Warm-Up: Permutations and Combinations Practice

1. How many 9-letter words can be made using all of the letters
d,a,r,t,h,y,a,n?
\[ \# \text{ of words} = \frac{11!}{2!2!} = 9,979,200 \]

2. How many even 3-digit numbers (can’t start with zero) can be made such that the first digit is one larger than the last digit?
\[ \frac{1 \times 10 \times 5}{1 \times 2 \times 2} = 50 \]

3. How many ways can 6 numbers be selected without repetition from a batch of 49 numbers if order does not matter?
\[ \binom{49}{6} = 13,983,816 \]

4. Elaine owns distinct Roald Dahl books. How many ways can she select 5 books to place on her bookshelf if...
a) ... the order does not matter when they are placed on the shelf?
Combination \[ \binom{10}{5} = 252 \]
b) ... the order does matter when she puts them on the shelf?
Permutation \[ 10^5 = 30,240 \]

5. How many ways can a committee of 5 be selected from a group of 12 girls and 8 boys if the group must comprise of at least 3 girls?
\[ \text{total ways of selected at least 3 girls} = \binom{3G2B + 4G1B + 5G0B}{12} \]
\[ = \binom{12}{3} + \binom{12}{4} + \binom{12}{5} \]
\[ = 6160 + 3960 + 792 = 10,912 \]