[illegible]

[illegible]

[illegible] A bag contains 7 blue, 5 red, and 9 green marbles. How many marbles must be chosen from the bag without looking to be sure that we have drawn

(a) a pair of red marbles?

(b) a pair of marbles of the same color?

(c) a pair of marbles with different colors?

(d) three marbles of the same color?

(e) a red, blue, and green marble?

Answer

(a) 18 (b) 4 (c) 10 (d) 7 (e) 17

[illegible] There are 10 people at a dinner party. Show that at least two people have the same number of acquaintances at the party.

Answer

Each person can know anywhere from 0 (no one) to 9 (everyone) people. But if someone knows no one, there cannot be someone who knows everyone, and vice versa. Thus, place the 10 people into the 9 boxes that are labeled 1, 2, ..., 8, and 0/9. By the pigeonhole principle, some box has at least 2 members. That is, there are at least two people at the party with the same number of acquaintances.