

Wk7 CER: Kinesiology data analysis

Your goal: Analyze your motion data and write a CER about fatigue and range of motion.

One product: Labeled graph of force or angle versus trial number plus a CER evaluating what the data support about fatigue and range of motion, citing specific trial values.

Question: What pattern does your graph show, and what additional evidence would be needed to attribute it to fatigue?

Start the work

Actual March 1 data and task notes are the preferred input. Ask for missing class records; use D1 as labeled practice.

1. Identify actual March 1 data or clearly select D1 recovery.
2. Graph the recorded measure versus trial number using E3.
3. Complete the assigned official analysis when the teacher supplies it; otherwise check the practice graph and ask for the official task.
4. Describe the trend and distinguish a plotted change from fatigue onset.
5. Write a trial-based CER, then submit graph and CER as one document.

If the assignment is unavailable, save the combined document and ask the teacher for the correct assignment. Request any missing class data or licensed prompts. Use the labeled practice for the graph; follow the actual official task when the teacher supplies it.

Words you will use

kinesiology

Study of human movement.

range of motion (ROM)

Extent of movement at a joint, measured as an angle in degrees.

angle / degree

Amount of turn between two lines; a degree is one unit of angle.

force / newton (N)

A push or pull; the newton is a unit of force.

fatigue

A reduction in the ability to produce force or power during a task.

trial

One numbered attempt or observation in a sequence.

trend

The overall pattern across values, including departures from that pattern.

plateau

A section with little or no change.

slope

Change in the vertical value divided by change in the horizontal value over a stated interval.

onset

The beginning of a process. A graph bend alone does not locate physiological fatigue onset.

protocol

The specified measurement procedure and conditions.

alternative explanation

Another reason that could account for the same pattern.

CER

Claim, Evidence, Reasoning: an answer, specific supporting information and an explanation of the link.

torque

The turning effect of a force around a joint or other pivot.

joint angular speed

How quickly a joint angle changes over time.

flexion / extension

Bending that generally decreases a joint angle; straightening that generally increases it.

goniometer

A tool used to measure joint angles.

biomechanics

Study of forces and movement in living systems.

E1: what angle and force can show

ROM describes the extent of joint movement in degrees. Force is a different quantity. A force graph alone does not measure ROM. Identify what your actual column measures before giving it a label.

Fatigue concerns reduced ability to produce force or power in a task. A falling angle may be compatible with fatigue, but angle alone does not establish its cause. Technique, effort, positioning or measurement differences remain possible explanations unless the study addresses them.

A published experiment by Cheng, Davidson and Rice studied repeated ankle movements in twelve young men. It measured ROM alongside other muscle and movement measures. ROM recovered rapidly after the task while reduced torque persisted. ROM and torque therefore did not recover together in this specific experiment.

This primary study supports distinguishing movement range from force-related performance. It does not identify a cause or onset in your classroom table. It is not a protocol for repeating that experiment.

E2: actual March 1 input and recovery route

Open the actual table from Monday, March 1, 2027. Keep its trial order, measure name, units and any teacher-approved task notes. Do not infer that the lab was completed.

If the table or meaning of its column is missing, ask your teacher for the actual record or assigned data packet. Do not invent a sensor reading or unit. Use D1 as clearly labeled analysis practice while you request the class records.

Use one identified dataset for both graph and CER. If using D1, write “D1 instructional dataset” in the title and claim. It is not your class result or proof that the actual lab was completed.

For a force-only record, describe force in its recorded unit. State that ROM change cannot be determined without angle data. A raw sensor signal must not be relabeled force without its supplied conversion.

D1: instructional ROM dataset

Original invented teaching data, not observations of any student or patient. These values represent a hypothetical series of ROM readings. No person performed these trials. No exercise, sensor protocol, joint identity, timing, measurement precision or fatigue-onset event is supplied.

Table D1 columns: trial number (count) and ROM (degrees). Trial 1: 72; trial 2: 74; trial 3: 73; trial 4: 71; trial 5: 72; trial 6: 69.

Trial 7: 68; trial 8: 70; trial 9: 67; trial 10: 66; trial 11: 68; trial 12: 65.

Retain every value. Describe the pattern you graph, not a required smooth decline. D1 supplies graph practice but no evidence that fatigue occurred in a person.

E3: graph and evidence rules

Put trial number on the horizontal x-axis and the recorded measure on the vertical y-axis. Label both axes, including degrees for ROM or the actual supplied force unit. Add a descriptive title and dataset identity.

For D1, use x-axis ticks 1 through 12 at equal spacing. Use a y-axis from 0 to 80 degrees, with equal 10-degree intervals. Place intermediate values proportionally between ticks.

Plot one point for each trial. Connect consecutive points with straight segments to show the sequence. Do not smooth away a rise, omit an inconvenient value or add unsupplied points. If a real record has a missing trial, show the gap.

For actual data, choose equal axis intervals covering all supplied values and state any nonzero axis start clearly. A graph needs enough room to read each point and label. Check every point against its table.

Describe the overall pattern and one exception. Cite at least two trial numbers, values and units. A local drop begins between plotted observations; it is not automatically the biological onset of fatigue.

R1: CER and recovery check

Claim what the graph supports, then address fatigue as an interpretation with a limit. Evidence gives exact trial values. Reasoning uses E1 to explain why that pattern can be discussed without claiming a proven cause.

For D1, use language such as “The instructional values show...” rather than “My muscles became fatigued.” For actual data, distinguish recorded values from your explanation. A flat or rising series is valid evidence too.

Absent or stuck: graph D1 and write one practice sentence citing two trial values and units. Label that response recovery practice. Develop it into the same CER by adding a claim, source-linked reasoning and a limit.

Self-check: “Fatigue lowered ROM because muscles get tired” repeats an idea without table evidence. Replace the evidence with two values from your selected table, then separate the observed pattern from its possible cause.

Optional extension: change per trial and a real-task limit

Choose two trials on your selected graph. Average change per trial = (later value minus earlier value) / (later trial number minus earlier trial number). Show the substituted values and retain the sign.

For ROM, the unit is degrees per trial. For force, use its recorded unit per trial. This is an average over your chosen interval, not a physiological fatigue rate. Trials are not seconds unless actual timing is supplied.

Consider a warehouse worker's repeated lift as a transfer question. Explain why a smaller movement range could matter if the job required a particular reach. This packet supplies no required reach, load or safe-work threshold.

State what additional task and protocol evidence you would need. Do not infer injury risk, work fitness or a safe limit from a classroom slope.

Official analysis and weekly evidence remain separate

The original 20–40-minute block requires the teacher-assigned myPLTW kinesiology analysis prompts. The expected activity is Project 1.2.6 Restoring ROM; ask the teacher to confirm the activity number. Ask for the exact assigned segment and prompts.

If available, complete the assigned analysis before writing the CER. If the official task is unavailable, use that block to check the practice graph, units and evidence limits, and ask for the analysis directions. This practice does not answer unseen licensed prompts.

Keep the actual graph and CER in one document. The teacher-posted data/model packet and weekly evidence requirements remain separate. Request missing packets and use evidence from official or prior lab work only after doing that work.

Today is Tuesday, March 2. Your data come from Monday, March 1; the weekly evidence date is Friday, March 5.

M1: a different graph question, plant-height readings

Original arithmetic model, not a plant experiment. A teaching table lists day 1: 10 cm; day 2: 12 cm; day 3: 11 cm; day 4: 14 cm. No growth conditions or actual observations are supplied.

Graph day number on x and height in centimetres (cm) on y. Use x ticks 1–4 and y ticks 0–16 every 2 cm. Plot (1,10), (2,12), (3,11), (4,14) and join consecutive points.

Claim: these instructional values rise overall, with a decrease on day 3. Evidence: day 1 is 10 cm and day 4 is 14 cm; day 2 to day 3 falls from 12 to 11 cm.

Reasoning: the endpoints show an increase, while the intermediate values prevent calling the pattern a steady rise. The table does not show why a value changed.

Average endpoint change = $(14 - 10) / (4 - 1) = 4/3$, about 1.33 cm per day. That average does not describe every daily change. Use the same graph/check method with your selected motion table; plant values are not physiology evidence.

Try the decision

You have graphed the twelve D1 values. Which conclusion respects their evidence?

- Describe the overall pattern your plotted D1 values show; these values alone do not identify a fatigue cause or onset.
- Fatigue began exactly at the first downward segment because a graph proves when a muscle tires.
- Calculating the plotted slope gives a safe lifting limit for a warehouse worker.

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

Your 80-minute flow

0–8 minutes	Answer both warmups; read E1 and identify actual data or D1.
8–20 minutes	Build selected graph.
20–40 minutes	Use the assigned prompts, or check the practice graph and source limits while requesting the official task.
40–55 minutes	Write trend, exception and limit; optional interval calculation.
55–75 minutes	Write and revise the CER with specific trials.
75–80 minutes	Save or submit graph plus CER; record unresolved inputs.

Your response record

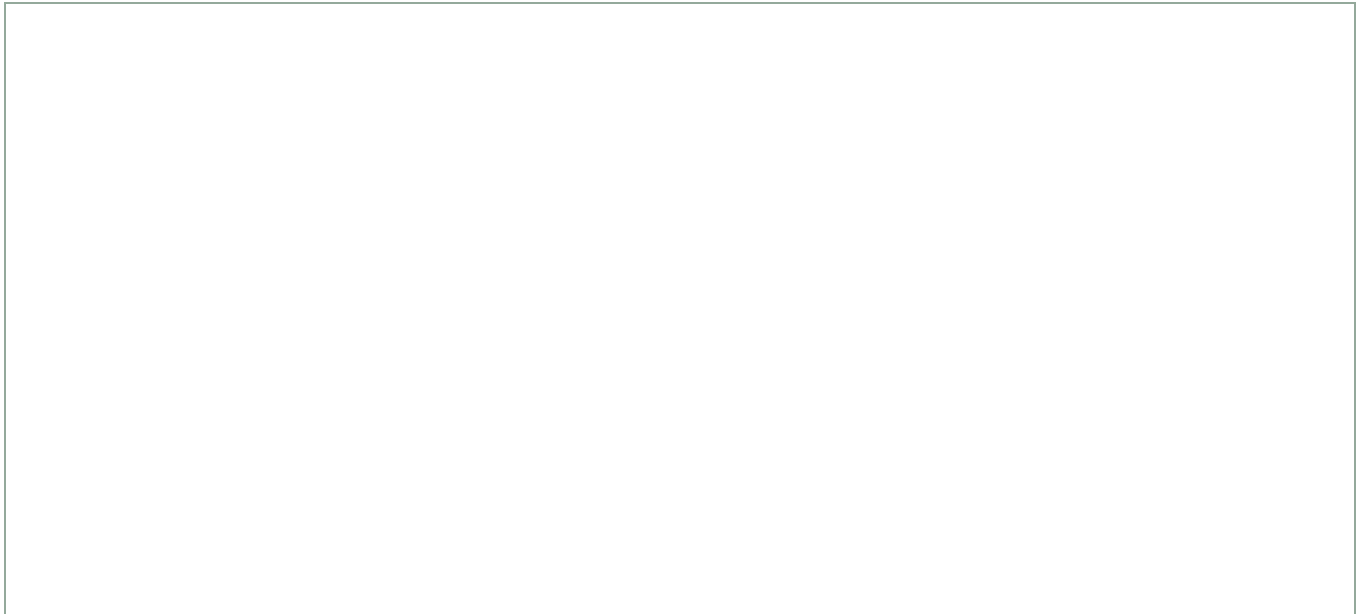
Use these labels on paper or in your document. The space below also works when this page is printed.

Read the table before graphing

Identify your dataset, measure and unit. Answer both warmups: what can a graph reveal beyond a column of numbers, and how is evidence different from repeating a claim?

Use actual March 1 data when available, or label D1 as instructional recovery. No new human measurements.

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

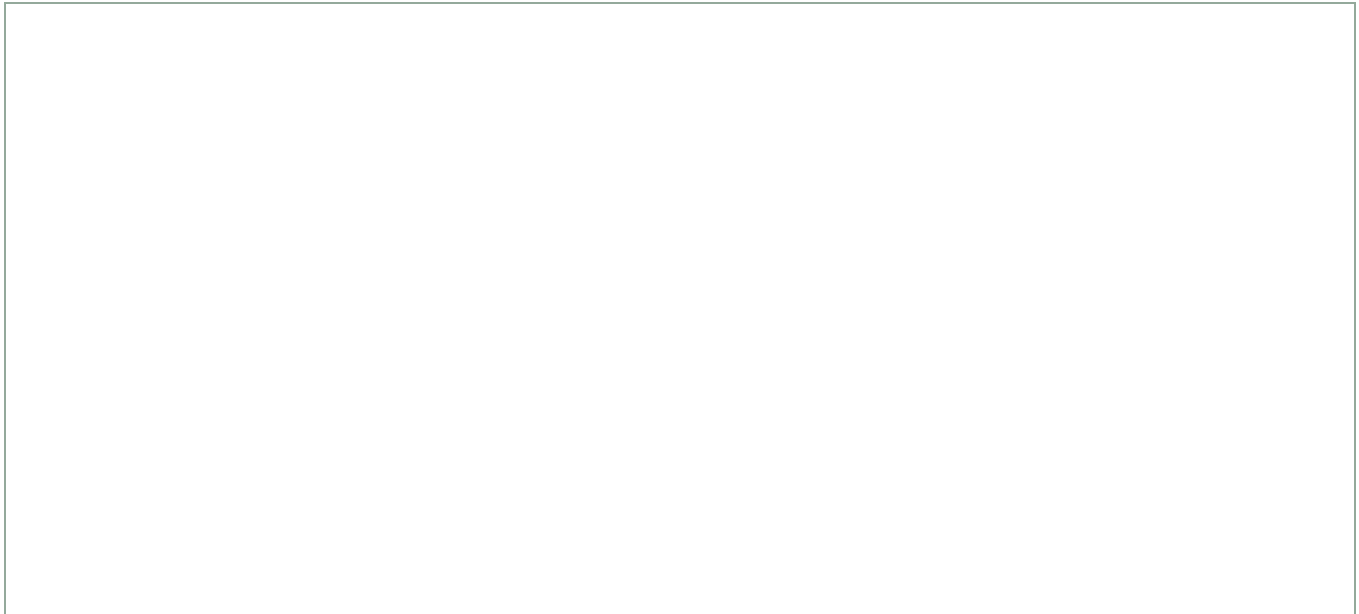


Labeled motion graph

Graph the selected measure versus trial number using E3. Add title, dataset identity, axes, units, equal intervals and every supplied point. Check points against the table.

Use a full graph page. Keep actual force separate from angle. D1 uses twelve points and ROM in degrees.

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

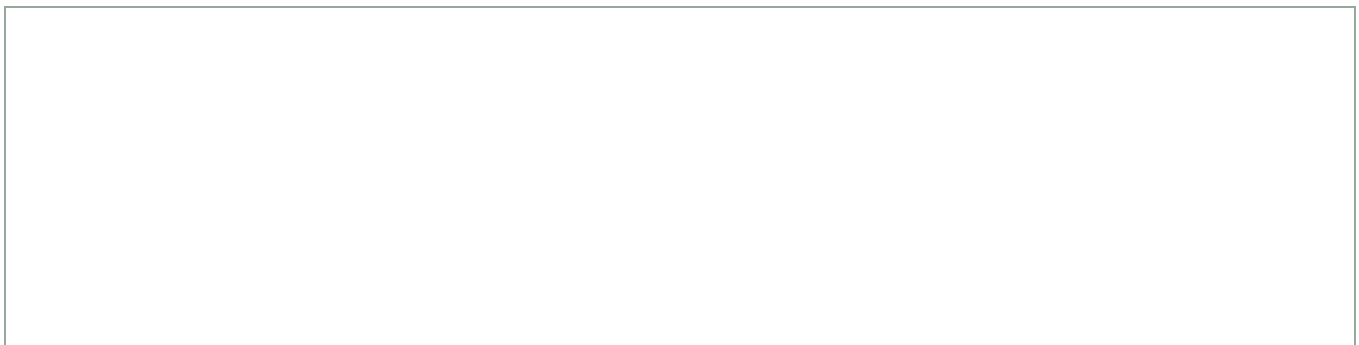


Trend and onset limit

Describe the overall trend and one local change or exception. Cite two trial values. Explain whether your evidence identifies fatigue onset or only a change in the plotted measure.

For D1, no fatigue event is supplied. For actual data, use recorded task evidence and state what remains uncertain.

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



Graph and CER, one document

Write a CER about the selected motion pattern and what it can or cannot support about fatigue. Cite trial numbers, values and units; use E1 and state a causal or onset limit.

Recovery starts with a two-value evidence sentence, then adds claim and reasoning. A force-only record does not establish ROM change.

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

Check the graph and assigned task

Check every plotted point and both axis labels. Revise unsupported causal language. Keep the graph and CER together. Include evidence from the assigned online analysis only after doing that task; ask for any missing instructions.

The practice decision adds no second submission. Never mark unavailable licensed prompts or a missing lab complete.

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

- My graph identifies the dataset and includes every supplied point with readable axes and units.
- My evidence cites trial numbers, values and units from that same dataset.
- My CER separates the pattern from an explanation and does not invent fatigue onset.
- Keep the graph and CER in one document. Identify the sources you used and include only official-task evidence you actually produced.

Keep the limit: A graph describes its identified dataset. Instructional values are not real observations. ROM alone cannot prove fatigue causation or onset, and change per trial is not a physiological fatigue rate.

Turn in your work

Submit the labeled graph and CER as one combined document to Wk7 CER: Kinesiology data analysis in your own HBS section. Follow the posted format and deadline. Identify D1 practice if that is your dataset.

If the assignment is unavailable, save the combined document and ask the teacher for the correct assignment. Request any missing class data or licensed prompts. Use the labeled practice for the graph; follow the actual official task when the teacher supplies it.

[Section 1292: Wk7 CER: Kinesiology data analysis](#)

[Section 6792: Wk7 CER: Kinesiology data analysis](#)

Carry forward

A trial value supports a pattern; a causal explanation needs more than the shape of a line.

Keep the graph and CER for the Friday, March 5 weekly evidence assignment; ask for missing official analysis directions or original inputs. Which graph feature supports your CER without proving fatigue causation?

Sources and resources

[Open today's page](#)

CHENG2010 · The influence of muscle length on the fatigue-related reduction in joint range of motion of the human dorsiflexors

Cheng AJ, Davidson AW, Rice CL. European Journal of Applied Physiology, 2010;109:405–415. DOI 10.1007/s00421-010-1364-3. Primary-study abstract inspected September 11, 2026.

<https://pubmed.ncbi.nlm.nih.gov/20131063/>