

PROBLEM SET VIII

PROBLEM 1. Two mountain trolls, Smeagol and Deagol, were born exactly one year apart. Today, they are celebrating their birthdays. Troll Bob claims that their total age is 1128 years. However, Bilbo the Hobbit is pretty sure that Bob is mistaken. How does he know?

PROBLEM 2. While visiting the island of Knights and Liars, you meet an islander. He tells you that yesterday he baked 39 cookies for his party. Every adult at the party ate exactly 2 cookies, and every child ate 4 cookies. The cookies were a big success, and by the end of the evening the guests ate all of them. Is this islander a knight or a liar?



PROBLEM 3. Slimy the Bog Witch invited the same number of witches and wizards to her birthday party. She bought 115 live frogs as party favors for her guests. (Each guest will receive the same number of frogs.) However, the witch's wise owl tells her that it is not possible to share the frogs this way. How does the owl know?



PROBLEM 4. While visiting the Knights and Liars Island, Max the Math Circle Student met an islander. Max asked the islander about his age. The islander replied, "If you multiply my age by 18, you get 1421." Max immediately recognized that the islander was a liar. Provided that Max did not bring a calculator to the island, how did he know?