Family edition

Air Traffic Control Lab: Cleared to Land, a Rule for Every Arrival

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

In Air Traffic Control Lab your child is the controller in the tower of a made-up airport, and writes one rule that clears every airplane to land.

What you need

- A computer or Chromebook with a current browser.
- The link: mytekdev.com/try/airtrafficlab?lesson=cleared-to-land-a-rule-for-every-arrival&ref=fam-airtrafficlab-1. No account, no email and nothing to install.

Before you start: try it once yourself

Open mytekdev.com/try/airtrafficlab?lesson=cleared-to-land-a-rule-for-every-arrival&ref=fam-airtrafficlab-1. A short guide opens over Level 1, Cleared to land. 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.** Larkspur 21 calls in 6 miles out at the start. Fernway 62 calls in at 1:10, 12 miles out, and Tidewing 4 at 2:20, 16 miles out.
2. **Clearing by hand.** Press play, click an airplane on the radar, and a box opens with its instructions; Cleared to land is the green one. The tower says it and the pilot reads it back in the radio log, and CLRD TO LAND appears in the data block.
3. **The rule.** Blocks, Rules: "when an arrival is 5 miles from the runway", with "clear this airplane to land" inside. The rule runs once for each airplane as it reaches 5 miles. The Python tab shows it as a function, closing_in, and tower.when_miles_out(5, closing_in).
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. **Numbers to expect.** Nothing done: Larkspur 21 goes around at 2:12. Cleared by hand or by rule: the three land at 2:44, 6:43 and 8:43, and the level ends at 9:28. The rule at 20, 10, 5, 2 and 1.5 miles: all three land. At 1 mile: Larkspur 21 goes around. "When an arrival checks in" with the clear block: all three land.

> The app accepts a clearance 20 miles out, and every arrival lands, because each one lands in turn. A real controller clears an airplane only when they know the runway will be clear when it gets there. It makes a good closing question.

The ideas, in plain words

An airplane may not land without a landing clearance from the tower: "Runway three six, cleared to land." The words in the app come from the FAA's rule book for controllers. If the clearance has not come by about a mile out, the pilot goes around: climbs away, flies a circuit and comes back. A go-around is not a failure; it is the safe thing when something is not right.

Pilots read every instruction back, so the controller hears a mistake before it matters. The radio log in the app shows both halves, the tower's words and the readback.

Real controllers already use computers that help: tools that sequence arrivals and warn of conflicts. In the app the child's program is like those tools. It acts on events, and the child can step in by hand at any moment; the radio log marks each instruction as the child's or the program's. 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=cleared-to-land-a-rule-for-every-arrival&ref=fam-airtrafficlab-1 together and press play. Watch Larkspur 21 on the radar.

   > **You'll know it worked when:** A mile from the runway it climbs away at 2:12: a go-around, "no landing clearance".

2. Press play again. Click Larkspur 21 on the radar and choose `Cleared to land`. Do the same for the two behind it as they call in.

   > **If you get stuck:** If the box is empty, press play first: instructions go to airplanes in the air.
   >
   > **You'll know it worked when:** All three land, at 2:44, 6:43 and 8:43.

3. Open `Blocks`. From `Rules`, drag out "when an arrival is 5 miles from the runway", put "clear this airplane to land" inside, then go back to `Simulator` and press play without clicking.

   > **You'll know it worked when:** All three land with nobody clicking.

4. Change the 5 to 20, then 1.5, then 1. Ask: why does 1 not work?

   > **You'll know it worked when:** 20 and 1.5 work; at 1 mile the clearance comes too late, and Larkspur 21 goes around.

Talk about it

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

- Why did Larkspur 21 go around?
- What did the pilot say back, and why?
- How does the rule know which airplane to clear?
- Between which two numbers does the rule stop working, and why?
- Why might a real controller not clear an airplane 20 miles out?

> The third question is the one that matters. A child who says "it runs for each airplane as it gets to 5 miles, and clears that one" understands an event. A child who says "it clears them all at the start" has the result but not the idea.

For younger and older kids

Younger: For a younger child, stop after clearing all three by hand, and read the radio log together.

Older: For an older child, open `Level 3`, where a faster airplane behind has to be slowed before it gets too close.

Keep going

- Open Level 2: an arrival flying across the approach. Write a rule that turns it onto the final, and keep the landing rule.
- Open the Python tab and find the rule. Which line says when it runs?
- Try "when the runway is clear" with the clear block inside. Does it land all three? Why might a real controller like it better?

Bring it into other subjects

- Math: an airliner on final flies about 140 knots, 140 nautical miles an hour. How many seconds does it take to fly the last mile?
- English: listen to how pilots and controllers keep words short and exact. Rewrite a classroom instruction in the same style.
- Careers: look up what an air traffic controller does in a day, and how the FAA hires them.
- Computer science: find a rule in an app you use, such as a phone that silences itself at night, and say what event starts it.

For your records

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

LESSON	Air Traffic Control Lab: Cleared to Land, a Rule for Every Arrival
SUBJECTS	Computer science
TIME	45 minutes

WHAT WE DID	Cleared simulated airliners to land by hand, wrote a rule in Blocks that did it for every arrival, and tested the rule at six distances.
SKILLS PRACTICED	Events and rules; Testing a program; Following a procedure

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/airtrafficlab?lesson=cleared-to-land-a-rule-for-every-arrival

Essential question: How can one rule do the same job for every airplane that arrives?

Warm-up: How does a pilot know it is safe to land? _____

1. **Vocabulary.** Air traffic controller, final approach, landing clearance, go-around, readback, rule: write each in your own words.

2. **Nothing done.** Larkspur 21 went around at ____ . The radio said: _____
3. **My table.** Miles in the rule / did all three land? 20: ____. 10: ____. 5: ____. 2: ____. 1.5: ____. 1: ____. "When an arrival checks in": ____.

4. **The edge.** The rule works down to ____ miles, and stops working at ____ miles.

1. Why does the rule stop working at 1 mile?

2. How does one rule clear three different airplanes?

Quick check

Name: _____

1. Without a landing clearance, an airplane: (A) lands anyway (B) goes around (C) waits on the runway

2. "When an arrival is 5 miles from the runway" runs: (A) once, at the start (B) once for each airplane, as it reaches 5 miles (C) every second

3. A friend's rule says "when an arrival is 1 mile from the runway" and the first airplane goes around. Use what you learned today to say what to change, and why.

Answers

QUESTION	ANSWER	WHY
1	B	It climbs away and comes back. Landing without a clearance is not allowed.
2	B	A rule waits for its event, and runs each time it happens, for that airplane.
3	Open answer	A bigger number, 1.5 or more, such as 5: at 1 mile the clearance comes too late for the pilot.

If your state or umbrella school asks, this lesson covers CSTA 2017 2-AP-17.

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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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