Tank & Uno: The HVAC Tech Investigation

Grade 7 | Career: HVAC Technician | Texas teacher sampler



Driving question: The air conditioner is running, but the building is not cooling. What should a qualified HVAC technician investigate first?

Student role: Join Tank and Detective Uno as an observation and evidence team. Read the clues, calculate temperature differences, and recommend a safe next step.

Time: 45 minutes **Format:** Teacher-led investigation, pairs or individual **Equipment:** Pencil, calculator (optional), printed evidence sheet.

Safety boundary: Classroom paper investigation only. Students do not open HVAC equipment, handle refrigerant, test live circuits, or perform electrical measurements.

What students will learn

• Explain how HVAC technicians use observations and measured evidence to investigate a problem.

• Calculate and compare temperature differences in degrees Celsius.

• Distinguish a symptom, a possible cause, and a conclusion supported by evidence.

• Explain why professional electrical safety and authorization matter.

The Building That Would Not Cool

Scene: Tank and Detective Uno arrive at a small office. The manager says: “The AC has been on for an hour, but the rooms still feel warm.” A qualified HVAC technician has recorded the following observations. Your job is to interpret the information, not repair the system.

Evidence A — Technician observation log

Clue	Observation
1	Thermostat is set to 22°C. Room air measures 27°C.
2	Air is coming from the supply vents, but it does not feel much cooler than the room.
3	The return-air filter looks heavily dusty.
4	No conclusion has yet been reached about the cause.

Evidence B — Simulated temperature readings

Measurement	Initial visit	After qualified technician checks airflow
Return-air temperature	27°C	27°C
Supply-air temperature	25°C	16°C

Important: These numbers are invented for a classroom reasoning exercise, not universal HVAC performance limits. Multiple conditions affect real systems.

Your investigation

1. Observe: List two facts from Evidence A. Do not guess at a cause yet.

_____

_____

2. Calculate: Subtract supply-air temperature from return-air temperature for each column in Evidence B.

Initial difference: _____ °C After-check difference: _____ °C

3. Compare: By how many degrees did the temperature difference change? _____ °C

4. Reason: Does the dusty filter prove that it caused the cooling problem? Explain.

_____

_____

5. Recommend: What should the qualified HVAC technician investigate next, and what evidence supports your recommendation?

_____

_____

Safety, Science & Communication

Evidence C — The tool mystery

In a real-life video, Uno carries an insulated electrical screwdriver. Detective Uno has found a clue, but a professional tool is not a toy. Insulated handles do not make it safe for an untrained person to work on energized equipment.

6. Safety decision: Choose the best action when an untrained person finds an electrical tool near HVAC equipment.

A. Open the equipment and check for loose wires. B. Secure the tool, stay clear of equipment, and alert the responsible adult or qualified technician. C. Use the tool because its handle is insulated.

My choice: _____ Why? _____

Evidence D — Refrigeration science

A cooling system transfers thermal energy from indoor air to outdoors. The evaporator absorbs heat from indoor air, while the condenser rejects heat outdoors. Fans and airflow affect how well the system transfers heat.

7. Science: In your own words, why might restricted airflow affect cooling?

_____

_____

Write like a professional

8. Case conclusion: Write 3–4 sentences to the office manager. Include one observation, one calculation, one reasonable next investigation, and one safety consideration.

_____

_____

_____

_____

_____

Exit ticket

9. Which school subjects did you use in this case, and how would an HVAC technician use each on the job? Name at least two.

_____

_____

45-Minute Facilitation Plan

Minutes	Teacher action	Student task
0–5	Introduce HVAC career and Tank & Uno case; show cover.	Predict which evidence a technician needs.
5–10	Read scene and observation log.	Separate observed facts from guesses.
10–20	Model return-minus-supply calculation.	Calculate 2°C and 11°C; compare.
20–30	Discuss dusty filter and limits of evidence.	Explain why one clue does not prove a cause.
30–37	Read tool scenario and refrigeration passage.	Choose safe response; connect heat transfer to airflow.
37–45	Assign case conclusion and exit ticket.	Write evidence-based recommendation.

Teacher answer guidance

• Q1: Any two accurate recorded observations, e.g., 27°C room air versus 22°C setpoint; weak cooling at vents; dusty return filter.

• Q2: Initial: 27 - 25 = **2°C**. After-check: 27 - 16 = **11°C**.

• Q3: Change: 11 - 2 = **9°C**.

• Q4: **No.** The filter is a clue, not proof. A technician must check airflow and other possible faults before diagnosing.

• Q5: Accept a justified professional next step such as checking airflow/filter condition and comparing temperatures, with further diagnosis by a qualified technician. Do not claim a confirmed fault.

• Q6: **B.** Secure the tool and refer equipment work to a qualified person.

• Q7: Restricted airflow can reduce effective heat transfer at the indoor coil; students should explain rather than prescribe repairs.

• Q8–9: Look for evidence, calculations, safety reasoning, and explicit science/math/reading connections.

Quick assessment (8 points)

Two correct observations (2); two temperature differences (2); correct comparison (1); distinguishes clue from diagnosis (1); safe tool decision (1); evidence-based written conclusion (1).

Optional media placement

Play a short excerpt of the real Uno insulated-screwdriver video as a **safety discussion opener**, if available to the teacher. Use the provided HVAC graphics as teacher reference only after technical fact-checking. The student worksheet is complete without the video or graphics.

Standards-Led Alignment

The unchanged CIL investigation is mapped to selected Grade 7 Texas standards. This is a **targeted alignment**, not a claim that one 45-minute lesson fully teaches or assesses every element of each standard.

Verified TEKS	Relevant student evidence
Science 7.1(A)	Students define a cooling problem from the scenario and observations.
Science 7.2(B), 7.2(C)	Students compare measurements, calculate differences, and evaluate what the data can and cannot establish.
Science 7.3(A), 7.3(B)	Students communicate an explanation and recommended next investigation supported by evidence.
Science 7.1(C)	Students select safe practices in the tool-handling scenario.
Mathematics 7.3 (supporting skill)	Students subtract rational-number temperature readings and justify numerical conclusions.

Alignment notes

The science codes above follow the 2021-adopted Grade 7 Science TEKS. The math activity directly practices subtraction; it is not labeled as a full proportional-relationships task. Grade 7 Math 7.4(D) would require a separate, genuine ratio/rate/percent problem before claiming that expectation.

Primary source: Texas Education Agency, 2021 Grade 7 Science TEKS side-by-side: https://tea.texas.gov/academics/2017-2021-grade-7-science-teks-side-by-side.pdf

Additional source: 19 TAC §112.27, Science Grade 7; Grade 7 Mathematics TEKS, Chapter 111.

What is included in this free sample

Case cover, student investigation, simulated data table, safety and science reading, written assessment, teacher facilitation plan, answer guidance, and Texas standards mapping.

Explore the complete program

Career-Infused Learning brings academic subjects inside real professions through orientation, workplace safety, career investigations, and assessment. See the complete Grade 7 HVAC pathway and other career investigations at **https://memejjandfriends.com/career-infused-learning/**.

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