Family edition

Air Traffic Control Lab: Two in a Row, Speed, Distance and Time

Ages 11-14 · about 45 minutes, in one sitting

In Air Traffic Control Lab your child keeps two airliners a safe distance apart, and uses speed, distance and time to see the trouble coming.

What you need

- A computer or Chromebook with a current browser.
- The link: mytekdev.com/try/airtrafficlab?lesson=two-in-a-row-speed-distance-and-time&ref=fam-airtrafficlab-2. No account, no email and nothing to install.
- A calculator, if you like.

Before you start: try it once yourself

Open mytekdev.com/try/airtrafficlab?lesson=two-in-a-row-speed-distance-and-time&ref=fam-airtrafficlab-2. A short guide opens over Level 3, Two in a row. The tower view is on the left: the airport from the control tower, the airliners with their landing lights on and a tag with each call sign. The radar is on the right: the runway at the top, the dashed final approach line, and a green dot for each airplane with its data block (call sign, altitude in hundreds of feet, speed in tens of knots). Under the radar the radio log keeps every word said, marked "you" or "program". Click an airplane on the radar to give it an instruction.

1. **The traffic.** Fernway 30 is 8 miles out at 160 knots; Larkspur 52 is 13 miles out at 210. Both call in at the start. There is a light headwind, 8 knots, the same for both, so it does not change the closing speed.
2. **The speed.** Click Larkspur 52 on the radar; the box has a Speed list in 5 knot steps and a Set speed button. The pilot reads it back and slows at about 1 to 2 knots a second. A jet takes 150 to 250 knots here.
3. **Inside 5 miles.** Each airplane slows to its own landing speed, 140 knots for these two, and takes no speed instructions. That is why the gap shrinks faster near the end.
4. **Speed.** Time runs at 4 times by default. Speed up and Slower, under the tower view, change it; the round play button starts the shift again from the beginning, with the program as it is now.
5. **The card's estimate.** Once Larkspur 52 is closing, the card works out "inside 3 miles in" from the gap and the closing speed at that moment, so just after the start it reads 2:23 and counts down. It is the same 2.4 minutes.
6. **Numbers to expect.** Nothing done: the conflict alert at 2:06, 2.99 miles. Larkspur 52 slowed at the start to 200: alert at 2:25. 190: alert at 2:57. 180: both land, closest 3.33 miles. 170: 3.71. 165: 3.90. 160: 4.10. 150: 4.49.

> The prediction, 2.4 minutes, is honest arithmetic with the numbers given, and the app is right too. The difference is compression, which is the closing discussion. Do not let children think their math was wrong.

The ideas, in plain words

Airplanes on the same final approach must stay at least 3 nautical miles apart, or 1,000 feet apart in height. A knot is one nautical mile an hour, so the arithmetic of the final approach is distance, rate and time with no conversions: 2 miles at a closing speed of 50 knots is 2/50 of an hour.

Controllers set up the spacing before 5 miles, because inside it each airplane flies its own landing speed and takes no speed instructions. A fast airplane behind a slow one keeps closing even then; controllers call it compression, and leave extra room up front.

When the spacing is lost, a real radar system raises a conflict alert. In the app nothing crashes: both airplanes stop where they are, and the card shows what happened. Air traffic controllers in the United States are hired by the FAA, which says it hired a record 2,235 trainees in its 2026 fiscal year. Applicants must apply before turning 31, and the median pay was $148,080 a year in 2025 (Bureau of Labor Statistics).

Do it together

1. Open mytekdev.com/try/airtrafficlab?lesson=two-in-a-row-speed-distance-and-time&ref=fam-airtrafficlab-2. Before pressing play, work it out: the airplanes are 5 miles apart, and the one behind flies 210 knots against 160. How long until they are only 3 miles apart?

   > **You'll know it worked when:** The gap closes at 50 knots. 2 miles at 50 knots is 2.4 minutes, 2 minutes 24 seconds.

2. Press play and note the time of the conflict alert.

   > **You'll know it worked when:** It comes at 2:06, a little early: the front airplane slows down to land inside 5 miles.

3. Press play again, click Larkspur 52 on the radar at once, choose 180 in `Speed` and press `Set speed`. Clear both to land.

   > **If you get stuck:** Click as soon as the shift starts: the speed takes a moment to change.
   >
   > **You'll know it worked when:** Both land; the closest they came was 3.33 miles.

4. Try 160 and 150. Ask: how much more room did each slower speed give?

   > **You'll know it worked when:** 160 gives 4.10 miles; 150 gives 4.49.

Talk about it

Ask these while you work together. A child who has understood it can answer them without help:

- How fast is the gap closing, and how did you work it out?
- Why does only 2 miles of the gap count?
- Why did the alert come before your prediction?
- About how much more room does each 10 knots slower give?
- Why not slow Larkspur 52 to 140?

> The third question is the one that matters. A child who says "the front one slowed down to land, so the gap closed faster" has compared a model with data. A child who says "my math was wrong" needs to see that it was right for the numbers given.

For younger and older kids

Younger: For a younger child, skip the calculation and just try the speeds, writing down the closest distance each time.

Older: For an older child, open `Level 4`, where the room needed depends on the size of the airplane in front.

Keep going

- Predict the closest distance for 175 before running it, from your table.
- Open Level 4, the heavy jet's wake: the room needed depends on the airplane in front. Find out how much.
- Write the rule in Blocks: "when an arrival checks in" with "slow this airplane to 160 knots". Does it slow both? Does it matter?

Bring it into other subjects

- Math: convert 210 knots to miles an hour and to kilometers an hour.
- Science: why do airplanes land into the wind? Look at how a headwind changes the speed over the ground.
- Careers: look up how controllers space airplanes at a busy airport, and what "miles in trail" means.
- Geography: find the busiest airport near you, and how many airplanes it lands an hour.

For your records

Ready to copy into an hour log, a portfolio or a transcript.

LESSON	Air Traffic Control Lab: Two in a Row, Speed, Distance and Time
SUBJECTS	Math
TIME	45 minutes
WHAT WE DID	Predicted when two simulated airliners would get too close from their speeds, checked it in the simulation, and measured the closest distance for six speeds.

SKILLS PRACTICED	Unit rates and constant speed; Making and testing a prediction; Recording data

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/airtrafficlab?lesson=two-in-a-row-speed-distance-and-time

Essential question: How fast does a gap close, and how do you keep it open?

Warm-up: A friend 1 mile behind you jogs at 5 miles an hour while you walk at 3. How long until they catch up?

_____

1. **Vocabulary.** Knot, nautical mile, closing speed, separation, unit rate, conflict alert: write each in your own words.

2. **My prediction.** Closing speed: ____ knots. Miles that can close before 3: ____. Time: ____ hours = ____ minutes.

3. **What happened.** The conflict alert came at ____ .

4. **My table.** Speed for Larkspur 52 / kept 3 miles? / closest distance. 200: ____. 190: ____. 180: ____. 170: ____. 160: ____. 150: ____.

1. Why did the alert come sooner than your prediction?

2. What speed would you give Larkspur 52, and why?

Quick check

Name: _____

1. One airplane flies 180 knots and the one behind it 200. The gap closes at: (A) 380 knots (B) 20 knots (C) 200 knots

2. At a closing speed of 30 knots, how long does it take to close 1 mile? (A) 30 minutes (B) 2 minutes (C) 1 minute

3. A friend predicts the gap will close in 2.4 minutes, and the alert comes at 2:06. Use what you learned today to explain why.

Answers

QUESTION	ANSWER	WHY
1	B	The gap closes at the difference between the speeds.
2	B	30 knots is 30 miles in 60 minutes, so 1 mile in 2 minutes.
3	Open answer	The front airplane slows down to land inside 5 miles, so the gap closes faster at the end: compression.

If your state or umbrella school asks, this lesson covers Common Core Math 6.RP.A.3b, Common Core Math MP4.

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The app this lesson uses is free and runs in the browser, with nothing to install and no account needed. It is at mytekdev.com.

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