Motion Story Homework Teacher Notes

Individual work is recommended but small groups with similar trips may be used for students to help each other.

Materials:

- Graph paper

Directions:

1. The example on the next pages may be used as an example for instructing students on how to write their stories.
    a. This example may be handed out at your discretion.
2. Instruct students to rewrite their stories from each of four perspectives: distance, speed, acceleration, and direction.
    a. Provide instruction on how to do one of the perspectives.
    b. If the story is written in multiple units (both minutes and seconds or feet and miles), the rewritten stories will need to be converted to only one unit (either minutes or seconds, etc.).
    c. Allow students some time to struggle with figuring out the others before providing guidance.
    d. Use the example on the following pages as needed.
    e. Tables with more instructions may be provided for struggling students.
    f. Repeat for each of the other perspectives.
3. Instruct students to graph the stories from each of the four perspectives.
    a. Graphs with labeled axes may be provided for struggling students.
    b. Emphasis should be on the shape of the graphs and how they relate to each other rather than exact values.

Examples:

1. Writing the trip in different formats:
    a. In paragraph form:
        - On my way to my friend's house, I first walked at *constant speed* out my door and down the driveway for about 15 feet in about 10 seconds. I *turned right* at the sidewalk walking one step (about 3 feet) in about 1 second then walked at a *constant speed* for 3 blocks (about 300 feet) in about 2 minutes. I *turned left* walking one step (about 3 feet) in about 1 second and *stopped* to wait for the light to change for about 1 minute. I *sped up* in several steps (about 10 feet) in about 5 seconds and walked at *constant speed* for 3 blocks (about 300 feet) in about 2 minutes. I *turned left* in one step (about 3 feet) toward my friend's house in about 1 second and *slowed down* for about 15 feet in about 10 seconds until I *stopped* at her door.
    b. In bulleted or numbered form:
        - First walked at *constant speed* out my door and down the driveway for about 15 feet in about 10 seconds

- I *turned right* at the sidewalk walking one step (about 3 feet) in about 1 second
- Then I walked at a *constant speed* for 3 blocks (about 300 feet) in about 2 minutes
- I *turned left* walking one step (about 3 feet) in about 1 second
- Then I *stopped* to wait for the light to change for about 1 minute
- I *sped up* over several steps (about 10 feet) in about 5 seconds
- I walked at *constant speed* for 3 blocks (about 300 feet) in about 2 minutes
- I *turned left* in one step (about 3 feet) toward my friend's house in about 1 second
- Finally, I *slowed down* for about 15 feet in about 10 seconds until I *stopped* at her door.

c. In tabular form:

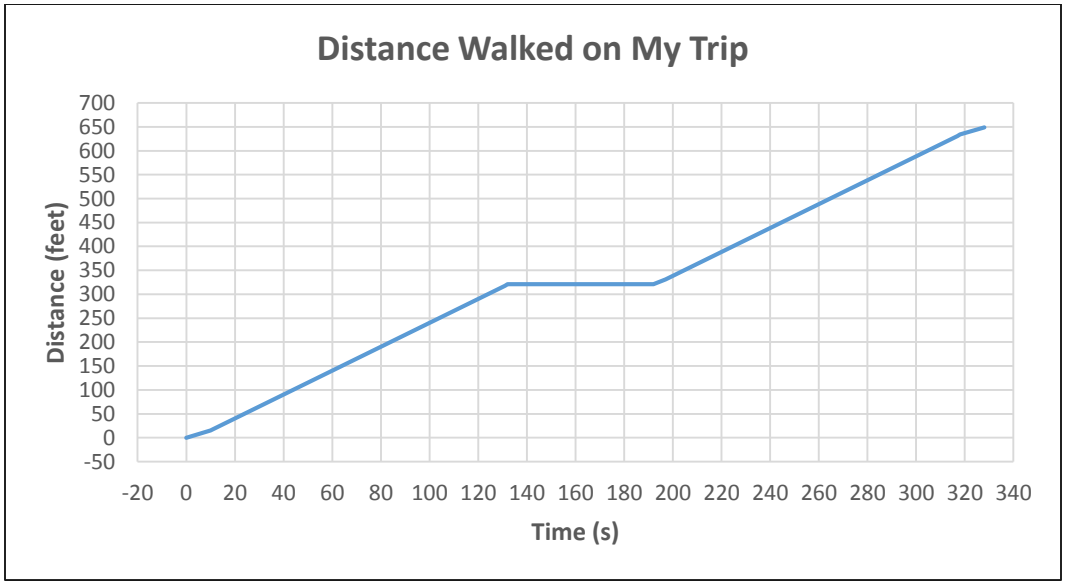
Action	**Approximate Distance**	**Approximate Time**
First walked at constant speed out my door and down the driveway	15 feet	10 seconds
I turned right at the sidewalk	1 step (3 feet)	1 second
Then walked at a constant speed	3 blocks (300 feet)	2 minutes (120 seconds)
I turned left	1 step (3 feet)	1 second
Then I stopped to wait for the light to change	0 feet	1 minute (60 seconds)
I sped up	Several steps (10 feet)	5 seconds
I walked at constant speed	3 blocks (300 feet)	2 minutes (120 seconds)
I turned left toward my friend's house	1 step (3 feet)	1 second
Finally, I slowed down until I stopped at her door	15 feet	10 seconds

2. Writing the trip from distance perspective:
   a. In bulleted form:
      - First walked at *constant speed* out my door and down the driveway for about 15 feet in about 10 seconds
      - I *turned right* at the sidewalk walking one step (about 3 feet) in about 1 second
      - Then I walked at a *constant speed* for 3 blocks (about 300 feet) in about 2 minutes
      - I *turned left* walking one step (about 3 feet) in about 1 second
      - Then I *stopped* to wait for the light to change for about 1 minute
      - I *sped up* over several steps (about 10 feet) in about 5 seconds
      - I walked at *constant speed* for 3 blocks (about 300 feet) in about 2 minutes
      - I *turned left* in one step (about 3 feet) toward my friend's house in about 1 second

- Finally, I *slowed down* for about 15 feet in about 10 seconds until I *stopped* at her door.

b. An example table and graph:

Time (seconds)	Total Time (seconds)	Distance (feet)	Total Distance (feet)
0	0	0	0
10	10	15	15
2	11	3	18
120	131	300	318
2	132	3	321
60	192	0	321
5	197	10	331
120	317	300	631
1	318	3	634
10	328	15	649

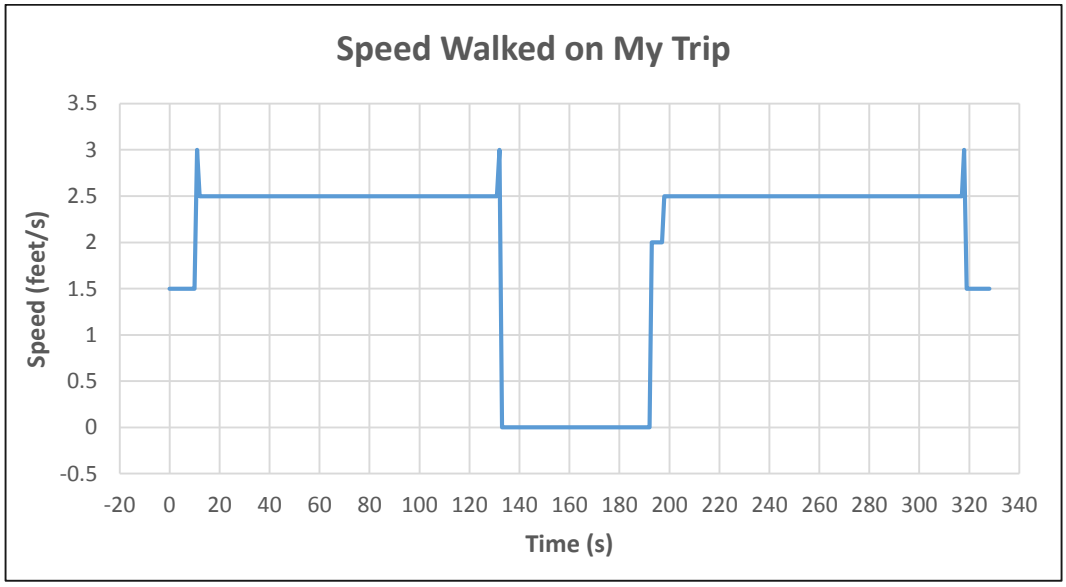


3. Writing the trip from speed perspective:
   a. In bulleted form:
      - First walked at *constant speed* out my door and down the driveway for about 15 feet in about 10 seconds
      - I *maintained this speed* when I turned right at the sidewalk walking one step (about 3 feet) in about 1 second
      - Then I continued to walk at a *constant speed* for 3 blocks (about 300 feet) in about 2 minutes
      - I *maintained this speed* when I turned left walking one step (about 3 feet) in about 1 second
      - Then I *decreased my speed suddenly before stopping* to wait for the light to change for about 1 minute
      - I *sped up* over several steps (about 10 feet) in about 5 seconds
      - I walked at *constant speed* for 3 blocks (about 300 feet) in about 2 minutes

- I *maintained my speed* while I turned left in one step (about 3 feet) toward my friend's house in about 1 second
- Finally, I *slowed down* for about 15 feet in about 10 seconds until I *stopped* at her door.

b. An example table and graph:

Time (seconds)	Speed (feet/s)
0	0
0-10	1.5
10-11	3
11-131	2.5
131-132	3
132-192	0
192-197	2
197-317	2.5
317-318	3
318-328	1.5

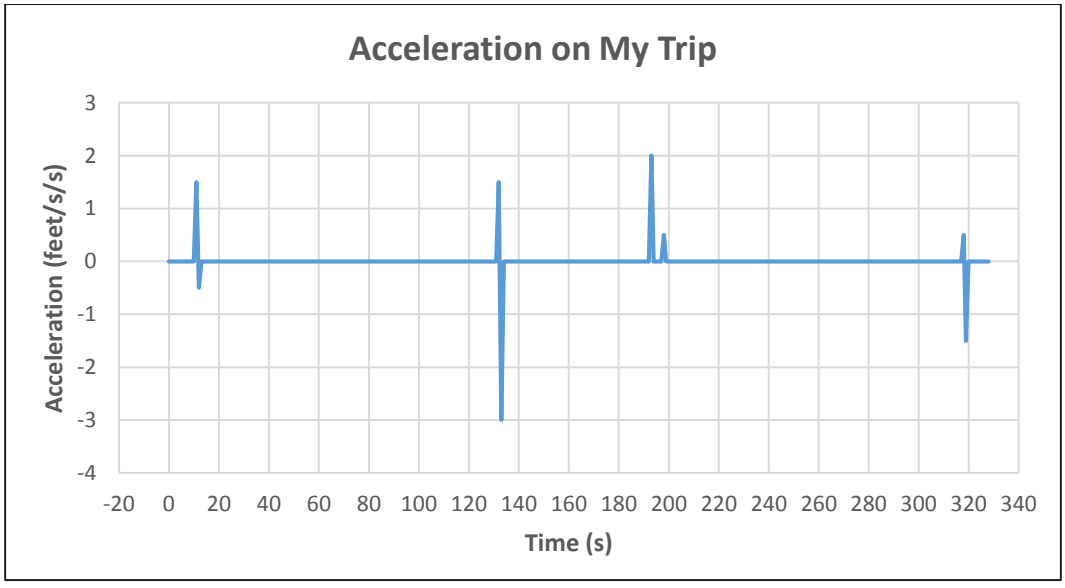


4. Writing the story from acceleration perspective:
   a. In bulleted form:
      - First I walked *with no acceleration* out my door and down my driveway (about 10 seconds)
      - I turned right *while accelerating slightly* at the sidewalk (about 1 second)
      - Then walked *with no change in acceleration* for about 3 blocks (about 2 minutes)
      - I turned left *while accelerating slightly* (about 1 second)
      - Then I *quickly decelerated* (about 2 seconds) to a stop (about 1 minute)
      - I *accelerated to reach constant walking speed* (about 5 seconds)
      - I walked *with no acceleration* for about 3 blocks (about 2 minutes)

- I turned left *while accelerating slightly* (about 1 second)
- Finally, I *decelerated slowly* (about 10 seconds) until I stopped at her door.

b. An example table and graph:

Time (seconds)	Acceleration (feet/s/s)
0	0
0-10	0
10-11	1.5
11-12	-0.5
12-131	0
131-132	1.5
132-133	-3
133-192	0
192-193	2
193-197	0
197-198	0.5
198-317	0
317-318	0.5
318-319	-1.5
319-328	0

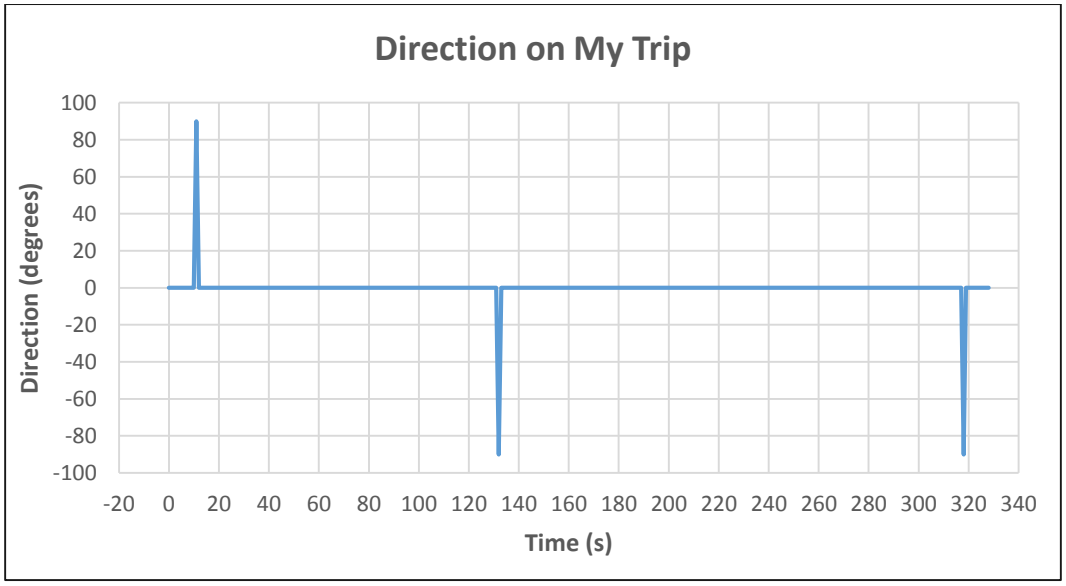


5. Writing the trip from direction perspective:
   a. In bulleted form:
      - First I walked **straight** out my door and down my driveway (about 10 seconds)
      - I **turned right** at the sidewalk (about 1 second)
      - Then walked **straight** for 3 blocks (about 2 minutes)
      - I **turned left** (about 1 second)

- Then I stopped **without turning** to wait for the light to change (about 1 minute)
- I sped up walking **straight** (about 5 seconds)
- I walked **straight** for 3 blocks (about 2 minutes)
- I **turned left** toward my friend's house (about 1 second)
- Finally, I slowed down while walking **straight** (about 10 seconds) until I stopped at her door.

b. An example table and graph:

Time (seconds)	Direction (degrees)
0	0
0-10	0
10-11	90
11-131	0
131-132	-90
132-317	0
317-318	-90
318-328	0



6. These stories can be used by struggling students as additional practice for graphing. Other adjustments may be made to challenge higher performing students and assist ELL students.
7. The basic skills of this task should not be altered in order to interpret the graphs for the simulation activity on day 3.
8. Students will need help with graphing. Provide examples of:
   a. Graph titles
   b. Labeling axes - both title and units
   c. Axes increments
9. For the speed and acceleration graphs, use the same time intervals as in the distance graph. Students can draw the basic shape of the graph. The velocity and acceleration

calculations from the *On the Move* activity and teacher notes may be used to calculate actual values, if desired.

10. Grade the homework with the following rubric:

Item/Score	0	1	2	3
Trip Rewrites (from each perspective)	Students did not attempt to write trip from each perspective.	Students attempted to write one or two perspectives, but not all. Student did not include all the necessary details.	Students attempted to write the trip in all three perspectives. Most of the necessary details were included.	Students wrote the trip from all three perspectives with few errors. Most or all of the necessary details were included.
Graphs	Students did not attempt to plot the data, label the axes or determine the best interval for time.	Students had numerous plotting, labeling, or interval errors in their graphs.	Students had some plotting, labeling, or interval errors in their graphs.	Students had few or no errors for each graphs.