

## STEP - Probability (2 pages; 25/3/18)

### (A) Approaches

(a) Basic definition of probability:

$$\frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

(assuming that the outcomes are equally likely),

where combinations can often be used to find the numbers

(b) Break down into the different possible cases, and count the number of possible arrangements for each case.

(c) Number of ways of allocating items to the 1<sup>st</sup> place  $\times$  number of ways of allocating items to the 2<sup>nd</sup> place etc

or  $\text{Prob}(1^{\text{st}} \text{ place being filled in a given way}) \times \text{Prob}(2^{\text{nd}} \text{ place being filled in a given way}) \times \dots$

(d) Conditional probability:

$$\text{Prob}(B | A) = \frac{\text{Prob}(A \cap B)}{\text{Prob}(A)} \text{ (consider Venn diagram)}$$

Alternatively,  $\text{Prob}(A \cap B) = \text{Prob}(A) \times \text{Prob}(B | A)$

[A occurs; then B occurs (given that A has already occurred)]

### (B) Devices

(a) Find total including non-permissible cases and then deduct these cases.

(b) For  $r$  indistinguishable items, assume initially that they are different, and then remove duplication by dividing by  $r!$  (or vice-versa)

(c) If items have to be next to each other, combine them into a single block of  $r$  items, and multiply by  $r!$