Hybleland AMC 10 Advanced Class Assignment

Lesson 05-06 Counting: Balls and Boxes

Problem 1. Pat wants to buy five donuts from an ample supply of four types of donuts: glazed, chocolate, sugar coated, and powdered. How many different selections are possible?
(A) 26   (B) 39   (C) 42   (D) 56   (E) 68

Problem 2. Pat wants to buy nine donuts from an ample supply of four types of donuts: glazed, chocolate, sugar coated, and powdered. How many different selections are possible if she needs to buy at least one of each type??
(A) 26   (B) 39   (C) 42   (D) 56   (E) 68

Problem 3. Pam has 10 identical pieces of sweet-meats that she wants to divide among her 3 children. How many ways can she do that?
(A) 24   (B) 25   (C) 27   (D) 28   (E) 66

Problem 4. Pam has 12 indistinguishable pieces of sweet-meats that she wants to divide among her 3 children. How many ways can she divide the sweet-meats so that each child gets at least 3 pieces of sweet-meats?
(A) 10   (B) 8   (C) 12   (D) 18   (E) 24

Problem 5. Sixteen identical soccer balls are given to 4 boys. Each boy gets at least three soccer balls. How many ways are there to give the soccer balls to the boys?
(A) 20   (B) 28   (C) 35   (D) 18   (E) 24

Problem 6. In how many ways can three people divide among themselves eight identical apples, two oranges, one plum, and one tangerine (without cutting any fruit)?
(A) 1540   (B) 2120   (C) 1720   (D) 2430   (E) 1200

Problem 7. Find the number of ordered quadruples (x_1, x_2, x_3, x_4) of positive even integers that satisfy $x_1 + x_2 + x_3 + x_4 = 20$.

(A) 40   (B) 52   (C) 72   (D) 84   (E) 120

Problem 8. Find the number of ordered quadruples (x_1, x_2, x_3, x_4) of positive odd integers that satisfy $x_1 + x_2 + x_3 + x_4 + x_5 = 21$.
(A) 540   (B) 120   (C) 720   (D) 495   (E) 715

Problem 9. Pat has eight different jobs to be done. She assigns all eight jobs to her three kids. Each kid will have at least two jobs. How many ways can Ellen assign the jobs?

(A) 5760   (B) 2003   (C) 2720   (D) 2940   (E) 2715

Problem 10. How many ways are there to give 7 different books to 3 students such that each student has at least one book?

(A)1806 (B)1834 (C)1875 (D)1912 (E)1930

Problem 11. In how many ways can seven different gifts be given to four different children with each child receiving at least one gift and each gift being given to exactly one child?

(A) 6760   (B) 7003   (C) 7200   (D) 8400   (E) 7120

Problem 12. How many ways are there to assign seven students to 3 different groups so that each group has at least two students?

(A) 930   (B) 831   (C) 732   (D) 720   (E) 630

Problem 13. How many ways can four people line up behind three registers?

(A) 120   (B) 240   (C) 300   (D) 360   (E) 230

Problem 14. In how many different ways can 7 people be placed into three groups with each group at least two people?

(A) 630   (B) 105   (C) 315   (D) 360   (E) 200

Problem 15. In how many different ways can 3 men and 4 women be placed into two groups of two people and one group of three people if there must be at least one man and one woman in each group?

(A) 12   (B) 24   (C) 72   (D) 90   (E) 36

Problem 16. In how many ways can a group of eight students be separated into two teams if the teams do not need to be of equal size?

(A) 125   (B) 127   (C) 540   (D) 545   (E) 547

Problem 17. Five girls (Alexandra, Betsy, Catherine, Deyola and Emily) travel with one boy (Frank) to a math contest. They have four hotel rooms, numbered 1 through 4. Each room can hold up to two people, and the boy has to have a room to himself. How many different ways are there to assign the students to the rooms, including the way shown here?
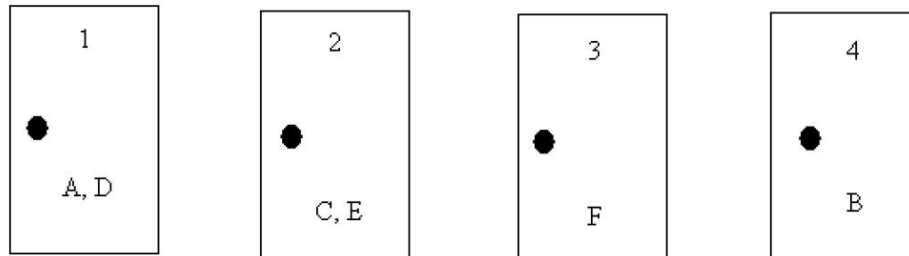
Problem 18.

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Pat wants to buy four donuts from an ample supply of three types of donuts: glazed, chocolate, and powdered. How many different selections are possible?

A. 6 B. 9 C. 12 D. 15 E. 18