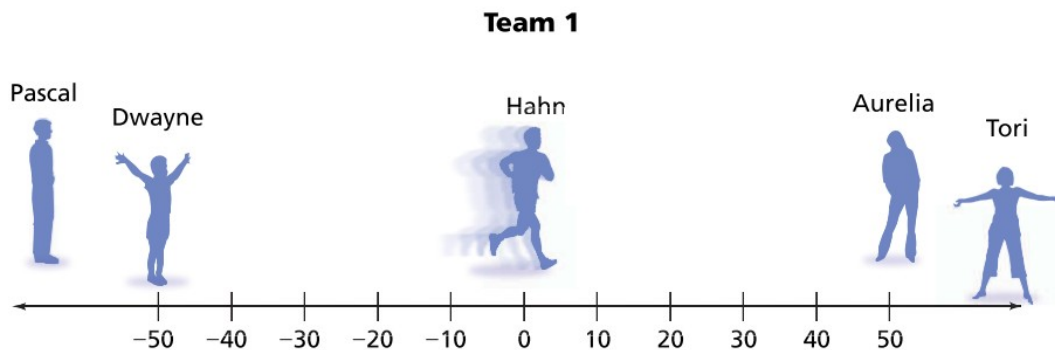


3.1 Multiplication Patterns With Integers

The math department at Everett Middle School sponsors a contest called the Number Relay Race. A number line measured in meters is drawn on the school field. Each team has five runners. Runners 1, 3, and 5 stand at the -50 -meter line. Runners 2 and 4 stand at the 50 -meter line.



For Team 1:

- Hahn starts and runs from -50 to 50 . He tags Aurelia.
- Aurelia runs back from 50 to -50 . She tags Dwayne.
- Dwayne runs from -50 to 50 . He tags Tori.
- Tori runs from 50 to -50 . She tags Pascal.
- Pascal runs from -50 to the finish line at position 0 .

Team 2 does the same with its 5 runners. Both teams line up on the same number line and start the race at the same time.

The team whose final runner reaches the 0 point first wins.



Problem 3.1

- A** 1. Write and solve a number sentence for each situation. Use positive numbers for running speeds to the right, and use negative numbers for running speeds to the left. Use positive numbers for time in the future, and use negative numbers for time in the past. (Note: Each runner runs at a constant speed.)
- Hahn passes the 0 point running 5 meters per second to the right. Where will he be 6 seconds later?
 - Aurelia passes the 0 point running to the left at 6 meters per second. Where will she be 8 seconds later?
 - Dwayne passes the 0 point running 4 meters per second to the right. Where was he 6 seconds earlier?
 - Tori passes the 0 point running to the left at 5 meters per second. Where was she 7 seconds earlier?
2. Determine whether the answer to each situation in part (1) is to the left or right of zero.
- B** Kalman wants to use red and black chips to model the relay race. He draws the following chip board to represent Aurelia's part of the race. How does this chip board relate to your work on Aurelia's part of the relay race? Explain.



Problem 3.1 *continued*

- C** 1. After studying the relay race problem, some students started looking for number patterns to see if what they found in the race made sense. How do the products change as the numbers multiplied by 5 decrease?

$$5 \cdot 3 = 15$$

$$5 \cdot 2 = 10$$

$$5 \cdot 1 = 5$$

$$5 \cdot 0 = 0$$

2. Predict the following products. Explain your reasoning.

$$5 \cdot (-1) = \blacksquare$$

$$5 \cdot (-2) = \blacksquare$$

$$5 \cdot (-3) = \blacksquare$$

- D** 1. Find each product. How do the products change as the numbers multiplied by -4 decrease?

$$-4 \cdot 3 = \blacksquare$$

$$-4 \cdot 2 = \blacksquare$$

$$-4 \cdot 1 = \blacksquare$$

$$-4 \cdot 0 = \blacksquare$$

2. Predict the following products. Explain your reasoning.

$$-4 \cdot (-1) = \blacksquare$$

$$-4 \cdot (-2) = \blacksquare$$

$$-4 \cdot (-3) = \blacksquare$$

- E** 1. The product $-4(-12)$ represents the location of a runner in the Number Relay. What question does the product answer? What location does it specify?
2. The product $4(-12)$ represents the location of a runner in the Number Relay. What question does the product answer? What location does it specify?
3. How do the locations in parts (1) and (2) relate to each other?

A C E Homework starts on page 66.