

EduTrend Contents

W4C · SCIENCE & ENGINEERING · PRIMARY

Balloon Racers

Can a balloon push a car across the room?

Ages 8–11	Level: Core	60 minutes	Pairs · up to 30	Activity 02

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 pupil worksheets · assessment checklist

ACTIVITY 02 · AT A GLANCE

Balloon Racers

Pupils build a simple car from card, straws and bottle tops, then fit it with a balloon "engine". Air rushing out of the balloon pushes the car forward. Pupils measure how far their car travels, find what slows it down and make one improvement based on evidence.

Learning outcomes

By the end of the session pupils can:

- explain that the air pushed backwards out of the balloon pushes the car forwards;
- identify friction as a force that slows the car down;
- measure distance in centimetres and compare results fairly;
- make and test one improvement to their car.

KEY WORDS

force · push · thrust · friction · axle · wheel · distance · fair test · variable

CURRICULUM LINKS

Science: forces, including friction. Design & technology: wheels and axles. Maths: measuring length. Balanced and unbalanced forces for grade 3 (NGSS 3-PS2-1); engineering design for grades 3–5 (NGSS 3-5-ETS1).

1	2	3	4	5	6
ASK	**BUILD**	**CHECK**	**FIT**	**TEST**	**IMPROVE**
Why does it fly?	Make the car	Does it roll?	Add the engine	Measure the run	Change one thing

Materials (per pair)

- 1 piece of stiff card, about 10 × 20 cm (a cereal box works)
- 2 paper drinking straws, cut to the width of the card
- 2 wooden skewers with the sharp points cut off by an adult
- 4 plastic bottle tops with a hole in the centre (made by an adult)
- 1 latex-free balloon and 1 extra straw for the nozzle
- 40 cm of masking tape
- Worksheets 1, 2 and 3
- For the class: 1 balloon pump per group, 2 tape measures, a 4 m track marked on a smooth floor

Before the session

- Cut the points off the skewers and make the holes in the bottle tops.
- Mark a start line and a 4 m track with masking tape.
- Build one car yourself; it takes about 15 minutes the first time.
- Print one set of worksheets per pupil.

SAFETY

Adults cut skewers and make holes. Use latex-free balloons and pumps, not mouths. Keep the track clear of walkers during runs.

ACTIVITY 02 · SESSION PLAN

Step by step

Timings are for a 60-minute session. The car build can be done in an earlier lesson if you need more time for testing.

Time	What happens	Say or ask
0–5 min **Hook**	Blow up a balloon with the pump and let it go without tying it. It shoots across the room. Blow up another and hold it: nothing moves until you let go.	*"What made the balloon move?"* *"Which way did the air go? Which way did the balloon go?"*
5–25 min **Build**	Pairs tape two straws across the card, push a skewer through each straw and press a bottle top onto each end. They check the car on Worksheet 1: wheels spin freely and the car rolls straight when pushed gently.	*"What is rubbing? How could you make the wheels spin more easily?"*
25–35 min **Add the engine**	Tape the balloon to the extra straw, then tape the straw to the car so it points backwards past the edge. Pump the balloon through the straw, pinch it, place the car on the start line and let go.	*"Which way is the air going? Which way does the car go?"*
35–50 min **Test & improve**	Pairs do two runs with the same number of pump strokes and record the distance on Worksheet 2. They choose one change (straighter axles, lighter body, longer nozzle) and test twice more.	*"Did you keep the number of pump strokes the same? Why does that matter?"*
50–60 min **Share**	Pairs report their best distance and the change that helped most. Pupils complete Worksheet 3.	*"What would you change next if you had more time?"*

CHALLENGE CARD (print or copy onto the board)

Build a balloon-powered car that travels as far as possible along the track in a straight line. You may use only the materials given. Every test uses the same number of pump strokes.

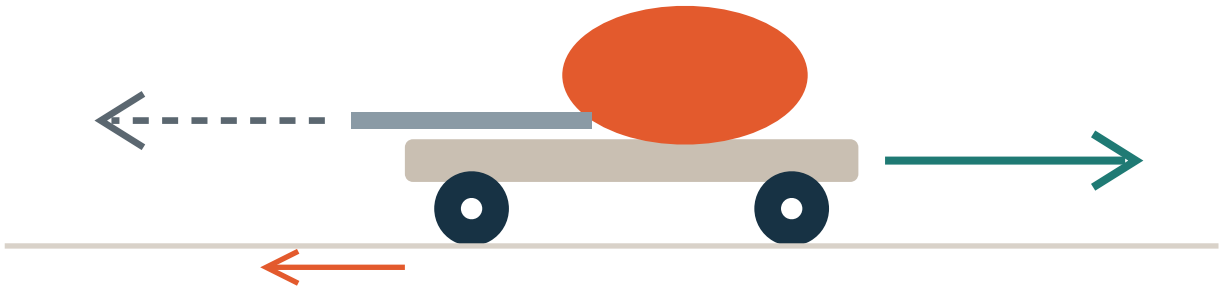
ACTIVITY 02 · FACILITATOR NOTES

The science in brief



Photo: Adi Goldstein / Unsplash

When the balloon is let go, its stretched rubber squeezes the air out through the straw. The balloon pushes the air backwards, and the air pushes the balloon, and the car attached to it, forwards. This pair of pushes is Newton's third law: for every action there is an equal and opposite reaction. Rockets and jet engines work in the same way.



Air pushed backwards out of the straw *Friction at the axles and floor slows the car* *The car is pushed forwards*

Friction works against the car. Most of it comes from the axles rubbing inside the straws and from wheels that wobble or drag on the card. Straight axles, wheels that sit square and a light body let more of the balloon's push turn into movement. The size of the balloon and the length of the nozzle also change how long and how hard it pushes.

Common ideas to listen for

- "The air pushes on the floor or the wall behind." The car moves because the air is pushed out of the balloon, even with nothing behind it.
- "Bigger wheels are always better." Wheels that wobble or rub cost more than their size gains.
- "One run is enough." Results vary; two runs with the same pump strokes give a fairer picture.

Adapting the activity

Support

Provide cars with axles already fitted so pupils focus on the balloon engine and measuring. Measure to the nearest 10 cm.

Stretch

Test how distance changes with 5, 10 and 15 pump strokes and draw a simple bar chart. Explain why the results are not exactly the same each time.

WORKSHEET 1

Build check

Name: _____ Class: _____ Date: _____

Before you add the balloon, check your car. Fix anything that is not right and write what you did.

My car check

Check	Yes or no	What we fixed
The wheels spin freely		
The car rolls straight when pushed gently		
Nothing drags on the floor		
The balloon straw points backwards		

Draw your car from the side

Label the body, axles, wheels, straw and balloon.

WORKSHEET 2

Race record

Use the same number of pump strokes for every run. Measure from the start line to the front of the car.

Results

Run	Pump strokes	Distance (cm)	Did it go straight?
Run 1			
Run 2			
Our change:			
Run 3			
Run 4			

Was it a fair test?

Tick the things you kept the same:

- ☐ the same number of pump strokes
- ☐ the same start line
- ☐ the same track and floor

Did our change help? How do we know?

WORKSHEET 3

Engineer's log

Colour in the box that is true for you.

What I can do

I can…	Not yet	Nearly	Yes!
explain what pushes the car forwards			
name a force that slows the car down			
measure a distance in centimetres			
keep a test fair			
improve my car using my results			

Something that slowed our car down was…

Home challenge

Find two things at home that roll on wheels. Which one rolls further with the same gentle push? Draw them and write why you think so.

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight pupils; copy as needed.

Pupil	Explains push and reaction	Measures and records accurately	Uses results to improve

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Balloon Racers is a sample activity from the EduTrend Contents W4C Science & Engineering programme (primary, level: core). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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