Three Languages, One Walk

Student Worksheet

Motion Foundations · Lab Activity 3 · ConceptArc Education (FundaFirst HS) · fundafirsths.com

Name: _____ Class: _____ Date: _____

How this sheet works. *One motion speaks three languages — a* **story**, *a* **graph**, *a* **walk**. *You will translate between them, committing* **in ink before every reveal**. *A crossed-out first answer beside a better second one is exactly what this sheet is for.*

Part 1 — Story Zero, dictated (before any screen)

The class agrees the +x direction points: _____. **Story Zero:** *"Start at the 2 m mark. Stand still for two claps. Walk steadily to the 6 m mark over four claps."*

1(a) Before the volunteer walks it, fill the checklist:

the story pins down…	your answer
start position	
first movement (which way, when)	
holds (standing still)	
end position and clock reading	

1(b) During the second walk (a volunteer's own invention), write its story so exactly that a stranger could draw its graph:

_____

_____

_____

1(c) Swap sheets. Does your neighbour's story answer all four checklist lines? Circle the missing ones on their sheet — in pencil, kindly.

Part 2 — Story → graph (Scene 1)

Round 1 commit (before Reveal):
A **B** **C** **D**
If your graph was wrong — which clause of the story did it contradict?

_____

Round 2 commit: **A** **B** **C** **D**
One wrong graph runs back toward earlier clock readings. What does "she walks back" actually change — the position numbers, or the clock?

_____

Part 3 — Graph → story (Scene 2)

Commit — the story this graph tells:
A **B** **C** **D**

3(a) After the reveal: high on this graph means _____ — not "up in the air".

3(b) The teleport story ("she moves at the instant 5 s") collapses three seconds of walking into one clock reading. What is she doing between 2 s and 5 s?

_____

Part 4 — Walk → words and graph (Scene 3, the dictation)

4(a) Write the driven walk's story (ink, before the replay):

_____

_____

_____

4(b) Sketch its graph (axes: position against clock reading):

x (m) against t (s)

Part 5 — Possible or not? (Scene 4)

5(a) Commit for each card before its reveal: Card 1: P / I Card 2: P / I Card 3: P / I Card 4: P / I Card 5: P / I

5(b) For Card 1 and Card 3, one sentence each on what the story breaks:
Card 1: _____
Card 3: _____

Going further

Layer B for Grades 11–12 · Layer C if you want the deep end

Layer B — quantitative translation

B1 This event table is a third language for the same motion. Write its story, then compute.

clock reading t (s)	0	3	5
position x (m)	4	4	0

Story:

Average velocity, first stretch (0 → 3 s): _____ m/s · second stretch (3 → 5 s): _____ m/s · whole motion: _____ m/s

B2 Invent a story whose graph is a single straight line with **negative** slope that crosses the zero mark partway through. Give real numbers (start, end, clock readings), then state its velocity.

velocity = _____ m/s

B3 Two claims: *"She was at 3 m* **at** *2 s"* and *"She was at 3 m* **for** *2 s."* Different claims? What exactly does each pin down on a graph?

Layer C — the deep end

C1 Call a story **complete** if a stranger could draw exactly one graph from it. The Part 4 checklist has four lines — show it is *not* enough by writing two different walks that answer all four the same way, **neither of which turns round**. Then state what a complete story must pin down, and compare your list with the Builder's inputs (x_0 plus the segments).

C2 Some walks are never steady on any stretch, however short. Why can no finite list of steady-walk sentences tell such a story *exactly*? What could a longer and longer list do?

C3 Words, graph, event table, walk: four languages. Which translations are unique (one right answer), and which require choices (an origin, a +x direction, units)? Where do those choices live in each language?

Grounded in PER: Knight, Arons, Trowbridge–McDermott, Moore, Chabay–Sherwood