Conditions

Use logical reasoning: Xenia corresponded on a regular basis with three pen pals. She wrote to all three on one Friday in 2003. She know she would next write to Daksha in India on Thursday two weeks after that, then on Wednesday in the fourth week. She would write to Leonel in the Dominican Republic every Friday. Finally, she would write to Catherine every fourth day, since they had been good friends before Catherine moved to England. On what date in 2003 did Xenia write for the second time to all three pen pals on the same day?

Solution

As she knows she would next write to Daksha in India on Thursday two weeks after that, then on Wednesday in the fourth week, then we can see, that she is writing to her after every (2 weeks-1) day. So the next time will be at Tuesday in the sixth week, then Monday at 8th, Sunday at 10th, Saturday at 12th, Friday at 14th and so on and so forth.

At the 14th week, in Friday, there will be the day, when she also writes to Leonel, as she writes him only at Fridays. The Friday at 14th week is the $14*7=98$ is the date, which can't be "the Catherine's day", as 98/4 is not integer. So, the next Friday will be after $7*2$ weeks passed, because of Daksha. And it will be the Friday after 28th week, the $28*7^{th}$ day after 1st. And $28*7=49*4$ so it divides by 4 so this is Catherine's day, also this is Friday, so it's also Leonel's day and it's the day of Daksha.

<u>Answer: After 28 weeks in a Friday.</u>