Section 3.3 : Probabilities Using Counting Methods

$$\text{Probability} = \frac{\text{favourable outcome}}{\text{total possible}}$$

- permutations (order impt.)
- combinations
- fundamental counting principle

ex.1 pg.152

Ten boys competing

Determine the probability that Jamaal, Ethan & Alberto will place 1st, 2nd, or 3rd, in any order.

$$\frac{\text{fav. outcome}}{\text{total possible}} \Rightarrow \frac{\text{Jamaal/Ethan/Alberto (1st/2nd/3rd)}}{\text{total possible for 1st, 2nd, 3rd}}$$

$$= \frac{3 \cdot 2 \cdot 1}{10 \cdot 9 \cdot 8}$$ ← 3 specific boys; ← Total of 10 in 3 positions

$$= \frac{6}{720} = 0.83\%$$

ex.2) pg.156

SASKATCHEWAN

Probability of correctly spelling SASKATCHEWAN if the tiles are mixed up. (Scrabble tiles)

$\frac{\text{fav. outcome}}{\text{total possible}} \Rightarrow \frac{\text{Spell it correctly} \to 1}{\text{all possible ways to arrange}}$

* ways of arranging (chp.2)
SASKATCHEWAN

$\frac{n!}{a!b!\ldots} = \frac{12!}{3!2!} = 39\,916\,800$

prob. $\Rightarrow \frac{1}{39\,916\,800}$

3) A 5 digit PIN number can begin with any digit (except zero) and no other restriction. Find the probability of the code beginning with a 7 and ending in 8.

fav. outcome $1 \cdot 10 \cdot 10 \cdot 10 \cdot 1$ (#7 … #8)

$= 1000$

Total possible (5 digit #'s) $9 \cdot 10 \cdot 10 \cdot 10 \cdot 10$ (can't be zero)

$= 90000$

$\text{Prob} = \frac{1000}{90000} = \frac{1}{90}$