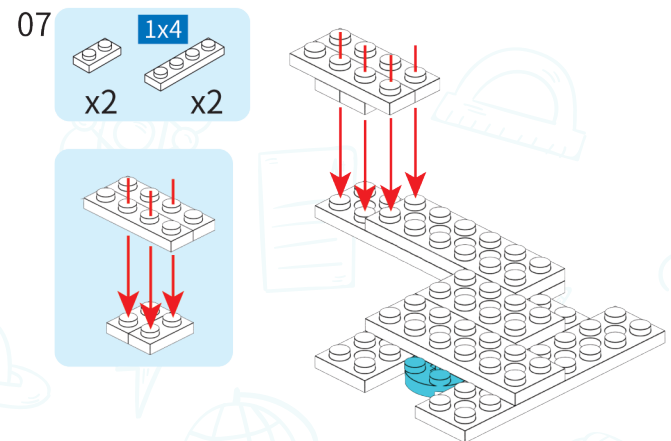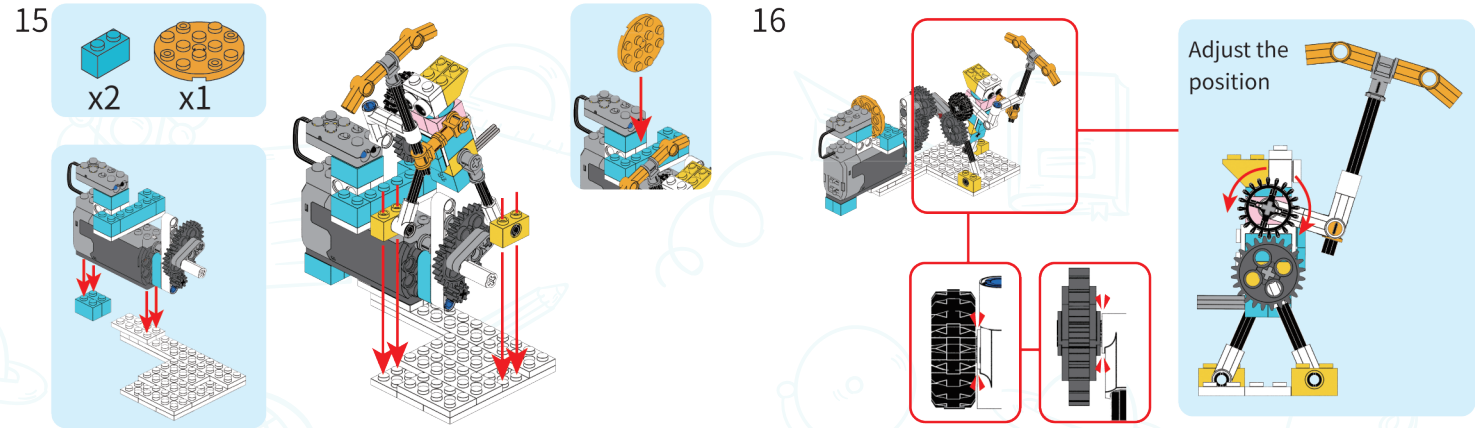
Play:

Now the farmer is done. Let's have some fun!

Please turn the switch to EM and CCW to see how the farmer works.

16

Adjust the position
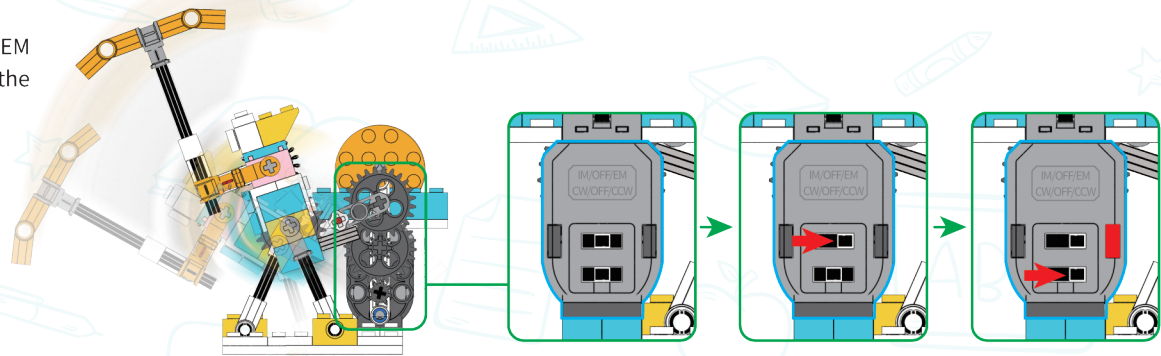
Now we are going to do some coding on the farmer and make some magic together.
First, we adjust the distance sensor to "Start when detecting an object" mode as pictured. Then switch the motor to IM and CCW.
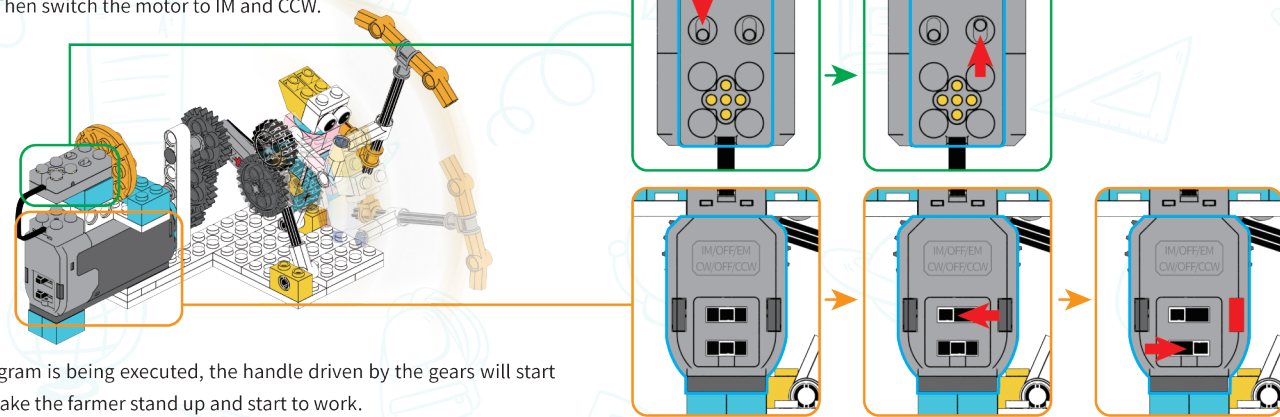
After the program is being executed, the handle driven by the gears will start rotating to make the farmer stand up and start to work.

○ Programming Flowchart

Start → Place the "coin" → NO → Stop

Place the "coin" → YES → Start
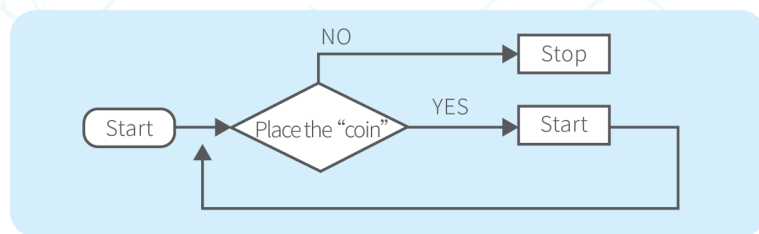
○ Create：

Do you know if there are any other way to make the farmer stronger?
Please adjust the distance sensor to "Stop when detecting an object" mode as pictured.
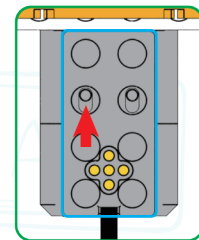
Vocal and Guitarist

★ ★ ★ ☆ ☆
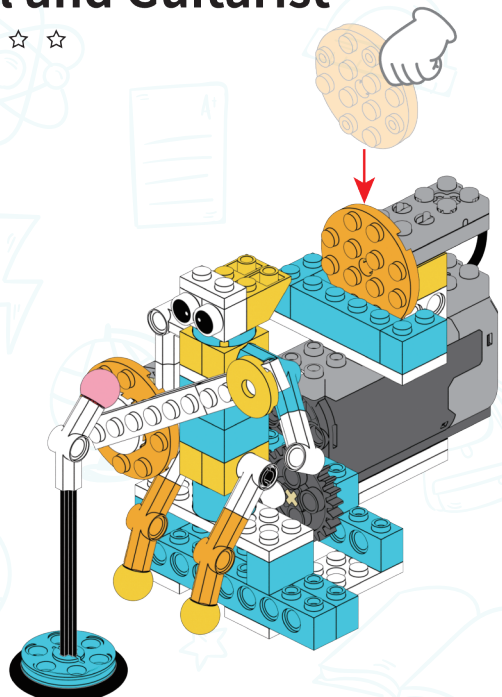
01
6 x1　4 x1　3 x1　x1　x1

1:1

02
2x8 x1
2x6 x2　2x4 x1

03
4 x1　x2　x1　x1　x1

1:1

04
2x6 x1　8 x2　x2

05
x2　x1　x2　x2

06
x2　x2　x2　x2　x4
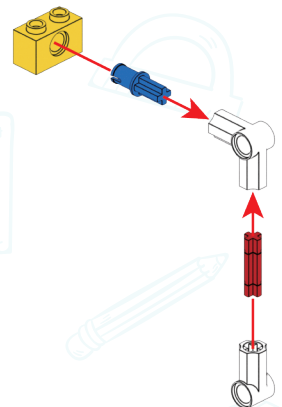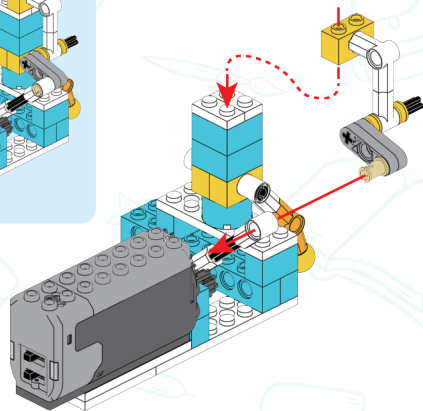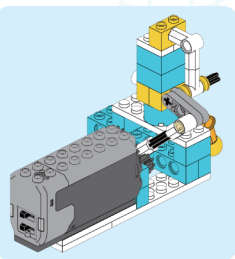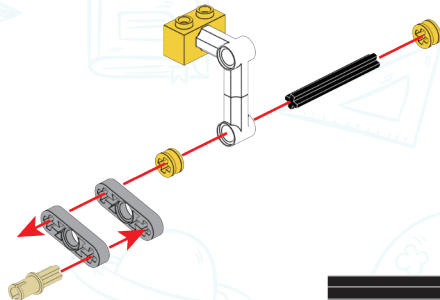
x2

x1 x1 x1

x1 x1

4

x1 x2 x1 x2

1:1

x1 x1 x1 x1 x1

x1 x1 x2 x2 x2

x1 x1 x1 x1

1x6 1x4

x2 x1

15

x1 x1

16

17

x2 x1 8 x1

1:1

18

x1 x1 x1

19

20

x1 x1 x2

21

2x6 x1 x1 x2

22

x1
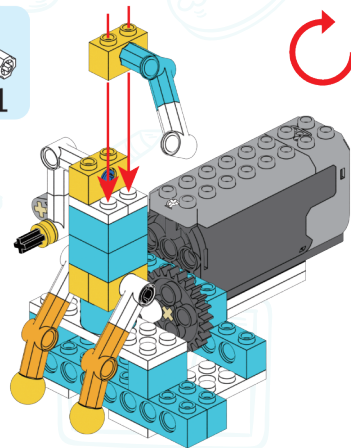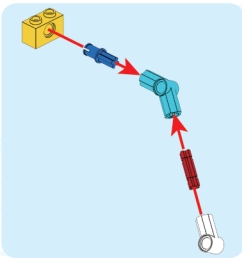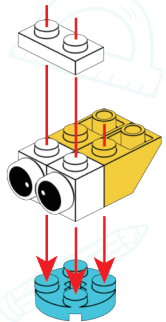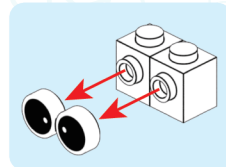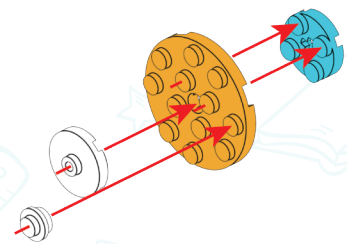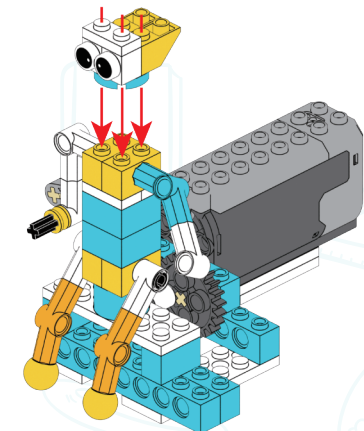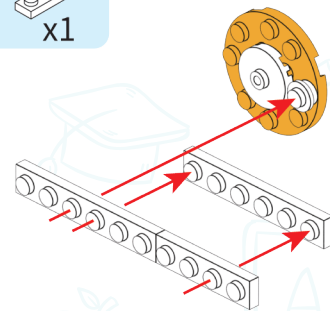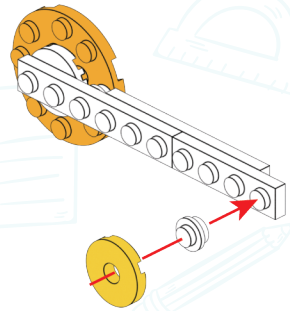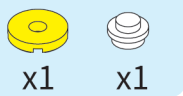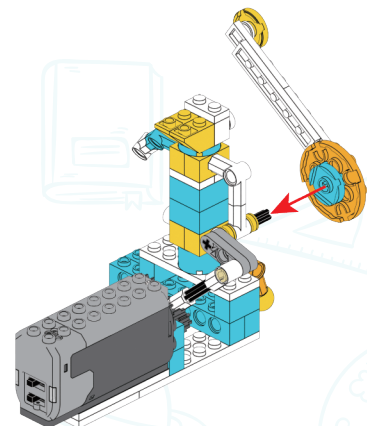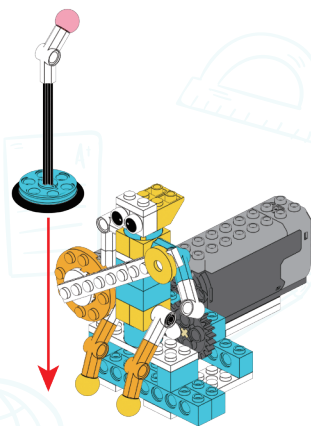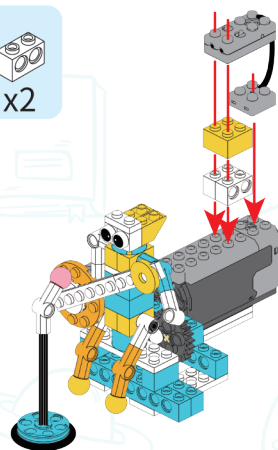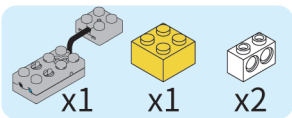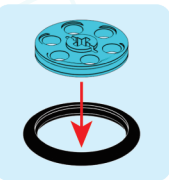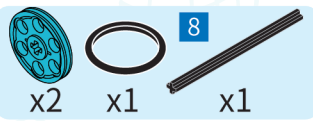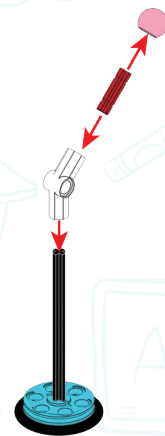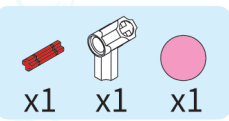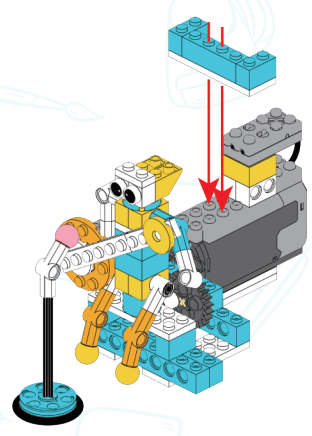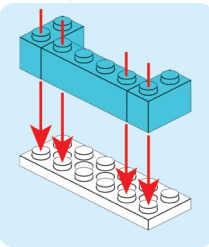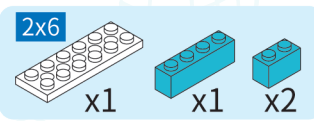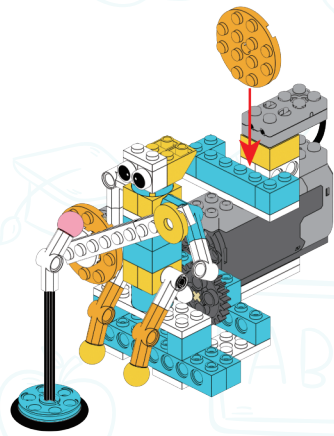
Pianist

★ ★ ★ ☆ ☆
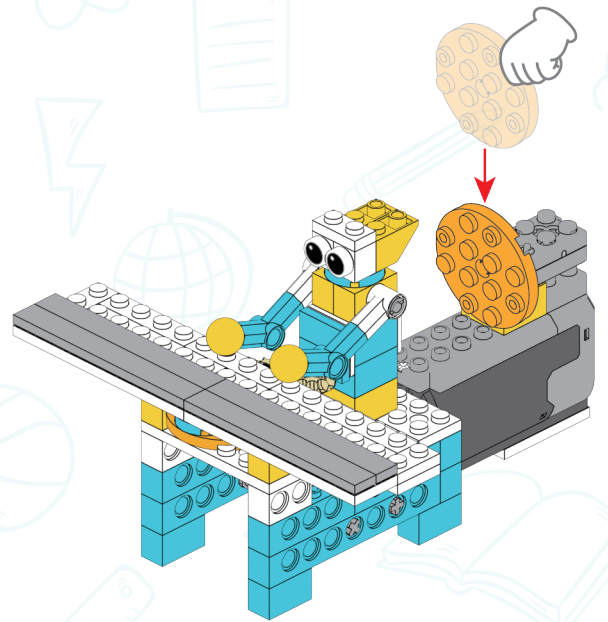
01 | 6 x2 | x2
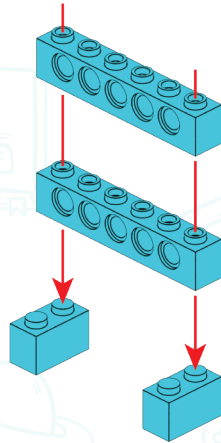
02 | x2 | x1

03 | 3 x1 | 1x4 x2 | x1
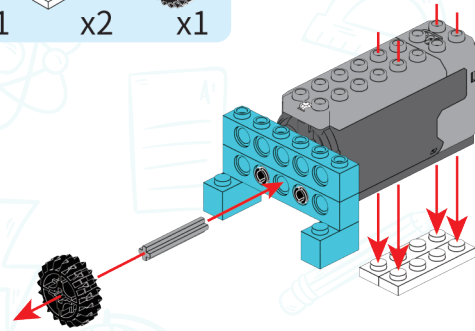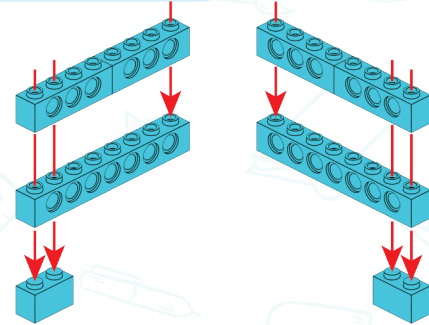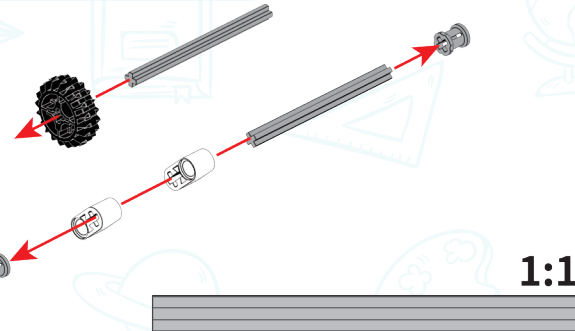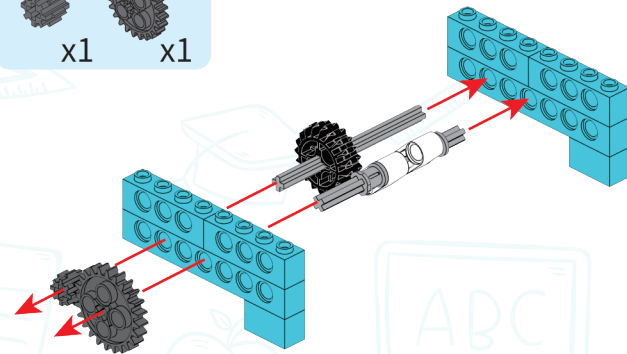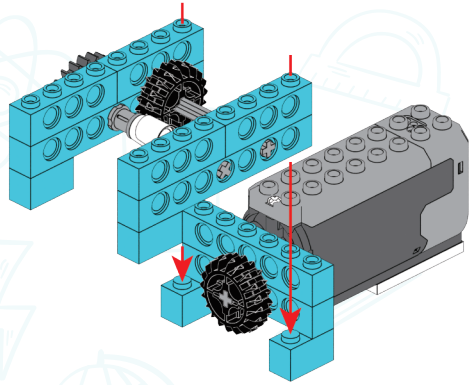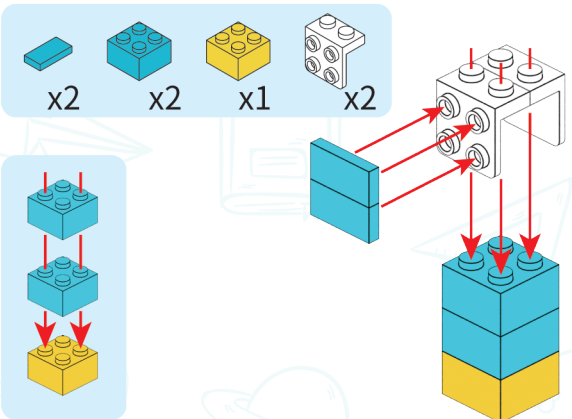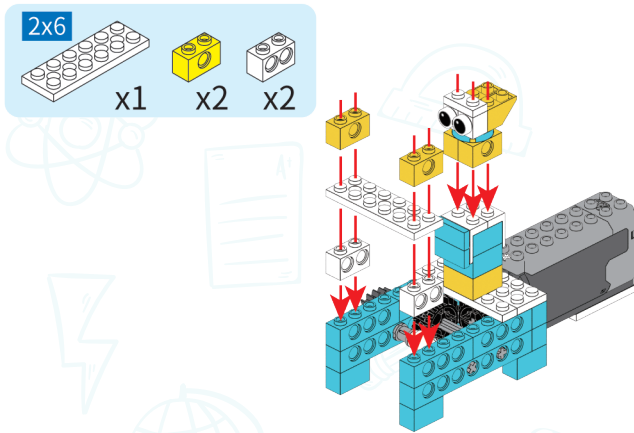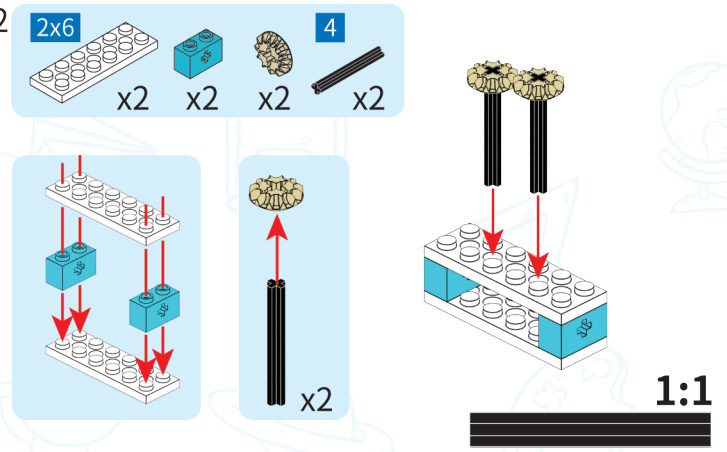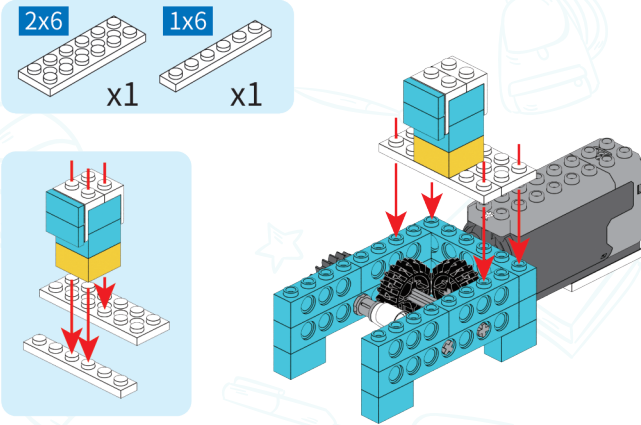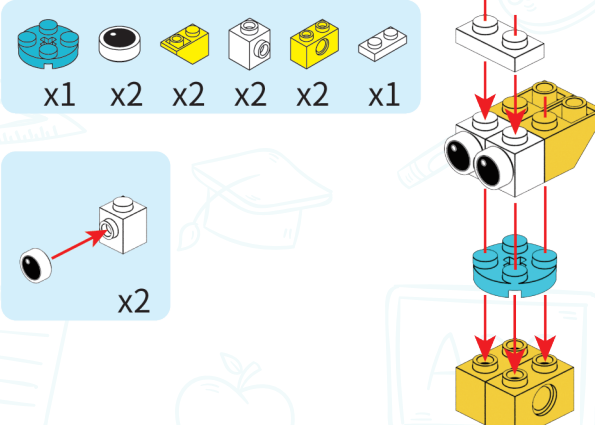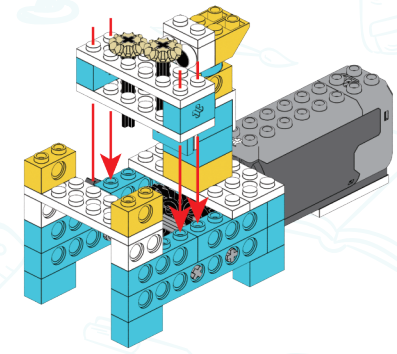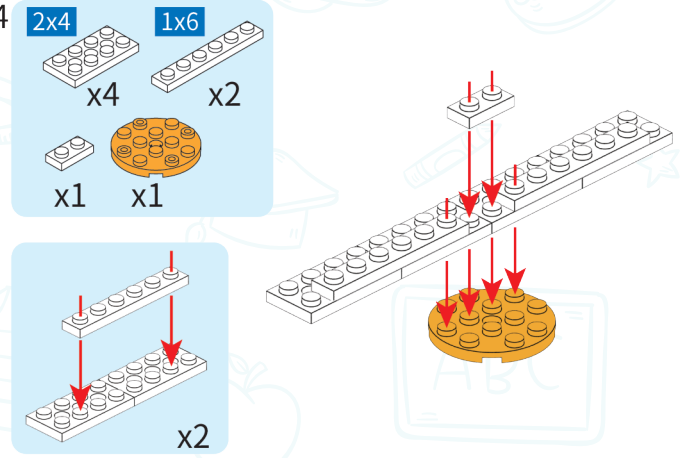
04 | 7 x2 | x1 | x2 | x2

1:1

05 | 8 x2 | 4 x4 | x2

06 | x1 | x1

1:1

07

08
x2 x2 x1 x2

09
2x6 x1   1x6 x1

10
x1 x2 x2 x2 x2 x1

x2

11
2x6 x1   x2   x2

12
2x6 x2   x2   x2   4 x2

x2

13

14
2x4 x4   1x6 x2

x1   x1

x2

1:1

15

1x6 x1

1x4 x2 x2

16

2x8 x2

x4

x2 x1

17

18

19

x4 x2 x2 x2 x2

x2

20

21

x1 x1

22

x1

Drummer

★ ★ ★ ☆ ☆

01

6	4		
x1	x2	x1	x2

02

2x8	3	
x1	x1	x1

1:1

03

7			
x2	x3	x4	x2

1:1

04

3			12	8	4
x1	x1	x1	x2	x2	x2

x2

1:1

05

x3	x1

06
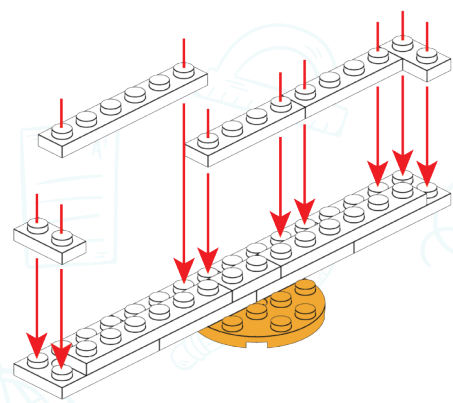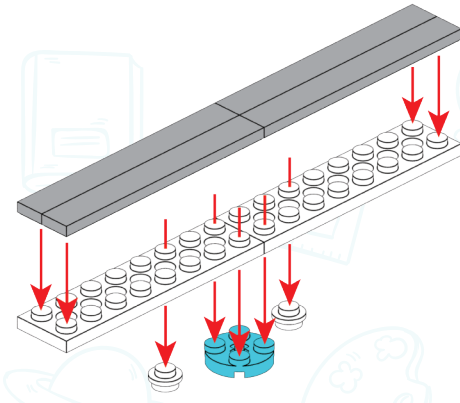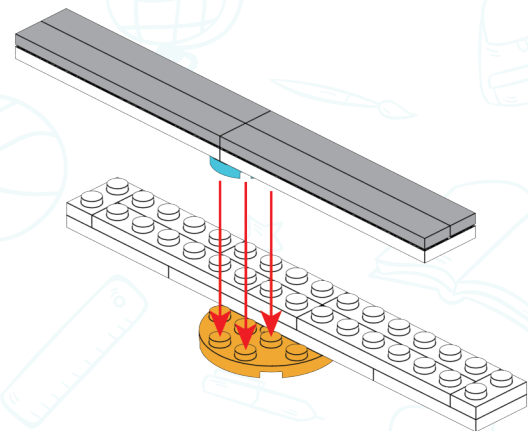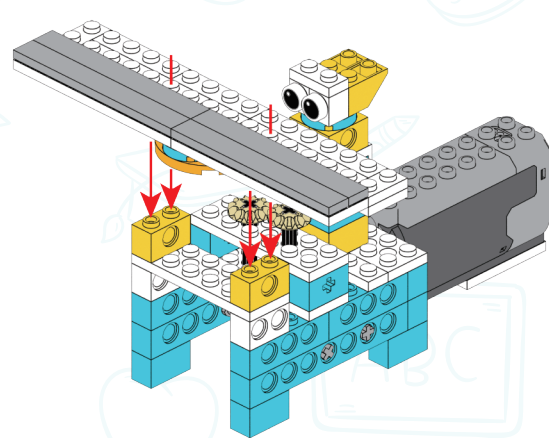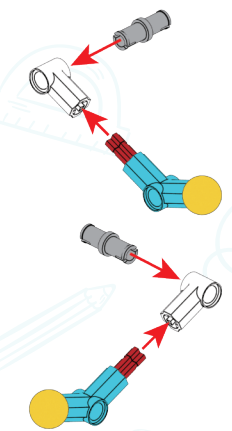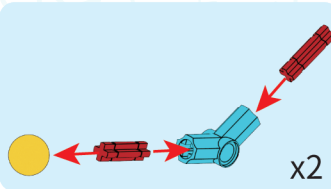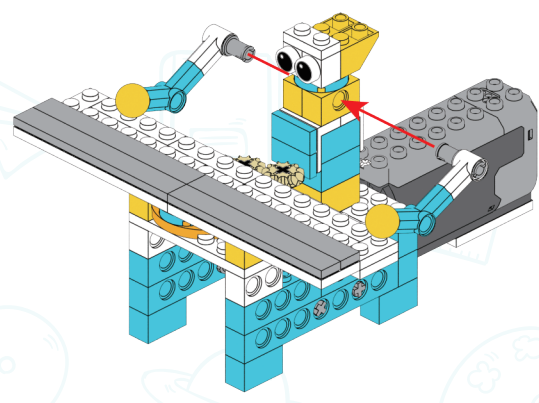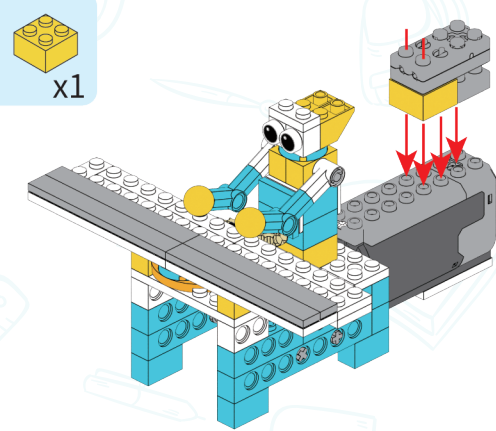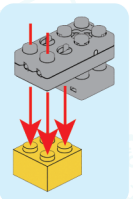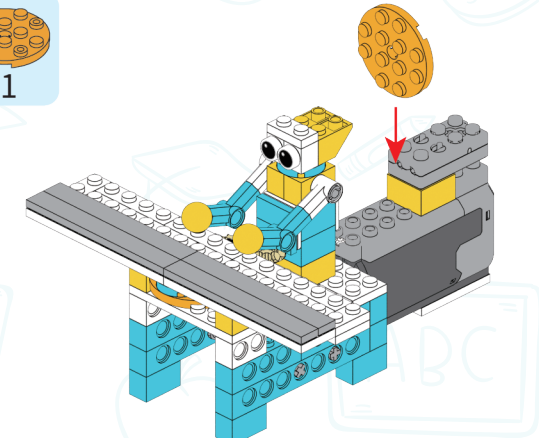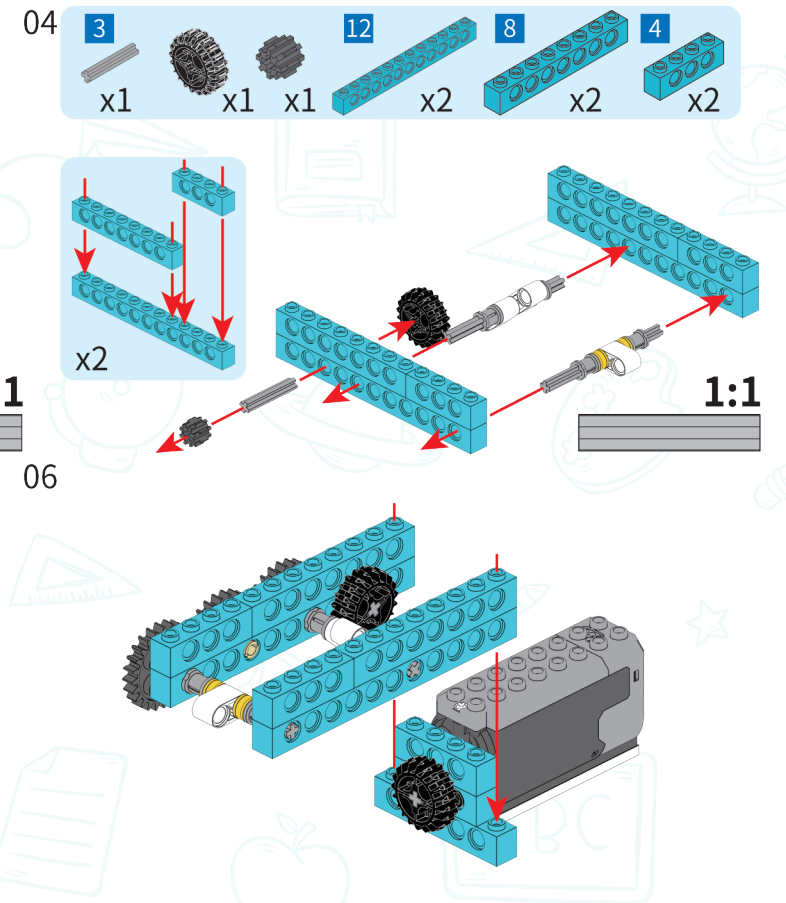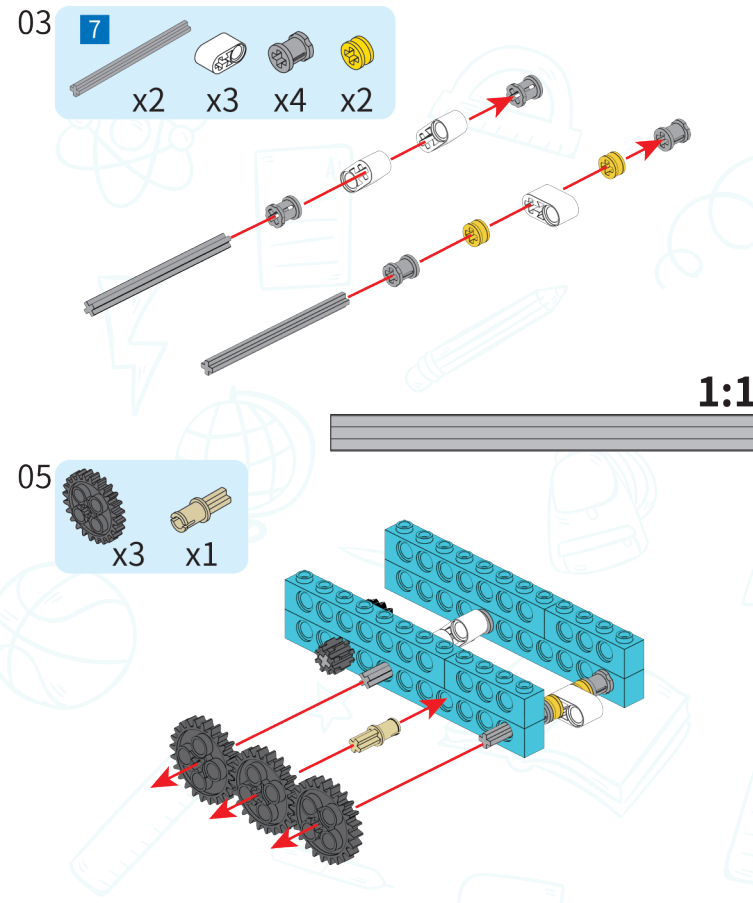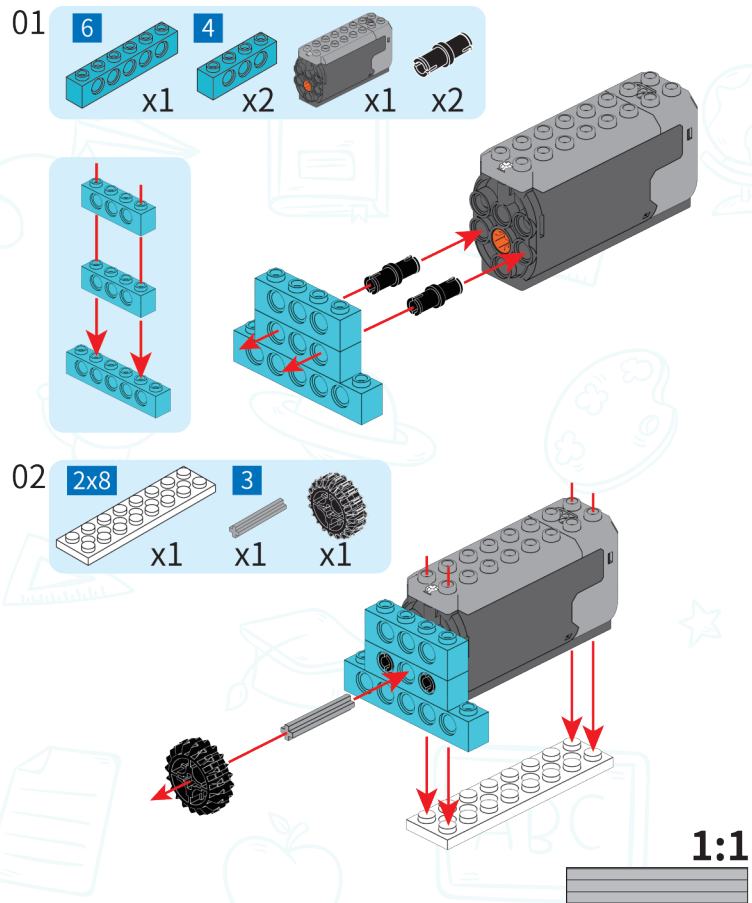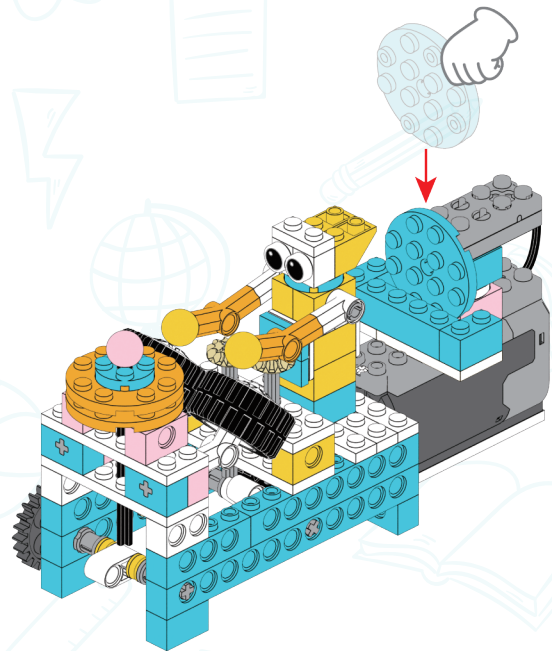
1x6 x3 x2
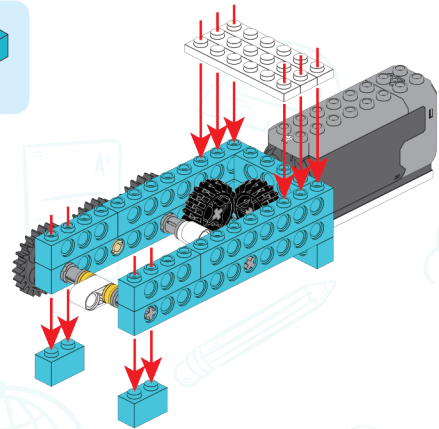
08 x2 x1 x2 x2
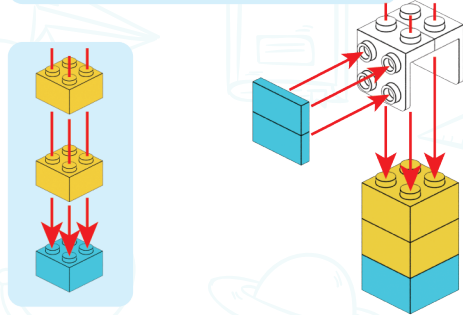
09 x1 x2 x2 x2 x2 x1
x2
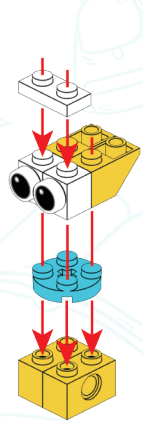
10

11 2x6 x2 x2 x2 5 x2
x2
1:1

12
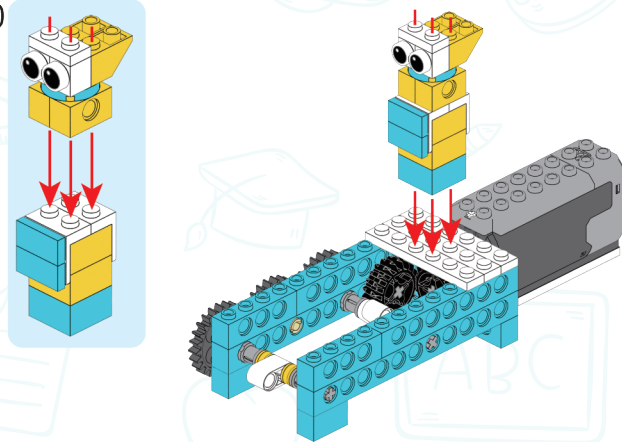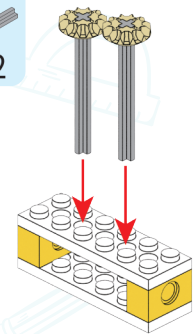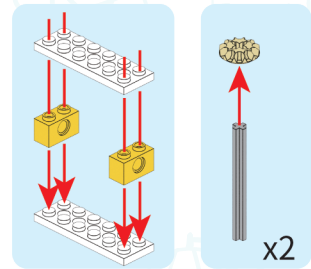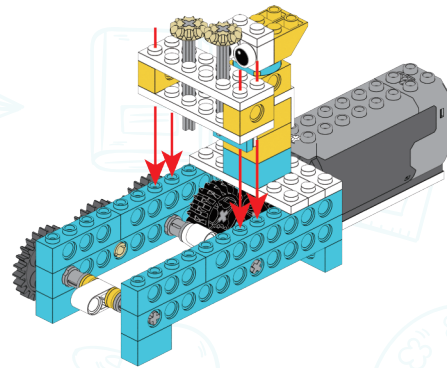
13 2x6 x2 3 x2 x2 x2
x2
1:1

14 x2 x2 x2 x2
x2
x2

15

x1 x2 x2

17

17

x4 x2 x2 x2 x2

x2

18

19 8

x1 x1 x1 x1

1:1

20

x1 x1 x1 x1

21 2x4

x1 x1 x2 x2

22

x1

Parts List

FAQ

Product Details

Product Name: Smart Robot
Product Model: MKZ-PF
Product SKU: MKZ-PF-SD
Power Supply: 2x AAA batteries (not included)
Rated Power: 5W
Suitable for: 6+
Made In China

Warning! Do not aim at the eyes or face.
Warning! Do not use projectiles not provided by the manufacturer.
Warning! This product contains small accessories, it is not for children under 3 years old.
Warning! This product contains small balls, which may cause a choking hazard and is not suitable for children under three years of age.
- The user manual contains important information, please keep it for future use.
- Rechargeable batteries should be charged under the supervision of an adult.
- Maintenance: This product shall not be used in water or a humid environment.
- Remove surface strains with a dry cloth before use.
- Do not mix old and new batteries.
- Do not mix alkaline batteries,standard(carbon-zinc) or rechargeable batteries.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.