Dragster

Design and technology
- Gears
- Levers
- Using and combining components
- Wheels

Science
- Energy
- Friction
- Measuring distance
- Scientific investigation

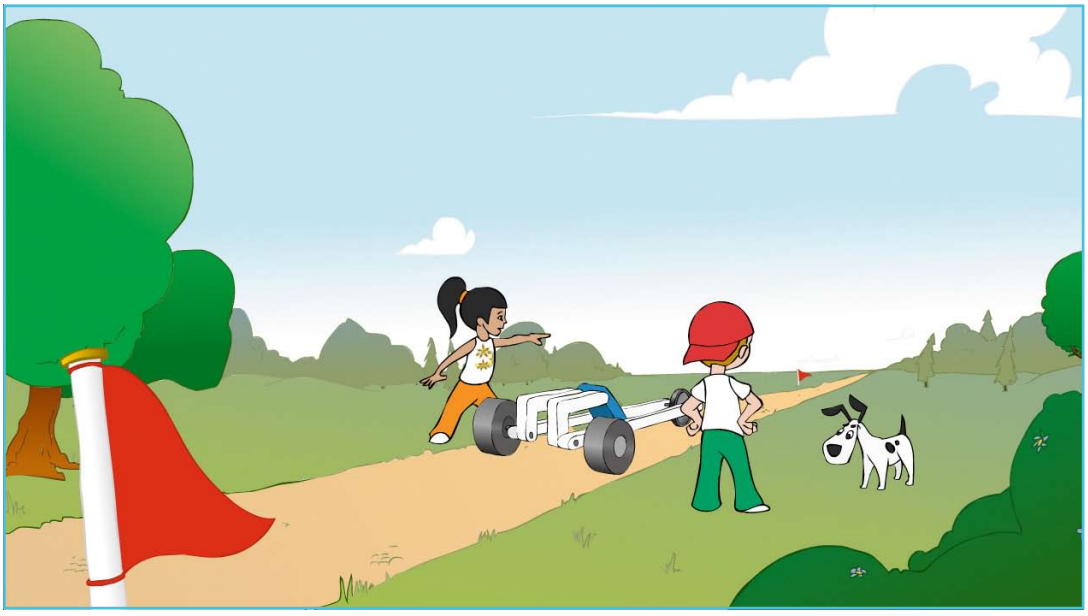
Vocabulary
- Acceleration
- Gears
- Mass
- Momentum

Other materials required
- Metre rule or measuring tape
- Up to 20 m of floor. You might have to use the corridor!

Connect

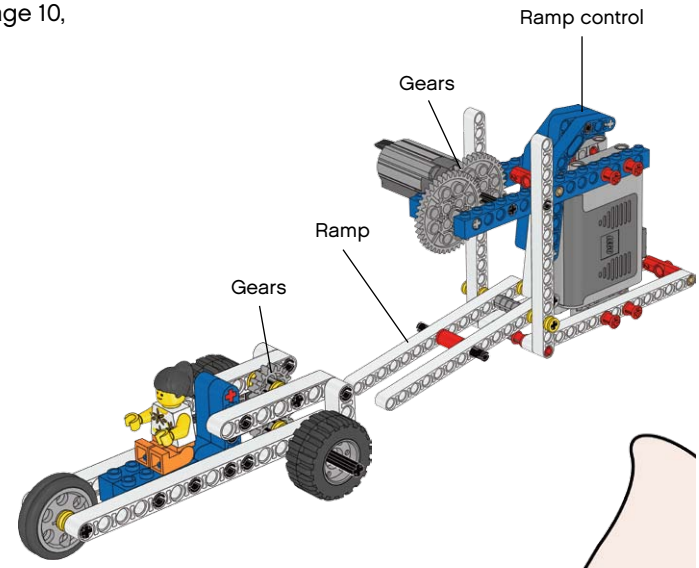
Jack and Jill are experimenting with their Dragster. With a great start from a launcher, they hope it will roll all the way from the start to the finish line. But even after a perfect launch it does not go very far.

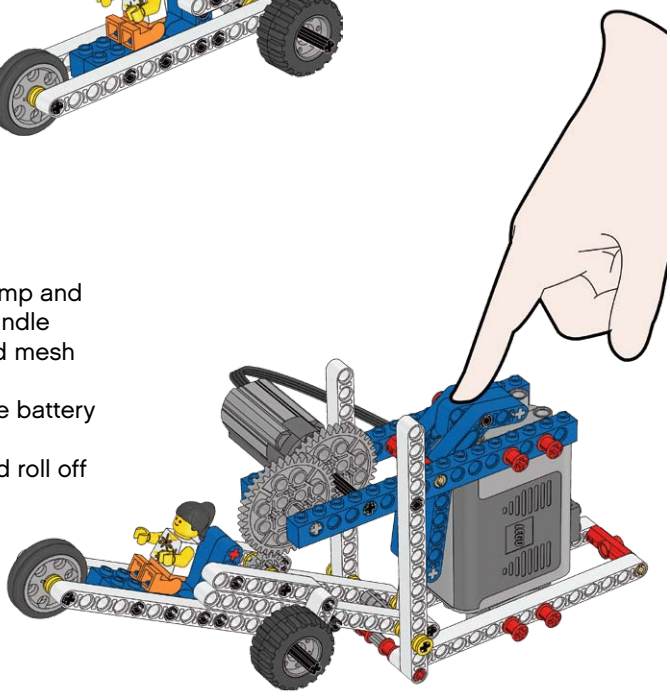
How can we make the Dragster go further?
Let's find out!



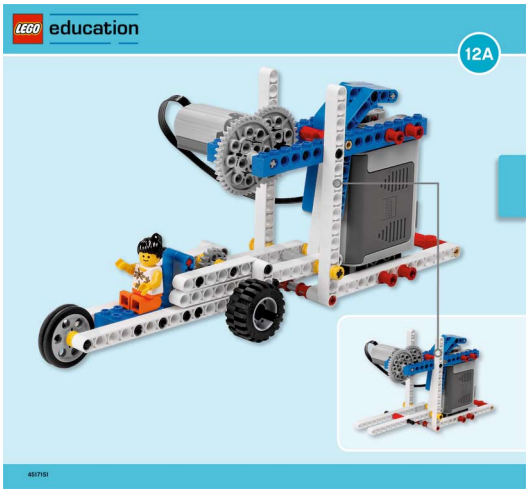
Construct

Build the Dragster and Launcher.
(all of book 12A and book 12B to page 10, step 13)

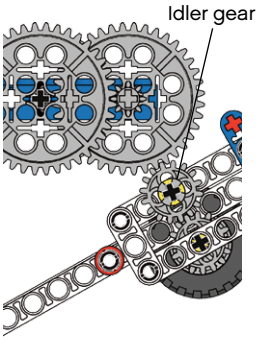




- Place the Dragster on the launch ramp and lift it up by pressing down on the handle
- The big gear on the launcher should mesh with the gear on the Dragster
- Start the motor by pushing down the battery switch
- Lower the ramp. The Dragster should roll off smoothly onto the floor



Did you know?



An idler gear changes the direction of rotation, but does not affect the output speed.

Tip:
If your Dragster vibrates, one of the tyres might be sitting unevenly on its hub. This increases axle friction and leads to large energy losses.

Contemplate

How far will the Dragster go?

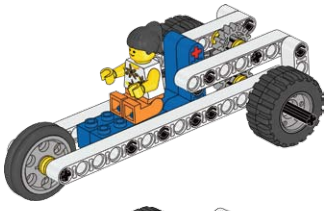
By changing the back wheels of your Dragster you can change how far it can travel.

First predict how far Dragster A will travel. Then test your prediction. Next, follow the same procedure for Dragsters B and C. Which will travel the furthest?

Test several times to make sure your results are consistent. Test results may vary depending on surface of your test track.

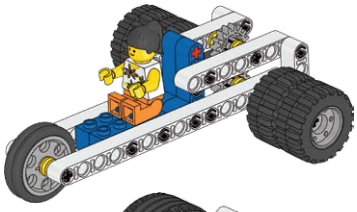
Dragster A (page 9, step 12) will travel approximately 0,7 m.

A



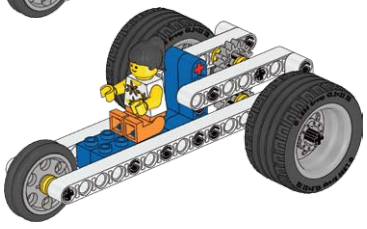
Dragster B (page 12, step 15) will travel approximately 2 m.

B



Dragster C (page 12, step 16) will travel even further, approximately 6 m.

C



Did you know?
The small wheel weighs 9 g.

The large wheel weighs 13 g.

Can you explain what happened when you changed the wheels?

Two small wheels store more energy than one, because they have twice the mass. That is why Dragster B goes further than Dragster A.

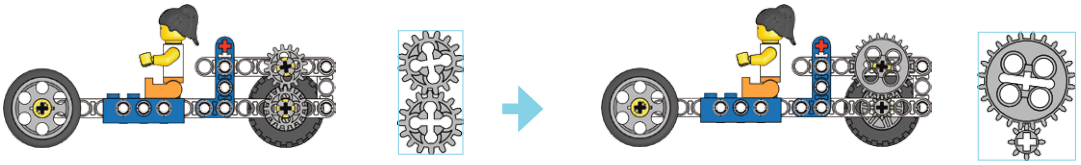
Dragster C goes further than Dragster B due to the larger circumference of the bigger tyres, and even though axle speed is the same.

The more tyre mass and the bigger the tyre circumference, the further the Dragster will go.

Continue

Can the Dragster go even further?

To gear up your Dragster, first disassemble it (book 12B to page 3, step 3), and then:



16:16 24:8

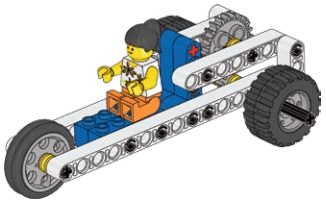
Replace the 16:16 gearing with a 24:8 gearing. Now build your geared-up Dragster (book 12B to page 9, step 12).

First predict how far geared-up Dragster D will travel. Then test your prediction. Next, follow the same procedure for your geared-up Dragsters E and F.
Which will travel the furthest?

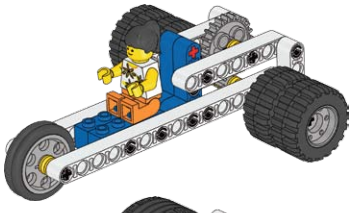
Dragster F will travel furthest, approximately 11 m.

Try other ideas and combinations to make your Dragster travel even further.
How far does your best travel?

D



E



F