MPS21XH - Combinations and Counting Problem Set
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1.) How many non-empty collections of fruit (at least one piece of fruit) can be made from 6 identical apples and 8 identical bananas?

2.) Given a set of 13 balls, 9 of which are green and the other 4 are yellow.

a.) How many ways are there to create a subset of 6 balls? Leave your answer as $\binom{n}{k}$.

b.) What fraction of those selections contain exactly 4 green balls and 2 yellow balls?

3.) If $\dfrac{\binom{n}{5}}{\binom{n}{3}} = \frac{3}{2}$, compute n.

4.) A game uses a deck of n different cards, where n is an integer and $n \geq 4$. The number of possible sets of 4 cards that can be drawn from the deck is 2 times the number of possible sets of 3 cards that can be drawn. Compute n.

5.) Nine parallel lines in a plane intersect a set of n parallel lines that go in another direction. The lines form a total of 360 parallelograms, many of which overlap each other. Compute n.

6.) How many odd numbers are there with middle digit 5 and no digit repeated between 20,000 and 69,999?

7.) There are 12 textbooks, 3 of which are mathematics books, and 3 empty boxes. One box will hold any three of the textbooks, one will hold any 4 books and one will hold any 5 books. If the books are packed into these boxes in random order, compute the probability that all 3 math books end up in the same box.

8.) A certain biased coin is flipped 5 times. The probability of getting heads exactly once is a non-zero value and is the same as the probability of getting exactly 2 heads. Compute the probability that the coin comes up heads exactly 3 times out the 5 flips.