Solving Distance Linear Equations

Unit 1
Lesson 6

Essential Question: What are some common mistakes to avoid when solving distance, rate, and time problems? Answer on your response card.

An application of linear equations can be found in distance problems. When solving distance problems we will use the relationship $d = r \cdot t$ or distance equals rate (aka speed) multiplied by time. For example, if a person were to travel 30 mph for 4 hours. To find the total distance we would multiply rate times time or (30)(4) = 120. This person travels a distance of 120 miles.

Two joggers start from opposite ends of an 8 mile course running towards each other. One jogger is running at a rate of 4 mph, and the other is running at a rate of 6 mph. After how long will the joggers meet?

r·t

	Rate	Time	Distance
Jog 1	4	x	4x
Jog 2	6	x	6x

Dist 1 + Dist 2 = 8

$4x + 6x = 8$

$x = 0.8$ hrs

You try!

Bob and Fred start from the same point and walk in opposite directions. Bob walks 2 miles per hour faster than Fred. After 3 hours they are 30 miles apart. How fast did Fred walk?

r·t

	Rate	Time	Distance
Bob	x+2	3	3(x+2)
Fred	x	3	3x

Dist. Bob + Dist. Fred = 30

$3(x+2) + 3x = 30$

4 mph

Carlos left the hospital at the same time as Imani. They travelled in opposite directions. Imani travelled at a speed of 70 mph. After 2 hours they were 260 miles apart. How fast did Carlos drive?

r·t

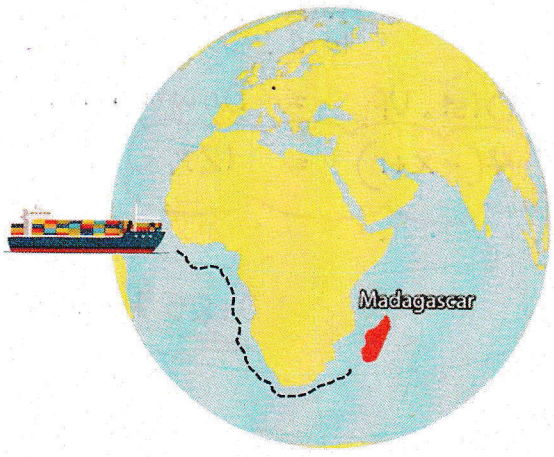
	Rate	Time	Distance
Carlos	x	2	2x
Imani	70	2	140

Distance Dist. Carlos + Imani = 260

$2x + 140 = 260$

60 mph

A container ship travelled to Madagascar and back. It took 5 hours longer to go there than it did to come back. The average speed on the way there was 12 km/h and due to the current, the average speed on the way back was 27 km/h. How many hours did it take to get to Madagascar?



r·t

	Rate	Time	Distance
Go there	12	x+5	12(x+5)
Back	27	x	27x

Distance there = Distance Back

$12(x+5) = 27x$

9 hours

Later vs. Earlier

Mike leaves his house traveling 2 mph. Joy leaves 6 hours later to catch up with him traveling 8 mph. How long will it take her to catch up with him?

r·t

	Rate	Time	Distance
Mike	2	x	2x
Joy	8	x-6	8(x-6)

Dist. Mike = Dist. Joy

$2x = 8(x-6)$

2 hours

A passenger plane left Sydney and flew towards Las Vegas at an average speed of 318 mph. A private jet left one hour later and flew in the same direction but with an average speed of 371 mph. How long did the passenger plane fly before the private jet caught up?

r·t

	Rate	Time	Distance
Plane	318	x	318x
Jet	371	x-1	371(x-1)

Dist. Plane = Dist Jet

$318x = 371(x-1)$

7 hours

You try!

Mike left school and drove towards the lake. Trevon left one hour later driving 14 mph faster in an effort to catch up to him. After 2 hours, Trevon finally caught up. What was Mike's average speed?

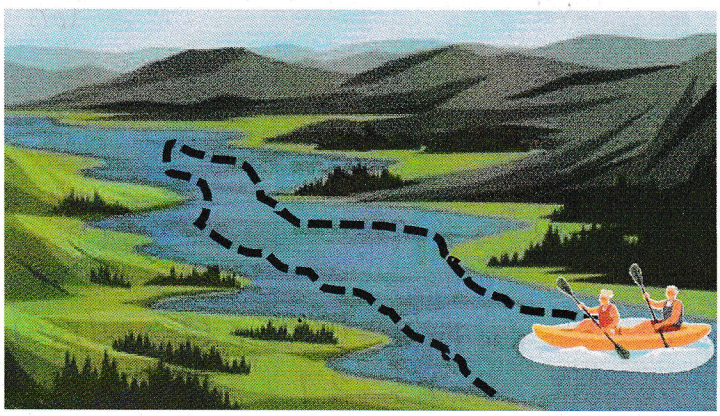
	Rate	Time	Distance
Mike	x	3	3x
Trevon	x+14	2	2(x+14)

Dist. Mike = Dist Trevon

$3x = 2(x+14)$

Mike 28 mph

Two campers left their campsite by canoe and paddled downstream at an average speed of 12 mph. They turned around and paddled back upstream at an average rate of 4 mph. The total trip took 1 hour. After how much time did the campers turn around downstream?



	Rate	Time	Distance
Upstream	4	-x+1	4(-x+1)
Downstream	12	x	12x

these two must add to 1.

Dist. Up = Down Dist.

$4(-x+1) = 12x$

0.25 hours