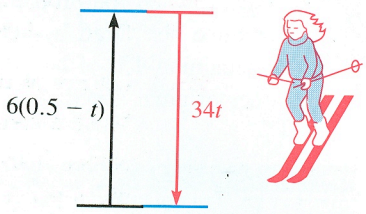
Example 3 (Round trip) A ski lift carried Maria up a slope at the rate of 6 km/h, and she skied back down parallel to the lift at 34 km/h. The round trip took 30 min. How far did she ski and for how long?

Solution

Step 1 The problem asks for Maria's skiing distance and time. Draw a sketch.

Step 2 Let t = Maria's skiing time. Make a chart.

Notice that 30 min = 0.5 h.



	Rate ×	Time	= Distance
Up	6	$0.5 - t$	$6(0.5 - t)$
Down	34	t	$34t$

Step 3 In round-trip problems, the two distances are equal.

$$34t = 6(0.5 - t)$$

Step 4

$$34t = 3 - 6t$$
$$40t = 3$$
$$t = \frac{3}{40} = 0.075 \text{ and } 34t = 34(0.075) = 2.55 \text{ (km)}$$

Step 5 The check is left to you.

∴ Maria skied for 0.075 h, or 4.5 min, for a distance of 2.55 km. ***Answer***

A calculator is helpful for solving problems such as the one above.

Oral Exercises

Classify each problem as involving (1) motion in opposite directions, (2) motion in the same direction, or (3) a round trip. Then complete the table and give an equation.

1. At noon a private plane left Austin for Los Angeles, 2100 km away, flying at 500 km/h. One hour later a jet left Los Angeles for Austin at 700 km/h. At what time did they pass each other?

	Rate ×	Time	= Distance
Plane	?	t	?
Jet	?	?	?

2. At 8:00 A.M. the Smiths left a campground, driving at 48 mi/h. At 8:20 A.M. the Garcias left the same campground and followed the same route, driving at 60 mi/h. At what time did they overtake the Smiths?

	Rate ×	Time	= Distance
Smiths	?	t	?
Garcias	?	?	?

3. Kwan hiked up a hill at 4 km/h and back down at 6 km/h. His total hiking time was 3 h. How long did the trip up the hill take him?

	Rate × Time = Distance		
Up	?	?	?
Down	?	?	?

4. Jenny had driven for 2 h at a constant speed when road repairs forced her to reduce her speed by 10 mi/h for the remaining 1 h of her 152 mi trip. Find her original speed.

	Rate × Time = Distance		
At original speed	?	?	?
At slower speed	?	?	?

Problems

A **1–4.** Complete the solutions of Oral Exercises 1–4.

Solve.

5. Two jets leave Denver at 9:00 A.M., one flying east at a speed 50 km/h greater than the other, which is traveling west. At 11:00 A.M. the planes are 2500 km apart. Find their speeds.

6. At 7:00 A.M. Joe starts jogging at 6 mi/h. At 7:10 A.M. Ken starts off after him. How fast must Ken run in order to overtake him at 7:30 A.M.?

7. At 9:30 A.M. Andrew left Exeter for Portsmouth, cycling at 12 mi/h. At 10:00 A.M. Stacy left Portsmouth for Exeter, cycling at 16 mi/h. The distance from Exeter to Portsmouth is 20 mi. Find the time when they met.

8. It takes a plane 40 min longer to fly from Boston to Los Angeles at 525 mi/h than it does to return at 600 mi/h. How far apart are the cities?

9. A bus traveled 387 km in 5 h. One hour of the trip was in city traffic. The bus's city speed was just half of its speed on open highway. The rest of the trip was on open highway. Find the bus's city speed.

10. It took Cindy 2 h to bike from Abbott to Benson at a constant speed. The return trip took only 1.5 h because she increased her speed by 6 km/h. How far apart are Abbott and Benson?

B **11.** Jerry spent 2.5 h biking up Mount Lowe, rested at the top for 30 min, and biked down in 1.5 h. How far did he bike if his rate of ascent was 3 km/h less than his rate of descent?