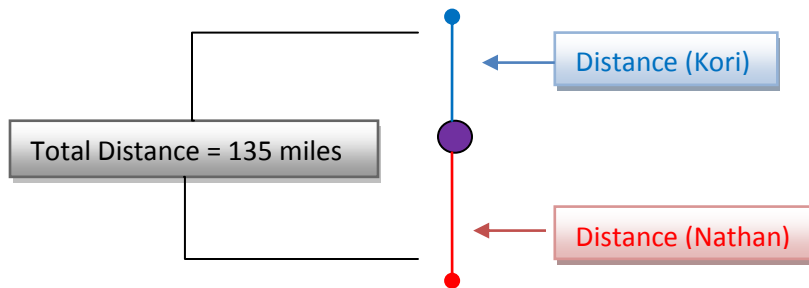


At 8:00 A.M., Kori and Nathan leave their parents' house to ride their bicycles in opposite directions. Kori rides north at 12 mi/h and Nathan travels south at 15 mi/h. At what time will Kori and Nathan be 135 miles apart?

There is more than one way to solve this problem. In any method we choose, we must remember that

$$\text{Rate} \cdot \text{Time} = \text{Distance} \quad \text{or} \quad \boxed{R \cdot T = D}$$

It is also important to notice that there are two distance segments that are added together to get a total distance (and we know that total distance is 135 miles). Let's make a diagram.



We can add Kori's distance and Nathan's distance to get the total distance.

$$\text{Distance (Kori)} + \text{Distance (Nathan)} = \text{Distance (Total)}$$

or

$$D_{\text{Kori}} + D_{\text{Nathan}} = D_{\text{Total}}$$

Let's make a table about Kori's distance and Nathan's distance.

	Rate	Time	Distance
Kori			
Nathan			

We know actual numbers for Kori's and Nathan's rates, so let's enter those now.

	Rate	Time	Distance
Kori	12		
Nathan	15		

We don't know the time (in hours) for either one of them. But if they left at the same time and are stopping simultaneously, then their times must be the same! We can call the time for both of them T .

	Rate	Time	Distance
Kori	12	T	
Nathan	15	T	

Now we can multiply the rate and the time for each of them to fill in the distance boxes.

	Rate	Time	Distance
Kori	12	T	$12T$
Nathan	15	T	$15T$

$$D_{Kori} = 12T \quad \text{and} \quad D_{Nathan} = 15T$$

$$(\text{We already know that } D_{Total} = 135)$$

We can substitute this stuff into our equation from the first page.

On the first page, we determined that

$$D_{Kori} + D_{Nathan} = D_{Total}$$

On the second page, we realized that

$$D_{Kori} = 12T \quad \text{and} \quad D_{Nathan} = 15T \quad \text{and} \quad D_{Total} = 135$$

When we substitute the stuff from the second page into the equation from the first page, we get

$$\begin{aligned} 12T + 15T &= 135 \\ 27T &= 135 \\ T &= 5 \end{aligned}$$

We found T ! It takes Kori and Nathan 5 hours to get 135 miles apart. But we were asked to find what the time on the clock will be when Kori and Nathan are 135 miles apart, not just how long it will take. We must add 5 hours to the time on the clock when they left the house on their bicycles (8:00 A.M.).

8:00 A.M. ————— + 5 hours —————> 1:00 P.M.

1:00 PM