# Problem of the Week
Problem B and Solution
High Noon, Two Trains, and a Bee

Problem

The Kitchener and London train stations are 100 km apart on a straight section of railroad. A train leaves Kitchener Station at noon, and travels toward London Station. A different train leaves London Station at noon, and travels toward Kitchener Station on a parallel track.

Kitchener   London

100 km
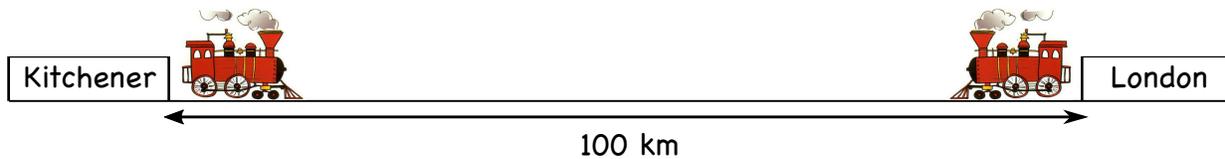
a) The train from Kitchener is travelling at 60 km per hour. What is its speed in km per minutes?

b) The train from London is travelling at 90 km per hour. What is its speed in km per minutes?

c) Find the time that the trains begin to pass each other. To do so, you may find completing the table below helpful.

Time (in minutes after noon)	Distance travelled by the train leaving Kitchener	Distance travelled by the train leaving London	Total distance travelled by the two trains
10	10	15	25
20	20	30	50
30	30	45	75
40	40	60	***100***
50	50	75	125
60	60	90	150

EXTENSION: Bert the magical bee flies at 120 km per hour back and forth between the two trains as they travel towards one another. What is the total distance he has travelled just as the trains begin to pass one another?

(Note: Bert will not lose any time as he changes direction.)

Solution

a) The train from Kitchener has a speed of
$$60 \text{ km/hour} = \frac{60 \text{ km}}{60 \text{ min}} = 1 \text{ km/min}.$$

b) The train from London has a speed of $\dfrac{90 \text{ km}}{60 \text{ min}} = 1.5\,\text{km/min}$.

c) The train from Kitchener has a speed of 1 km/min. Thus in 10 minutes, it will travel 10 km.
The train from London has a speed of 1.5 km/min. Thus in 10 minutes, it will travel 15 km.
We can now fill in the table. This is done on the previous page.
The two trains will begin to pass each other when the total distance travelled is equal to the distance between the two stations. The table values reveal that this occurs 40 minutes after noon.
Therefore, the trains begin to pass each other at 12:40 pm.

EXTENSION:
Magical Bert flies at 120 km/hr, or $\dfrac{120 \text{ km}}{60 \text{ min}} = 2\,\text{km/min}$, or 20 km in 10 minutes. Since the trains begin to pass one another after 40 minutes, Bert is flying back and forth between the trains for 40 minutes. Thus after 40 minutes, he will have flown $20\,\text{km} \times 4 = 80\,\text{km}$ in total.