**Main Problem #4**

Topic: *Add and Subtract Fractions*

Problem: After winning second place at the national cross country championship, you decided to train again for next year’s competition. For the next few months, you will be across 4 different cities. You will first run through Opa Locka, then Hialeah, after Hialeah Garden, and finally Miami Lakes. The table below shows the distances from one city to the next.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CITY | Current City -> Opa Locka | Opa Locka -> Hialeah | Hialeah -> Hialeah Gardens | Hialeah Gardens -> Miami Lakes |
| MILES | $$\frac{15}{4}$$ | $$\frac{42}{8}$$ | $$\frac{6}{2}$$ | $$\frac{48}{16}$$ |

Q1. What is the total distance from your current city to Hialeah? To Hialeah Gardens?

Q2. How far is it from your current city to Miami Lakes?

Q3. What is the distance between Miami Lakes and Opa Locka?

Q4. If you were to run back to your current city, what will your total distance back-and-forth?

A1. Current City -> Opa Locka -> Hialeah => $\frac{15}{4}+\frac{42}{8}$

We need to change $\frac{15}{4}$into a fraction whose denominator is 8, therefore we must multiply $\frac{15}{4}$by $\frac{2}{2}$, which is $\frac{30}{8}$. Therefore, the total distance to Hialeah is $\frac{30}{8}+\frac{42}{8}=\frac{72}{8}=9$miles.

Using the distance obtained to Hialeah, we simply add $\frac{6}{2}$miles to find the total distance to Hialeah Gardens. $\frac{6}{2}$equals 3, which is also $\frac{24}{8}$since $\frac{6}{2}⋅\frac{4}{4}=\frac{24}{8}$. Therefore, the total distance to Hialeah is $9+3=\frac{72}{8}+\frac{24}{8}=\frac{96}{8}=12$miles.

A2. Using the information from A1, we add $\frac{48}{16}$miles to 12 (or $\frac{96}{8}$miles). Students should notice that $\frac{48}{16}=3$and $\frac{96}{8}⋅\frac{2}{2}=\frac{192}{16}=12$. Therefore, $\frac{48}{16}+\frac{96}{2}=\frac{48}{16}+\frac{192}{16}=3+12=15$miles.

A3. For this problem, students should solve two different ways.

1. Find distance from Opa Locka to Miami Lakes.

 Opa Locka -> Hialeah -> Hialeah Gardens -> Miami Lakes

 $\frac{42}{8}+\frac{6}{2}+\frac{48}{16}=\frac{84}{16}+\frac{48}{16}+\frac{48}{16}=\frac{180}{16}=11\frac{4}{16}=11\frac{1}{4}$miles.

1. Subtract distance to Opa Locka from total distance to Miami Lakes (found in A2).

$$15-\frac{15}{4}=x$$

$$\frac{60}{4}-\frac{15}{4}=\frac{45}{4}=11\frac{1}{4}$$

Using Missing Addend Method.

$$15 = x+\frac{15}{4}$$

$$\frac{60}{4}=x+\frac{15}{4}$$

$$x = \frac{45}{4}=11\frac{1}{4}$$

A4. To find total back-and-forth distance (or relay distance), students simply add another 15 miles (=$\frac{240}{16}$miles) to total distance. Therefore, the relay distance is $\frac{240}{16}+\frac{240}{16}=\frac{480}{16}=15+15=30$miles.