Listing and Counting Strategies
How many ways can we list $A, B, C, D$

| $A B C D$ | $B A C D$ | $C A B D$ | $D A B C$ |
| :--- | :--- | :--- | :--- |
| $A B D C$ | $B A D C$ | $C A D B$ | $D A C B$ |
| $A C B D$ | $B C A D$ | $C B A D$ | $D B A C$ |
| $A C D B$ | $B C D A$ | $C B D A$ | $D B C A$ |
| $A D B C$ | $B D A C$ | $C D A B$ | $D C A B$ |
| $A D C B$ | $B D C A$ | $C D B A$ | $D C B A$ |

24 arrangements of $A, B, C, D$

$$
4 \times 3 \times 2 \times 1=24
$$

Choosing Dinner

| Starter | Main | Dessert |
| :--- | :--- | :--- |
| Soup | Beef | Rice |
| Prawns | Lamb | Ice-Cream |
|  | Chicken | Jelly |
|  | Veg |  |

List possible choices if you have a starter, a main, a dessert

| $S B R$ | $S L R$ | $S C R$ | $S V R$ |
| :--- | :--- | :--- | :--- |
| $S B I$ | $S L I$ | $S C I$ | $S V I$ |
| $S B I$ | $S L I$ | $S C I$ | $S V I$ |
| $P B R$ | $P L R$ | $P C R$ | $P V R$ |
| $P B I$ | $P L I$ | $P C I$ | $P V I$ |
| $P B I$ | $P L I$ | $P C J$ | $P V J$ |

24 different meals

$$
2 \times 4 \times 3=24
$$

Counting Strategies
loHmz 17 girls 11 boys
How many ways can we choose 2 class reps if we require a boy and a girl?

$$
17 \times 11=187 \text { ways }
$$

How many ways can we choose 2 class reps if there are no gender restrictions?

$$
\frac{28 \times 27}{2}=378 \text { ways }
$$

We divide by 2 because $A B$ and $B A$ are the same pair when order does not matter

Sport Round Robin
$A, B, C, D$ all play each other once Fixtures

| $A \vee B$ | $B \vee C$ |
| :--- | :--- |
| $A \vee C$ | $B \vee D$ |
| $A \vee D$ |  |

6 games


Handshake Problem
$A, B, C, D, E$ all shatere each other's hands How many handshakes take place?


$$
=\frac{5 \times 4}{2}=10
$$

