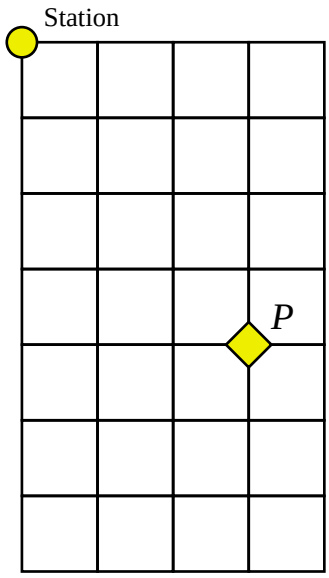
2008-2009 Primary Division Set III Solutions

P3.1. *Grand Central Station*



The street system in New York is built up as a series of blocks. The section in which Claire works is 4 blocks wide and 7 blocks long with Grand Central Station located at the top North West corner of the section.

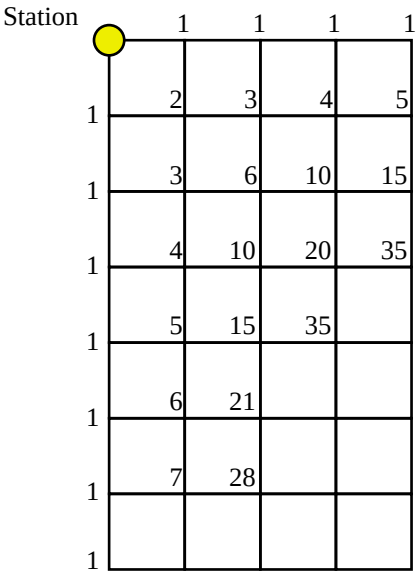
When asked where she worked she would not say exactly but said that from Grand Central Station she could take a different route to work every day (including Saturdays and Sundays) of February 2009 but that on the March 1st, she would need to repeat a route already used.

If Claire only walks either south or east, find out where she works.

Give your answer as a grid location from the station. For example, *P* is 4 blocks south and 3 blocks east.

Hint: *How many different ways can Claire take to get to 1 block south and 2 blocks east.*

Solution



February has 28 days so that means Claire has 28 routes.

The diagram shows the number of routes that can be taken to reach each of the intersections.

As 28 routes appears just once, that is where Claire works.

So Claire works 6 blocks south and 2 blocks east.

P3.2. During a certain period of days, observations were made on the weather. It was noted that whenever it rained in the morning it was clear in the afternoon and whenever it rained in the afternoon, it had been clear on that morning. During this period, it rained on 9 days and was clear on 6 mornings and on 7 afternoons. How long was the period of days?

Solution 1

The number of totally clear days will be half the number of the sum of clear mornings and clear afternoons less the number of days on which it rained. This is then $\frac{1}{2}(6 + 7 - 9) = 2$. So the period was 11 days.

Solution 2

During the observation time:

it rained on 9 days (which represents 9 half-days) and it was fine for 13 half days.

Thus there was a total of 22 half days.

So the period was 11 days.

P3.3. Once a week, a cyclist leaves home to cycle to the golf course. On one particular day, at 15:56, one fifth of the way to the course, he passes the town clock. At 16:05, half way to the course, he passes the school gate. At what time does he leave home and when does he reach the golf course?

Solution

Between the town clock and the school gate, he travels $\frac{1}{2} - \frac{1}{5} = \frac{3}{10}$ of the way in 9 minutes.

The time to travel $\frac{1}{2}$ of the way is 15 minutes so he left at 15:50.

The total time for the journey is 30 minute so he arrives at 16:20.