_____'s Whysheet for

Your name

Why do some roads have truck escape ramps?

Yeah, why? Write (or draw) your answer:

Whybricks

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Part 1: The car on the hill

For the first part of this investigation, you will need the car.

Build it!

First, build the car out of Whybricks.

> **Grab this resource!**
>
> The **Car** build guide.

Once it's built, test it out. Put your car on a flat surface like your desk, table or the floor and give your car a push.

Make a prediction, then run a test

For this test you will need your car and a ramp that leads onto a flat surface, like a table or the floor. Read what the test is, write down your prediction and then run the test.

To run the test, place your car at the top of the ramp. Let go of your car and observe what happens. **What do you think the car will do?**

Write down your prediction:

Now, run the test. If you want, you can run it more than once.

> **I notice...**
>
> What do you notice about this phenomenon? Write your observations on your Notice sheet.

> **I wonder...**
>
> What are you now wondering about? Write your questions on your Wonder sheet.

What is going on?

Think back to the main 'why' question of this investigation:

Why do some roads have truck escape ramps?

Why don't all roads have these ramps? Why are they ramps? Why are they called 'truck escape ramps' and not 'car escape ramps'?

Investigate **inclined planes** and **Newton's second law** to help you form some ideas to help answer some of these questions.

Grab this resource!

The **Inclined plane** WOW sheet.

Grab this resource!

The **Newton's second law** WOW sheet.

What factors do you think affect what happens to a vehicle that travels down a hill?

Write down your ideas about what affects a vehicle that travels down a hill:

Part 2: Your experiment

You are going to design and run an experiment to discover more about one of the factors you think affects what happens to a vehicle that travels down a hill.

Step 1: Available equipment

Look at the materials and equipment available for you in your experiment.

List all the available materials and equipment:

Tinker and experiment with the materials and equipment that you have available to explore how everything works.

I notice...

What do you notice about this phenomenon? Write your observations on your Notice sheet.

I wonder...

What are you now wondering about? Write your questions on your Wonder sheet.

Step 2: Determine variables

What are the **independent variables** you could test? (An **independent variable** is a variable that is manipulated or changed by the experimenter. Think of things you could control.)

Your list of independent variables:

What are the **dependent variables** you could measure? (A **dependent variable** is a variable that responds to what else is happening. These variables can be measured and/or calculated with the available equipment.)

Your list of dependent variables:

Step 3: Determine your question

You need to create a testable question that you will be able to answer by making a claim based on evidence from your scientific experiment.
One format you can use is to select one independent variable and one dependent variable and ask 'How will changing *the independent variable* affect *the dependent variable*?'

You will need to choose one independent variable you will change in your experiment and one dependent variable you will measure.

Independent variable selected for testing:

Dependent variable selected for measuring:

Write out your question:

How will changing_____

affect _____**?**

This is the question your experiment will help you answer.

Step 4: Hypotheses

Once you have run your experiment, you will be able to make a claim about how your independent variable affects your dependent variable. You will be able to support this claim with the data you collect. It's important to consider every possible claim you might be able to make once you have collected your data.

1. **Direct relationship:** increasing *the independent variable* will increase *the dependent variable.*

Increasing _____

will **increase** _____.

2. **Indirect relationship:** increasing *the independent variable* will decrease *the dependent variable.*

Increasing _____

will **decrease** _____.

3. **No relationship:** increasing *the independent variable* will not change *the dependent variable.*

Increasing _____

will **not change** _____.

Step 5: Designing the experiment

You need to design your experiment to test how your independent variable affects your dependent variable.

Draw and label your experimental setup

Materials and equipment list

List of the materials and equipment I need for my experiment:

Experimental procedure

You need to write your procedure with enough detail so that it can be repeated exactly. Be sure to include how you collect your data.

Control variables

All independent variables that you have NOT selected for testing must be controlled in your experiment. For example, you need to give each one a set value and keep it that way for the whole experiment. Be sure to explicitly note your controlled settings in your procedure.

My experimental procedure:

Step 6: Run your experiment and record your data

It's time to run your experiment! Use the data table below to record your results.

Add your independent and dependent variables into the correct spots and write what units you will be using for that variable. (An example of units might be 'centimetres' or 'inches' if you are measuring height or distance.)

Remember you are only going to change the setting for your independent variable. List each setting you will use. For each setting you try with your independent variable, you should run five trials with that setting. Then average the results for the setting in the last column.

_____ Independent variable name (units)	_____ Dependent variable name (units)					
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average

Step 7: Present your results

You can now present your findings and answer your question using the CER (**C**laim, **E**vidence, **R**easoning) method.

Claim – This is the answer to your investigation question. It should either be one of the hypotheses from step 4 or a new claim you hadn't considered.

My claim is:

Evidence – Cite data from your experiment to support your claim.

My evidence is:

Reasoning – Explain how your evidence supports your claim by connecting your evidence to your claim using scientific principles and rules.

My reasoning is:

So... why do some roads have truck escape ramps?

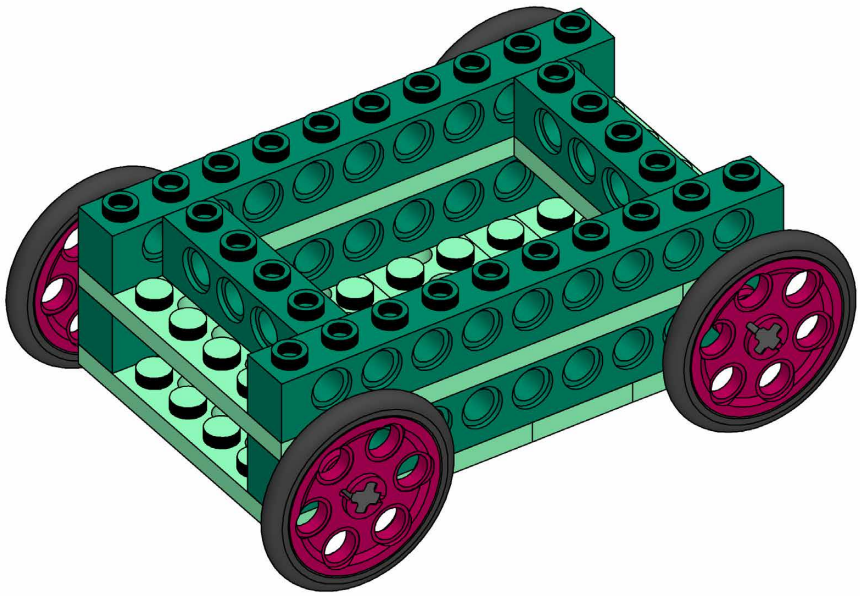
Now that you've completed this investigation, what do you think about your original answer? Can you add any new information to your original explanation?

And... what are you wondering about now?

Now I wonder...

Now that you have completed the investigation, what new questions do you have?

Car



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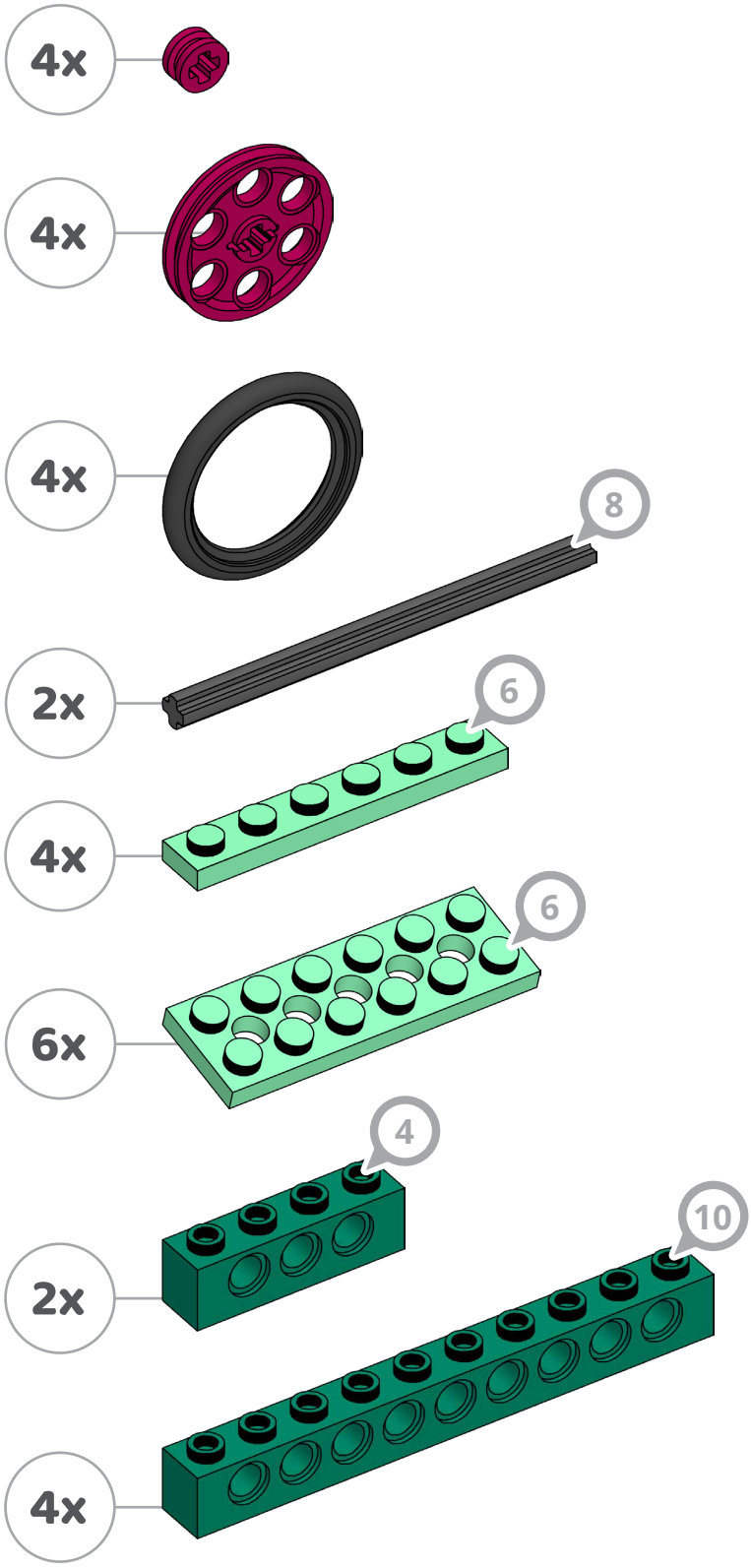
Parts



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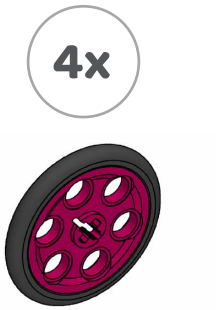

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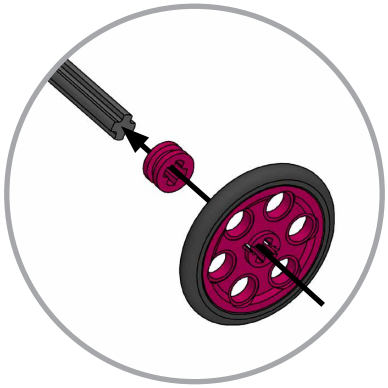

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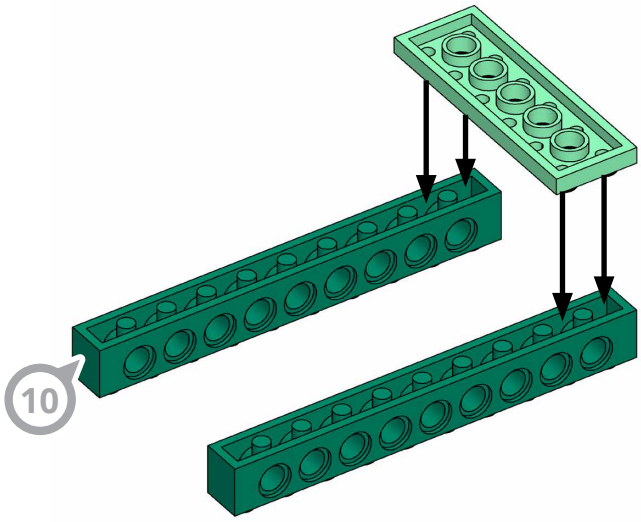

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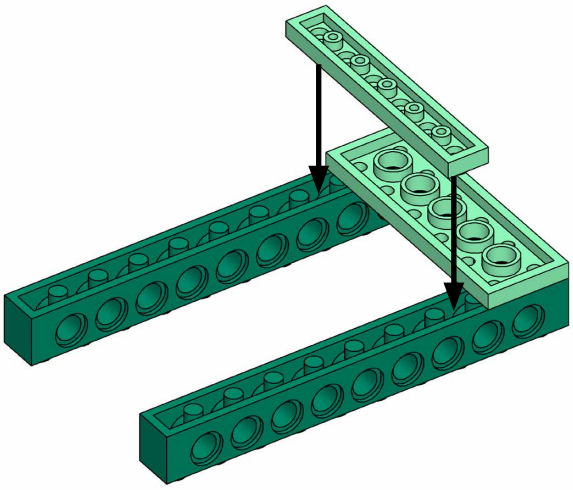

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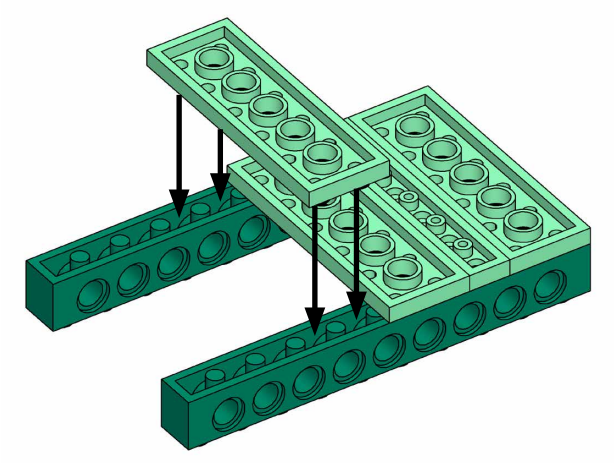

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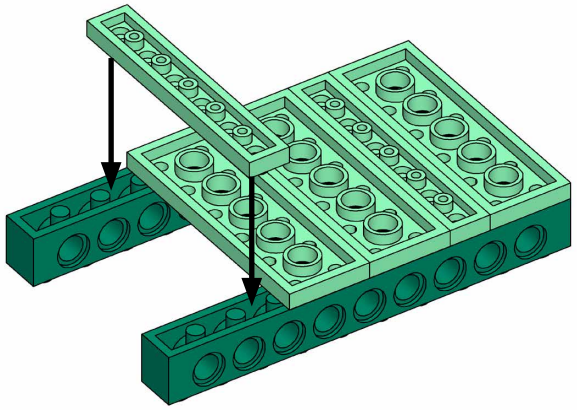

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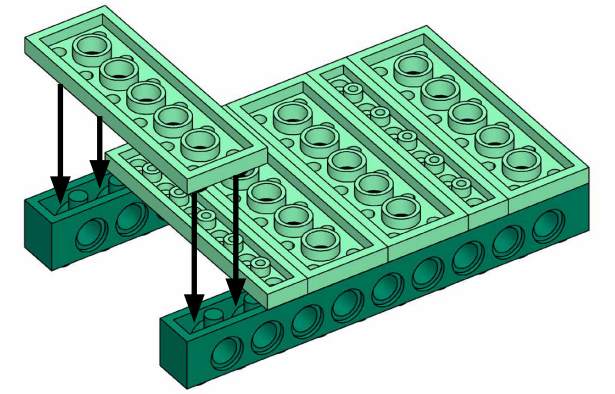

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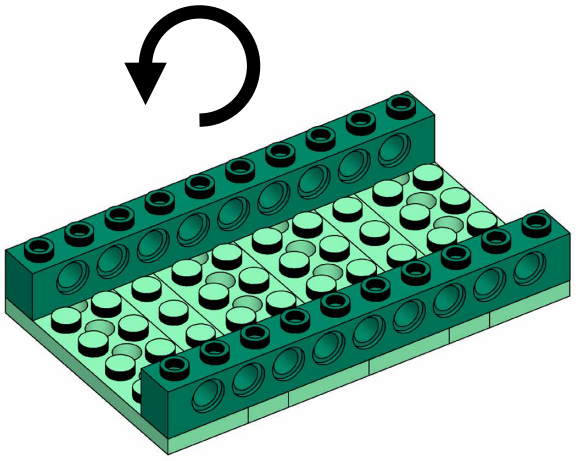

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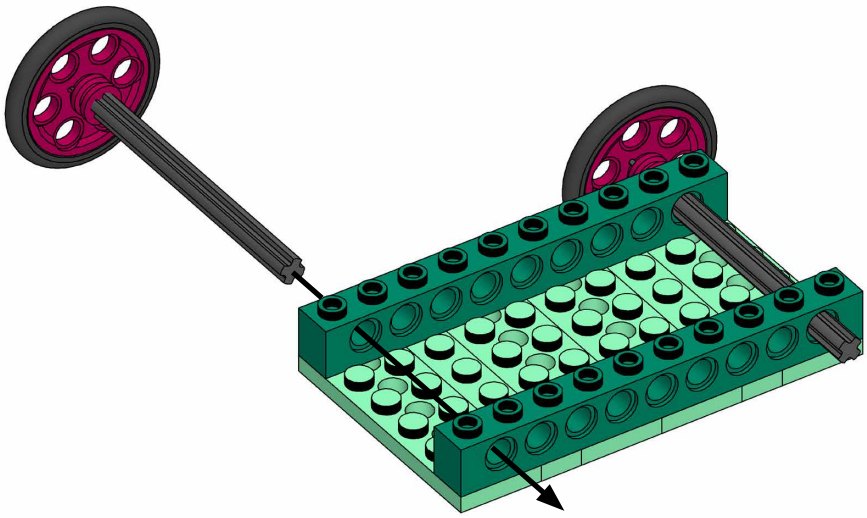

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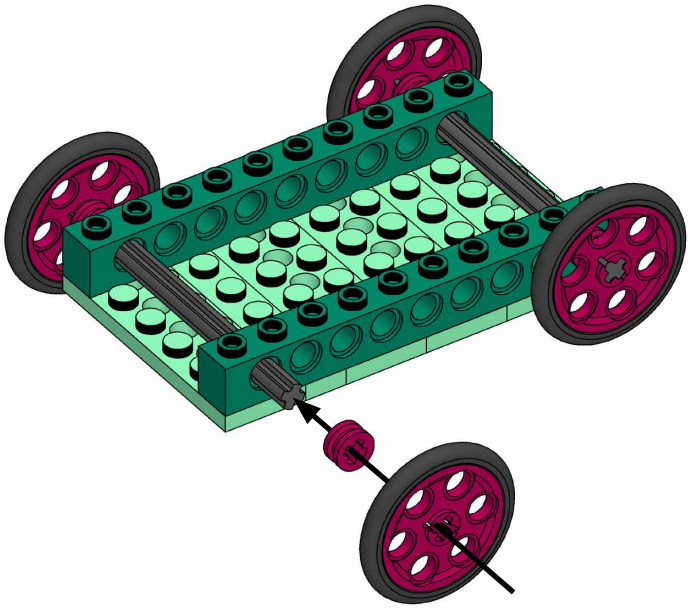

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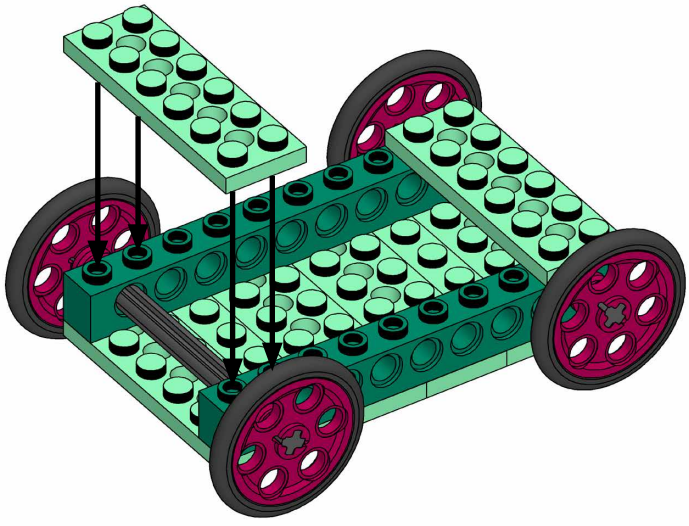

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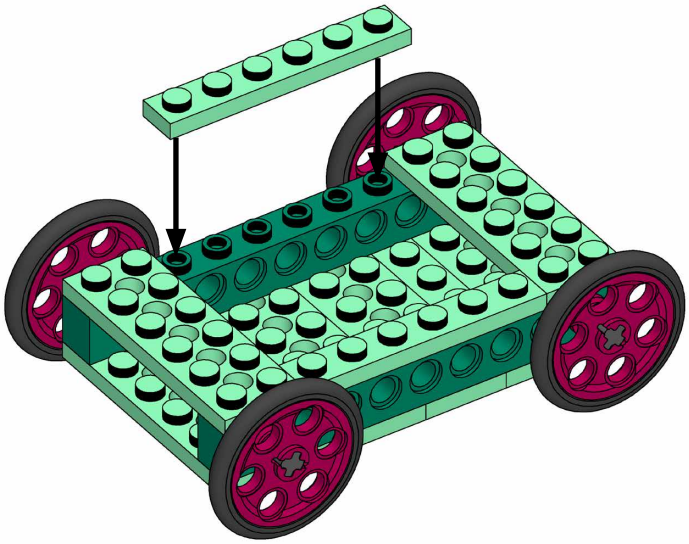

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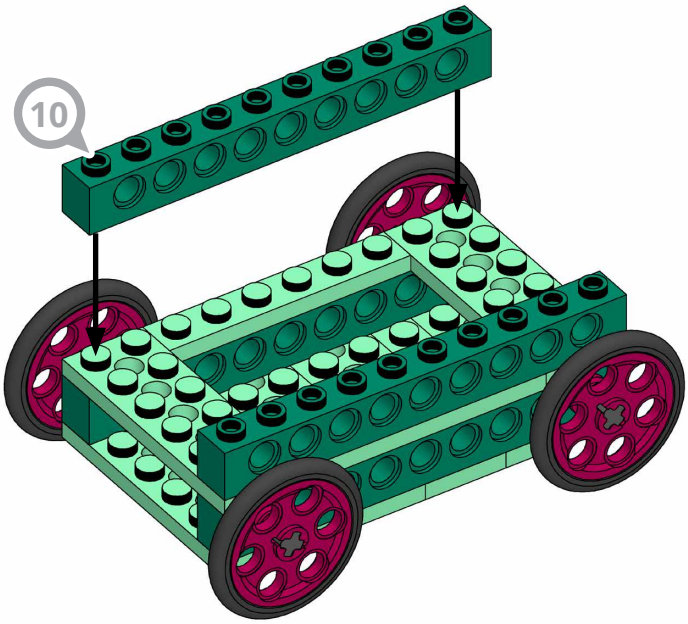

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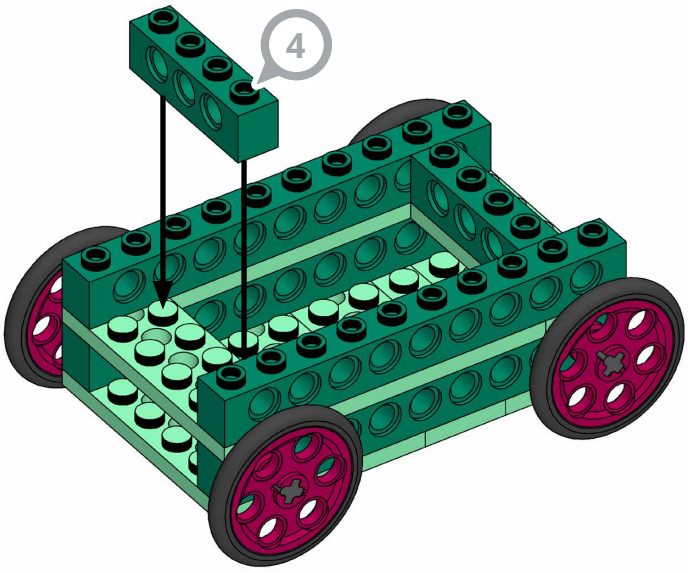

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