

Do Now

Solve.

- 1) Find the distance you travel if you go 55 mi/h for 6 hours.
- 2) Find the time you travel if you traveled for 45 mi/h for 50 miles.
- 3) What is your rate if you travel for 246 miles for 6 hours.
- 4) If you travel for 20 meters for 2 seconds and 30 meters for 18 seconds, what is your total distance? Total time?

9.6

Wind and water current problems

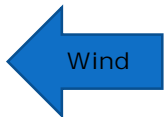
Lesson



This plane is traveling at 300 mph



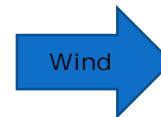
How fast is the plane really going now if it has a 50 mph wind behind it?



How fast is the plane really going if it has a 50 mph wind against it?

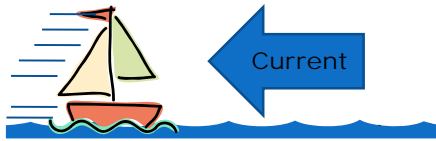
Write a variable expression for rate for the following situations.

$r = \text{rate}$
 $w = \text{wind}$



Write a variable expression for rate for the following situations.

$r = \text{rate}$
 $c = \text{current}$



Oral Exercises

Complete the table. All rates are in km/h.

	Rate of plane in still air	Rate of wind	Rate of plane with wind	Rate of plane against wind
1.	700	50	?	?
2.	825	100	?	?
3.	900	w	?	?
4.	p	w	?	?

The following rates are given in km/h.

$r = \text{rate of a rowboat in still water}$
 $s = \text{rate of a swimmer in still water}$
 $c = \text{rate of the current of Silver River}$

Explain what rate each expression represents.

5. $r + c$ 6. $r - c$ 7. $s + c$ 8. $s - c$

Each equation below states some fact about a rowboat or swimmer. What is this fact?

9. $r + c = 12$ 10. $r - c = 8$ 11. $s + c = 3$ 12. $s - c = 1$

Match each equation with its corresponding statement on the right.

(Hint: $\frac{\text{Distance}}{\text{Rate}} = \text{Time}$)

13. $\frac{30}{r+c} = 2$ a. A rowboat traveled 20 km upstream and 30 km downstream in 2 h.
14. $\frac{30}{r-c} = 2$ b. A rowboat traveled 30 km upstream in 2 h.
15. $\frac{30}{r+c} = \frac{20}{r-c}$ c. A rowboat traveled 30 km downstream in 2 h.
16. $\frac{30}{r+c} + \frac{20}{r-c} = 2$ d. A rowboat traveled 30 km downstream and 20 km upstream in the same amount of time.

Problems

Let $r = \text{rate in km/h of the rowboat in still water}$ and $c = \text{rate in km/h of the current}$. Write an equation that expresses each fact.

- A**
- The rate of the rowboat going downstream is 15 km/h.
 - The rate of the rowboat going upstream is 10 km/h.
 - The rowboat takes 3 hours to go 24 km upstream.
 - The rowboat takes 2 hours to go 20 km upstream.

Solve.

- Jim's motorboat travels downstream at the rate of 15 km/h. Going upstream it travels at 7 km/h. Write an equation that expresses each fact. What is the rate of the current?
- Camille can swim against the current at 1.5 m/s and with the current at 3.5 m/s. Write an equation that expresses each fact. How fast can she swim in still water?

Complete each table.

7. A motorboat travels at 10 km/h in still water. The boat makes a trip 30 km downstream and 30 km back.

	No current			5 km/h current		
	Rate \times Time = Distance			Rate \times Time = Distance		
Downstream	?	?	30	?	?	30
Upstream	?	?	30	?	?	30

Total distance = $\frac{?}{?}$ Total distance = $\frac{?}{?}$
 Total time = $\frac{?}{?}$ Total time = $\frac{?}{?}$
 Average speed = $\frac{?}{?}$ Average speed = $\frac{?}{?}$

8. In a canoe race Norma travels 300 m upstream and then returns. Norma can paddle at a rate of 5 m/s in still water, and the rate of the current is 1 m/s.

	Rate \times Time = Distance			
Upstream	?	?	?	Total distance = $\frac{?}{?}$
Downstream	?	?	?	Total time = $\frac{?}{?}$
				Average speed = $\frac{?}{?}$

9. Flying with no wind, a plane makes a 600 km trip in 3 h. On the return trip, the plane flies with a 50 km/h wind.

	Rate \times Time = Distance		
No wind	?	?	?
With wind	?	?	?

Total distance = $\frac{?}{?}$
 Total time = $\frac{?}{?}$
 Average speed = $\frac{?}{?}$

10. Flying with no wind, a plane makes an 840 mi trip in 6 h. On the return trip, the plane flies with a 70 mi/h wind.

	Rate \times Time = Distance		
No wind	?	?	?
With wind	?	?	?

Total distance = $\frac{?}{?}$
 Total time = $\frac{?}{?}$
 Average speed = $\frac{?}{?}$

Solve.

11. A plane travels 8400 km against the wind in 7 h. With the wind, the plane makes the return trip in 6 h. Find the speed of the plane in still air and the speed of the wind.

	Rate \times Time = Distance		
Against Wind			
With Wind			

13. A sailboat travels 12 mi downstream in only 2 h. The return trip upstream takes 3 h. Find the speed of the sailboat in still water and the rate of the current.

	Rate \times Time = Distance		
Downstream			
Upstream			

16. The 1080 km trip from Madrid to Paris takes 2 h flying against the wind and 1.5 h flying with the wind. Find the speed of the plane in still air and the speed of the wind.

	<i>Rate X Time =Distance</i>		
Against wind			
With wind			

17. Len is planning a three-hour trip down the Allenem River and back to his starting point. He knows that he can paddle in still water at 3 mi/h and that the rate of the current is 2 mi/h. How much time can he spend going downstream? How far downstream can he travel?

	<i>Rate X Time =Distance</i>		
Downstream			
Upstream			

19. A motorboat goes 36 km downstream in the same amount of time that it takes to go 24 km upstream. If the current is flowing at 3 km/h, what is the rate of the boat in still water?

	<i>Rate X Time =Distance</i>		
Downstream			
Upstream			