

6.5 Applications of Linear Systems (D3)

SWBAT translate a wind and current word problem into a system of linear equations and solve.

When a plane travels from west to east across the United States, the steady west-to-east winds act as tailwinds. This increases the plane's speed relative to the ground. When a plane travels from east to west, the winds act as headwinds. This decreases the plane's speed relative to the ground.

From West to East

From East to West

Solving a Wind and Current Problem

Step 1: _____ the problem

Step 2: Underline or _____ the _____

Step 3: Define the _____ (they are found in the question)

Step 4: Reread the problem and _____
(one with wind or current and one without wind or current)

Step 5: Solve the equation using _____.

1. A traveler flies from Charlotte, North Carolina, to Los Angeles, California. At the same time, another traveler flies from Los Angeles to Charlotte. The air speed of each plane is the same. The ground speeds are shown. What is the air speed? What is the wind speed?

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

2. You row upstream at a speed of 2 mi/h. You travel the same distance downstream at a speed of 5 mi/h. What would be your rowing speed in still water? What is the speed of the current?

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

3. A boat is traveling in a river with a current that has a speed of 1.5 km/h. In one hour, the boat can travel twice the distance downstream as it can travel upstream. What is the boat's speed in still water?

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

4. A barge travels 32 miles up a river in 4 hours. He spends an hour unloading his cargo then begins the return trip. It takes 2 hours for him to get back. Find the rate of the current.

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

5. It took a plane 50 minutes to fly the 330km from Washington, DC, to New York against the wind. The return trip with the wind took 5 minutes less. Find the speed of the plane in still air and the wind speed in kilometers per hour.

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

6. A plane flew for 4 hours against a 50-mph wind. It then flew for 3 hours with the same wind. Find the rate of the plane in still air and the total distance it traveled.

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

7. Lindsay can row 10 km/h in still water. She rowed downstream for 4 hours. The return trip upstream took 6 hours. How far did she row in all?

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

8. A swamp buggy goes 18 kilometers downstream in 4 ours. It goes the same distance upstream in 6 hours. Find the speed of the swamp buggy in still water and the speed of the current.

Set Up:

Let _____ = _____

Let _____ = _____

Solve

Table:

	rate	time	distance

9. A canoeist travels with the current at 17 km/h and travels against the current at 6 km/h. Find the canoe's rate in still water and the rate of the current.

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

10. It took a plane 50 minutes to fly the 330 km from Washington, DC, to New York against the wind. The return trip with the wind took 5 minutes less. Find the speed of the plane in still air and the wind speed.

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

11. Brianna can row 4 miles per hour in still water. It takes as long to row 8 miles upstream as 24 miles downstream. How fast is the current?

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

12. A boat can go 20 miles against a current in the same time that it can go 60 miles with the current. The current is 4 miles per hour. Find the speed of the boat with no current.

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

13. A boat goes 210 miles downriver in the same time it can go 140 miles upriver. The speed of the current is 5 miles per hour. Find the speed of the boat in still water.

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

14. The Russian River has a current of 3 miles per hour. A motorboat takes the same amount of time to go 12 miles downstream as it takes to go 8 miles upstream. What is the speed of the boat in still water?

Set Up:

Let _____ = _____

Let _____ = _____

Solve:

Table:

	rate	time	distance

15. CHALLENGE: In still water, a speedboat travels 5 times faster than the current of the river. If the speed boat can travel 48 miles upstream and ten back in 5 hours, find the rate of the current.

Set Up:

Let _____ = _____

Let _____ = _____

Table:

	rate	time	distance