

Thermal Structure

Track structure and diction in a technical explanation.

12.RI.2 "Craft and Style Analyze text structures to discern how they affect the meaning and message of informational and technical writing and how their text structures differ from those in narrative texts..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB In the three technical paragraphs, underline transitions and circle words that reveal attitude. Then mark the turning point in the contrasting narrative. Compare how each text guides the reader's understanding.

How a Heat Pump Moves Warmth

Winter heating often sounds like a battle against cold, but an air-source heat pump in heating mode transfers thermal energy from outdoor air into a building. In a resistance heater, electrical energy is converted into thermal energy at the unit. A heat pump uses electricity to operate equipment that transfers heat, so it can deliver more heat energy indoors than the electrical energy it consumes. Neither device creates energy from nothing. This comparison explains the potential efficiency advantage before the process is described.

First, refrigerant absorbs outdoor heat as it evaporates in an outdoor coil. Next, a compressor raises the vapor's pressure and temperature. Inside the building, refrigerant releases heat through an indoor coil and condenses. Finally, an expansion device lowers its pressure so the cycle can repeat. The cycle is closed and carefully controlled: the refrigerant circulates through the equipment while energy moves into and out of it. This description follows the system's stages rather than a person's experience.

However, performance depends on conditions. Some systems use supplemental heating during severe cold; equipment selection and installation matter. The technology remains capable, but its benefits are conditional on climate, design and the building. These qualifications temper the promise of savings.

Contrasting narrative (original fiction)

Before the technician arrived, Mara pressed her hands around a cold mug and watched the window fog. At noon, the new unit hummed. She waited, doubtful, until warm air brushed her sleeve. Only then did she loosen her scarf. That evening, she kept glancing at the weather forecast, unsure how the machine would fare in the coming freeze.

2 ANSWER WITH EVIDENCE _____ Use the passage

- 1** How does the order of stages in paragraph 2 help explain the heat-transfer cycle? Cite two transitions.

- 2** How do the comparison in paragraph 1 and the qualifications in paragraph 3 shape the message of the process explanation?

- 3** Analyze the combined effect of carefully controlled, capable, and conditional on the technical writer's attitude.

- 4** Both texts use time order. How does the narrative's turning point differ from a stage in the technical explanation? Cite a detail from each.

3 YOUR TURN

Your own words

In one developed paragraph, compare the texts' organization and cumulative word choices. Explain how each shapes a different message about the same technology. Use two brief pieces of evidence from each text and explain their effects, including the narrative's ending.

Compare structure and diction

Develop your comparison below. Check that every interpretation connects to specific evidence from the two texts.

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PART 1 • READ AND MARK

In the three technical paragraphs, underline transitions and circle words that reveal attitude. Then mark the turning point in the contrasting narrative. Compare how each text guides the reader's understanding. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does the order of stages in paragraph 2 help explain the heat-transfer cycle? Cite two transitions.	First and Next (or Finally) organize connected equipment stages. Readers can follow absorption, compression, heat release and pressure reduction as a repeatable cycle.
2	How do the comparison in paragraph 1 and the qualifications in paragraph 3 shape the message of the process explanation?	The comparison establishes why transfer can offer efficiency advantages; the final qualifications show that performance depends on conditions. Together they support an informed, conditional claim rather than a universal promise.
3	Analyze the combined effect of carefully controlled, capable, and conditional on the technical writer's attitude.	Carefully controlled and capable suggest confidence in a functioning technology, while conditional qualifies that confidence. Together they create a measured, cautiously favorable attitude rather than excitement or a guarantee.
4	Both texts use time order. How does the narrative's turning point differ from a stage in the technical explanation? Cite a detail from each.	The narrative turns when warm air reaches Mara and she loosens her scarf: an event changes a person's response. The technical explanation links equipment stages, such as compression before indoor heat release, to clarify a mechanism. Sequence alone does not make their purposes the same.

PART 3 · YOUR TURN (SAMPLE ANSWER)

The explanation moves from comparison through mechanism to limits, presenting the heat pump as useful under suitable conditions. Its phrases “carefully controlled” and “conditional” combine confidence with caution. The narrative instead follows a change in Mara’s response: warmth makes her loosen her scarf, yet her repeated glances at the forecast sustain uncertainty. Words such as “doubtful” and “unsure” make the technical limitation feel personal. The explanation equips readers to understand performance; the narrative shows someone living with hope and uncertainty.

TEACHER ASSESSMENT NOTES

Evaluate effects and evidence rather than device-label recall. Credit supported alternative mood readings. The narrative is original fiction and is not scientific evidence. The technical account is an instructional synthesis of the U.S. Department of Energy, Heat Pump Systems (energy.gov/energysaver/heat-pump-systems) and OpenStax, College Physics 2e, section 15.5 (openstax.org/books/college-physics-2e/pages/15-5-applications-of-thermodynamics-heat-pumps-and-refrigerators). Students need no outside text for the comparison.