



Math Olympiad and Problem Solving Programs
E220 - Intermediate Math Competitions
Problem Set 9.2 - AMC 8 Counting

Name:

Date:

1. D

2. Organize your counting:

Case 1: he buys only one type of donut. He can either buy 4 glazed, 4 chocolate, or 4 powdered, so there are **3** ways to do this.

Case 2: he buys two types of donuts. He can choose 2 of the 3 flavors, and there are $\binom{3}{2} = 3$ ways to do this. Then he can get 1 of type 1 and 3 of type 2, 1 of type 2 and 3 of type 1, or 2 of each (for instance, if he selects glazed and chocolate, he can get GCCC, CGGG, or CCGG). So there are 3 ways of selecting for each flavor combination. So there are $3 \times 3 = 9$ ways of doing this combination.

Case 3: he buys all three types of donuts. There is 1 way to select the three types of donuts. Then he can get 1 of one, 1 of two, and 2 of the third type. And there are $3! \div 2! = 3$ ways of assigning how much he get of each type.

So there are $3 + 9 + 3 = 15$. D

3. A

4. 1st time: 10 tiles removed, 90 are left. 2nd time: 9 perfect squares are less than 90, so 9 tiles are removed, and 81 remain. 3rd: 9 tiles removed, 72 remain. 4th: 8 tiles removed, 64 remain. 5th: 8 tiles removed, 56 remain. 6th: 7 tiles removed, 49 remain. 7th: 7 tiles removed, 42 remain. 8th: 6 tiles removed, 36 remain. 9th: 6 tiles removed, 30 remain. 10th: 5 tiles removed, 25 remain. 11th: 5 tiles removed, 20 remain. 12th: 4 tiles removed, 16 remain. 13th: 4 tiles removed, 12 remain. 14th: 3 tiles removed, 9 remain. 15th: 3 tiles removed, 6 remain. 16th: 2 tiles removed, 4 remain. 17th: 2 tiles removed, 2 remain. 18th: 1 tile removed, 1 remains. So 18 times. C

5. Count backwards from the end of the list. USOMA is the last word, or the 120th word. The 119th is USOAM. Then USMOA is 118th, then USMAO is 117th. USAOM is 116th, and USAMO is 115th. D

6. D

7. Use the same method of organized counting as in question 2. You will get 28. D

8. There are 26×10^4 old license plates. There are $26^3 \times 10^3$ new license plates. To find how many times the number increased, divide the new number by the old number: $\frac{26^3 \times 10^3}{26 \times 10^4} = \frac{26^2}{10}$.

C

9. B