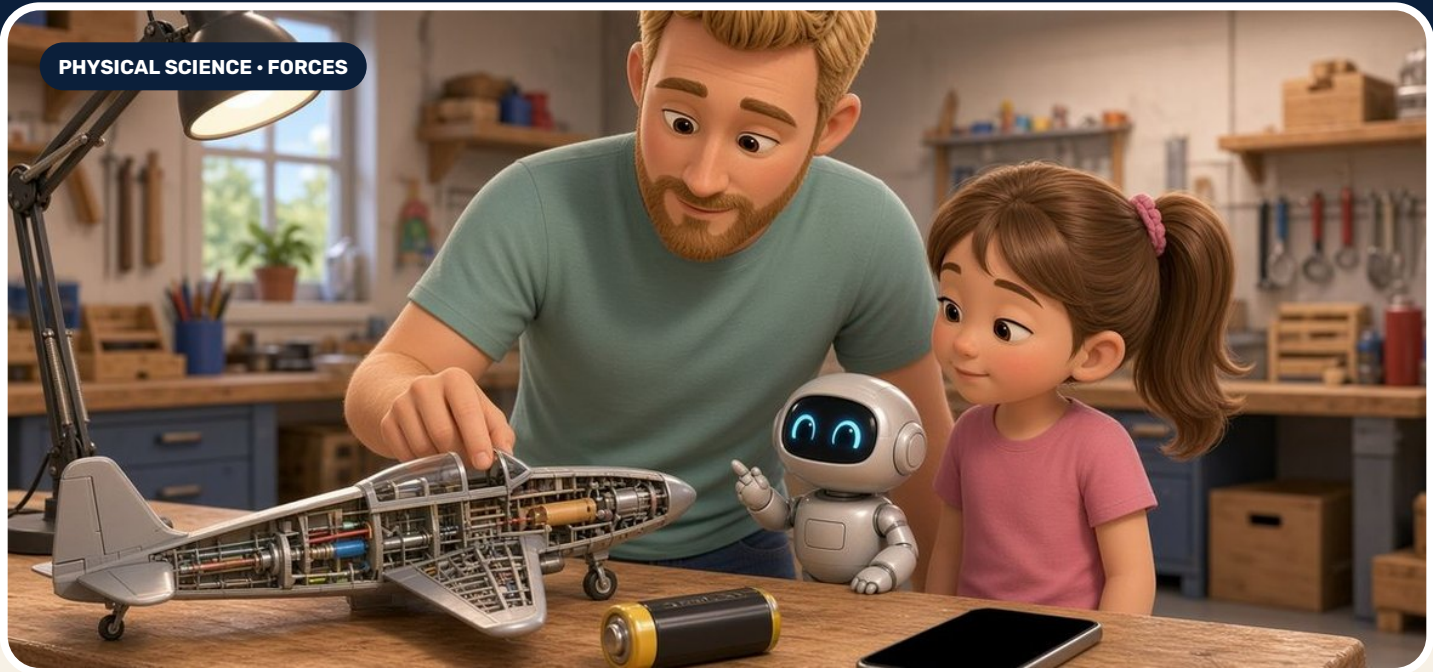
LISTEN & DISCUSS • TEACHER GUIDE

How Do Planes Fly?

A big metal plane is incredibly heavy. So why doesn't it fall out of the sky like a rock?



GRADES	TIME	FORMAT	STANDARDS
K–4	**~40 min**	**Listen + do**	**NGSS**
Ages 5–10	incl. 7-min episode	Talk · activity · exit ticket	K-PS2-1, 3-PS2-1

INSIDE THIS GUIDE

2 **Lesson overview** objectives · science background · vocabulary · standards

3 **Lesson plan** step-by-step timing · discussion · hands-on activity

4 **Student page** printable exit ticket

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Scan to listen
Free transcript on the episode page

BEFORE YOU TEACH

Lesson overview

Learning objectives

Students will be able to…

1. Explain that air is real "stuff" that can push on things moving through it.
2. Describe the different jobs of the engines (push forward) and the wings (make lift).
3. Explain that when a wing pushes air down, the air pushes the wing up, and compare lift with gravity.

The science in 60 seconds

Background for the teacher, drawn from the episode.

- Air is made of tiny particles. Move through it fast and you can feel it push, like your hand in a strong breeze. Air is a fluid, like water, only thinner.
- Engines point backward and push the plane forward (**thrust**). They do not lift it. A plane with engines but no wings could not fly.
- Wings are tilted and curved. As air rushes past, the wing guides air downward. Push air down, and the air pushes the wing up: **lift**. For every action there is an equal and opposite reaction.
- Gravity pulls the plane down. When lift matches the plane's weight it flies level; more lift and it climbs; less and it descends. (Simplified: real climbing also uses engine power.)
- Pilots steer by moving small parts on the back edges of the wings and tail (flaps, ailerons, elevators), changing how the air pushes on the plane.

BEFORE CLASS: PREP CHECKLIST

- ☐ Test the episode audio (QR code on the cover).
- ☐ Gather the activity materials (page 3).
- ☐ Print the student page (page 4), one per student.

THE BIG IDEA

Engines push the plane forward. Air rushes past the tilted, curved wings, which push air down. The air pushes the wings up. That upward push is lift.

Key vocabulary

Air
The invisible gas all around us. Wings push against it.

Force
A push or a pull.

Lift
The upward push of air on the wings.

Thrust
The forward push from the engines.

Gravity
The pull that brings things down toward the ground.

WATCH FOR THIS MISCONCEPTION

Students may think: "The engines lift the plane up, like rockets."

Actually: The engines push the plane forward. The wings make the lift. You need both.

NGSS CONNECTIONS (PERFORMANCE EXPECTATIONS)

K-PS2-1 — **Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** How this lesson connects: Students compare how a hand-wing is pushed at different tilts and breeze speeds.

3-PS2-1 — **Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** How this lesson connects: Lift vs. gravity: balanced means level flight; unbalanced means climbing or sinking.

This short lesson builds toward these expectations; it does not fully assess them on its own.

STEP BY STEP · ABOUT 40 MINUTES

Lesson plan

ENGAGE 5 min

Spark curiosity

Hold up a book and a sheet of paper. Ask: "Which is heavier?" A plane is far heavier than both. "How can it stay up in the sky?" Collect guesses.

LISTEN 7 min

Play the episode

Play the episode from the QR code on the cover or the episode page. Give students two things to listen for:

- What is the engines' job?
- What do the wings do to the air?

DISCUSS 8 min

Talk about it

Use think-pair-share: 30 seconds to think, a minute with a partner, then share. Model answers are on page 5.

1. If you hold your hand flat like a wing in a steady breeze and tilt the front edge up a little, what do you feel? How is a plane's wing like your hand?
2. The engines don't lift the plane up. What is their job?
3. The wing pushes air down. What does the air do back to the wing?

EXPLORE 15 min

Hands-on: Wing in the breeze

1. An adult sets the fan on low. Students take turns standing an arm's length away, in the breeze.
2. Hold one hand out flat, palm down, fingers pointing into the breeze. Record the push: none, some, or lots.
3. Tilt the front edge of the hand up a little. Record again. Then try a big tilt: it mostly pushes the hand backward.
4. Turn the fan to medium and repeat the small tilt. Faster air = a stronger push. That is why planes race down the runway first.

MATERIALS

- Box fan or desk fan (adult-operated)
- Notebooks or paper to record results
- Pencils

Safety: Adult operates the fan. Keep fingers, hair, and paper away from the blades. Never hold a hand out of a moving car, bike, or any vehicle.

WRAP UP 5 min

Exit ticket

Hand out the student page (page 4). For K–1, read each item aloud and let students circle, point, or draw. Return to the guesses from the start: what changed?

Name _____ Date _____

How Do Planes Fly?

Show what you learned! Circle, write, or draw.

1 **What is the engines' main job?** Circle one.

- **a)** lift the plane straight up
- **b)** push the plane forward
- **c)** make the wings flap

2 **True or false? Circle T or F.**

Air is nothing. It can't push on anything. **T** **F**

If lift and gravity are equal, the plane flies level. **T** **F**

3 **Fill in the blanks. Use the word bank.**

Word bank: **engines** **up** **wings**

The _____ push the plane forward. The _____ push air down. The air pushes the wings _____.

4 **Draw a plane. Add an arrow for lift (up) and an arrow for gravity (down).**

Label your drawing!

FOR THE TEACHER

Answer key & extensions

Talk about it: model answers

1. If you hold your hand flat like a wing in a steady breeze and tilt the front edge up a little, what do you feel? How is a plane's wing like your hand?

> You feel the air push your hand up. A wing is like a giant tilted hand: as air rushes past, the air pushes it up.

2. The engines don't lift the plane up. What is their job?

> To push the plane forward, fast. The speed makes air rush over the wings. No speed, no lift.

3. The wing pushes air down. What does the air do back to the wing?

> It pushes the wing back up. That upward push is called lift.

Exit ticket answers

1. b) push the plane forward

2. F: Air is nothing. It can't push on anything. · T: If lift and gravity are equal, the plane flies level.

3. engines, wings, up

4. Look for: an up arrow (lift) and a down arrow (gravity) on the plane.

Differentiation

Grades K–1: Act it out: "engine" students push a classmate forward, "wing" students tilt their arms. Use big UP and DOWN arrow cards for lift and gravity.

Grades 2–4: Record push results in a table, then draw a force diagram with arrows for lift, gravity, and thrust.

Keep wondering

- Fair test: fold two paper planes. Change just one thing (like bending the back edges up a little) and test which flies farther.
- Watch a bird take off. How does it get air moving past its wings?

Quick-check rubric

Got it	Getting there	Not yet
Explains the big idea in their own words and uses 2+ vocabulary words correctly.	Explains part of the idea, or needs a prompt or the word bank.	Can't yet explain it. Revisit the activity, then retry the exit ticket orally.



TRY IT AT HOME

Feel the push

With a grown-up, stand near a fan or in an outdoor breeze and try the "hand wing": flat, then tilted up a little. Watch planes or birds take off: what do they need before they lift? (Speed!) Never put a hand out of a moving car.

Listen together