

Heat Evidence Hunt

Trace how a focused question shapes credible evidence and cautious analysis.

12.T.RA.1 “Research & Inquiry: Conduct research, generating questions to guide investigations of complex topics of interest and using credible sources to support analyses.”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the guiding research question, circle each source named, and number the credibility checks or limits that keep the team’s conclusion careful. The Phoenix student team is an illustrative research scenario, not a reported project.

Mapping Heat in Phoenix

- ① When a city plans ways to reduce dangerous summer heat, a useful investigation begins with a question that is narrow enough to research but broad enough to matter. A student team studying Phoenix asked, “Which neighborhood conditions are most strongly connected to higher daytime surface temperatures?” The question directs the team to compare conditions, such as tree canopy, pavement, building density, and income, rather than merely collect facts about hot weather. It also leaves room for an analysis: the team can examine patterns, consider possible causes, and distinguish surface temperature from the air temperature reported in a weather forecast.
- ② To answer it, the team uses a city map dataset showing land cover, satellite images from NASA’s Landsat program, and peer-reviewed articles on urban heat. Each source has a different purpose. The map dataset helps locate parks, roads, and roofs. Satellite images provide repeated measurements of land-surface temperature across the city. The articles explain methods, limits, and findings from other researchers. Before relying on a source, the team checks who produced it, when it was published, how the information was collected, and whether another credible source supports it. A social media post showing one shaded sidewalk might suggest an idea, but it cannot establish a citywide pattern.

- ③ After gathering evidence, the team does not claim that one feature alone causes heat. It compares locations with sparse tree cover and extensive pavement to locations with more shade, while noting that building form, time of day, and measurement methods may affect results. If several reliable sources point to the same relationship, the team can argue that increasing tree canopy may be a promising heat-reduction strategy. The word *may* matters. A responsible analysis states what the evidence supports, identifies uncertainty, and names what additional data, such as neighborhood-level air-temperature readings, could strengthen the conclusion before the city spends public funds.

2 ANSWER WITH EVIDENCE _____ Use the passage

- ① What research question guides the Phoenix investigation? Name two conditions that question directs the team to compare.

- ② How would the city map dataset and the NASA satellite images contribute different evidence to the investigation?

- ③ Name two checks the team uses to judge a source's credibility. Why is one social media post about a shaded sidewalk not enough evidence?

- 4 What conclusion could the team responsibly make if several reliable sources show the same relationship? Name one uncertainty or additional type of data the passage says the team should consider.

3 YOUR TURN

Your own words

Sources for Your Turn

For a school-start-time inquiry, read these two attributed summaries as research sources. For another issue, read two relevant credible sources available to you. Keep track of what each source supports and what local evidence is still missing.

Source A: CDC (2024). Sleep and Health.

Editorial summary: CDC reports the American Academy of Sleep Medicine recommendation that adolescents ages 13-18 obtain 8-10 hours of sleep per 24 hours. Adequate sleep supports attention, concentration and academic performance. The page discusses later school starts together with good sleep habits as ways to support adolescent sleep.

Scope and limits: This guidance does not measure a particular school's students or guarantee the effect of a proposed 30-minute delay. Transportation, family schedules and sleep habits still matter.

<https://www.cdc.gov/physical-activity-education/staying-healthy/sleep.html>

Source B: Dunster et al. (2018). Sleepmore in Seattle. Science Advances.

Editorial summary: Researchers compared independent groups of biology students at two Seattle high schools before and after a 55-minute start-time delay in 2016. Median school-night sleep was 34 minutes longer afterward. The study supplies evidence from an actual schedule change rather than a recommendation alone.

Scope and limits: The groups were different students, and this observational comparison does not isolate the schedule as the sole cause or predict effects at another school. Its median sleep result is not an individual gain or a local average.

<https://doi.org/10.1126/sciadv.aau6200>

Choose a complex issue that affects your school or community. Write one focused research question, name three credible sources and the distinct evidence each could provide, then state one cautious claim you could test and one limitation you would need to consider.

Plan your inquiry

Distinguish proposed local evidence from data already collected.

[illegible]

Use evidence to test your plan

After reading two sources, write 3-4 sentences explaining what they support about your question. Cite and connect both sources. Identify what remains unanswered and the evidence needed before making a local claim.

[illegible]

PART 1 • READ AND MARK

Underline the guiding research question, circle each source named, and number the credibility checks or limits that keep the team's conclusion careful. The Phoenix student team is an illustrative research scenario, not a reported project. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What research question guides the Phoenix investigation? Name two conditions that question directs the team to compare.	The guiding question is, "Which neighborhood conditions are most strongly connected to higher daytime surface temperatures?" It directs the team to compare any two of these: tree canopy, pavement, building density, and income.
2	How would the city map dataset and the NASA satellite images contribute different evidence to the investigation?	The map dataset identifies land-cover features such as parks, roads, and roofs. The satellite images provide repeated measurements of land-surface temperature across Phoenix.
3	Name two checks the team uses to judge a source's credibility. Why is one social media post about a shaded sidewalk not enough evidence?	The team checks who produced the source, when it was published, how information was collected, and whether another credible source supports it. One post can suggest an idea, but it cannot establish a citywide pattern.
4	What conclusion could the team responsibly make if several reliable sources show the same relationship? Name one uncertainty or additional type of data the passage says the team should consider.	The team could argue that increasing tree canopy may be a promising heat-reduction strategy. It should consider factors such as building form, time of day, or measurement methods, or gather neighborhood-level air-temperature readings.

PART 3 · YOUR TURN (SAMPLE ANSWER)

My question is: How did moving the start time later affect attendance and average sleep among students at Riverside High during the first two years after the change? District attendance records could show attendance patterns, an anonymous sleep survey administered by the school research office could report student sleep estimates, and peer-reviewed sleep research could provide comparison methods and context. I could test the claim that a later start time is associated with improved attendance and more sleep, but changes in transportation, enrollment, or survey response rates could also affect the results.

Accept focused, researchable questions that identify a population, condition, or time frame. In Part 3, sources should be credible and distinct, and the claim should be cautious rather than presented as proven. The original sample models the planning step, not a completed study at Riverside High. For the evidence step, a suitable response could explain: CDC guidance supports adequate adolescent sleep and later starts with good sleep habits. Dunster et al. observed longer median sleep after a Seattle delay, offering evidence from an actual change. These sources support investigating the proposal but cannot establish Riverside's local attendance or average-sleep effects; local attendance records and comparable sleep surveys are still needed. Accept equivalent evidence-based analyses for other questions and sources. Do not require an entire research paper. Landsat background: USGS, <https://www.usgs.gov/landsat-missions/landsat-surface-temperature> .