Week in Review #5

1. (a) Venn diagram

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Basketball  Tennis
20    25    12
10    15    8
 5    65
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(b) 38
(c) 58
(d) 57

2. (a) Use the information to fill in this venn diagram and use the information to get the simplified equations listed on the left.

\[
x + y = 21 \\
x + z = 44 \\
y + z = 37
\]

Solve the system of equations to get the venn diagram.

(b) 115

3. \[4 \cdot 3 \cdot 2 \cdot 1 = 4! = 24\]

4. \[2 \cdot 2 \cdot 2 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 2^3 \cdot 4^5\]

5. \[4(2 \cdot 1 \cdot 1 \cdot 3 \cdot 2 \cdot 1) = 48\]

6. (a) \[3 \cdot 26 \cdot 26 \cdot 26 + 3 \cdot 26 \cdot 10 \cdot 10 \cdot 10 = 1448928\]
   (b) \[3 \cdot 25 \cdot 24 \cdot 23 \cdot 22 + 3 \cdot 25 \cdot 10 \cdot 9 \cdot 8 = 964800\]

7. (a) \[C(4, 2) \cdot C(7, 4) = 210\]
   (b) exactly two red and 4 other balls.
   \[C(4, 2) \cdot C(15, 4) = 8190\]
   (c) at least means two or more green balls.
   \[C(7, 2) \cdot C(12, 4) + C(7, 3) \cdot C(12, 3) + C(7, 4) \cdot C(12, 2) + C(7, 5) \cdot C(12, 1) + C(7, 6) \cdot C(12, 0) = 20664\]
   or work this by Total - don’t want
   \[C(19, 6) - [C(7, 0) \cdot C(12, 6) + C(7, 1) \cdot C(12, 5)] = 20664\]
(d) the key word is or. Use the formula: \( n(A \cup B) = n(A) + n(B) - n(A \cap B) \)
\[ C(4, 2) \times C(15, 4) + C(8, 4) \times C(11, 2) - C(4, 2) \times C(8, 4) = 11620 \]

(e) the key word is or. Use the formula: \( n(A \cup B) = n(A) + n(B) - n(A \cap B) \)
\[ C(4, 2) \times C(15, 4) + C(7, 3) \times C(12, 3) - C(4, 2) \times C(7, 3) \times C(8, 1) = 14210 \]

8. For this problem somebody may have both vegetable dishes be the same or both vegetable dishes be different. This means we have to break the problem into two parts.

part I: both vegetable dishes different.
\[ C(10, 1) \times C(13, 2) \times C(8, 1) \text{ or } 10 \times C(13, 2) \times 8 \]

Part II: both vegetable dishes the same.
\[ C(10 \times 1) \times C(13, 1) \times C(8, 1) \text{ or } 10 \times 13 \times 8 \]

Answer: \[ C(10, 1) \times C(13, 2) \times C(8, 1) + C(10 \times 1) \times C(13, 1) \times C(8, 1) = 6240 + 1020 = 7260 \]

9. \[ P(365, 10) = 365 \times 364 \times 363 \times 362 \times 361 \times 360 \times 359 \times 358 \times 357 \times 356 \]

10. \[ C(20, 5) \times C(15, 5) \times C(10, 5) \times C(5, 5) \]

11. \[ \frac{14!}{2!3!2!} = 1816214400 \]