

1 Homework Set XIII

Problem 1 Shmerlin the Magician is expecting several wicked witches to come to his house. Shmerlin heads to the Wizards Shop to purchase dried frogs as gifts for the witches. Every guest is supposed to get the same (nonzero) number of frogs, and Shmerlin does not want to have any leftovers. What is the smallest number of frogs that Shmerlin should buy if he knows that:

(a) either 3 or 5 witches are coming?

(b) either 4 or 6 witches are coming?

Problem 2 Restore the missing digits:

$$\begin{aligned} ** + * &= **8, & *6* + 2*5 &= 638, & 83 \times ** &= *3 + 1* *0 = ****, \\ *93 + ** &= **51, & 29 \times ** &= *7 + **0 = 3**, & ** \times *8 &= ** + **0 = 3*6 \end{aligned}$$

2 Challenge Problems

Problem 1 A pair of gold coins, a pair of silver coins, and a pair of bronze coins have been placed on the table. In each pair, one coin is counterfeit - it is lighter than the real coin. Moreover, all the real coins have the same weight, and the counterfeit coins are all of the same weight as well. How can you and all three counterfeit coins using 2 weighings on a balance scale with two pans?