

Work on these with your partner(s) at the board

- (a) How many permutations are there on the word FRITO?

(b) How many permutations are there with the letters RI kept together in this order?
- How many permutations are there on the word COFFEE?
- Find the values of the following: (a) $P(6, 4)$ (b) $P(6, 3)$ (c) $P(6, 6)$
- Each user on a computer system has a password that is six characters long, where each character is an upper case letter (A–Z) or a digit (0–9).
If each password must contain exactly one digit, how many possible passwords are there?
- A survey of 1000 Netflix users gives that 329 have watched *The Great British Baking Show*, 531 have watched *Demon Slayer*, and 142 have watched both.
How many have watched either show? How many have watched neither?

6. Let A and B be sets where $|A| = 5$ and $|B| = 7$.
- (a) How many functions are there from A to B ?
 - (b) How many functions are there from B to A ?
 - (c) How many one-one functions are there from A to B ?
7. A *derangement* of the set $\{1, 2, \dots, n\}$ is a permutation where no number appears in its original position. e.g. 21 is the only derangement of $\{1, 2\}$.
- (a) List 3 derangements of $\{1, 2, 3, 4\}$
 - (b) List 3 permutations of $\{1, 2, 3, 4\}$ that are not derangements
 - (c) Let d_n denote the number of derangements of $\{1, 2, \dots, n\}$. Find d_1 , d_2 , d_3 , and d_4
 - (d) Verify $d_n = (n - 1)(d_{n-2} + d_{n-1})$ for $n = 3, 4$
Explain why this formula holds in general