Problem of the Week
Problem D and Solution
Layover Between the Trips

Problem

A plane travels from Calgary, AB to Grande Prairie, AB. The total flight time, including takeoff and landing, is 1 hour and 40 minutes. The return flight takes the same route and time. The average speed for these two flights is 500 km/h.

After a brief layover in Grande Prairie, the average speed of this entire round trip (including the two flights and the layover in between) becomes 425 km/h. How long was the layover?

Solution

Let t be the length of the layover, in hours.

The plane travels from Calgary to Grande Prairie in 1 hour 40 minutes at a speed of 500 km/h. Using the formula distance = speed × time, the distance from Calgary to Grande Prairie must be $500\frac{\text{km}}{\text{h}} \times 1\frac{2}{3}$ h $= 500 \times \frac{5}{3} = \frac{2500}{3}$ km.

Therefore, for the two-way trip, the plane travels $2 \times \frac{2500}{3} = \frac{5000}{3}$ km.

The length of time of the entire two-way trip is the time of the two flights plus the layover time. Therefore, the total length of time of the trip is $\frac{5}{3} + \frac{5}{3} + t = \frac{10}{3} + t$ hours.

Since the average speed of the entire two-way trip is 425 km/h, using the formula distance = speed × time, we have

$$\frac{5000}{3} = 425 \times \left(\frac{10}{3} + t\right)$$
$$\frac{10}{3} + t = \frac{5000}{3 \times 425}$$
$$t = \frac{200}{51} - \frac{10}{3}$$
$$= \frac{200}{51} - \frac{170}{51}$$
$$= \frac{10}{17}$$

Therefore, the layover was $\frac{10}{17}$ hours, or approximately 35 minutes.