

2027-02-26 · 80 minutes

Physiology variables

Your goal: Launch Problem 2 by identifying variables for a human physiology research design.

One product: Problem 2 launch: chosen physiological measure, identified independent/dependent/controlled variables, and a testable hypothesis.

Question: How can a physiology question become a measurable comparison with clearly defined variables?

Start the work

Use only evidence of the ER presentation work you actually did. This planning exercise supplies its own background and requires no personal health record.

1. Read the planning scope and E1–E3; ask the teacher for the licensed overview if you cannot open it.
2. Complete the stairs warmup, then choose your own measure using S2.
3. Label IV, DV and controls, with units and proposed measurement conditions.
4. Write a testable hypothesis and a way evidence could challenge it.
5. Save or submit the same planning record through the confirmed route; use partner or self-feedback to revise.

If the assignment is unavailable, retain your work and report the route issue. A saved record does not mean the licensed overview, Study critique packet or official activity is complete.

Words you will use

physiology

Study of how the body functions.

variable

A factor or condition that can have different values or categories.

independent variable (IV)

The factor deliberately changed or compared in this plan.

dependent variable (DV)

The outcome to be observed or measured, whether or not it changes.

controlled variable

A condition intended to remain consistent across comparisons.

hypothesis

A tentative answer that can be evaluated with evidence.

prediction

The pattern expected if an idea is supported.

testable

Specific enough that observations could support or fail to support it.

heart rate

How fast the heart beats, expressed here in beats per minute.

posture

The position of the body, such as seated or standing.

recording interval

The defined span or time window used for a planned measurement.

alternative explanation

Another factor that could account for a difference.

protocol

The specified procedure and conditions for carrying out a study.

caffeine

A substance used only as a named comparison factor in this paper exercise.

E1: variable roles

Science Buddies distinguishes the factor deliberately changed in an experiment, the outcome observed or measured, and conditions intended to stay consistent. These are the independent, dependent and controlled variables. A measured outcome need not actually change. Naming the roles does not establish a cause. Our simple planning exercise compares one factor at a time.

E2: testable hypothesis

Science Buddies describes a hypothesis as a tentative, testable answer to a question. A prediction links the proposed independent factor to a measurable outcome. Evidence may support or fail to support it. "If...then..." is one useful format, not the only valid one. Today you write a prediction; you do not report a result.

E3: physiology background

MedlinePlus identifies heart rate, or pulse, as how fast the heart beats. Its overview says heart rate depends on factors including activity and whether someone is sitting or standing. This supplies a reason to investigate a defined comparison. It gives no result for your proposed study. Use heart rate in beats per minute for the fully supplied planning route.

S1: stairs warmup and absence example

Thought exercise only: imagine comparing seated rest with the period after stair climbing. Do not climb stairs or collect a pulse for this lesson. Complete: I change __; I would measure __; I would keep __ consistent. Check after trying: is your independent variable the condition you change, your dependent variable the outcome you would measure, and each control something you keep the same? No measured values or safety findings are supplied.

S2: your own application route

Plan a different physiology comparison from S1: seated versus standing posture and heart rate. State which factor you compare, what outcome you would record and its unit, and at least two conditions you would keep consistent. You may choose another physiological measure/question only if its meaning and measurement method are supplied by your teacher. For the complete route here, use posture and heart rate. Specify a proposed recording interval and method on paper; ask the teacher to review actual equipment and protocol before use. Do not conduct the plan. For a complete paper method, propose counting beats during a 60-second window, so the count would be expressed as beats per minute, using the same counting procedure in both conditions. The teacher must supply or approve the actual pulse-location technique, equipment, timing after each posture change and participation conditions before any use. Ask the teacher to confirm that timing rather than inventing a validated stabilization period.

S3: music control warmup

Thought exercise only: to ask whether music changes heart rate, identify music condition as the comparison and heart rate as the outcome. Name two conditions to keep consistent for both listeners, such as posture and recent activity, using E3. Explain why using two different listeners could still introduce individual differences. The variable labels do not show that music caused an effect. Do not recruit listeners or collect readings.

R1: check the plan

Check that the comparison has clear conditions, the outcome has a unit, and controls have a reason. A hypothesis should say what difference or absence of difference you predict. Ask what evidence could fail to support it. A list of controls does not eliminate every alternative explanation, and no human study is approved merely because its variables are named.

Optional extension: two easily missed controls

Choose two planning factors from posture before recording, recent activity, recording method and interval. Explain how changing either between comparisons could offer another explanation for the recorded difference. E3 supports considering posture and activity. You may propose time of day or caffeine as further factors to research, but this packet supplies no instruction to alter either or collect personal consumption histories. No caffeine is given or withheld.

Caffeine check, conceptual only

In the hypothetical question “Does caffeine exposure affect heart rate?”, label which is the independent factor and which is the dependent measure. Those labels would not show an effect occurred. This is only a variable-identification check; do not administer, withhold or consume anything for it.

Course inputs to request

The actual Problem 2 overview and weekly Study critique packet have not been supplied here. This original planning reference is not either document. Ask the teacher for those inputs before reading them and completing their licensed tasks. Ask your teacher how this variable/hypothesis task fits Project 2.1.1 Scientific Research before checking official completion.

Today’s original planning record can be completed without exercise, bodily measurements or personal records. Any future human investigation requires the teacher’s actual protocol, equipment, participation and privacy decisions.

Worked model: ramp slope and travel time

Different-question model: a fictional team plans to compare a paper ramp at two marked slopes. It would record a toy car’s travel time in seconds. The team would use the same car, travel distance and release method. No run has occurred.

Independent factor: ramp slope. Dependent measure: travel time in seconds. Controls: car, distance and release method. Tentative prediction: the car will take less time at the steeper slope. This prediction could fail if repeated measurements did not show the expected difference. It is a planning example, not a measured finding.

For your physiology plan, transfer the role labels and testability check. Do not use the car prediction as evidence about a heart. Your own application uses E3 and S2; the stairs example stays a separate recovery response.

Try the decision

Practice question, not your S2 plan: does room temperature change skin temperature? Which planning statement fits E1 and E2?

- Compare room-temperature conditions, name skin temperature as the measured outcome and specify controls while leaving the result unknown.
- Call skin temperature independent because an instrument would measure it.
- Report that warmth caused a rise because the hypothesis predicts one.

Explain your choice using the reading. Discuss it or say it to yourself. This practice does not add another submission.

Your 80-minute flow

0–10 minutes	Complete the stairs and music warmups; review roles and a remaining limitation.
10–25 minutes	Read and compare model/question/measurement choices.
25–40 minutes	Draft own IV/DV/controls with a proposed method and interval.
40–60 minutes	Write hypothesis, explain source connection and revise unclear controls.
60–75 minutes	Assemble/save the planning record, including recovery example if used; submit only to confirmed route.
75–80 minutes	Give one feedback point and keep final revision with the record.

Your response record

Use these labels on paper or in your document. The space below also works when this page is printed.

Stairs example

Complete S1's three blanks with IV, DV and a control. If returning after absence, keep this example with your own application below. Then complete S3: name two controls for the music question and one remaining limitation.

This is a thought exercise. No stairs, pulse reading or personal data.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

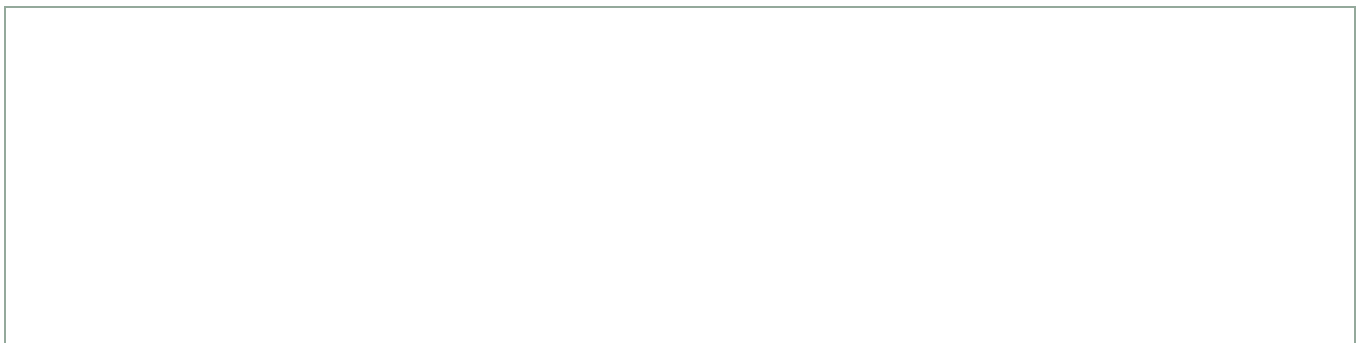


Chosen physiology measure

Name your physiological measure, its unit and your comparison question. Use the supplied S2 route or a teacher-supplied alternative.

For the fully supplied route, compare posture conditions using heart rate. Identify what you would record without recording it today.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

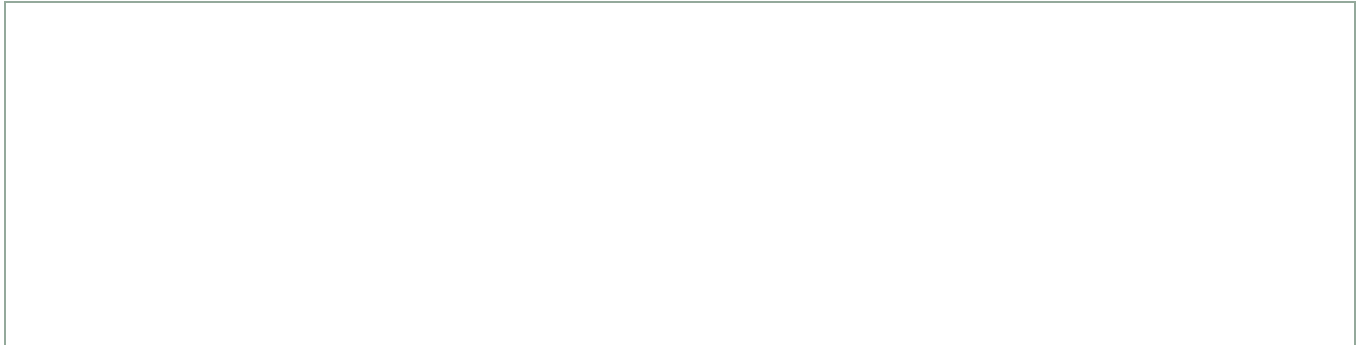


Independent, dependent and controlled

Label your IV and its comparison conditions, your DV and unit, and at least two controls. Explain why each control matters. State your proposed recording method and interval as a plan needing teacher review.

A control is not the outcome. Avoid claiming that all other conditions can be perfectly fixed in people.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

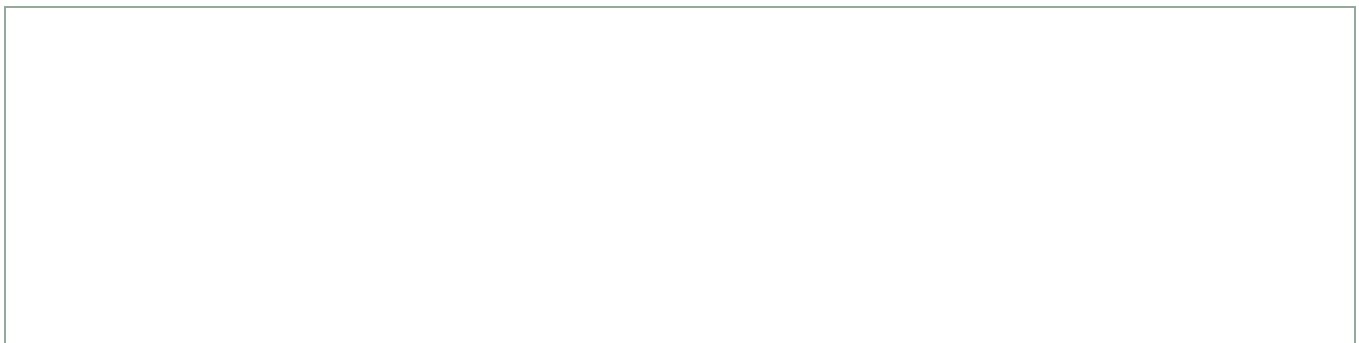


Testable hypothesis

Write a hypothesis with a clear prediction linking the IV and DV. Explain how E3 makes your question reasonable and name a possible observation that would fail to support your prediction.

You may predict a difference or no detectable difference. The source does not prescribe a numerical result or prove your direction.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Check and revise the same record

Use R1 with a partner or alone. Give one specific feedback point, then revise or explain why no change is needed. Complete the conceptual caffeine IV/DV check.

Label self-feedback honestly; do not invent partner speech. Keep the check on this same record, not a separate submission.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Check your product

- I identify a chosen physiology measure and unit.
- I distinguish IV, DV and controls for a specific comparison.
- My hypothesis makes a testable prediction without claiming a result.
- I keep the recovery example and own application distinct.
- I record one honest feedback point and keep actual course-input holds visible.

Keep the limit: This is an original planning record. No participant, observation or result is supplied; variable labels and predictions cannot establish causation, safety or official completion.

Turn in your work

Keep the chosen measure, variables and hypothesis in one planning record. Include the stairs example and check on that record. Use the linked BI assignment and the teacher's required format. After uploading, check that Schoology shows Submitted.

If the assignment is unavailable, retain your work and report the route issue. A saved record does not mean the licensed overview, Study critique packet or official activity is complete.

[Open this assignment in Schoology.](#)

Carry forward

Name the comparison, the measured outcome and the conditions you intend to hold consistent before interpreting results.

The teacher must provide the actual overview, critique packet and approved protocol before the corresponding course work or human data collection proceeds. What information is missing before you can evaluate the proposed study?

Sources and resources

[Open today's page](#)

SB-VARS · What are Variables?

Science Buddies, original science-education guide; inspected September 11, 2026

<https://www.sciencebuddies.org/science-fair-projects/science-fair/variables>

SB-HYP · Writing a Hypothesis for Your Science Fair Project

Science Buddies, original science-education guide; inspected September 11, 2026

<https://www.sciencebuddies.org/science-fair-projects/science-fair/writing-a-hypothesis>

MED-VITAL · Vital Signs

MedlinePlus, National Library of Medicine; inspected September 11, 2026

<https://medlineplus.gov/vitalsigns.html>