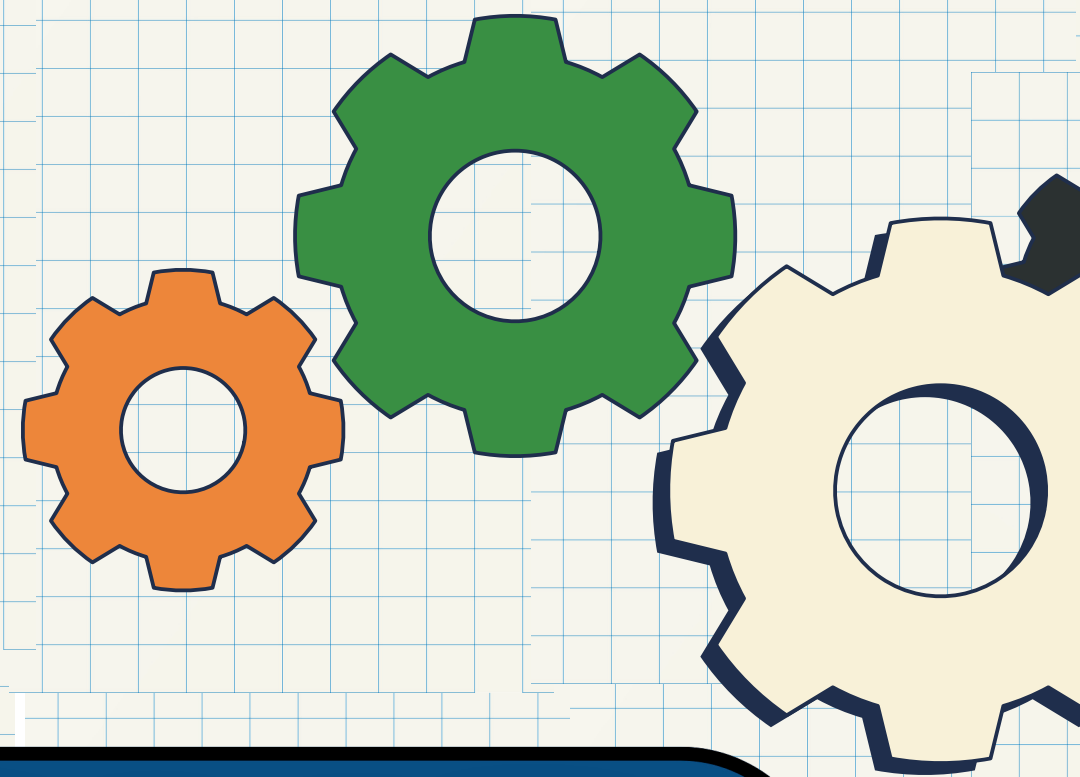


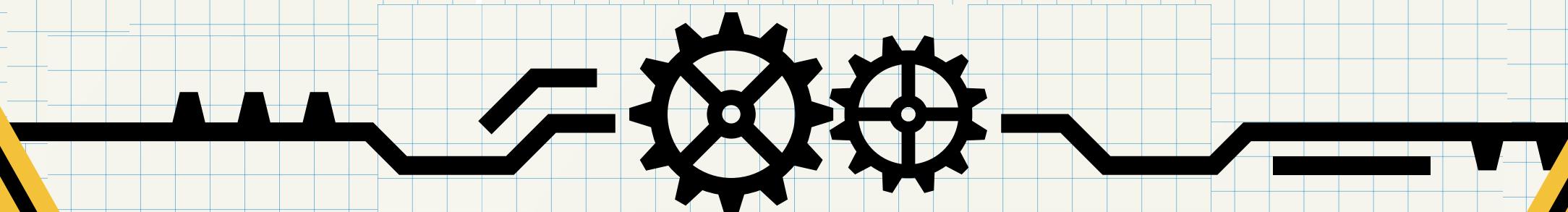
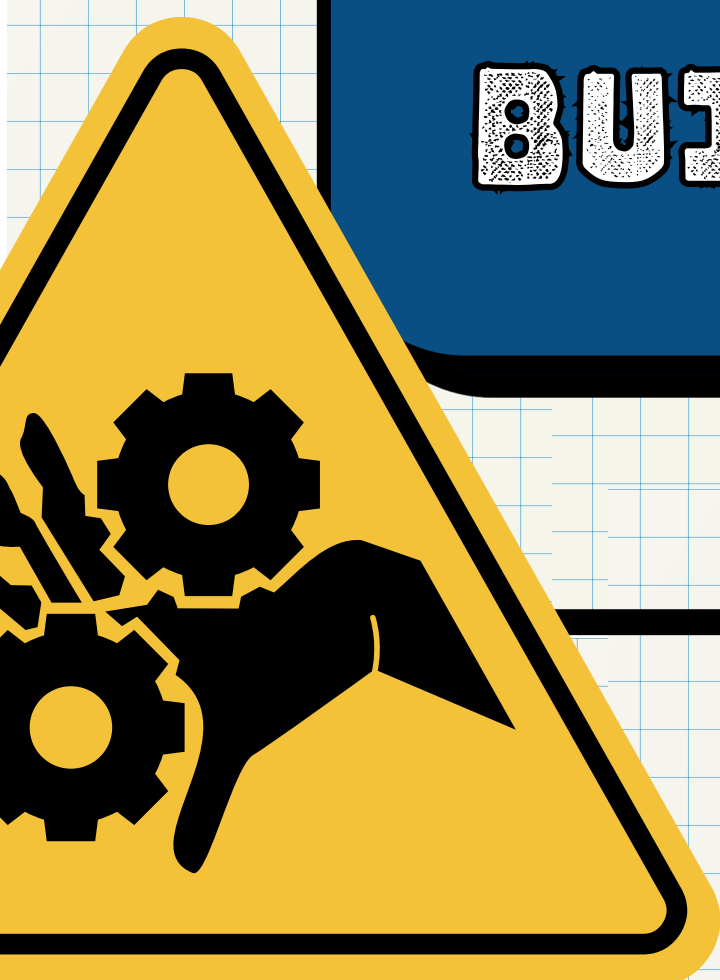


**NEXT CHAPTER
JOZI**

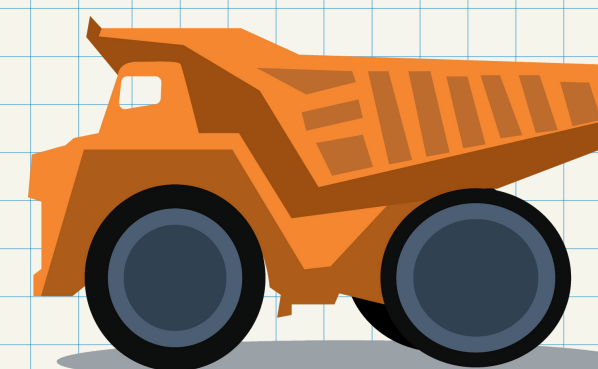


RUBBER-BAND RACERS!

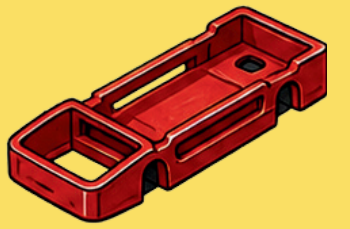
BUILD • RACE • TEST • IMPROVE



JUNIOR ENGINEERS MANUAL



Project by Navmith Vandanapu
Booklet designed by Jenovic Lumu



NAME:

TEAM NAME:

SCHOOL:

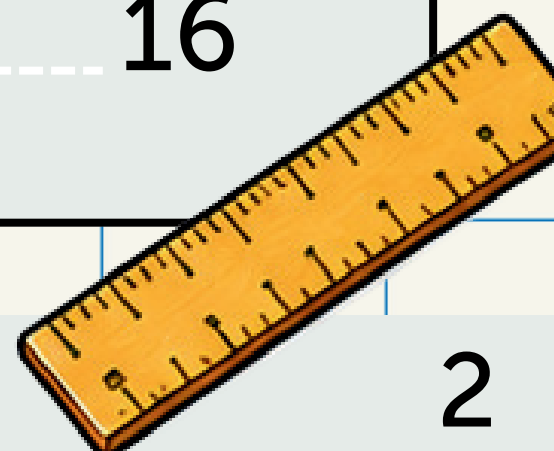
WORKSHOP LEAD:

WHAT'S INSIDE?

This booklet is your Junior Engineers mission guide. You Will build a rubber-band racer, test it, improve it, and learn the science behind how it moves.

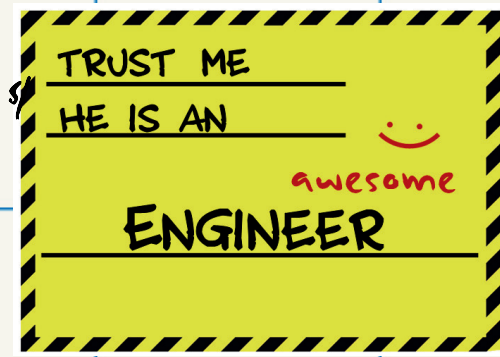
SECTIONS

- WELCOME + HOW TO USE THIS BOOKLET 3
- WHO WE ARE (NEXT CHAPTER JOZI) 4
- MEET THE JOZI JUNIOR ENGINEERS 5
- YOUR RACER KIT + SAFETY 6
- BUILD IT: PART 1 7
- BUILD I: PART 1 8
- POWER UP + RACE 9
- THE PHYSICS OF SPEED 10
- EXPERIMENT LAB: PLAN 11
- EXPERIMENT LAB: DATA 12
- IMPROVE YOUR RACER 13
- PUZZLE ZONE 14
- CAREERS AND SUBJECTS 15
- REFLECTION 16





WELCOME TO THE LAB!



Today, you are not just a learner.

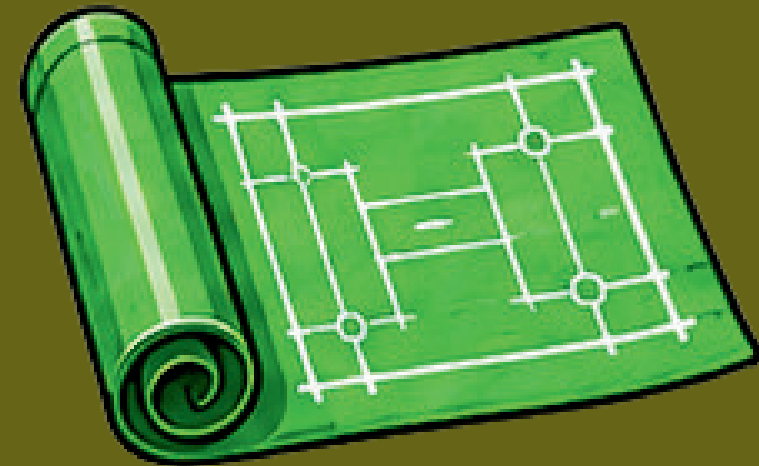
You are a **Junior Engineer**.

You will build a rubber-band racer, test how far it travels, measure your results, and improve your design. Some things may not work the first time - and this is okay.

Engineer's test, fail, learn, fix, and try again.

TODAY'S MISSION

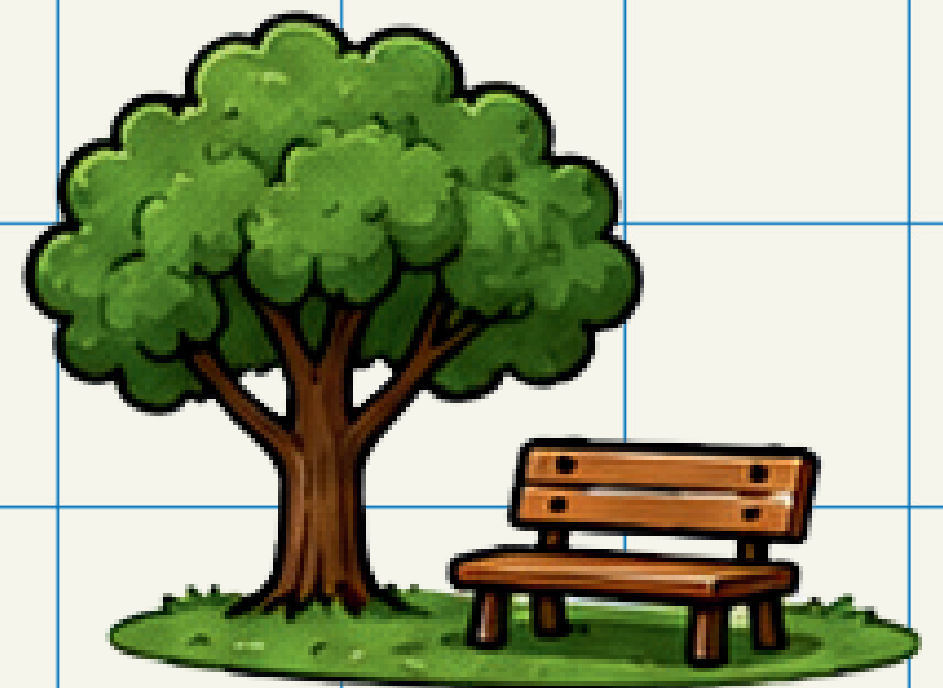
- Build your racer
- Power it with a rubber band
- Race and measure
- Improve your design
- Reflect like an engineer



PROJECT: RUBBER-BAND RACER

Assigned to Lead Engineer:

Authorization Signature:



(By signing, you agree to test, fail, and try again!)



Next Chapter Jozi is a student-led initiative working to support reading, learning, and STEM opportunities in Johannesburg schools.

We believe every learner deserves access to books, creative learning, and activities that make science and problem-solving exciting.

Through reading sessions, book donations, and STEM workshops, we help young people build confidence and imagine bigger futures.



NEXT CHAPTER JOZI



Read

We support literacy and reading confidence.



Build

We create hands-on STEM activities.



Grow

We help learners see new possibilities.





Today, you will not be learning alone. You will be guided by the Jozi Junior Engineers – four young thinkers who love building, reading, testing, solving problems, and imagining big futures. Each Junior Engineer has a different dream, a different strength, and a different way of helping you through this booklet.

I build, test and try again – that's how ideas become real!

Neo
The Builder

I ask questions, explore ideas, and learn how energy works!

Amahle
The Energy Expert

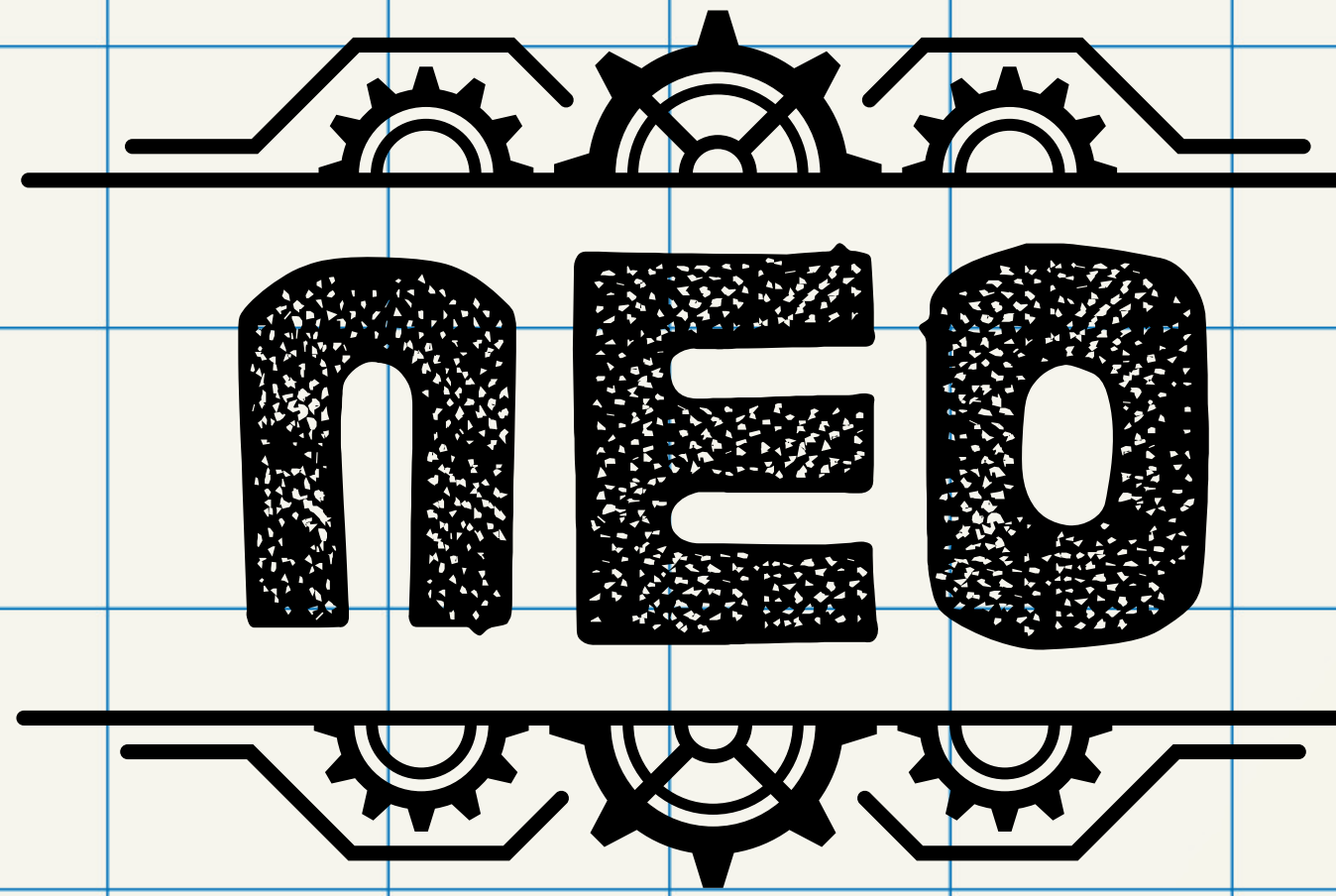
I measure, record, and compare results – that is how we learn what works best!

Laila
The Data Detective

I keep trying, take on challenges, and never give up!

Kabelo
The Challenge Captain

TOGETHER, THEY WILL HELP YOU READ, BUILD, TEST, IMPROVE, AND DREAM BIGGER.



Neo's dream box

When I grow up, I want to build things that help people. Maybe I will design safer cars, better school equipment, robots, tools, or machines that make everyday life easier.

Neo's advice

Hi, I'm Neo.

I like building things with my hands. I enjoy finding out how wheels turn, how axles move, and how small parts can become something useful.

When I grow up, I might become a mechanical engineer, a car designer, a robotics technician, or even someone who fixes machines in my community.

I have learned that building is not about getting everything perfect the first time. It is about trying, checking, fixing, and trying again.

Neo's Build Tip:

Before you race, check your wheels. If they cannot spin freely, your racer will struggle to move.

“A GOOD BUILDER IS ALSO A GOOD PROBLEM-SOLVER.”



AMAHLE



Hi, I'm Amahle.
 I love asking questions like:
 Why does this move?
 Where does the energy come from?
 What happens if I change one thing?
 When I grow up, I might become a scientist, a doctor, an environmental engineer, a teacher, or someone who helps South Africa use energy better.
 Today, I will help you understand how a rubber band can store energy and turn it into movement.

When I grow up, I want to understand the world so I can improve it. Maybe I will study energy, medicine, climate, electricity, space, or how science can help communities.

Amahle's advice
 Amahle's Science Note:
 When you twist or stretch a rubber band, it stores energy. When you let go, that energy can make your racer move.



LAILA

When I grow up, I want to use information to solve real problems.

Maybe I will study numbers, health, buildings, weather, transport, or how to make schools better.

Laila's advice

Laila's Data Tip:

Do not only test once. Test more than once, write down your results, and compare what changed.

Hi, I'm Laila.

I like noticing details. I measure, record, compare, and look for patterns. To me, data is like a story. If you look carefully, it tells you what happened and what you can improve.

When I grow up, I might become a data analyst, a doctor, a researcher, a pilot, an accountant, an architect, or a scientist. Today, I will help you record your racer's results and use your data to make better decisions.

“GOOD DATA HELPS GOOD IDEAS BECOME EVEN BETTER.”



KABELO



Hi, I'm Kabelo.

I love challenges. I like racing, competing, cheering my team on, and finding ways to improve. But I also know that winning is not everything.

The real goal is to learn.

When I grow up, I might become a sports coach, an entrepreneur, a mechanic, a pilot, a designer, a community leader, or an engineer.

Today, I will remind you that mistakes are not failures. They are clues.

**“A FAILED TEST
IS NOT THE
END. IT IS A
CLUE.”**

Kabelo's dream box

When I grow up, I want to lead, create, and encourage others. Maybe I will start a business, coach a team, design something new, or help young people believe in themselves.

Kabelo's advice

Kabelo's Challenge:

Do not worry if it does not work first time. That is how engineers learn!

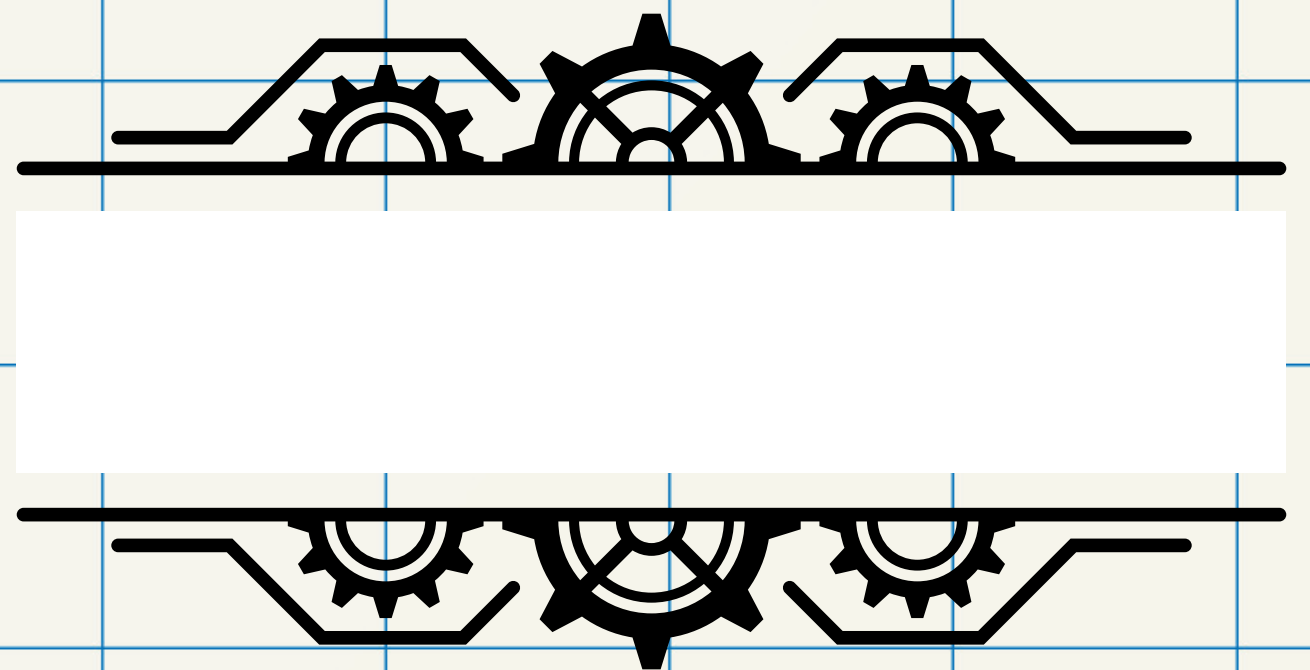


[YOUR PICTURE]

The Jozi Junior Engineers all have different dreams. Some want to build, some want to research, some want to measure, and some want to lead.

Now it is your turn.

You do not have to know exactly what you want to become yet. You only need to stay curious, keep learning, and believe that your ideas matter.



ACTIVITY BOX

MY JUNIOR ENGINEER PROFILE



ONE THING I ENJOY DOING:

ONE THING I AM GOOD AT:

ONE JOB I MIGHT LIKE ONE DAY:

ONE PROBLEM I WOULD LIKE TO HELP SOLVE:

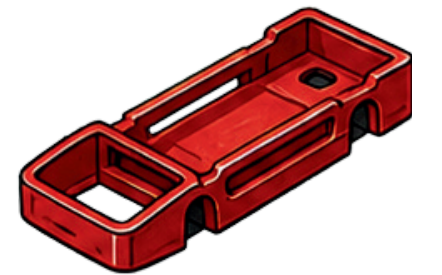


Before we build, let's check our parts and learn how to work safely.

Before every great build, engineers check their tools, parts, and safety rules. Your racer kit may look simple, but every part has an important job. The body holds everything together, the wheels help it move, the axle lets the wheels turn, and the rubber band stores the energy that powers the racer.



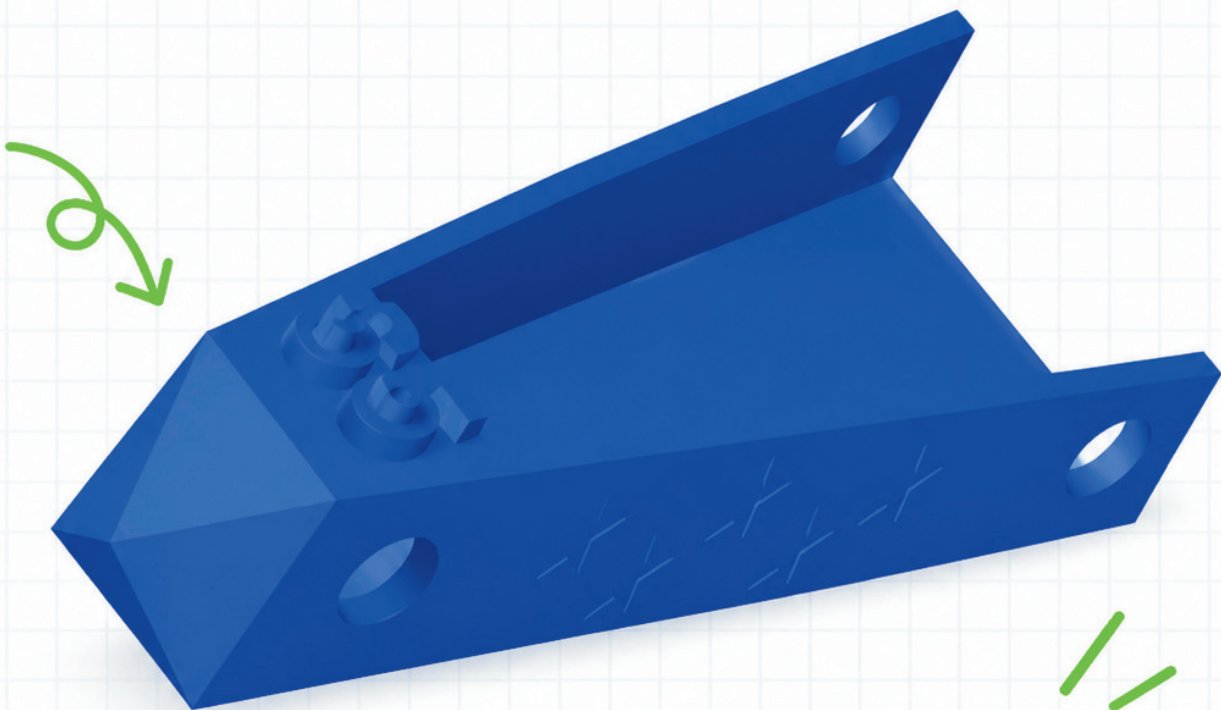
Tick each item as you find it.



WHAT'S IN YOUR KIT?



BODY

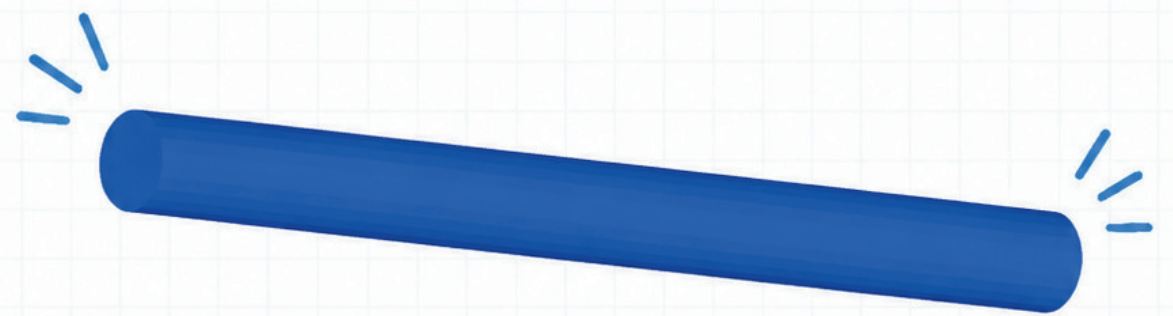


119.048 mm × 33.954 mm × 18.386 mm

Found it



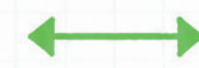
AXLE



2.778 mm × 2.778 mm × 35 mm



DIAMETER
2.778 mm



LENGTH
35 mm



SHAPE
Round Rod

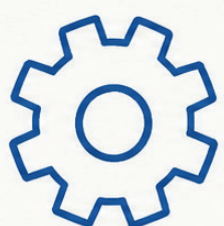


Found it



Neo's Build Tip:

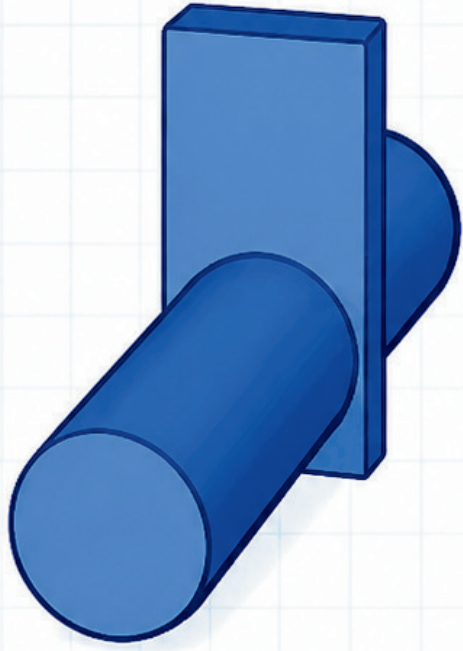
Do not rush this step. A missing part can stop your racer from working later.





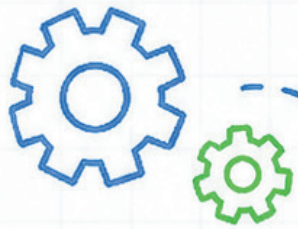
PART
2

CONNECTOR



— DIMENSIONS —

2.8 mm × 5.8 mm × 55 mm

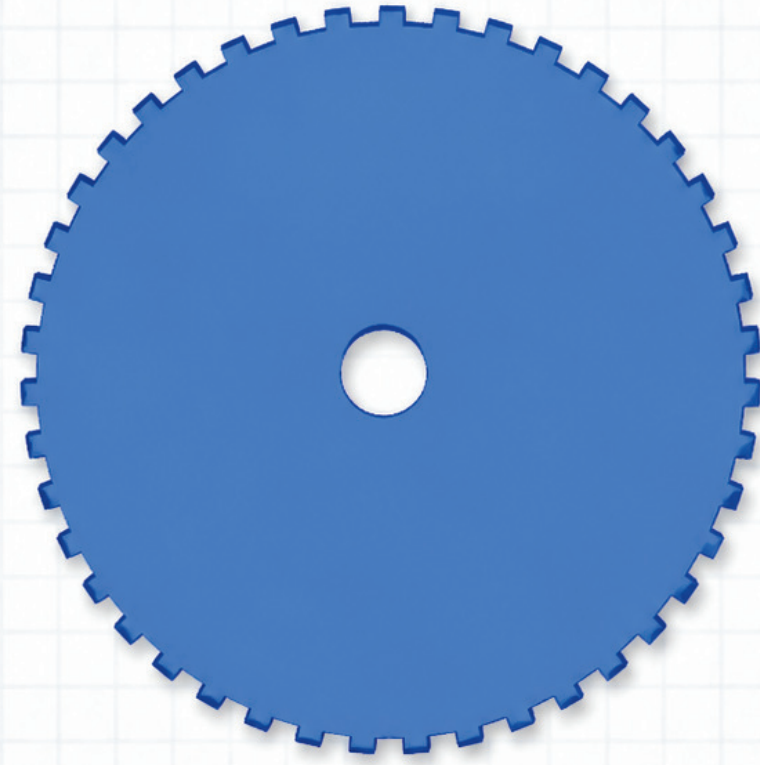


Found it



PART 3

SMALL GEAR



30.36 mm × 30.36 mm × 2.618 mm

Triangles
1240

Vertices
620

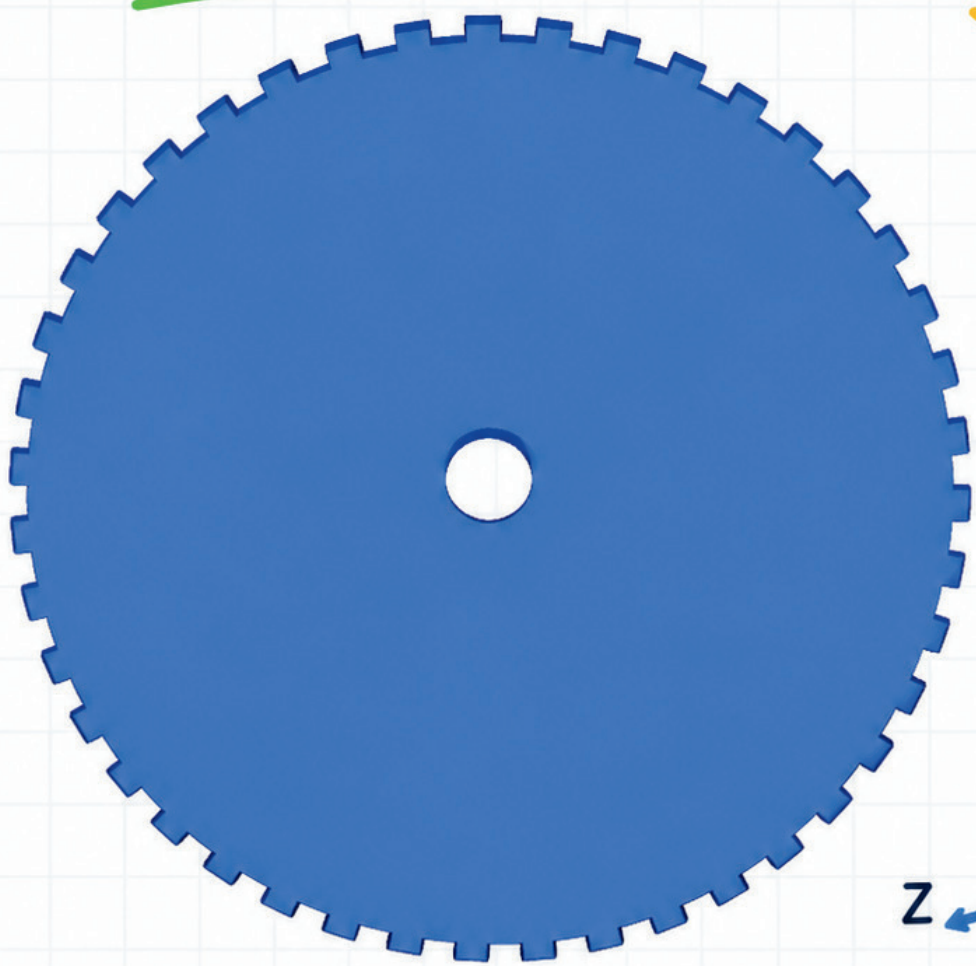
Edges
1860



Found it



BIG GEAR



SIZE: 44.647 mm × 44.647 mm × 3.85 mm

TRIANGLES
3 202

VERTICES
1 601

EDGES
4 803

VOLUME
5 725.906 mm³



Found it



SAFETY FIRST



Engineers are careful because good building needs focus, teamwork, and respect.

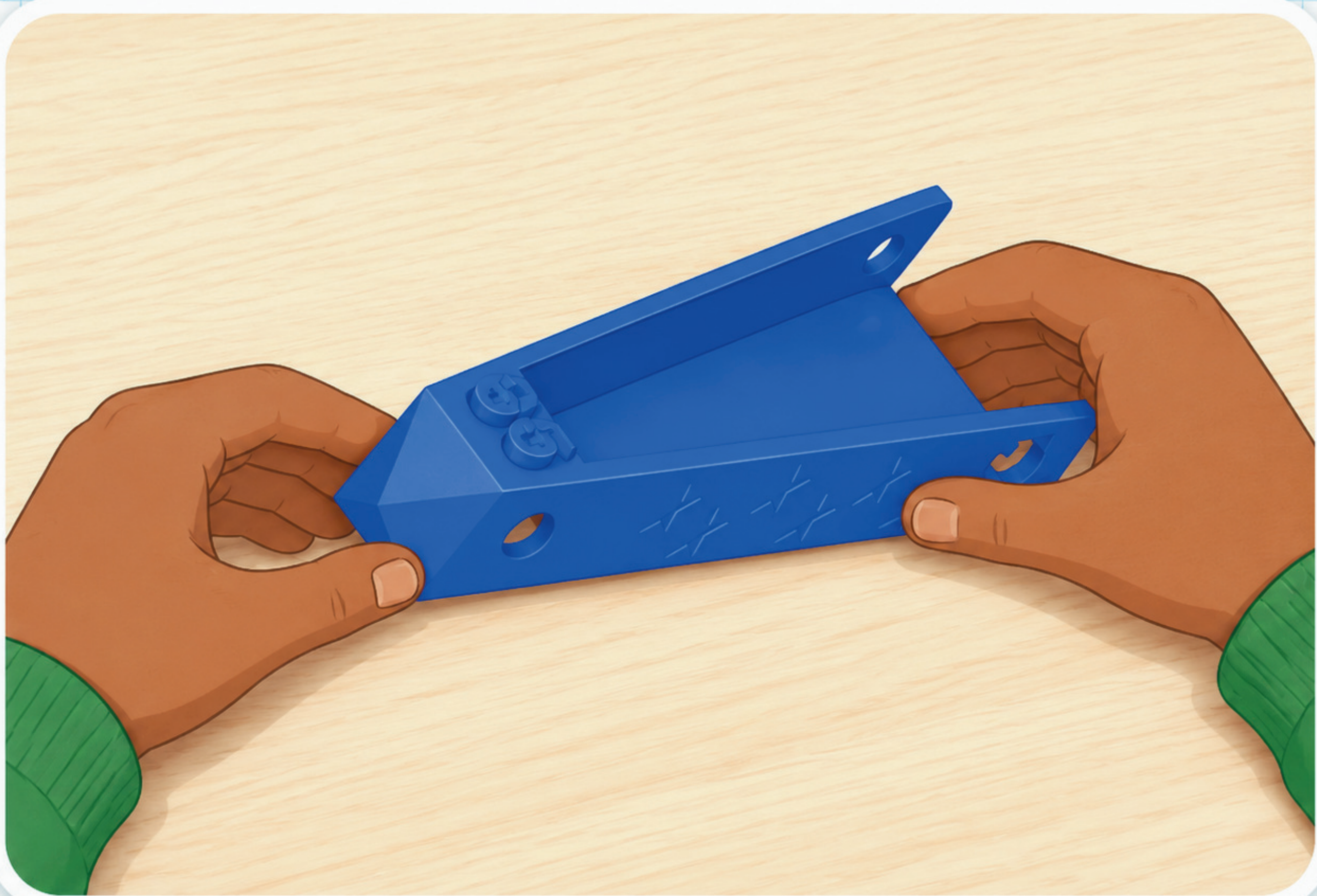
- Do not shoot rubber bands at anyone.
- Keep small parts away from your mouth.
 - Keep your fingers away from stretched rubber bands.
- Do not race until the workshop lead says "go".
 - Keep your workspace tidy.
- Share tools and parts with your team.
- Ask for help if something feels stuck or unsafe.



Let's start putting your racer together. Go slowly and tick each step as you finish.

Now that you know your parts and safety rules, it is time to start building. In this first part, you will prepare the body, add the axle, and begin setting up the wheels. Take your time. A neat build now will make your racer move better later.

STEP 1: START WITH THE BODY



What you need
 Body / chassis

What to do

Place the body of your racer flat on the table. This is the main frame of your racer. Every other part will connect to it, so make sure it is facing the correct way before you continue.



Check before moving on

- The pointed/front side is facing forward.
- The two front holes are easy to see.
- The two back holes are easy to see.
- The body is flat and steady on the table.

Why do you think the body needs holes?

Answer:



Neo's Build Tip:



Look carefully at the shape of the body before adding parts. A good builder checks the frame first.



STEP 2: ADD THE BACK CONNECTOR

What you need

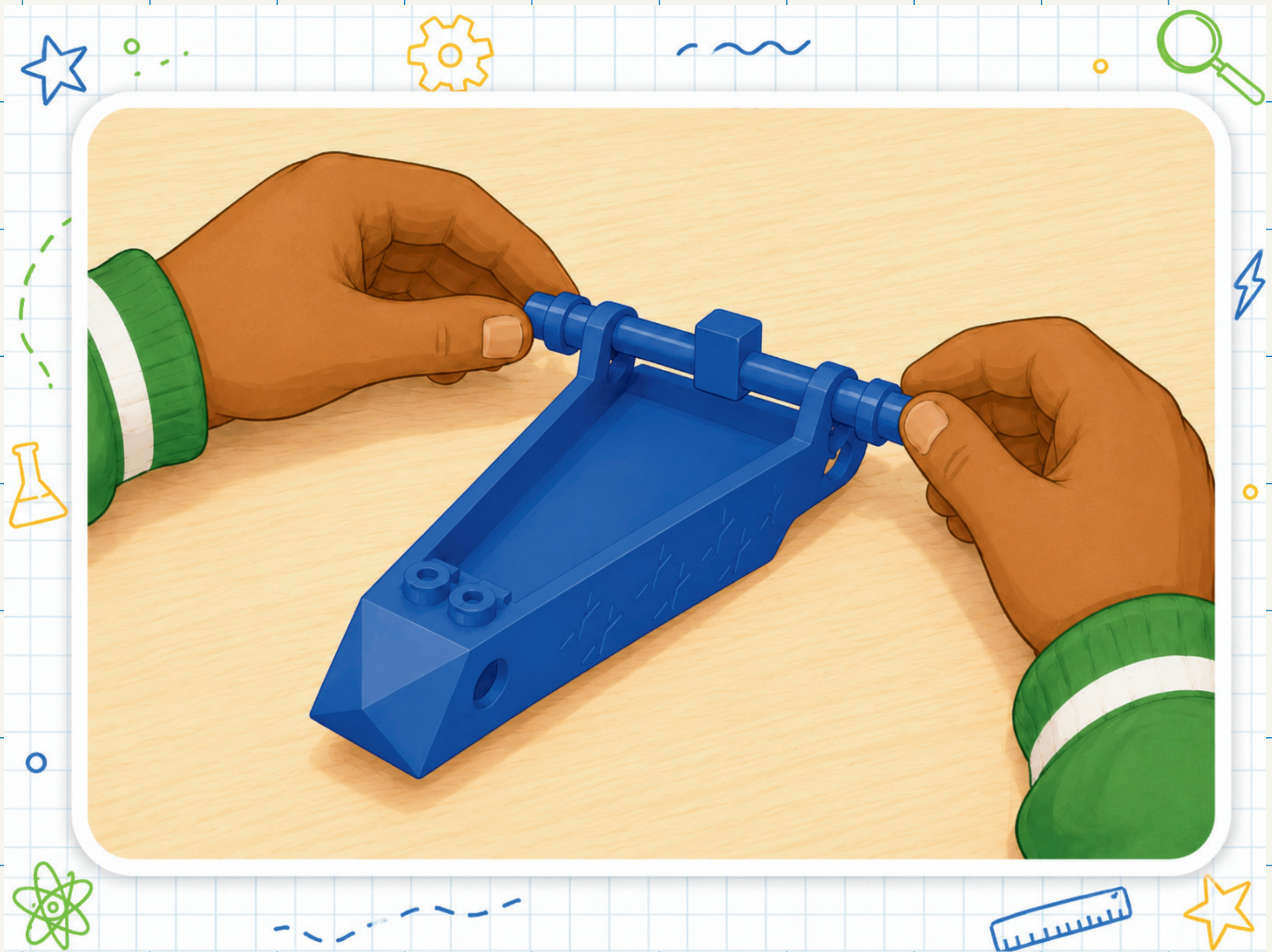
- Body / chassis
- Connector axle

What to do

Slide the connector axle through the two back holes of the body.

The connector axle has a small raised block in the middle. This part will help the racer work properly later, so make sure it is in the correct place.





Check before moving on

- The connector axle goes through both back holes.
- The raised block is near the middle.
 - The axle is straight.
 - The axle can still turn.

Neo's Build Tip:

Do not force the connector. If it feels stuck, gently line it up with the holes and try again.





What could happen if the connector axle is not straight?

Answer:

Handwritten answer area with three horizontal dashed lines.

STEP 3: ADD THE FRONT AXLE

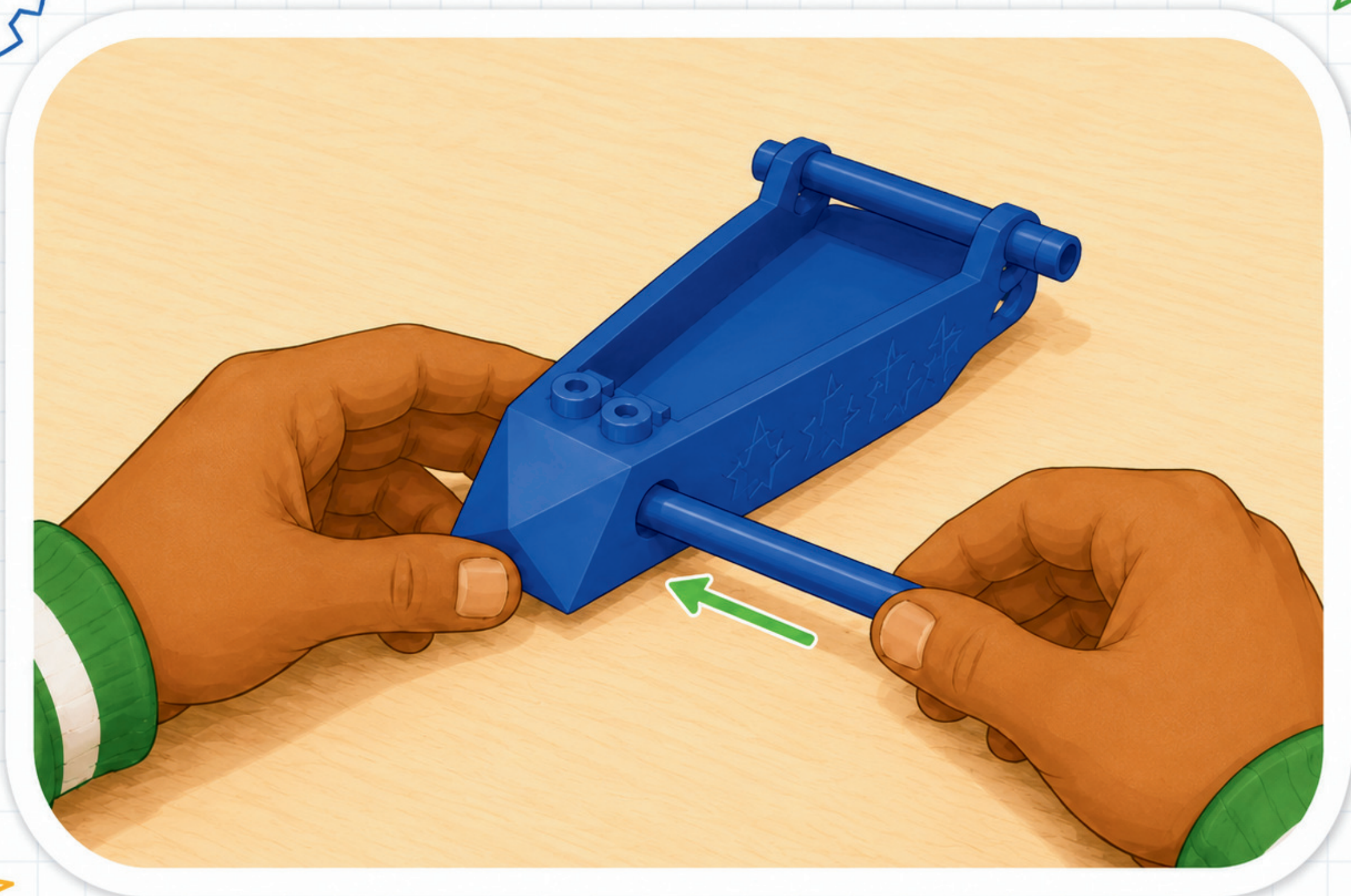
What you need

- Body / chassis
- Normal axle

What to do

Slide the normal axle through the two front holes of the body.

This axle does not have a raised block. It should pass straight through the front holes so the front wheels can be added next.





Check before moving on

- The axle goes through both front holes.
- The axle sticks out on both sides.
 - The axle is straight.
- The axle is not loose or bent.



Neo's Build Tip:

A straight axle helps the racer move smoothly. If the axle is crooked, the wheels may wobble.



Why do both sides of the axle need to stick out?

Answer:

STEP 4: ADD THE BIG BACK WHEELS

What you need

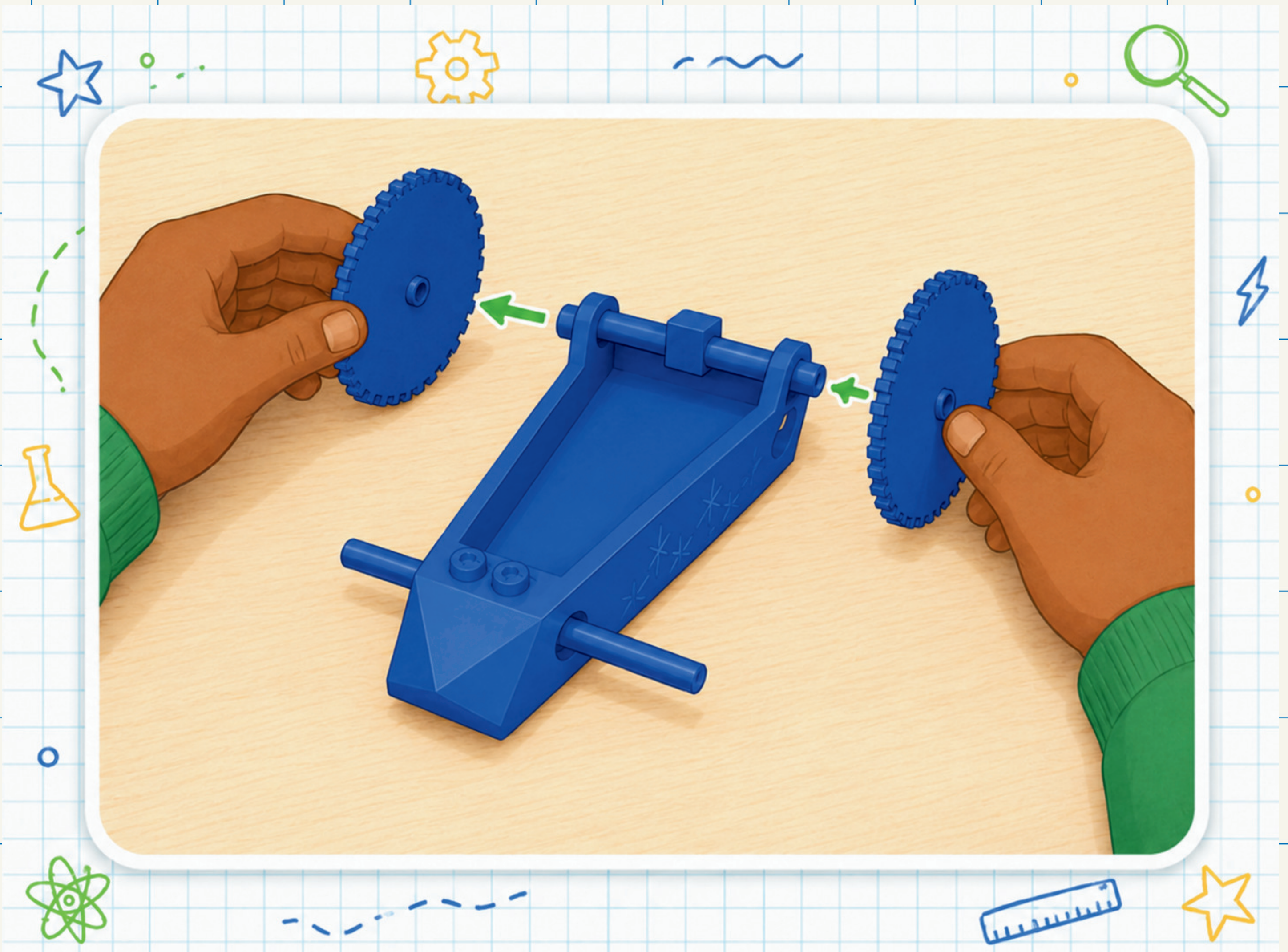
- Racer body with both axles
- Two big wheels

What to do


Attach the two big wheels to the back axle. Push one big wheel onto each side of the back axle. Do not push them too tightly against the body, because the wheels need space to spin.

Check before moving on

- One big wheel is on the left side.
- One big wheel is on the right side.
- Both wheels are on the back axle.
 - The wheels can spin freely.
- The wheels are not rubbing against the body.



Neo's Build Tip: Leave a tiny gap between the wheel and the body. If the wheel rubs, friction will slow your racer down.



What force can slow the wheels down if they rub against the body?

Answer:

Handwritten answer area with dashed lines for writing.



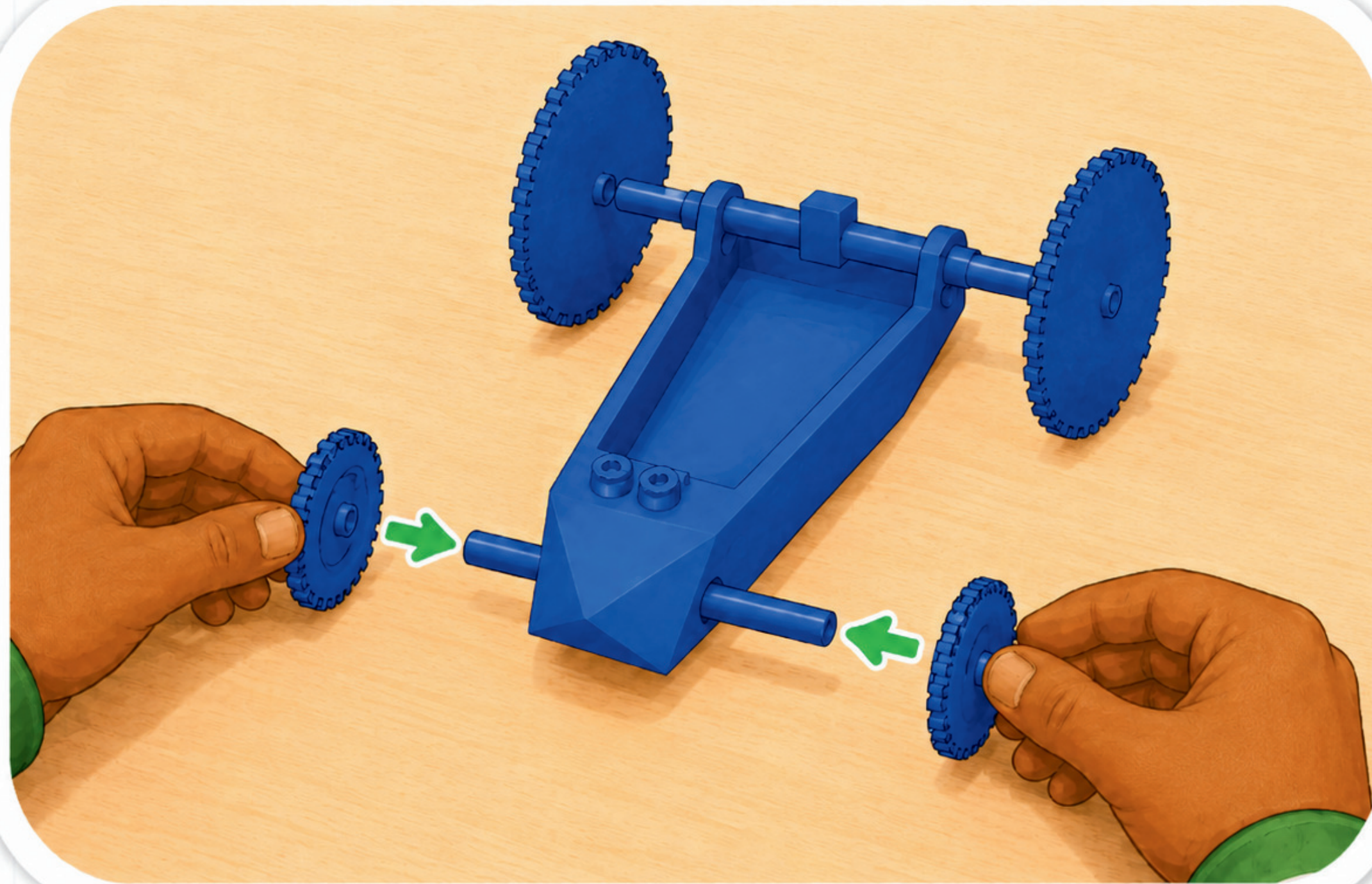
STEP 5: ADD THE SMALL FRONT WHEELS

What you need

- Racer body with back wheels
- Two small wheels

What to do

Attach the two small wheels to the front axle. Push one small wheel onto each side of the front axle. Make sure they are balanced and can turn easily.



Check before moving on

- One small wheel is on the left side.
- One small wheel is on the right side.
- Both wheels are on the front axle.
 - The wheels can spin.
- The racer sits evenly on the table.



Neo's Build Tip:



If one wheel is tighter than the other, your racer might turn instead of going straight.



Why is it important for the racer to sit evenly?

Answer:

STEP 6: CHECK YOUR ROLL

What you need

- Your partly built racer

What to do

Place your racer on the table and gently push it forward.

This is not the race yet. This is a test to check whether your wheels and axles are working properly.

Roll test

Push your racer gently.

What happened?

- It rolled straight.
- It turned left.
- It turned right.
- It did not move well.
- A wheel got stuck.

If something went wrong, check

- Are the wheels pushed too tightly?
 - Is an axle crooked?
- Are the big wheels at the back?
- Are the small wheels at the front?
- Is anything rubbing against the body?



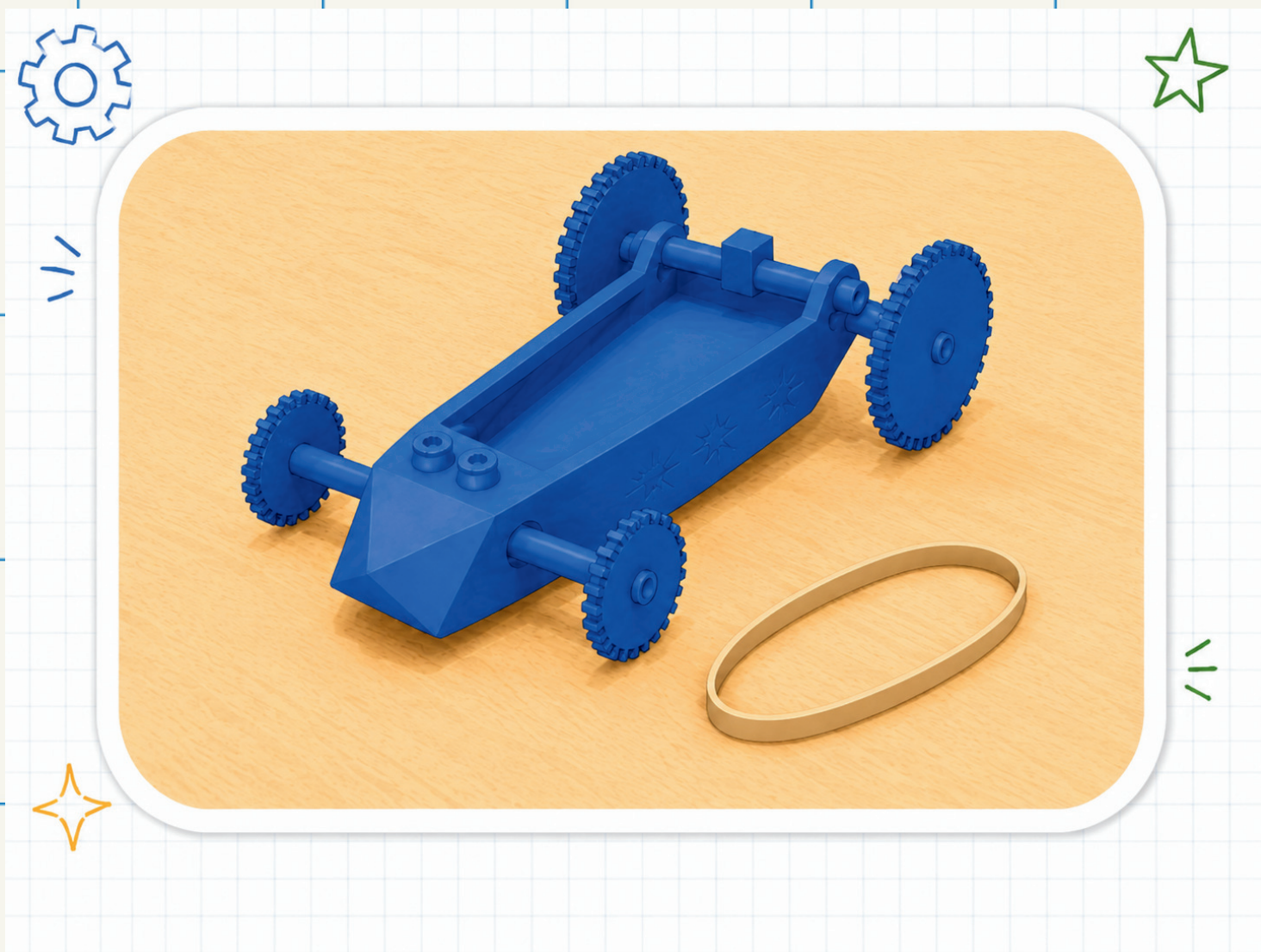
Now let's give your racer its energy source.

Now that your racer can roll, it is time to add the rubber band. The rubber band is important because it stores energy when it is stretched or twisted. When the rubber band is released, that stored energy helps turn the axle and move the racer forward. Go slowly and make sure the rubber band is attached properly before testing.

STEP 1: FIND THE RUBBER BAND

- What you need
- Your completed Part 1 racer
 - Rubber band
 - Back connector axle
 - Front hook / holding point

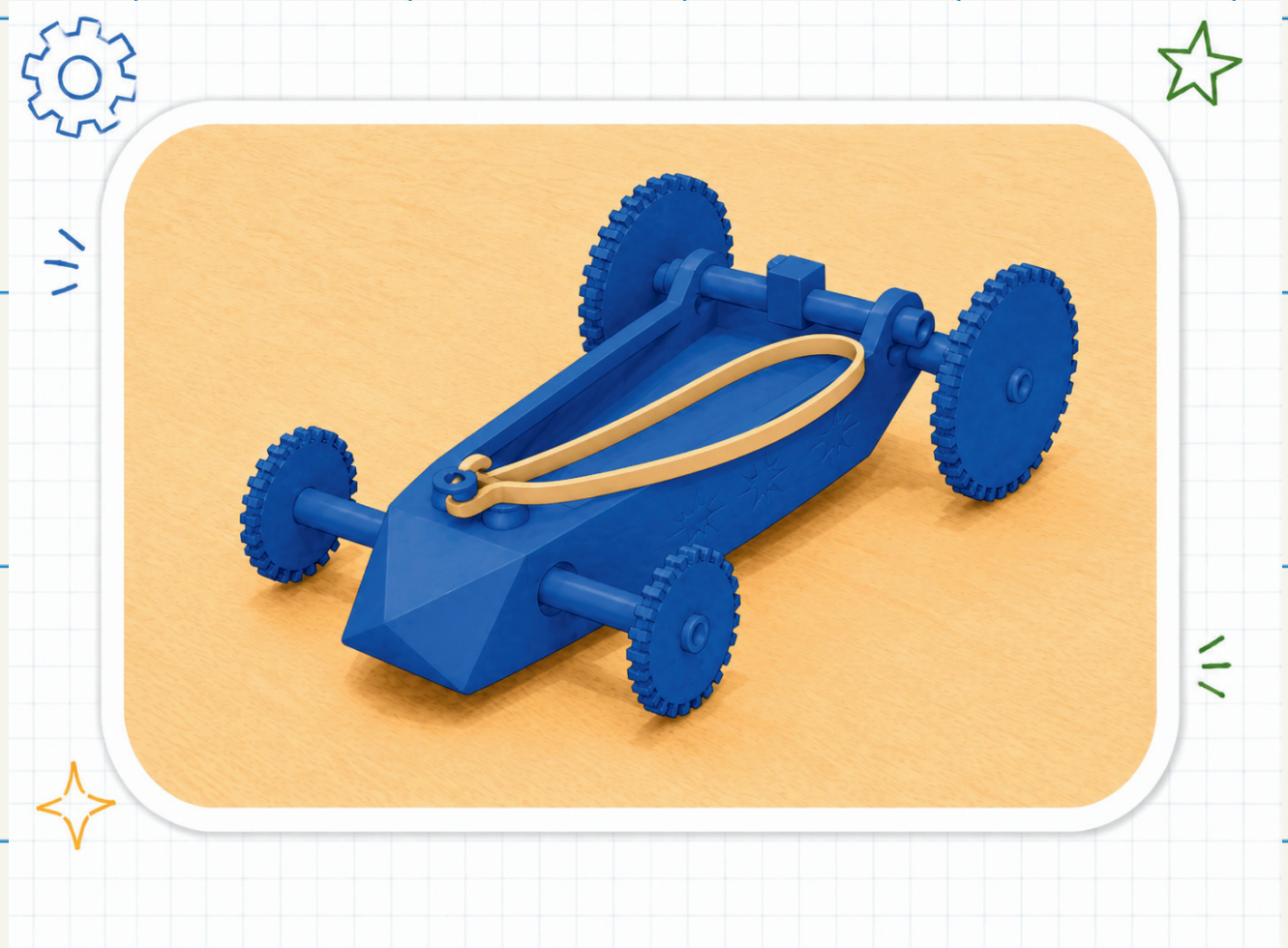
Take one rubber band from your kit.



Done

STEP 2: HOOK THE RUBBER BAND AT THE FRONT

Attach one side of the rubber band to the front holding point of the racer

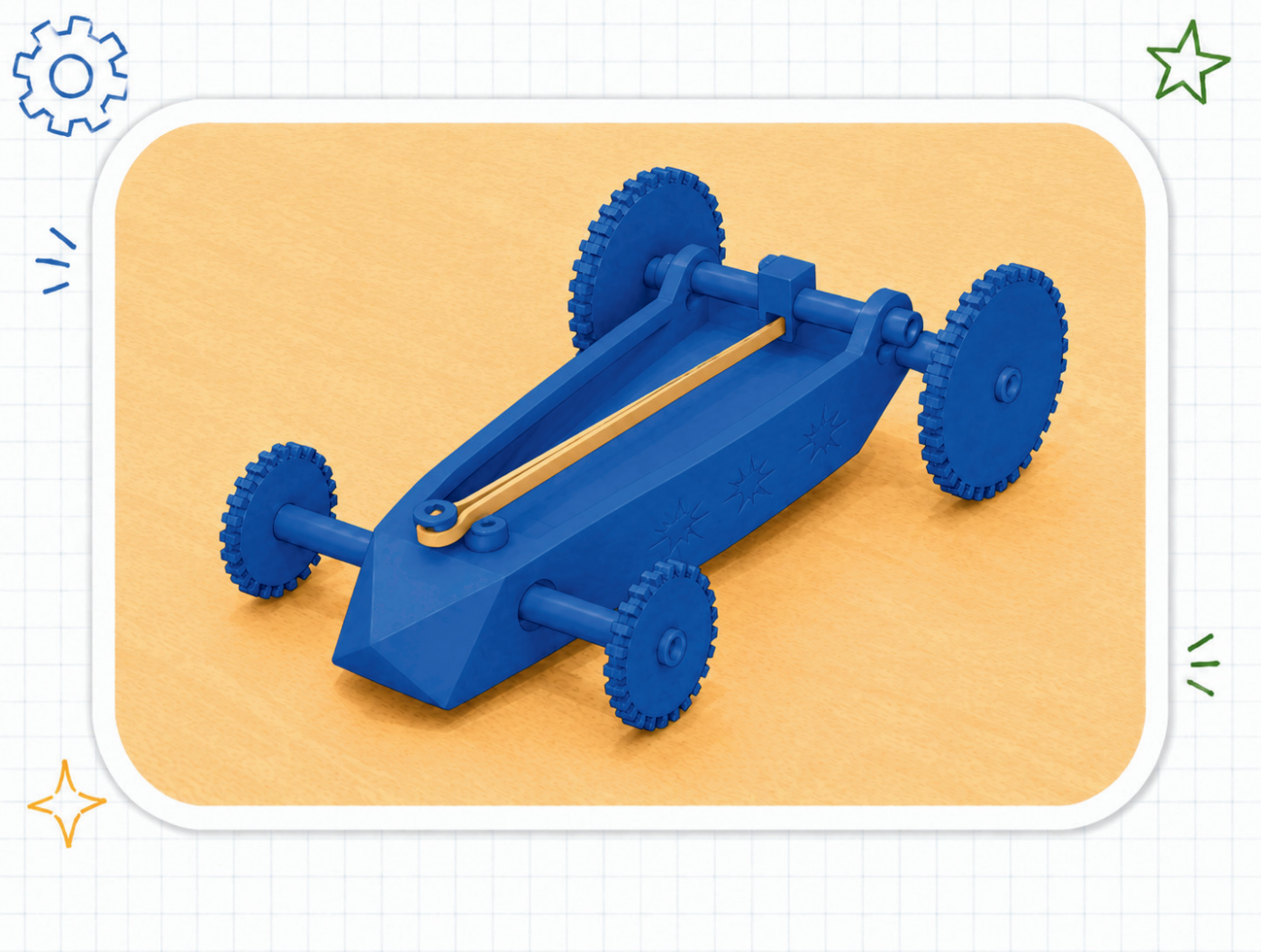


Done



STEP 3: STRETCH IT TO THE BACK CONNECTOR

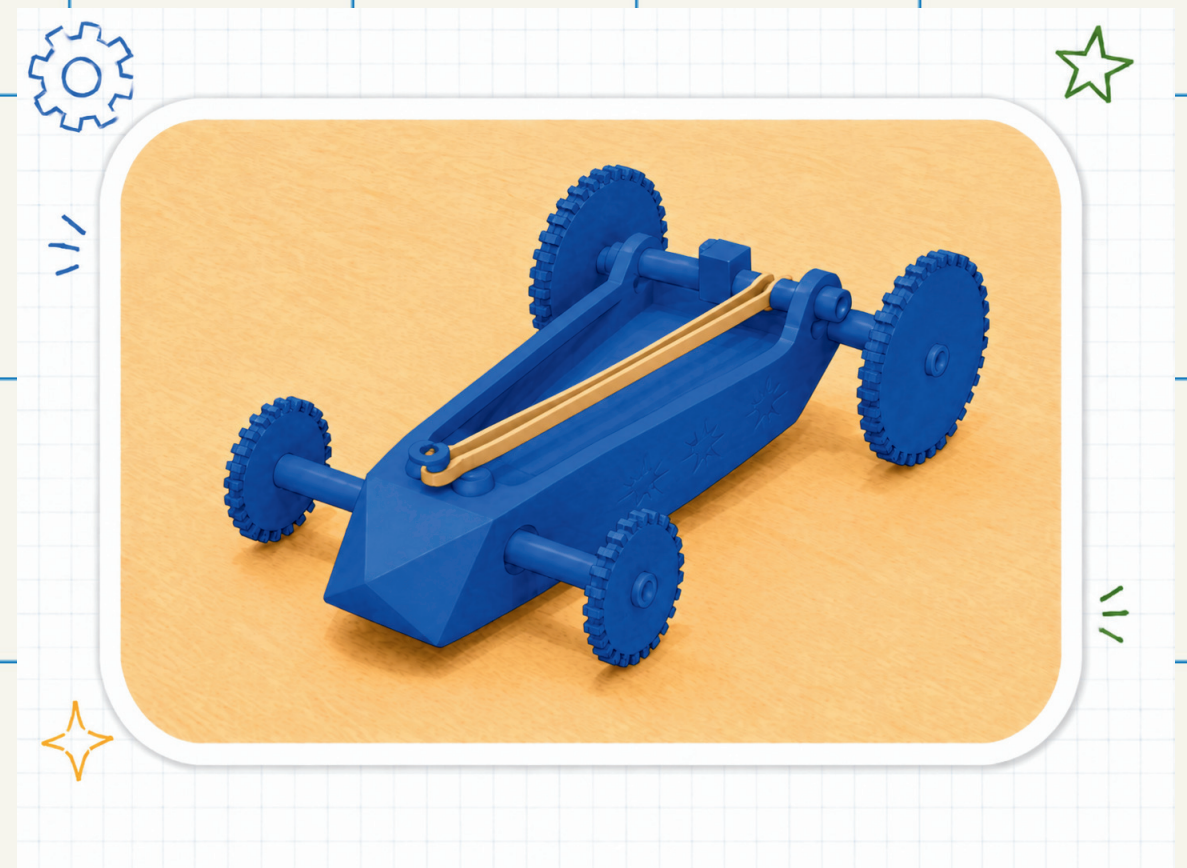
Pull the rubber band gently towards the back connector axle.



Done

STEP 4: LOOP IT AROUND THE BACK CONNECTOR

Loop the rubber band around the raised part of the back connector axle.



Done

Check before moving on

- The rubber band is attached at the front.
- The rubber band reaches the back connector.
 - The rubber band is not twisted badly.
 - The rubber band is not about to snap.
- The rubber band can turn the back axle when wound.

Amahle's Science Note:

When you stretch or twist a rubber band, it stores elastic potential energy. That energy can later change into movement.





Now let's turn stored energy into movement.

Your rubber band is now attached to the racer. The next step is to wind it around the back connector axle.

When you wind the rubber band, you are storing energy. When you let go, that energy can turn the back axle and move the racer forward.

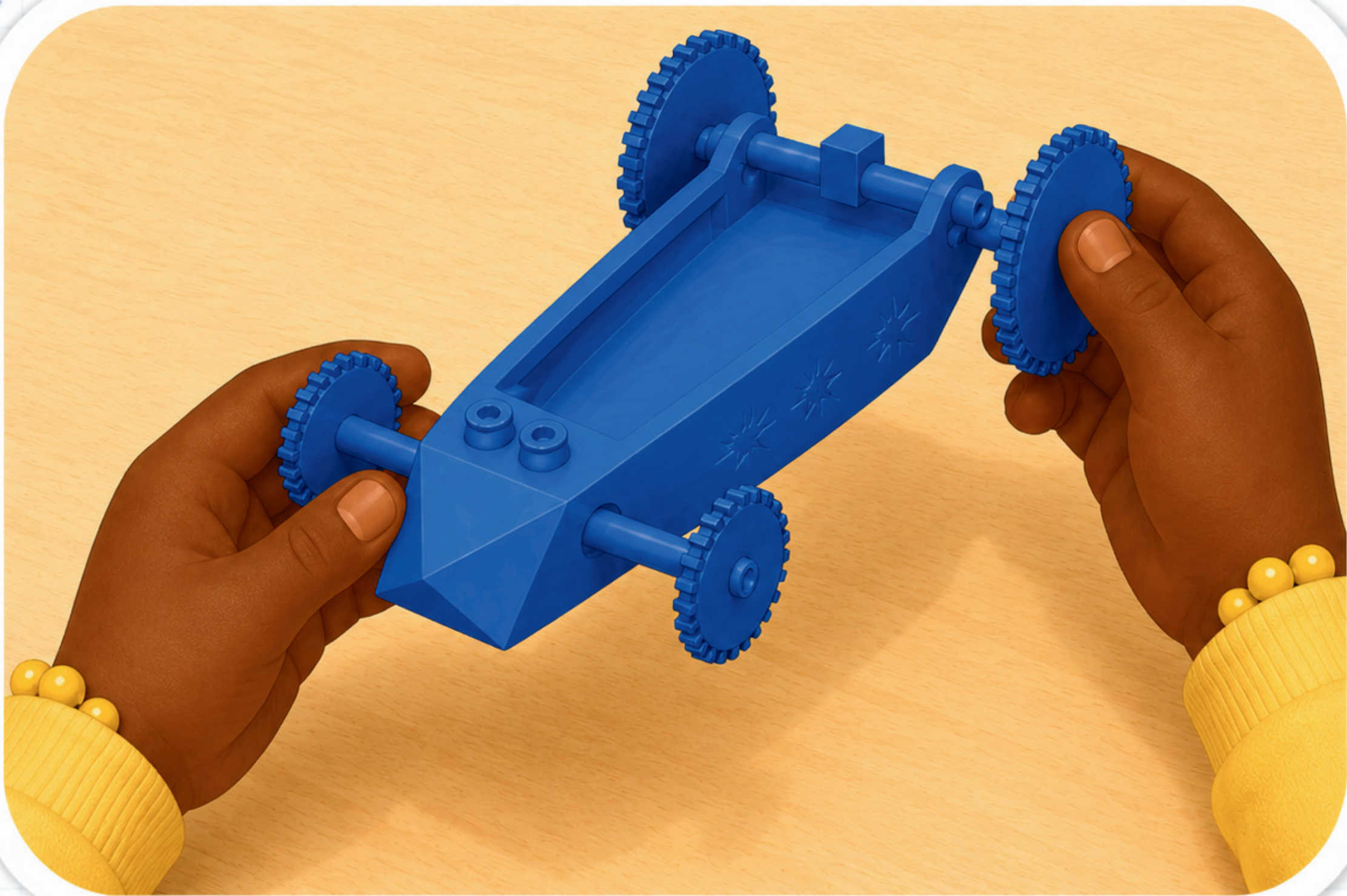
Start with a small test first. Do not overwind it yet.

What you need

- Your racer with the rubber band attached
 - A clear space to test
 - A start line
- A ruler or measuring tape

STEP 1: LIFT THE BACK WHEELS SLIGHTLY

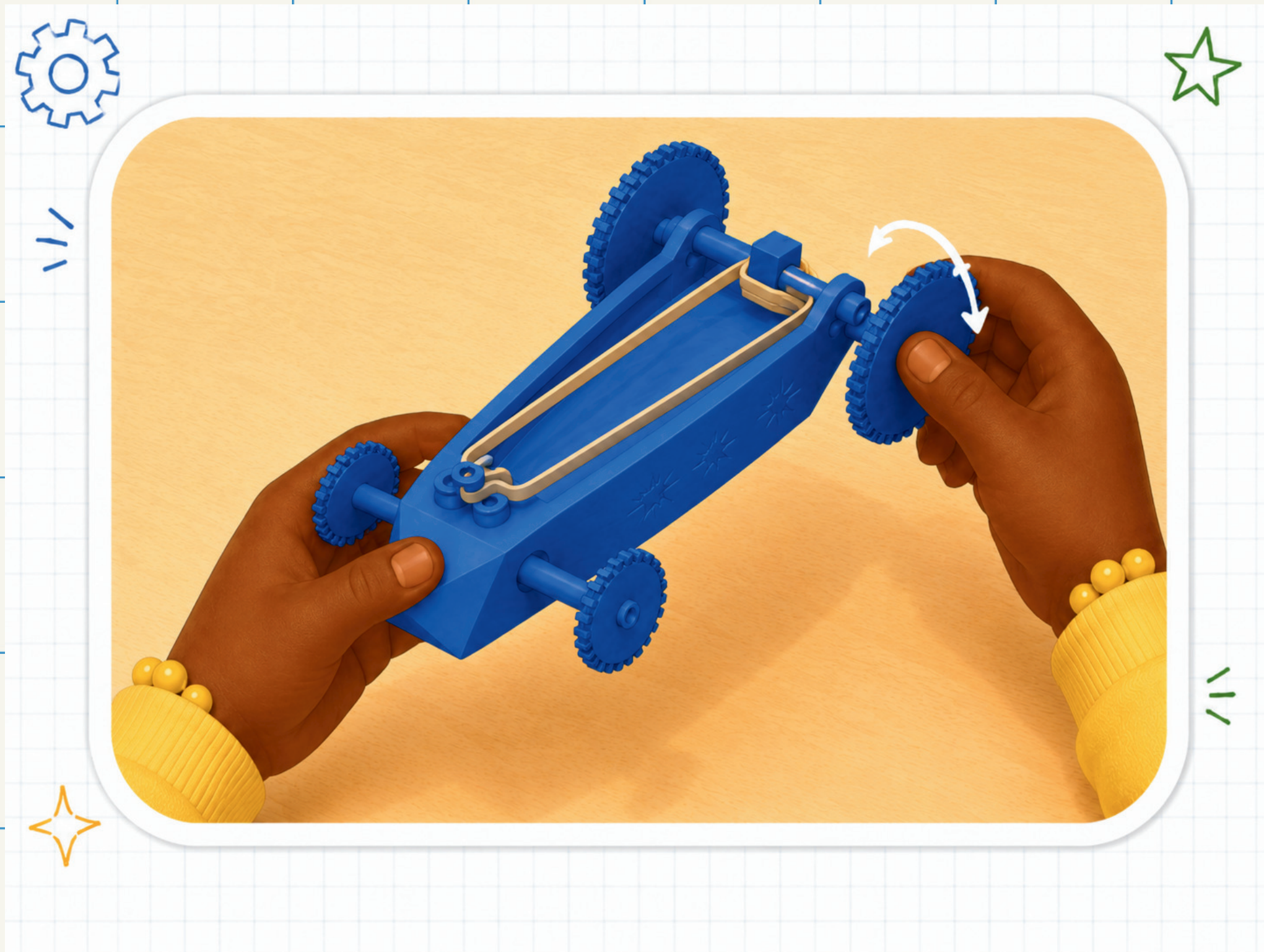
Hold the racer gently so the back wheels can turn.





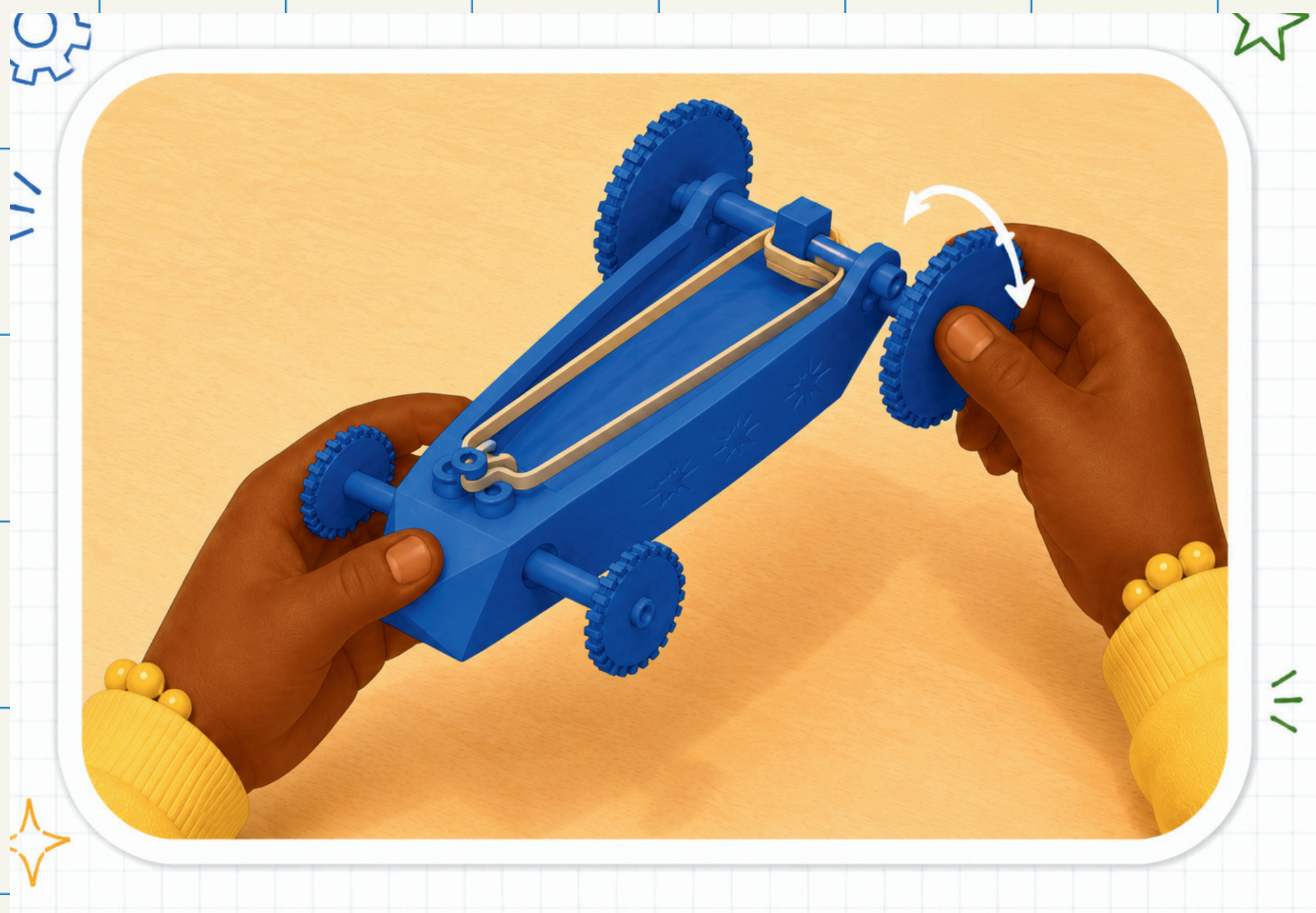
STEP 2: WIND THE BACK WHEELS

Turn the back wheels slowly so the rubber band wraps around the back connector axle.



STEP 3: PLACE IT AT THE START LINE

Put your racer behind the start line. Keep holding it until everyone is ready.





STEP 4: LET GO GENTLY

Release the racer and watch what happens.



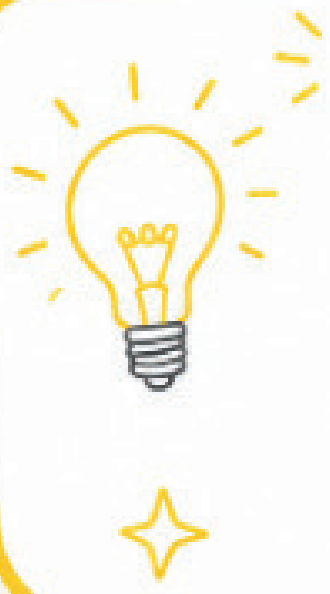
FIRST TEST TABLE

What happened in your first test?

- It moved forward.
- It moved backwards.
- It turned sideways.
- It did not move.
- The rubber band slipped.
- A wheel got stuck.

What happened when you let go of the racer?

Answer:



Amahle's Science Note:

When the rubber band unwinds, stored energy changes into movement. This movement energy is called **kinetic energy**.



Kabelo's Challenge:

Your first test does not need to be perfect. Your goal is to find out **what works** and **what needs fixing**.



Quick fix box

If your racer did not move well, check:

- Is the rubber band attached at the front?
- Is the rubber band wrapped around the back connector?
 - Are the wheels spinning freely?
 - Did you wind it in the correct direction?
- Did you wind it too little or too much?

Why is it important for the racer to sit evenly?

Answer:



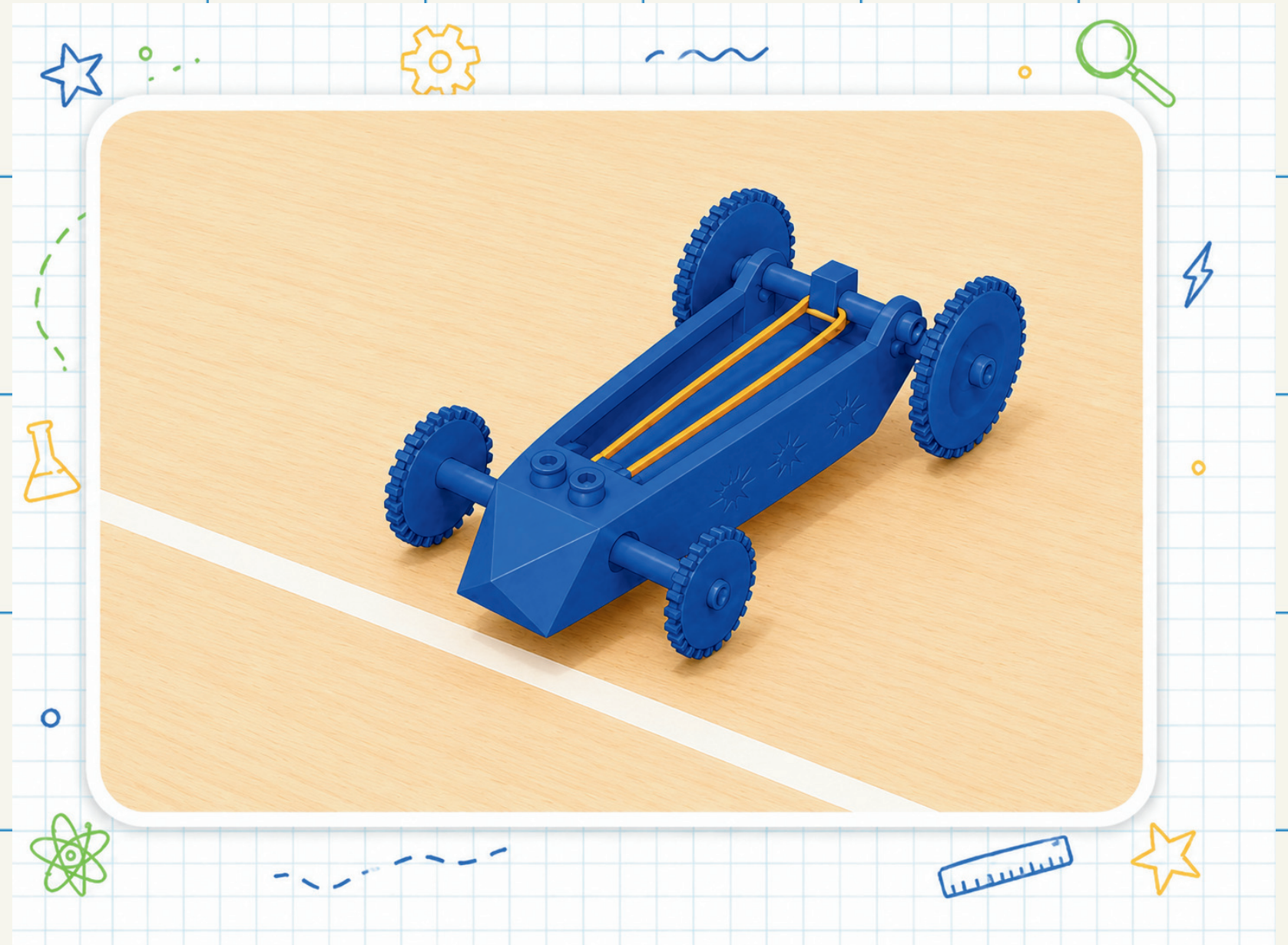
Now that your racer can move, it is time to test how well it performs. Engineers do not only say, "It worked!" They measure what happened. On this page, you will record how far your racer travels and how long it takes. Try to keep each test fair. Use the same start line, the same surface, and the same way of winding each time.

What you need

- Your rubber-band racer
- A start line
- A ruler or measuring tape
- A stopwatch
- A pencil

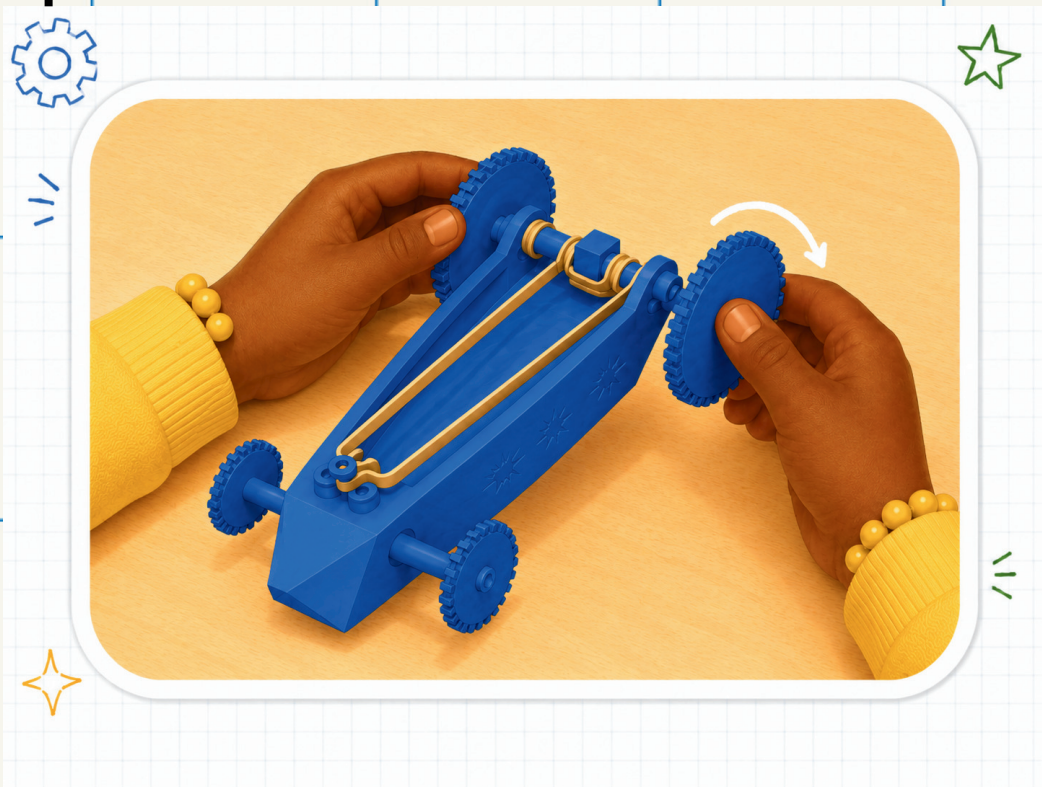
STEP 1: SET UP YOUR RACE TRACK

Place your racer behind the start line.



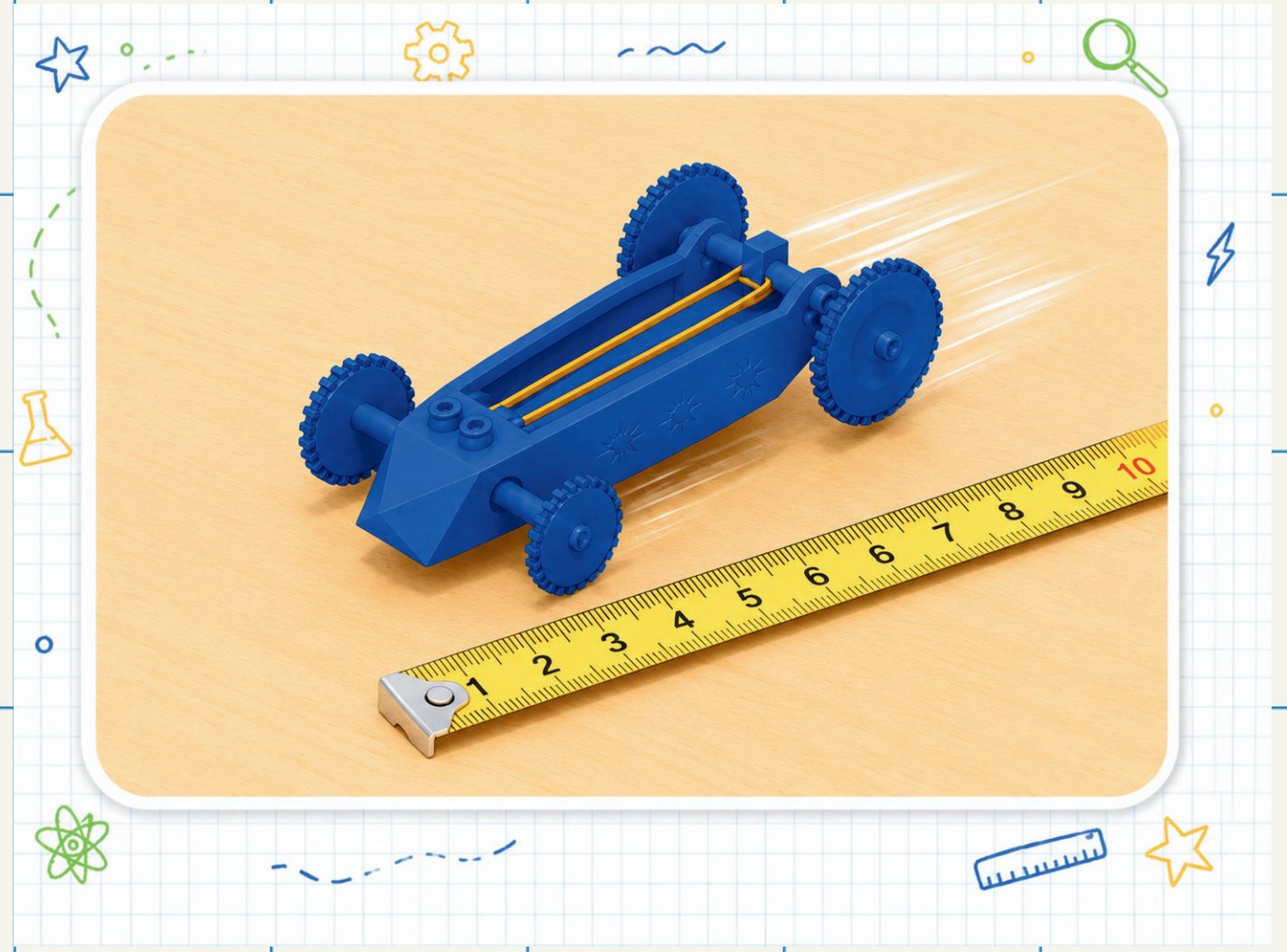
STEP 2: WIND THE RACER

Wind the back wheels the same number of turns each time.



STEP 3: RELEASE AND MEASURE

Let go gently. Measure how far the racer travels.





STEP 4: RECORD YOUR RESULTS

Write your results in the table below.

Trial	Number of turns	Distance travelled	Time taken	What did you notice?
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____

Laila's Data Tip:

Do not only test once. Test more than once, write down your results, and compare what changed.



Quick check

Which trial went the furthest?

Trial: _____

Which trial was the fastest?

Trial: _____

Did your racer move in a straight line?

- Yes
- No
- A little

Mini question

Why should engineers record their results?

Answer:



What makes your racer move, slow down, or go faster?

SECTION 1: ENERGY CHANGE

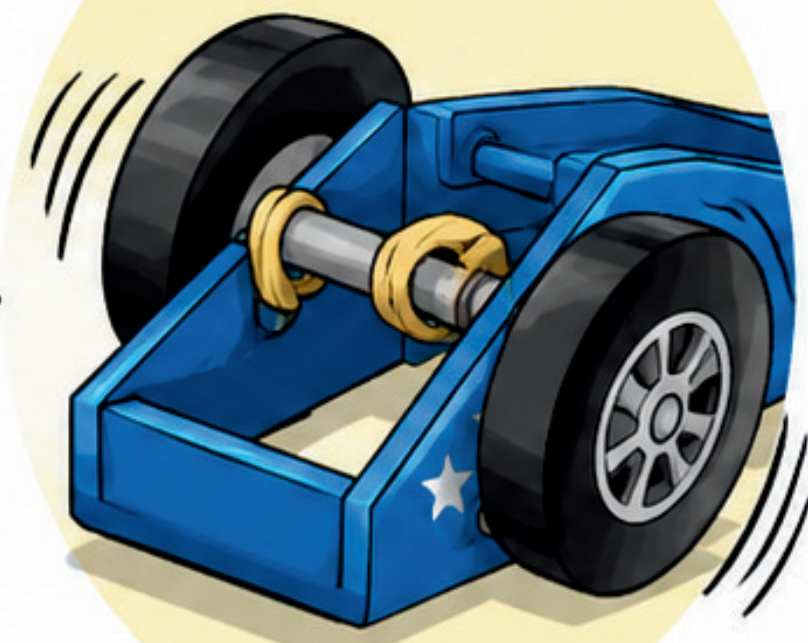
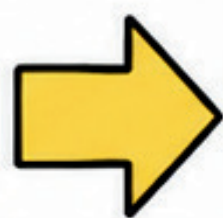
Your racer moved because energy was stored in the rubber band. When you stretched or twisted the rubber band, it stored elastic potential energy. When the rubber band unwound, that stored energy changed into kinetic energy, which is movement energy.

But energy is not the only thing that matters. Your racer can also be slowed down by friction, heavy parts, loose wheels, or wheels that do not spin properly.

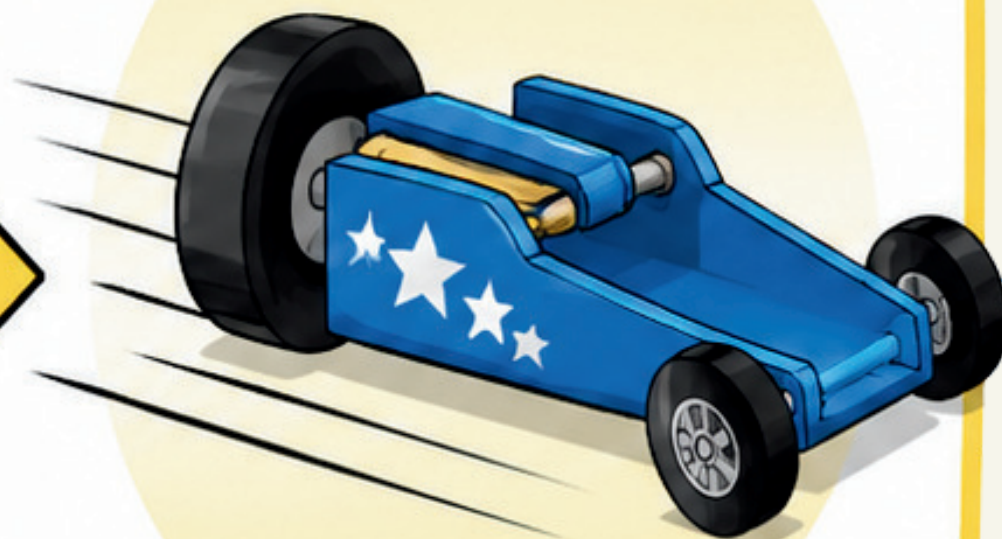
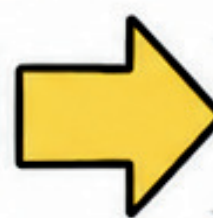
Engineers study these forces so they can design better, faster, smoother machines.



Elastic potential energy



Kinetic energy



Movement

The rubber band stores energy first. Then the energy changes into movement.

That movement makes the wheels turn and the racer move forward.



SECTION 2: KEY WORDS

1

Energy

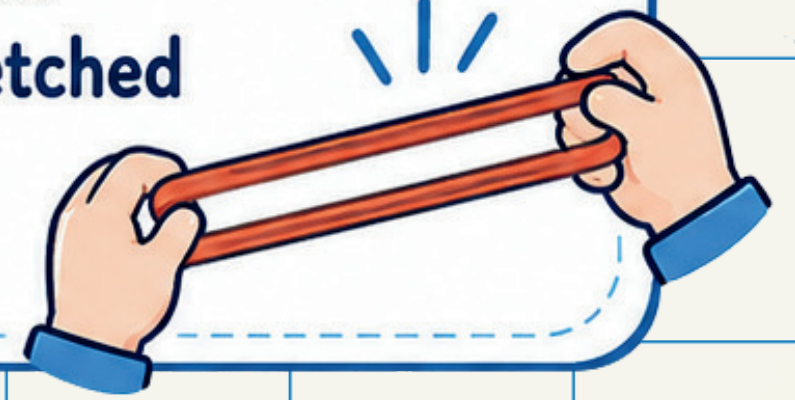
The ability to make something happen.



2

Elastic potential energy

Energy stored in something stretched or twisted.



3

Kinetic energy

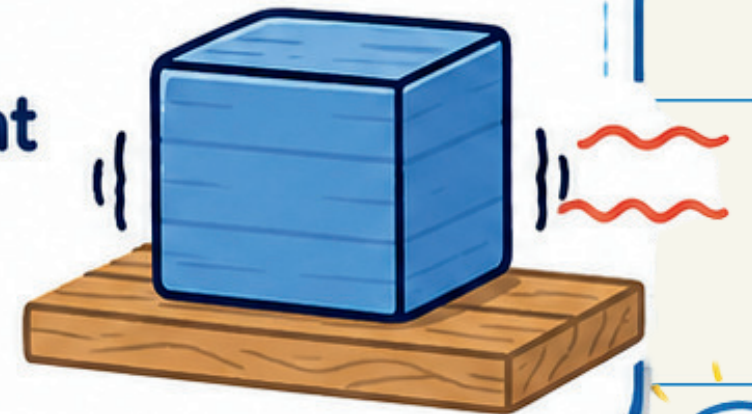
Energy of movement.



4

Friction

A force that slows movement when surfaces rub together.



SECTION 3: SPEED FORMULA

STEM FORMULA

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$



★ Speed tells us how fast something is moving.



If your racer travels a long distance in a short time, it is faster.

Example:

If your racer travels 6 metres in 3 seconds:

$$\text{Speed} = 6 \div 3 = 2 \text{ m/s}$$

So the racer's speed is:

2 metres per second



MINI ACTIVITY

Amahle's Science Note:



Speed tells us how fast something moves.
To calculate speed, divide the distance
travelled by the time taken.



My racer travelled:

Distance: _____

Time: _____

So my speed is:

_____ ÷ _____ = _____

Quick thinking question

What could make your racer slower?

- Too much friction
- Wheels rubbing against the body
- Axles not straight
- Rubber band slipping
- All of the above



MINI ACTIVITY

Now that your racer can move, it is time to test it like a scientist. An experiment is not just playing around. In a fair experiment, you change one thing, measure what happens, and keep everything else the same. Today, your team will investigate this question:

Quick thinking question

What could make your racer slower?

- Too much friction
- Wheels rubbing against the body
- Axles not straight
- Rubber band slipping
- All of the above

MY PREDICTION

Write:

Before we test, make a prediction.

What do you think will happen?

I think that if we use more rubber-band turns, the racer will:

- travel further
- travel a shorter distance
- stay about the same
- not work properly

Because:

Investigation Question

How does the number of rubber-band turns affect the distance travelled by the racer?

Variables section

FAIR TEST CHECK

Write:

A fair test changes only one thing at a time.





MINI ACTIVITY

Now that your racer can move, it is time to test it like a scientist. An experiment is not just playing around. In a fair experiment, you change one thing, measure what happens, and keep everything else the same. Today, your team will investigate this question:

What will we change?

This is called the independent variable.

- Number of rubber-band turns

What will we measure?

This is called the dependent variable.

- Distance travelled by the racer

What will we keep the same?

These are called controlled variables.

Tick the things your team will keep the same:

- Same racer
- Same track surface
- Same start line
- Same measuring tool
- Same release method
- Same person releasing the racer
- Same way of recording results

OUR TEST PLAN

Write:

We will test the racer using these numbers of turns:

- 5 turns
- 10 turns
- 15 turns
- 20 turns

Or write your own:

Trial 1: _____ turns

Trial 2: _____ turns

Trial 3: _____ turns

Trial 4: _____ turns

Laila's Data Tip:

A fair test changes one thing at a time. If you change too many things, you will not know what caused the result.





TEAM ROLES

Choose a job for each person in your team.

Builder: _____

Checks the racer before each test.

Winder: _____

Winds the rubber band carefully.

Launcher: _____

Releases the racer from the start line.

Measurer: _____

Measures the distance travelled.

Recorder: _____

Writes down the results.

THINK LIKE A SCIENTIST

Why is it important to keep the start line the same each time?

Answer:



Now test, measure, and record your results carefully.

Now it is time to run your experiment.

Remember your investigation question:

How does the number of rubber-band turns affect the distance travelled by the racer?

For each test, change only the number of turns. Keep everything else the same so that your experiment is fair.

Instructions box

How to test

1. Place your racer behind the same start line.
2. Wind the rubber band the number of turns shown in the table.
3. Let go gently.
4. Measure how far the racer travels.
5. Write the result in the table.
6. Repeat the test more than once.

Rubber-band turns	Trial 1 distance	Trial 2 distance	Trial 3 distance	Best distance	Notes
5 turns	_____	_____	_____	_____	_____
10 turns	_____	_____	_____	_____	_____
15 turns	_____	_____	_____	_____	_____
20 turns	_____	_____	_____	_____	_____



Observation questions

What did your data show?

Which number of turns made the racer travel the furthest?

Answer: _____

Which number of turns made the racer travel the shortest distance?

Answer: _____

Did more turns always make the racer go further?

- Yes
- No
- Sometimes

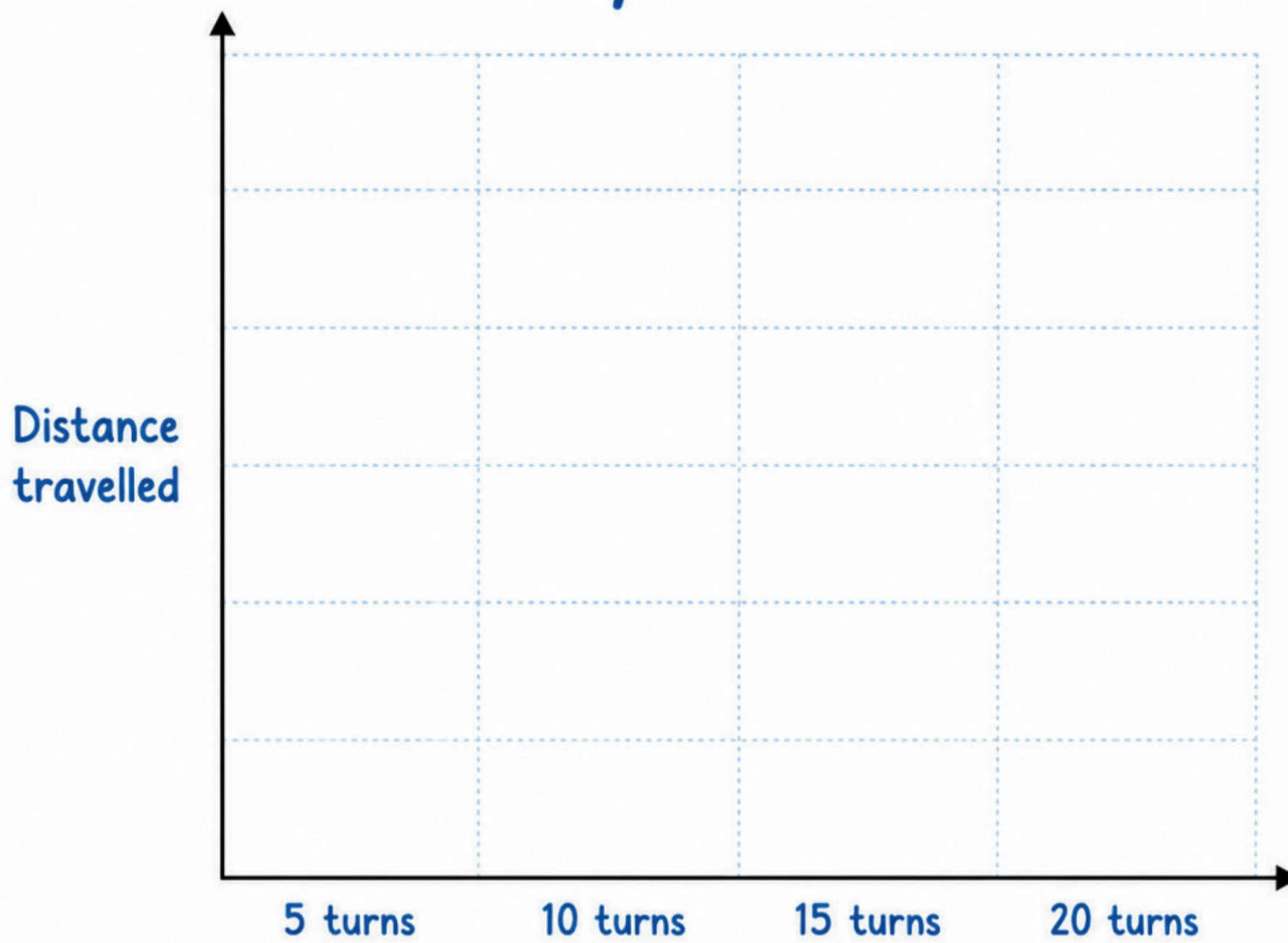
Why do you think that happened?

Laila's Data Tip:

Your results tell a story.
Look for patterns before
you decide what worked best.



Draw your results





Quick thinking box

Think like Laila

A good scientist does not only ask, "What happened?"

A good scientist also asks, "Why did it happen?"

One pattern I noticed in my results was:

IMPROVE YOUR RACER

Engineers make things better by testing, changing, and trying again.

Your racer has now been built, powered, tested, and measured.

But engineers do not stop after one test. They look carefully at their results and ask:

What worked well?

What went wrong?

What can we improve?

On this page, your team will choose one improvement, make the change, and test your racer again.

SECTION 1: WHAT PROBLEM DID YOU NOTICE?

WHAT DID YOU NOTICE?

Tick any problems your team saw during testing:

- The racer did not move far.
- The racer turned left or right.
- The wheels were rubbing.
- The rubber band slipped.
- The axle was not straight.
- The racer was too slow.
- One wheel was too tight.
- The racer did not move at all.
- Other: _____



SECTION 2: CHOOSE ONE IMPROVEMENT

Do not change everything at once. Choose one thing to improve first.

Tick the change your team will make:

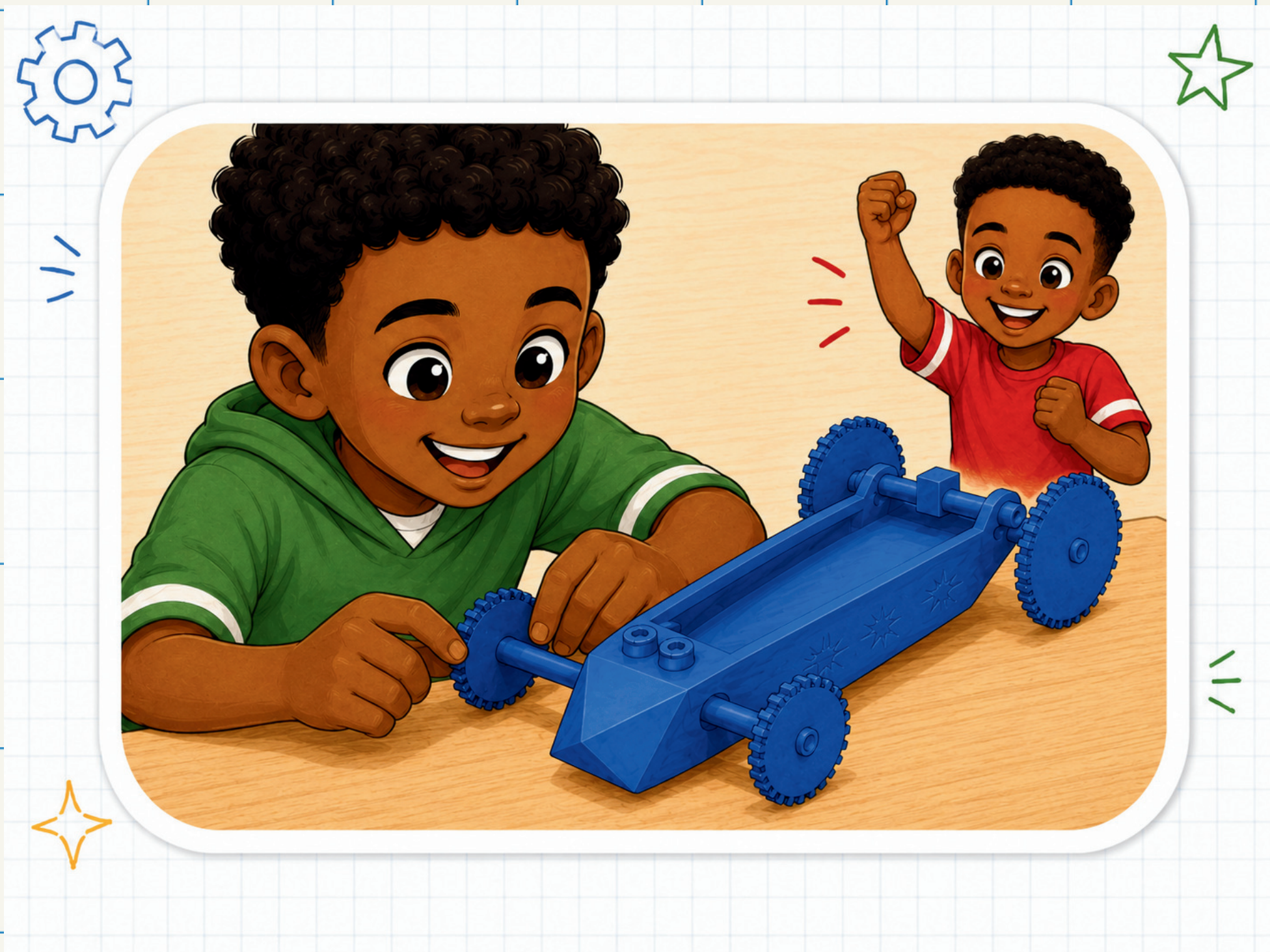
- Straighten the axle.
- Loosen the wheels slightly.
- Make sure the wheels spin freely.
- Check the rubber band position.
- Wind the rubber band more carefully.
- Reduce friction.
- Improve the launch.
- Other: _____

SECTION 3: OUR IMPROVEMENT PLAN

The problem we noticed was: _____

The change we will make is: _____

We think this will help because: _____





SECTION 4: TEST AGAIN

Do not change everything at once. Choose one thing to improve first.
Tick the change your team will make:

- Straighten the axle.
- Loosen the wheels slightly.
- Make sure the wheels spin freely.
- Check the rubber band position.
- Wind the rubber band more carefully.
- Reduce friction.
- Improve the launch.
- Other: _____

SECTION 5: DID IT IMPROVE?

TEST AGAIN

After making your improvement, test your racer again.

Test	Distance travelled	What happened?
Before improvement	_____	_____
After improvement	_____	_____

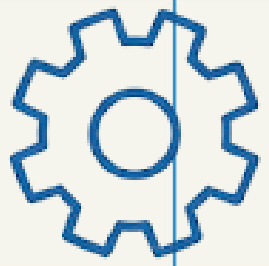


Tick one:

- Yes, it worked better.
- A little bit.
- No, but we learned something.
- We need to try another change.

One thing we learned from improving our racer was:

Neo's Build Tip:



Change one thing at a time.
If you change too much, you will not
know what made your racer better.



Kabelo's Challenge:



If your racer does not improve, do not give up.
A failed test **is a clue, not the end.**



Think like an engineer

Engineering is about improving ideas. What would you change if you had more time?



You have built, powered, tested, measured, and improved your racer. Now it is time to check what you learned. Complete the puzzles below with your team. You can use the previous pages to help you.

ACTIVITY 1: WORD SEARCH

E	N	E	R	G	Y	A	X	L	E
L	A	T	E	S	T	I	M	E	R
A	R	U	B	B	E	R	C	S	A
S	P	E	E	D	H	K	I	T	C
T	D	I	S	T	A	N	C	E	E
I	W	H	E	E	L	N	E	S	R
C	F	R	I	C	T	I	O	N	X
K	I	N	E	T	I	C	A	B	Y
A	X	L	E	P	L	A	N	R	Z
T	E	S	T	W	H	E	E	L	S

ACTIVITY 2: FIX THE RACER

WHAT WOULD YOU FIX?

A team tested their racer, but it kept turning to the left.

Tick what they should check first:

- The wheels are pushed too tightly on one side.
- The axle is not straight.
- The rubber band is slipping.
- The racer is on an uneven surface.
- All of the above.

I think they should fix: _____



ACTIVITY 3: SPEED PUZZLE

Speed = distance ÷ time

A racer travelled 6 metres in 3 seconds.

Speed = _____ ÷ _____

Speed = _____ m/s

Now try your own:

My racer travelled _____ metres in _____ seconds.

Speed = _____ ÷ _____ = _____ m/s

ACTIVITY 4: SPOT THE FAIR TEST

WHICH TEST IS FAIR?

Circle the fair test.

Test A:

The team changes the number of rubber-band turns but also changes the floor surface.

Test B:

The team changes only the number of rubber-band turns and keeps the same racer, track, start line, and release method.

Test C:

The team changes the racer, the rubber band, and the number of turns at the same time.

Answer: Test _____

Why?



ACTIVITY 5: DESIGN YOUR UPGRADE

DESIGN YOUR UPGRADE

Draw one improvement you would make to your racer.

DESIGN YOUR UPGRADE

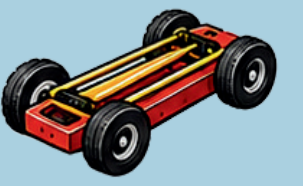
Draw one improvement you would make to your racer.

Kabelo's Challenge:



If your racer does not improve, do not give up.
A failed test is a clue, not the end.





What could this activity lead to one day?

Today, you built a rubber-band racer. But you also practised skills that people use in many real careers.

You used creativity, teamwork, measuring, testing, problem-solving, and science thinking. These skills can help you in many different jobs one day.

You do not have to know your future career yet. The important thing is to stay curious, keep learning, and try new things.

SECTION 1: WHAT SKILLS DID YOU USE TODAY?

SKILLS I USED TODAY

Tick the skills you practised:

- Building
- Measuring
- Testing
- Teamwork
- Problem-solving
- Creativity
- Asking questions
- Recording results
- Improving a design
- Explaining what happened

These are real STEM skills.

SECTION 2: CAREERS THIS CONNECTS TO

Engineer

Designs, builds, and improves things like bridges, machines, cars, buildings, robots, and energy systems.

Scientist

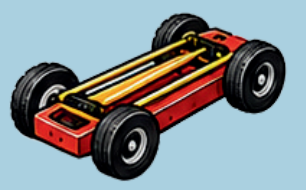
Asks questions, tests ideas, studies evidence, and explains how the world works.

Mechanic


Fixes and improves engines, vehicles, machines, and moving parts.

Designer


Creates useful and beautiful products, tools, buildings, apps, posters, or machines.




Doctor




Uses science, problem-solving, and careful thinking to help people stay healthy.



Teacher



Helps learners understand new ideas and believe in what they can become.



Data Analyst



Looks at results, finds patterns, and uses information to make better decisions.



Entrepreneur



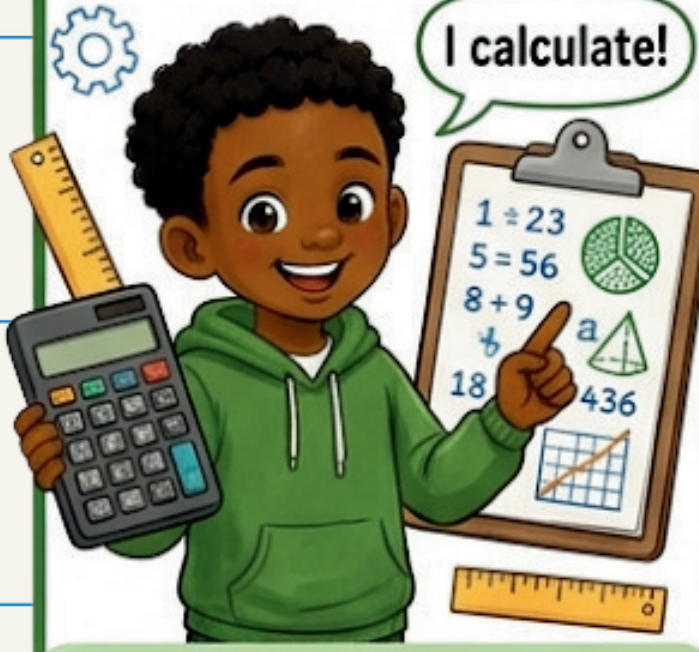
Starts new ideas, solves problems, builds projects, and creates opportunities.



SECTION 3: SCHOOL SUBJECTS THAT HELP

Mathematics

I calculate!



Helps you calculate speed, distance, time, size, and patterns.

Natural Sciences

I understand!



Helps you understand energy, forces, friction, motion, and materials.

Technology

I design!



Helps you design, build, test, and improve useful things.

English


I explain!



Helps you explain your ideas, write results, read instructions, and communicate clearly.

Art and Design

I imagine!



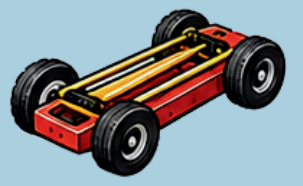
Helps you imagine, draw, decorate, plan, and make your ideas look good.

Life Skills

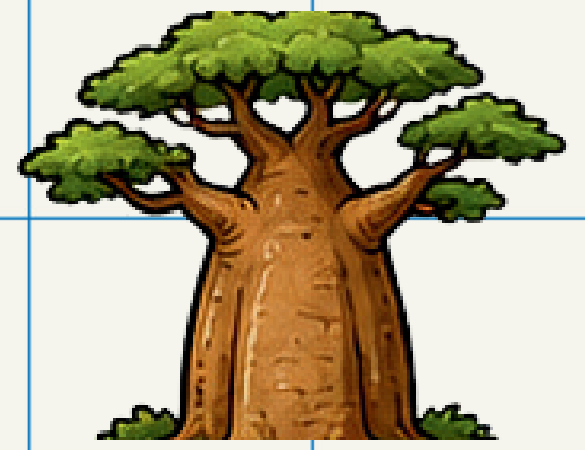
I solve!



Helps you work with others, make choices, solve problems, and build confidence.



SECTION 4: CHARACTER FUTURE MAP



WHAT DO THE JUNIOR ENGINEERS DREAM OF?

“ I like building and fixing things. One day I might become an engineer, architect, mechanic, or inventor. ”

Neo
The Builder

“ I like asking why things happen. One day I might become a scientist, doctor, teacher, or environmental engineer. ”

Amahle
The Energy Expert

I like measuring and finding patterns. One day I might become a data analyst, researcher, accountant, pilot, or scientist.

Laila
The Data Detective

I like testing, racing, and improving. One day I might become a mechanic, athlete, engineer, entrepreneur, or designer.

Kabelo
The Challenge Captain



MY FUTURE SELF

One career I want to learn more about is:

One subject I want to get better at is:

One skill I used today that can help my future is:

YOUR FUTURE DOES NOT START ONE DAY. IT STARTS EVERY TIME YOU READ, BUILD, TEST, ASK QUESTIONS, AND TRY AGAIN.



You have reached the end of the rubber-band racer challenge. Today, you were not just playing with a car. You were thinking like a builder, scientist, data detective, and racer. You used teamwork, creativity, measuring, testing, problem-solving, and reflection. Before you finish, take a few minutes to think about what you learned.

TODAY I LEARNED

Complete the sentences:

One thing I learned about energy was:

One thing I learned about speed was:

One thing I learned about testing was: