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CHERYL'S BIRTHDAY

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ABSTRACT

Cheryl's Birthday is the mathematics brain teaser that was asked in an Asian math Olympiad in 2015, and made it to every numerphile out there after getting viral in a time span of just a few days. The quiz asked readers to determine the birthday of a girl named Cheryl using a handful of clues given to her friends Albert and Bernard.

Keywords—brain teaser, clue, Cheryl, logic, wordplay

I. INTRODUCTION

Albert and Bernard just become friends with Cheryl and they want to know when her birthday is. Cheryl gives them a list of possible dates.

May 15	***May 16***	***May 19***
June 17	***June 18***	
July 14	***July 16***	
August 14	***August 15***	***August 17***

CHERYL THEN TELLS ALBERT AND BERNARD SEPARATELY THE MONTH AND THE DAY OF HER BIRTHDAY RESPECTIVELY.

[1]ALBERT: I DON'T KNOW WHEN CHERYL'S BIRTHDAY IS, BUT I KNOW THAT BERNARD DOESN'T KNOW TOO.

[2]BERNARD: AT FIRST I DON'T KNOW WHEN CHERYL'S BIRTHDAY IS, BUT I KNOW NOW.

[3]ALBERT: THEN I ALSO KNOW WHEN CHERYL'S BIRTHDAY IS.

This shows that both Albert and Bernard were in the dark about what Cheryl's birthday was. They both then deduced the correct day through logical reasoning.The method through which they found the specific date has it's roots in hard logic and mathematical reasoning. By elimination process,one by one the unlikely dates are removed. Giving them the final answer

SOLUTION

The answer can be deduced by progressively eliminating impossible dates

[1]All Albert knows is the month, and every month has more than one possible date, so of course he doesn't know when her birthday is. The first part of the sentence is redundant.The only way that Bernard could know the date with a single number, however, would be if Cheryl had told him 18 or 19, since of the ten date options these are the only numbers that appear just once, as May 19 and June 18.For Albert to know that Bernard does not know, Albert must therefore have been told July or August, since this rules out Bernard being told 18 or 19.

[2] Bernard has deduced that Albert has either August or July. If he knows the full date, he must have been told 15, 16 or 17, since if he had been told 14 he would be none the wiser about whether the month was August or

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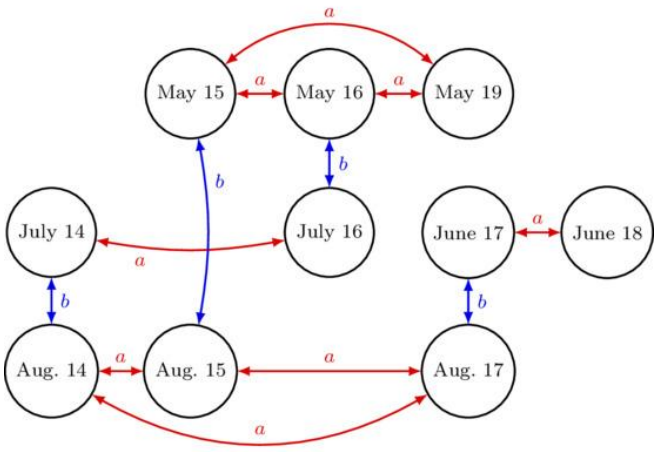
July. Each of 15, 16 and 17 only refers to one specific month, but 14 could be either month. [3]Albert has therefore deduced that the possible dates are July 16, Aug 15 and Aug 17. For him to now know, he must have been told July. If he had been told August, he would not know which date for certain is the birthday.

Therefore, the answer is July 16.



APPENDIX

After the question went viral, some people suggested August 17 was an alternative answer to the question. This is rejected by the Singapore and Asian School Math Olympiads as a valid answer. The solutions which arrive at this answer ignore that the latter part of [1] conveys information to Bernard about how Albert was able to deduce this. Bernard would only have known the birthday if the date was unique, 18 or 19. Albert therefore is able to deduce that "Bernard doesn't know" because he heard a month that does not contain those dates (July or August).Realizing this, Bernard can rule out May and June, which allows him to arrive at a unique birthday even if he is given the dates 15 or 16, not just 17.August 17 would be the answer if the first statement was made by Cheryl instead:

Cheryl: Bernard doesn't know when my birthday is.Albert: I still don't know when Cheryl's birthday is.

Bernard: At first I didn't know when Cheryl's birthday is, but I know now.

Albert: Then I also know when Cheryl's birthday is.

REFERENCES

[1] Singaporean Maths Olympiad:

[2]Youtube:https://www.youtube.com/watch?v=emiMj8cCL5E

[3]Appendix: https://en.wikipedia.org/wiki/Cheryl%27s_Birthday#Incorrect_solution

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