# comparing rates of change

Earlier in this unit, we investigated money earned by students participating in a walkathon. In this investigation, we will look at the effect a walking rate has on the relationship between time walked and distance walked. Below are the walking rates for Gilberto, Alana, and Leanne during the walkathon.

Name	Walking Rate
Alana	1 meter per second
Gilberto	2 meters per second
Leanne	2.5 meters per second

1. Fill in the table showing the distance walked by each student for the first 10 seconds.

Time (seconds)	Distance (meters)		
	Alana	Gilberto	Leanne
0	0	0	0
1	1	2	2.5
2	2	4	5
3	3	6	7.5
4	4	8	10
5	5	10	12.5
6	6	12	15
7	7	14	17.5
8	8	16	20
9	9	18	22.5
10	10	20	25

2. Plot those points on the graph using a different color for each of the three students. Use Pink for Alana, Blue for Gilberto, and Green for Leanne.
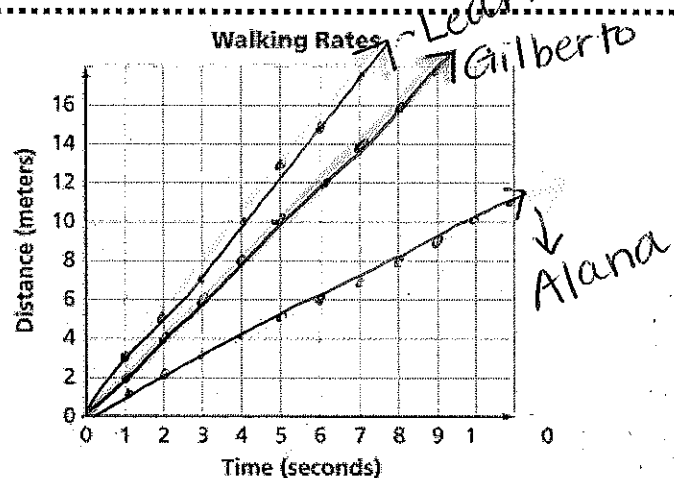
3. How does walking rate appear in the table?
   It is how much the distance increases for each second.

4. How does walking rate affect the graph?
   The faster your walking rate, the steeper your line.

5. Do the walking rates represent a linear relationship? Explain how you know.
   Yes, the rate of change is constant & graph is a line.

6. Write an equation that gives the relationship between the time (t) and the distance (d) walked for each student.

Alana's Equation: $d = 1t$

Gilberto's Equation: $d = 2t$

Leanne's equation: $d = 2.5t$

7. How is the walking rate represented in the equations?

It is the m in
$y = mx$
dep. var. — ind. var.
↑
rate of change

8. If Gilberto doubled his walking rate, how would his graph change?

The line would be steeper.

9. Two other friends made table representations of their walking data. Is either of these relationships linear? Explain.

George's Walking Rate

Time (seconds)	Distance (meters)
0	0 → +2
1	2 → +7
2	9
3	11
4	20
5	25

Elizabeth's Walking Rate

Time (seconds)	Distance (meters)
0	0 → +3
+2 ⟨ 2	3 → +3
+2 ⟨ 4	6 → +3
6	9
8	12
10	15

Answer

Elizabeth's is linear because her rate of change is constant +3 meters / 2 sec. or 1.5m / 1 sec.

10. Billie wrote an equation to represent his walking rate. From the information given, determine if the walking rate is linear. Yes because $y = mx$ means his rate is 2.25 m/second.

Billie's Walking Rate
$D = 2.25t$

D represents distance
t represents time

Alana 1 m/sec
Gilberto 2 m/sec
Leanne 2.5 m/sec
Elizabeth 1.5 m/sec
Billie 2.25 m/sec

Putting it all together: Using the walking rates given for Alana, Gilberto, Leanne, Elizabeth, and Billie, rank the students in order of slowest to fastest walking rate.

Alana, Elizabeth, Gilberto, Billie, Leanne
↓   1.5m/s   2m/sec   2.25m/s   2.5m/s
1m/s