

Word Problem on Systems of Linear Equations: Problem Type 3

• Example 1

Flying against the jetstream, a jet travels 5400 km in 9 hours. Flying with the jetstream, the same jet travels 7840 km in 8 hours. What is the speed of the jet in still air, and what is the speed of the jetstream?

We first make a list of the data provided in the problem. We denote by x the speed in km/h of the jet in still air and y the speed in km/h of the jetstream:

Distance covered when flying against the jetstream:	5400 km
Time taken for that distance:	9 hours
Distance covered when flying with the jetstream:	7840 km
Time taken for that distance:	8 hours
Jet speed in still air:	x km/h
Jetstream speed:	y km/h

We know that

$$\frac{\text{Distance}}{\text{Time}} = \text{Speed}.$$

Thus, the speed of the jet when flying against the jetstream is $\frac{5400}{9} = 600$ km/h, and the speed of the when flying with the jetstream is $\frac{7840}{8} = 980$ km/h.

The problem can now be written as a pair of linear equations:

$$\begin{aligned} x - y &= 600 \\ x + y &= 980. \end{aligned}$$

Where x and y are the values to be found.

Solving the equations, we find $x = 790$ and $y = 190$.

Thus, the speed of the jet in still air is 790 km/h and the speed of the jetstream is 190 km/h.

• • • CHECK YOURSELF 1

A plane flies 480 mi in an easterly direction, with the wind, in 4 h. Returning westerly along the same route, against the wind, the plane takes 6 h. What is the rate of the plane in still air? What is the rate of the wind?

● ● ● CHECK YOURSELF ANSWER

1. 100 mi/h plane and 20 mi/h wind.
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2.35 Exercises

Name _____

Section _____

Date _____

A N S W E R S

Solve each motion problem.

1. **Motion.** A boat traveled 36 mi up a river in 3 h. Returning downstream, the boat took 2 h. What is the boat's rate in still water, and what is the rate of the river's current?

1. _____

2. _____

3. _____

4. _____

2. **Motion.** A jet flew east a distance of 1800 mi with the jetstream in 3 h. Returning west, against the jetstream, the jet took 4 h. Find the jet's speed in still air and the rate of the jetstream.

3. **Motion.** Ondine swam 2 mi up a river in 1 h. Returning downstream, she took $\frac{1}{2}$ h. What is her swimming rate in still water, and what is the rate of the current?

4. **Motion.** A plane flew east a distance of 600 mi with the wind in 2 h. Returning west, against the wind, the plane took 3 h. Find the plane's speed in still air and the speed of the wind.