Walking Dead Lab

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BRAINS

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Walking Dead Lab

Directions for Use:

This is a great introductory lab for students as they begin to study force and motion, particularly the concepts of speed, velocity, and acceleration. An additional page with teacher prep, instructions, and helpful tips has been included. Materials required to do this lab are: a long, straight hallway (around 30 meters) or area outdoors, measuring tape (with meter markings, 30 meters long), stopwatch, tape, washers or weighted objects that can be taped to the back of provided distance markers, pre-assembled distance markers with weights, student handouts, clipboard or hard writing surface for data recorders.

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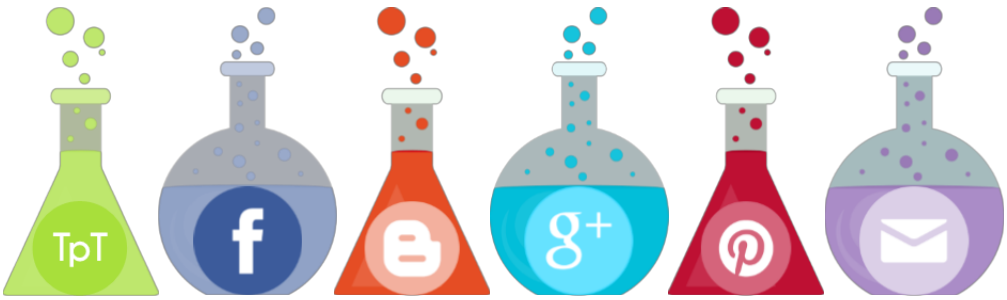


Walking Dead Lab - Teacher Instructions

Ahead of time:

1) Print out distance markers on brightly colored cardstock and laminate (optional). Tape a metal washer (or other weighted object) to the back of each distance marker.

2) Print job cards and walking cards on cardstock (laminate for durability).

3) Make copies of the 4 data pages and the conclusion questions for each student.

4) Gather materials needed: measuring tape, timing device, secure area for "track" (make sure you have a location for students to perform the lab. If weather permits, I would highly recommend taking the students outside on a flat, concreted area. This allows for multiple groups to perform the lab without interfering with each other.)

5) Depending on class sizes, pre-determine whether you will need one group or two groups to perform the lab. The recommended group size is 11-13 students. The more students you include in a group, the more difficult it will be to keep students on task and prevent crowding around the measuring tape with the distance markers.

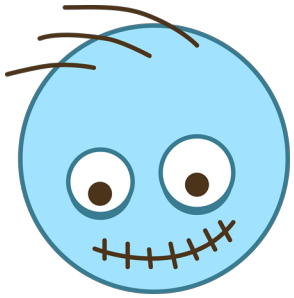
   You will need: 1 timer, 1-3 recorders, 4 walkers, 5-7 distance markers

6) Before going outside, make sure that students understand what their individual job is and walkers understand how to walk. I recommend having the timer be a responsible student who has a loud voice. The recorder(s) should be someone who is responsible and can read the measuring tape accurately. There should be 5-7 distance markers (1st person can be in charge of 2 & 4 seconds, next person in charge of 6 & 8 seconds, etc...). If you don't have enough students to have 5 distance markers, you could have the walkers (who aren't walking at that moment) to serve as a distance marker.

7) Data collection can take 30-40 minutes. After returning to the classroom, post the data recorder's paper under a document camera (if available) so that the rest of the class can copy down the information.

8) In most cases (assuming 40-55 minute class periods), two days are needed to complete the lab. Day 2 can be used to allow students to make line graphs for each of the sets of data.

9) Allow students to discuss and compare their graphs. Have a class discussion to clarify any misconceptions before handing out the conclusion questions.

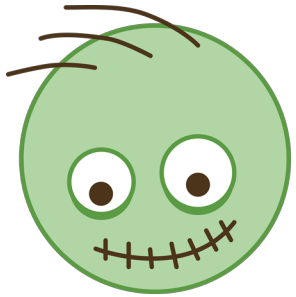


Time Keeper

Your job is to keep track of the time using a timing device. Announce the time every 2 seconds (ex: Ready, set, go, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20).

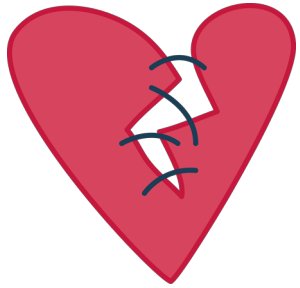
Data Recorder

Your job is to record the distance of each marker on the data tables provided. You will need a pencil, a clipboard or other firm surface to write on, & the data tables for all 4 walkers.



Walker

Follow the walking directions on your walking card. If you don't understand something, ask your teacher for clarification.



Distance Marker

Your job is to use the small distance markers to indicate the distance traveled by the walker at a specific time. Gently place the markers down along the track when you hear your time announced by the time keeper. You may need to assist the recorder in determining the distance traveled.

Walker #1

Start at 0 meters. Slowly walk at a constant, steady speed, heel-to-toe for the entire 20 seconds.

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Walker #2

Start at 0 meters. Very slowly walk heel-to-toe. At 8 seconds go a bit faster and at 16 seconds go as fast as you can until 20 seconds. (Make sure you have 3 obviously different speeds.)

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Walker #3

Start at 0 meters. Slowly walk heel-to-toe. At 8 seconds stop. When 16 seconds is announced, walk very quickly with long steps until 20 seconds.

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Walker #4

Start at 0 meters. Walk quickly with long steps until 6 seconds. Stop from 6 to 12 seconds (while you are stopped, pivot around on one foot). At 12 seconds, begin walking slowly, heel-to-toe, back towards the beginning of the track.

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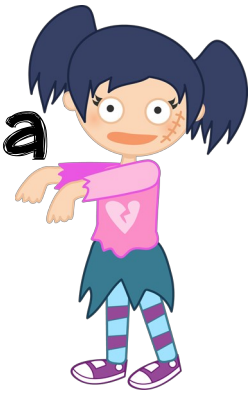
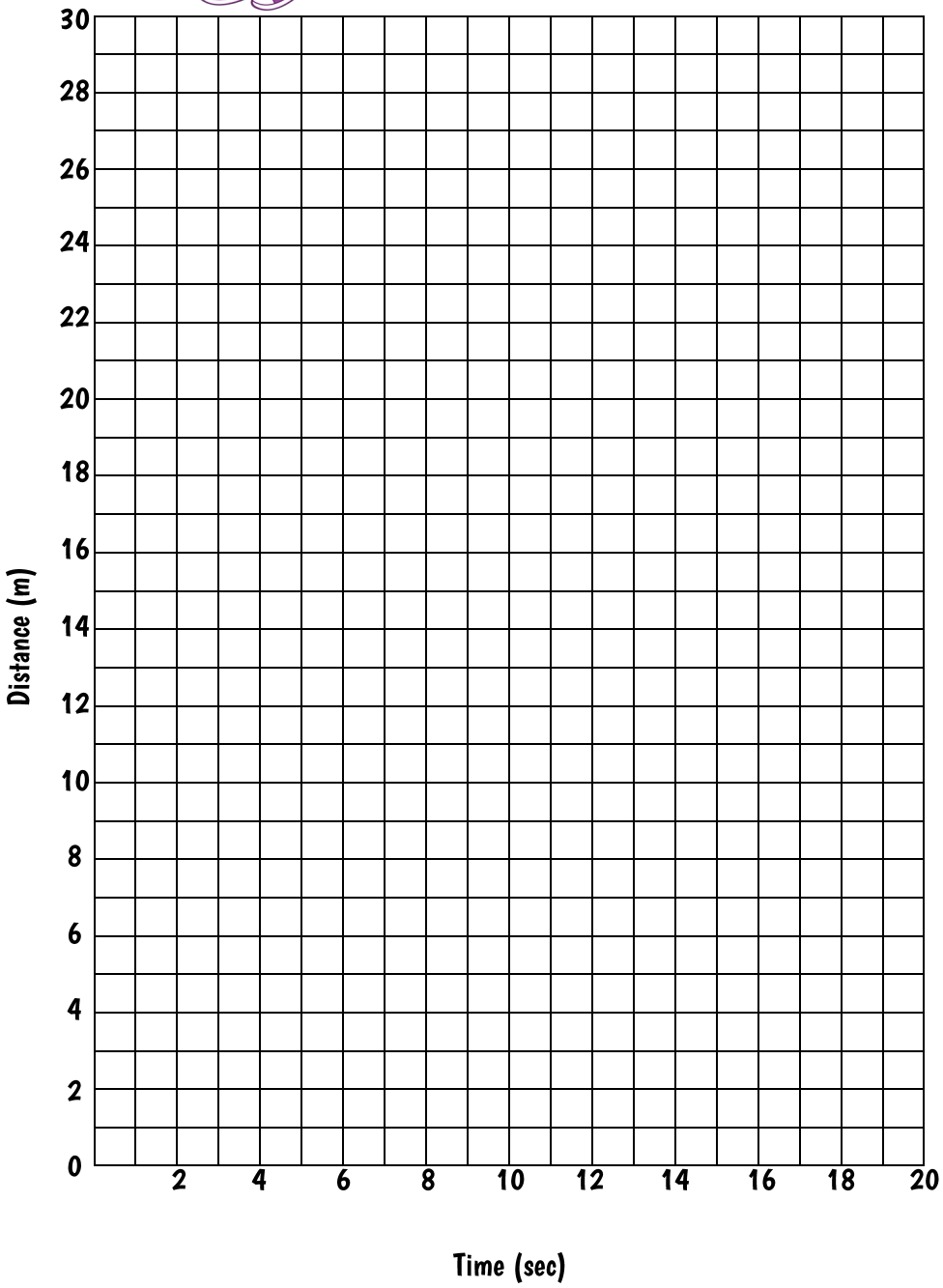
0 seconds	2 seconds	4 seconds
6 seconds	8 seconds	10 seconds
12 seconds	14 seconds	16 seconds
18 seconds	20 seconds	**Distance markers** Tape a weight on the back of each of these cards, such as a metal washer, so that when they are placed along the track, they won't move. It is also recommended that you print these on brightly colored paper (yellow) and laminate for durability.

Walker #1 Data



Time (s)	Distance (m)
0	
2	
4	
6	
8	
10	
12	
14	
16	
18	
20	



Walker #2 Data

Time (s)	Distance (m)
0	
2	
4	
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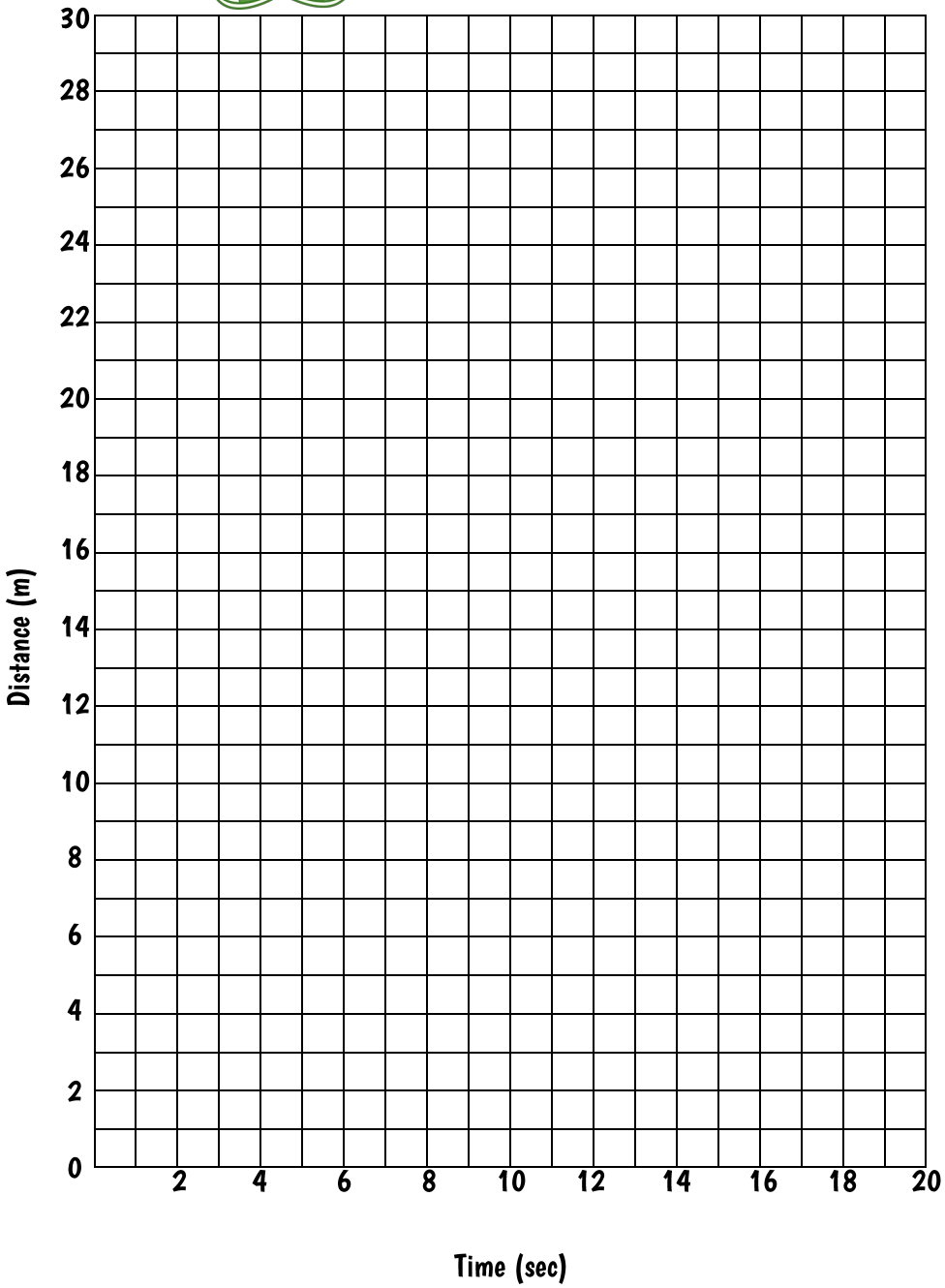
10	
12	
14	
16	
18	
20	



Walker #3 Data

Time (s)	Distance (m)
0	
2	
4	
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16	
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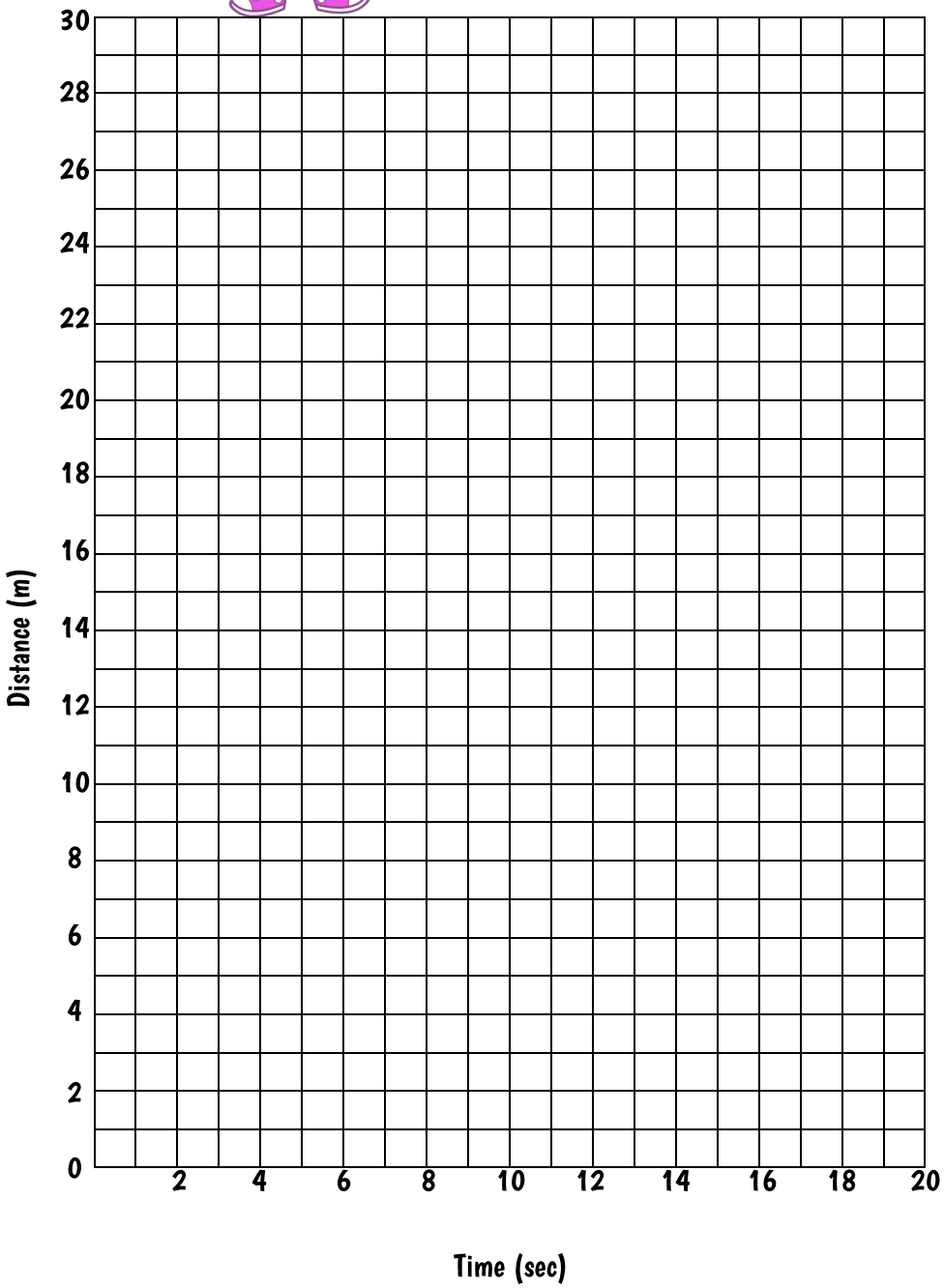

Walker #4 Data

Time (s)	Distance (m)
0	
2	
4	
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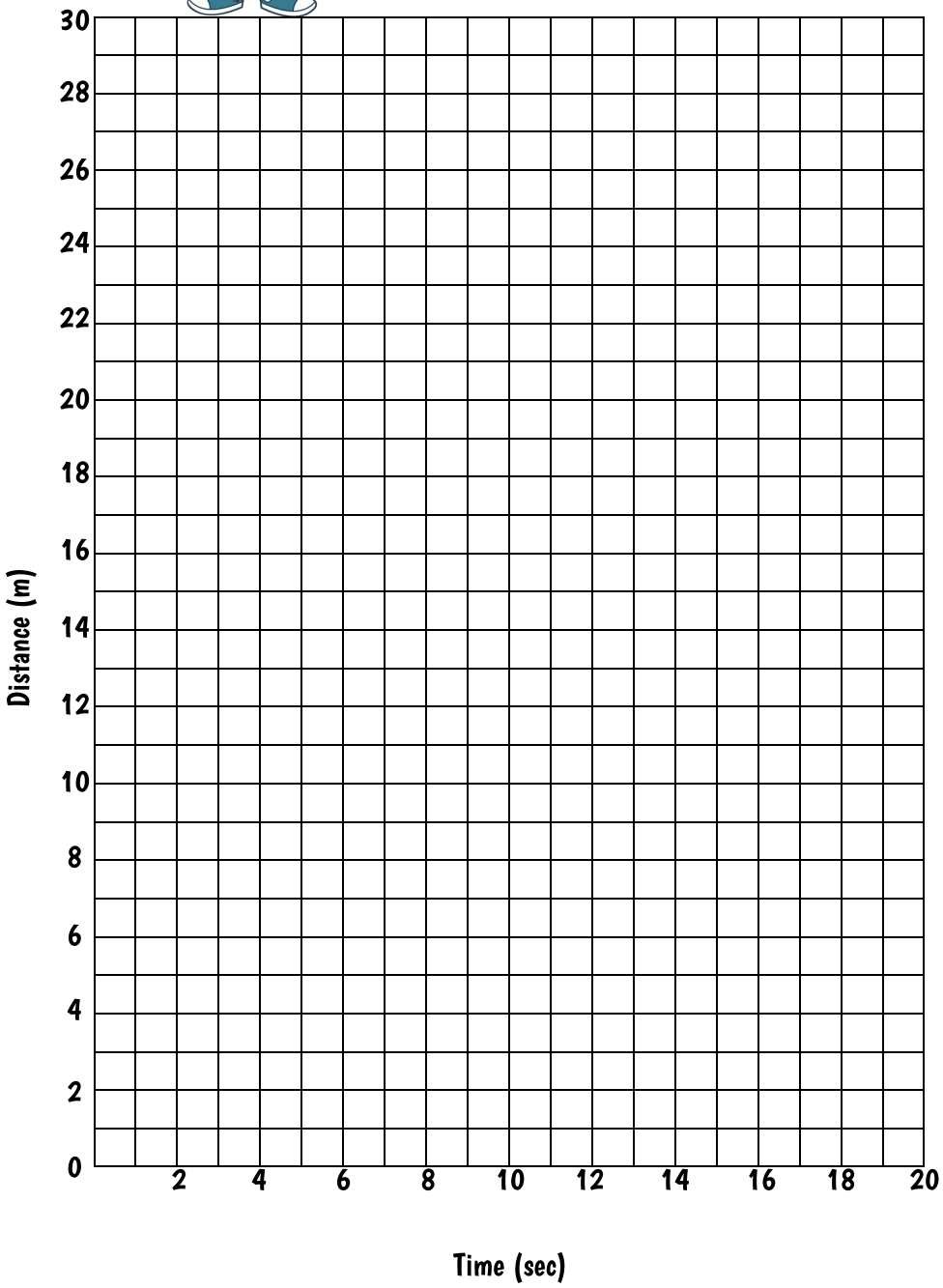
16	
18	
20	



Name _____ Date _____

Walking Dead Lab
Conclusion Questions

Answer in complete sentences using the 4 graphs.

1) In graph 1, does the speed of the walker change? Explain.

2) Describe what a constant speed looks like on a line graph.

3) In graph 2, does the speed of the walker change? If so, how?

4) Describe what this change in speed looks like on the graph (graph 2).

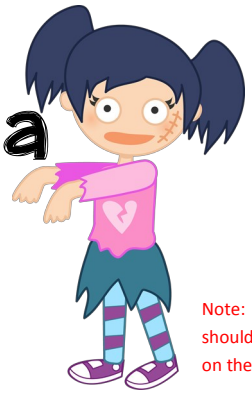
5) In graph 3, does the speed of the walker change? If so, how?

6) Describe what the graph looked like when walker #3 was stopped.

7) In graph 4, does the speed of the walker change? If so, how?

8) In which graph does the walker change directions? How does this look on a graph?

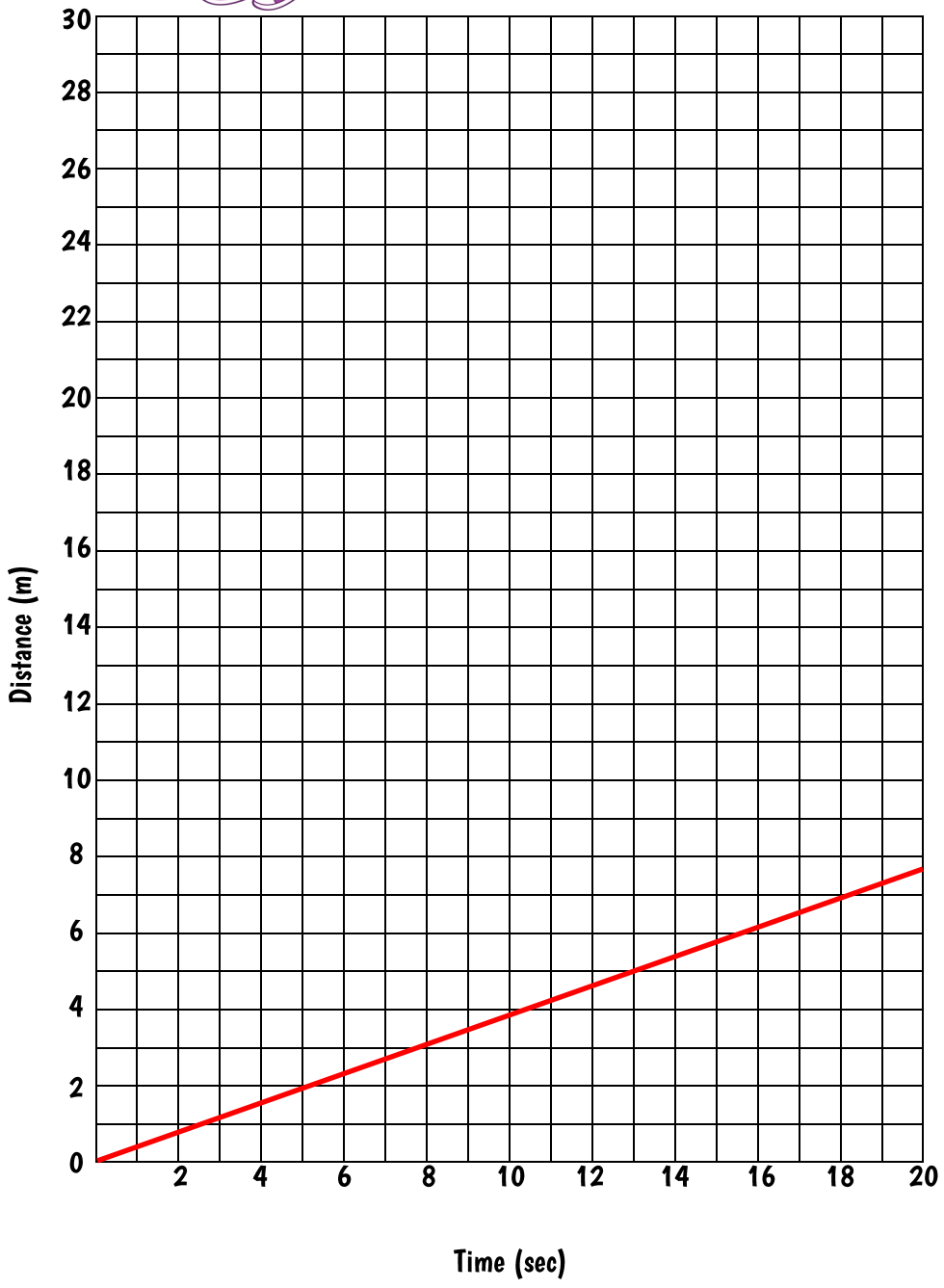
Walker #1 Data



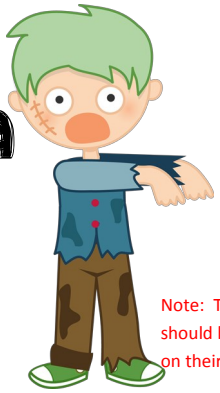
Teacher Answer Key

Note: The graphs shown are only meant to show the general shape that the line should have. Depending on the data collected, students will see slight variations on their graphs.

Time (s)	Distance (m)
0	
2	
4	
6	
8	
10	
12	
14	
16	
18	
20	



Walker #2 Data



Teacher Answer Key

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Time (s)	Distance (m)
0	
2	
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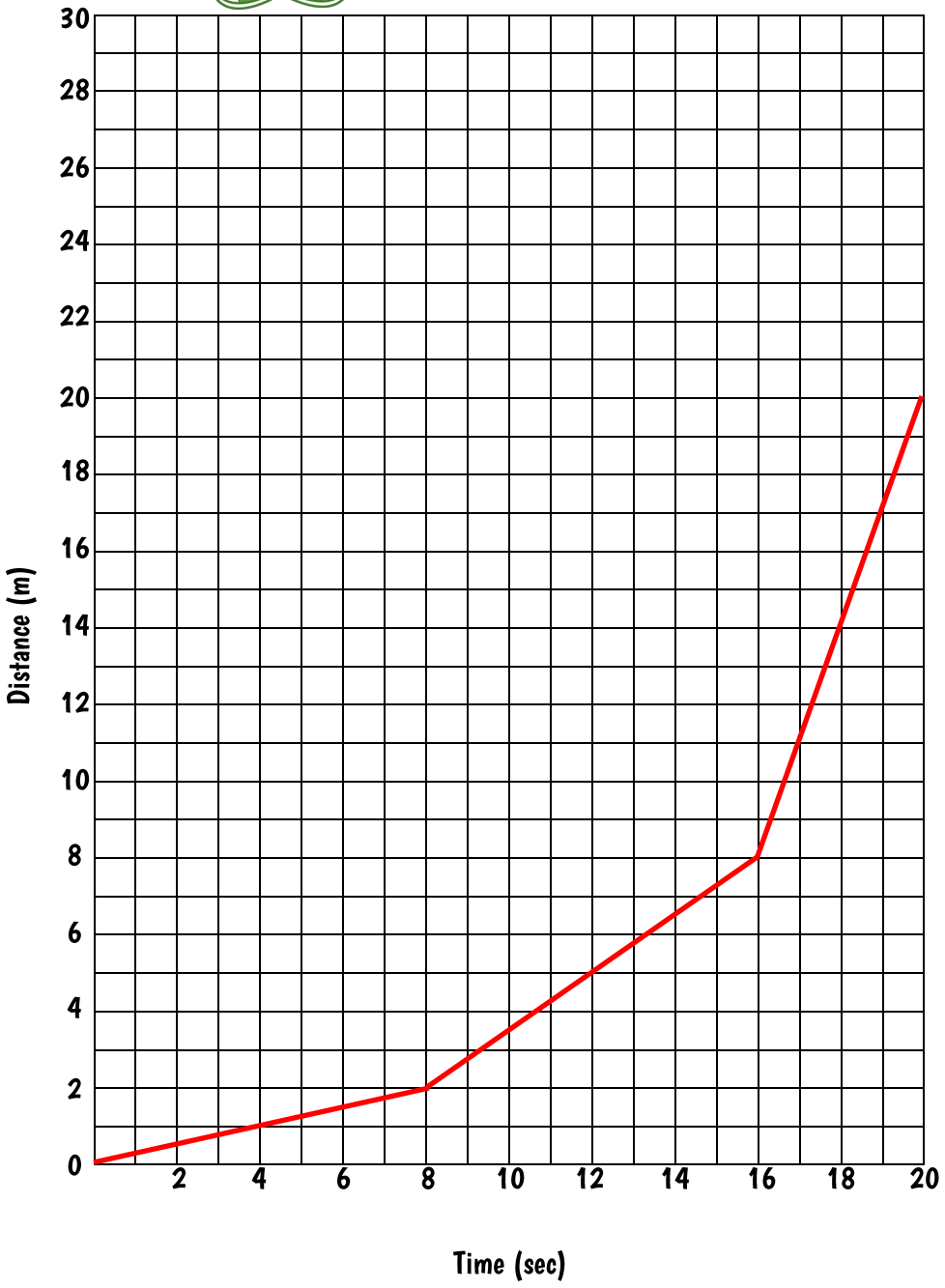
16	
18	
20	



Walker #3 Data

Teacher Answer Key

Note: The graphs shown are only meant to show the general shape that the line should have. Depending on the data collected, students will see slight variations on their graphs.

Time (s)	Distance (m)
0	
2	
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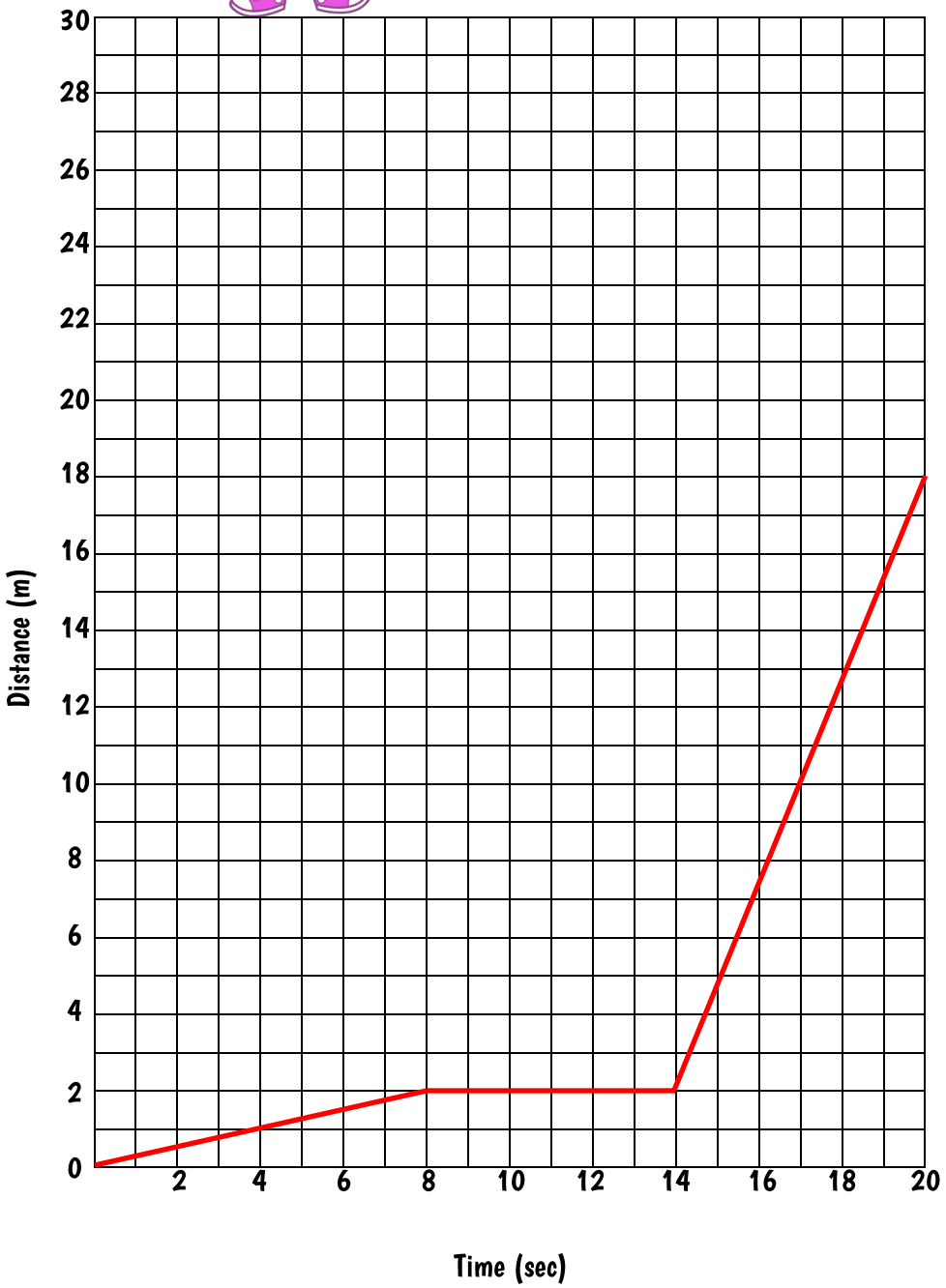
20	



Walker #4 Data

Teacher Answer Key

Note: The graphs shown are only meant to show the general shape that the line should have. Depending on the data collected, students will see slight variations on their graphs.

Time (s)	Distance (m)
0	
2	
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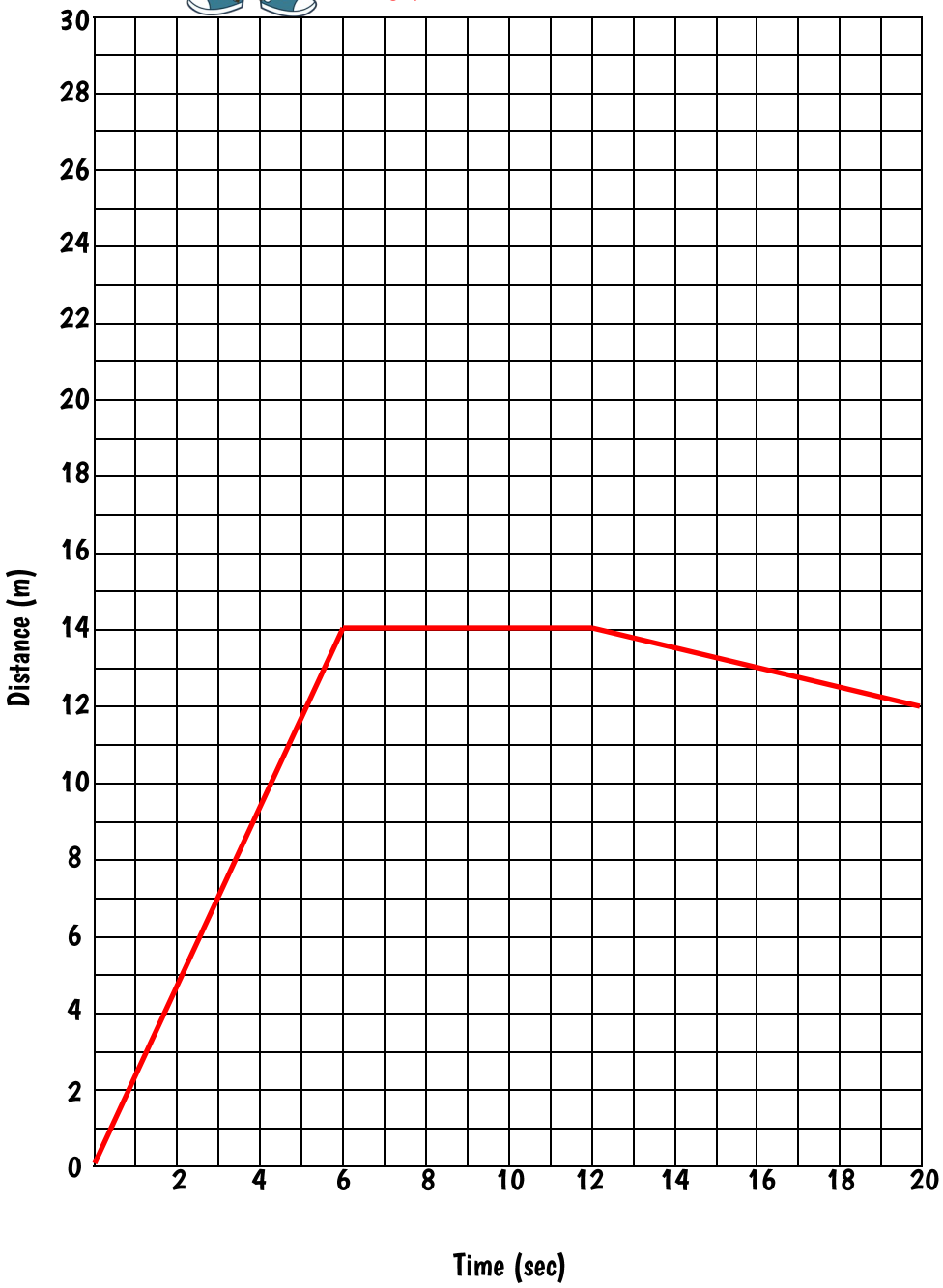

Name _____ Date _____

Walking Dead Lab
Conclusion Questions

Answer in complete sentences using the 4 graphs.

1) In graph 1, does the speed of the walker change? Explain.

In most cases you will see that the line on the graph is NOT a perfectly straight line. This would be a good time to discuss how difficult it may be for a human to maintain a perfectly constant speed throughout the 20 seconds of data collection. Therefore, Walker #1's graph DOES show a slight change in speed.

2) Describe what a constant speed looks like on a line graph.

A constant speed is represented by a perfectly straight line. (Note: Students can check to see if a line is straight by holding a ruler up to the line to verify.)

3) In graph 2, does the speed of the walker change? If so, how?

Yes, the speed changes. Walker #2 started out slowly, then walked at a medium speed, then a fast speed. Walker #2 was increasing in speed throughout the 20 seconds (he/she was accelerating).

4) Describe what this change in speed looks like on the graph (graph 2).

This acceleration is represented on the graph by a line that starts out nearly horizontal, then quickly curves up. (line curving upwards)

5) In graph 3, does the speed of the walker change? If so, how?

Yes, the speed changes. Walker #3 started out slowly, then stopped, then continued at a fast speed.

6) Describe what the graph looked like when walker #3 was stopped.

When walker #3 stopped, the line was a horizontal, straight line.

7) In graph 4, does the speed of the walker change? If so, how?

Yes, the speed changes. Walker #4 started out at a high speed, then stopped, then turned around and walked at a very low speed back towards the start.

8) In which graph does the walker change directions? How does this look on a graph?

In graph #4 the walker changed directions (started walking back towards the beginning of the track). This is shown on the graph with a downward sloping line.