Moving Straight Ahead
Investigation 1: Walking Rates

Problem 1.1 Finding and Using Rates

A. What is your walking rate in meters per second?
   *Hint: Start with your walking rate in seconds per 10 meters

B. Assume you continue to walk at this constant rate.
1. How long would it take you to walk 500 meters?

2. How far could you walk in 30 seconds?

In 10 minutes?

In 1 hour?

3. Describe in words the distance in meters you could walk in a given number of seconds.

4. Write an equation that represents the distance d in meters that you could walk in t seconds if you maintain this pace.

5. Use the equation to predict the distance you would walk in 45 seconds.

Problem 1.2 Linear Relationships in Tables, Graphs, and Equations

Here are the walking rates that Gilberto, Alana, and Leanne found in their experiment.

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

A. 1. Make a table showing the distance walked by each student for the first ten seconds. How does the walking rate affect the data?

Time	1	2	3	4	5	6	7	8	9	10
Alana										
Gilberto										
Leanne										

2. Graph the time and distance on the same coordinate axes. Use a different color for each student's data.
How does the walking rate affect the graph?

3. Write an equation that gives the relationship between the time t and the distance d walked for each student. How is the walking rate represented in the equations?
Alana's Equation:

Gilberto's Equation:

Leanne's Equation

B. For each student:
1. If t increases by 1 second, by how much does the distance change?
   Alana: **Gilberto:**

   Leanne:

How is this change represented in a table?

Alana:

Gilberto:

Leanne:

In a graph?

Alana:

Gilberto:

Leanne:

2. If t increases by 5 seconds, by how much does the distance change?

Alana: **Gilberto:**

Leanne:

3. What is the walking rate per minute?

Alana: **Gilberto:**

Leanne:

The walking rate per hour?

Alana: **Gilberto:**

Leanne:

C. Four other friends who are part of the walkathon made the following representations of their data. Are any of these relationships linear relationships? Explain.

George's Walking Rate	
Time (seconds)	Distance (meters)
0	0
1	2
2	9
3	11
4	20
5	25

Elizabeth's Walking Rate	
Time (seconds)	Distance (meters)
0	0
2	3
4	6
6	9
8	12
10	15

Billie's Walking Rate
$$D = 2.25t$$
D represents distance
t represents time

Bob's Walking Rate
$$t = \frac{100}{r}$$
t represents time
r represents walking rate

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Each student found sponsors who are willing to pledge the following amounts.
• Leanne's sponsors will pay $10 regardless of how far she walks.
• Gilberto's sponsors will pay $2 per kilometer (km).
• Alana's sponsors will make a $5 donation plus 50¢ per kilometer.
The class refers to these as pledge plans.

A. 1. Make a table for each student's pledge plan, showing the amount of money each of his or her sponsors would owe if he or she walked distances from 0 to 6 kilometers.

Distance	0	1	2	3	4	5	6
Leanne							
Gilberto							
Alana							

2. Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.

What are the dependent and independent variables?

3. Write an equation for each pledge plan. Explain what information each number and variable in your equation represents.
Leanne:

 Gilberto:

Alana:

4. a. What pattern of change for each pledge plan do you observe in the table?

Leanne:

 Gilberto:

Alana:

b. How does this pattern appear in the graph?

Leanne:

 Gilberto:

Alana:

   In the equation?

Leanne:

 Gilberto:

Alana:

B. 1. Suppose each student walks 8 kilometers in the walk-a-thon. How much does each sponsor owe?

Leanne: **Gilberto:**

Alana:

2. Suppose each student receives $10 from a sponsor. How many kilometers does each student walk?

Leanne: **Gilberto:**

Alana:

3. On which graph does the point (12, 11) lie?

What information does this point represent?

4. In Alana's plan, how is the fixed $5 donation represented in …

a. the table?

b. the graph?

c. the equation?

C. Gilberto decides to give a T-shirt to each of his sponsors. Each shirt costs him $4.75. He plans to pay for each shirt with some of the money he collects from each sponsor.
1. Write an equation that represents the amount of money Gilberto makes from each sponsor after he has paid for the T-shirts.

Explain what information each number and variable in the equation represents.

2. Graph the equation for distances from 0 to 5 kilometers.

Distance	0	1	2	3	4	5
Glilberto						

3. Compare this graph to the graph of Gilberto's pledge plan in Question A, part (2).

Problem 1.4 Recognizing Linear Relationships

Ms. Chang's class decides to use their money from the walkathon to provide books for the children's ward at the hospital. They put the money in the school safe and withdraw a fixed amount each week to buy new books. To keep track of the money, Isabella makes a table of the amount of money in the account at the end of each week.

Week	Amount of Money at the End of Each Week
0	$144
1	$132
2	$120
3	$108
4	$96
5	$84

A. 1. How much money is in the account at the start of the project?

2. How much money is withdrawn from the account each week?

3. Is the relationship between the number of weeks and the amount of money left in the account a linear relationship? Explain.

4. Suppose the students continue withdrawing the same amount of money each week. Sketch a graph of this relationship.

5. Write an equation that represents the relationship. Explain what information each number and variable represents.

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B. Mr. Mamer's class also raised money from the walkathon. They use their money to buy games and puzzles for the children's ward. Sade uses a graph to keep track of the amount of money in their account at the end of each week.

Money in Mr. Mamer's Class Account
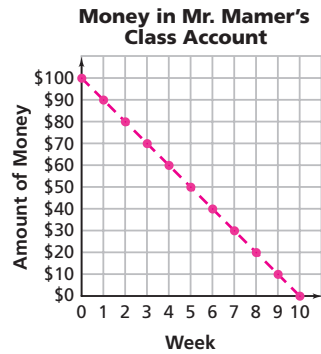
1. What information does the graph represent about the money in Mr. Mamer's class account?

2. Make a table of data for the first 10 weeks.

Week	1	2	3	4	5	6	7	8	9	10
Money										

Explain why the table represents a linear relationship.

3. Write an equation that represents the linear relationship.

Explain what information each number and variable represents.

C. How can you determine if a relationship is linear from a…
Graph-

 Table-

Equation-

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