

Mathematical Puzzles, Games and Other  
Diversions  
Day 1

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January 21, 2020

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Knights and Knaves Problems

Knights and Knaves live on Smullyan island. Knights ALWAYS tell the truth and Knaves ALWAYS lie.

1. You see your first islander walking toward you. She says "I am a knight." What does that tell you?
2. You see a pair of people walking down. Before you can say anything, one turns and says, "We are both Knaves!" What can you deduce from that?
3. Further down, another couple of islanders greet you. One says "Either I am a knave or she [pointing to his companion] is a knight." What can you say about each of the islanders?

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A Tough Problem

Cheryl tells Albert and Bernard that her birthday party is on one of these dates:

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

Then she tells Albert the month only, and Bernard the day of the month it falls on only.

Then the following conversation ensued:

**Albert:** I don't know when Cheryl's birthday party is, but I know that Bernard doesn't know either.

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

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

**Question:** When is the party?

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A Tough Problem: Solution

	14	15	16	17	18	19
May		X	X			X
June				X	X	
July	X		X			
Aug	X	X		X		

**Albert:** I don't know when Cheryl's birthday party is, but I know that Bernard doesn't know either.

This tells us that Cheryl's party can't be in May or June. If it was in May, then it's possible that Bernard was told 19, in which case he WOULD know the date of Cheryl's party since 19 does not appear in any other month. Similarly, June is ruled out.

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A Tough Problem: Solution (cont.)

	14	15	16	17	18	19
May						
June						
July	X		X			
Aug	X	X		X		

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

This tells us that Cheryl's party can't be on the 14th. If it was, then Bernard wouldn't know if it was July or August.

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A Tough Problem: Solution (cont.)

	14	15	16	17	18	19
May						
June						
July			X			
Aug		X		X		

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

This tells us that Cheryl's party must be in July. If it was in August, Bernard would have two options: Aug 15 or Aug 17.

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A Tough Problem: Solution (cont.)

	14	15	16	17	18	19
May						
June						
July			X			
Aug						

So this leaves us with only one outcome. The party must be on **July 16th**.

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