Name: Date:

1. $\boxed{\text{D}}$

2. $\boxed{\text{D}}$

3. $\boxed{\text{C}}$

4. The next time the boys meet again, the faster boy has run $\frac{9}{14}$ of the track and the slower boy has run $\frac{5}{14}$ of the track. As they continue around, they will again meet once the faster boy has run another $\frac{9}{14}$ of the track and the slower boy has run another $\frac{5}{14}$. So each time they meet, they have each run $(\frac{9}{14})n$ and $(\frac{5}{14})n$ of the track. We want them to meet at the starting point A again, so we need the total fraction of the track they each have run to be whole numbers. The least such n that makes both above equalities whole numbers is $n = 14$, so they will meet again at A on their 14th time passing each other. The problem asks us to exclude start and finish. We do not count the beginning, but we must exclude the last meeting, so they meet 13 times on the track. $\boxed{\text{A}}$

5. $\boxed{\text{C}}$

6. Let the distance between towns be d, let the speed against the wind be v and the speed with the wind be w. Then the speed of the plane in still air is the average of the two speeds, or $\frac{1}{2}(v + w)$. We know $t = \frac{d}{r}$, so we are given

$$\frac{d}{v} = 84 \text{ and } \frac{d}{w} = \frac{d}{\frac{1}{2}(w + v)} - 9.$$

We are solving for the time t it takes to return with the wind, so we want $t = \frac{d}{w}$. First manipulate the second equation:

$$\frac{d}{w} = \frac{2}{\frac{w}{d} + \frac{v}{d}} - 9.$$

And now we replace $\frac{w}{d}$ with $\frac{1}{t}$ and $\frac{v}{d}$ with $\frac{1}{84}$.

$$t = \frac{2}{\frac{1}{t} + \frac{1}{84}} - 9 = \frac{168x}{84 + x}.$$

Simplifying, we obtain $t^2 - 75t + 756 = 0$. Using the quadratic equation, we arrive at the solutions $t = 63$ and $t = 12$. $\boxed{\text{C}}$

7. $\boxed{12}$

8. $\boxed{\frac{60}{13} \text{ seconds}}$

9. $\boxed{\frac{10}{3} \text{ hrs}}$

10. $\boxed{\$42{,}000 \text{ and } \$41{,}000}$