Warm-Up

How many 4-digit PINs are possible if:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

10 options

a) First and last digit must be the same...

$$\underbrace{10}_{D1} \times \underbrace{10}_{D2} \times \underbrace{10}_{D3} \times \underbrace{1}_{D4}$$

$$= 1000$$

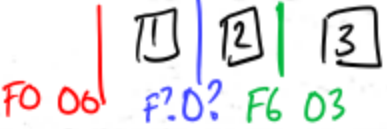
b) ... but the middle two digits must be different from each other

$$\underbrace{10}_{} \quad \underbrace{9}_{} \quad \underbrace{1}_{}$$

$$= 900$$

#1-7

4. The score at the end of the second period of a hockey game is: Flames 6 Oilers 3.
Jarome was attempting to determine how many different possibilities there are for the score at the end of the first period. He used the fundamental counting principle and multiplied 6 by 3 to get an answer of 18. Explain the error in his reasoning.



5. If each of the students in a class of 30 students is capable of winning any of the class prizes, how many ways are there of awarding

a) a first prize, a second prize, and a third prize in Mathematics?

b) a Mathematics prize, a Chemistry prize, and a Physics prize?

6. Three digit numbers are formed using only the digits 2, 3, 5, 6, 7, and 9. 6 options

a) If repetitions are not permitted, how many 3-digit numbers can be formed?

6 × 5 × 4 = 120

b) How many of these are

i) less than 400? 2 5 4 — 2, 3

ii) even? 5 4 2 — 2, 6

iii) odd?

iv) multiples of 5?

7. A vehicle license plate consists of 3 letters followed by 3 digits. How many different license plates are possible if:

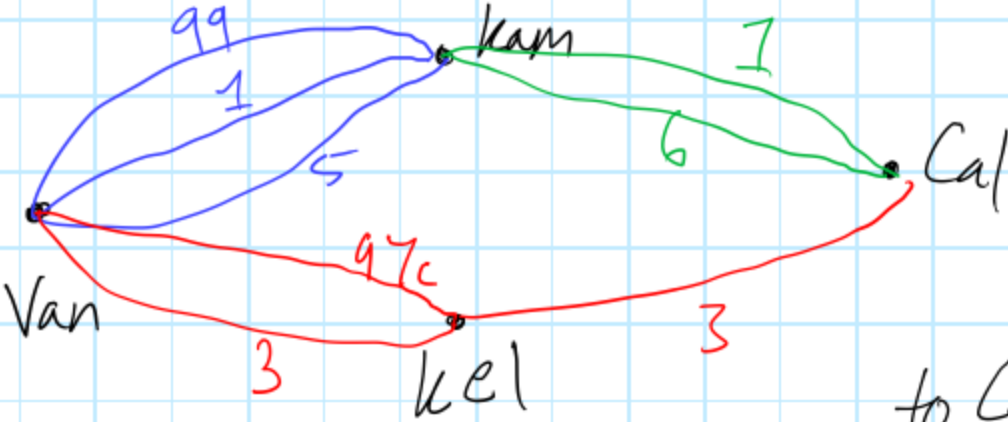
a) there are no restrictions on the letters or digits used? 26 26 26 10 10 10 — Let Let Let # # #

b) no letters may be repeated?

c) the first digit cannot be zero and no digits can be repeated?

Fundamental Counting Principle

Ex1 Taking a road trip from Vancouver to Calgary, you need to stop in either Kamloops or Kelowna for food + Gas.



$$99 < \begin{matrix}1\\6\end{matrix}$$

$$1 < \begin{matrix}1\\6\end{matrix}$$

$$5 < \begin{matrix}1\\6\end{matrix}$$

How many different routes exist to Calgary?

a) Going through Kamloops $\underbrace{③}_{V \to Kam} \times \underbrace{②}_{Kam \to Cal} = 6$

b) Going through Kelowna $\frac{(2)}{V \to kel} \times \frac{(1)}{kel \to cal} = 2$

c) total $= 6 + 2 = 8$

we go through Kelowna (or) $\Rightarrow$ (+) add
we go through Kamloops

Ex 2 BC license plates have the format let let # # # let

They don't use Zero or O (because it's confusing).

- For commerical vehicles,

"C C odd # # let"

- For regular (all other) vehicles, no repeats for letters and digits.

How many plates are possible?

For all cars, it is either commercial (or) regular

(+)

$$\underset{C}{1} \times \underset{C}{1} \times \underset{\text{odd}}{5} \times \underset{\text{no zero}}{9} \times 9 \times \underset{\text{no 0}}{25} = 10125$$

(+)

$$25 \times 24 \times 9 \times 8 \times 7 \times 23 = 6\,955\,200$$

$= 6 \quad 965 \quad 325$

Ex 3 For Word Scape, you need to rearrange the letters of 'BLANKET' to make a 4-letter "word". How many are possible if: (NOTE: no repeating letters)

a) no restrictions

7 letters

$$\underline{7} \times \underline{6} \times \underline{5} \times \underline{4}$$

$$= 840$$

b) First letter MUST be "T"

$$\underline{1} \quad \underline{6} \quad \underline{5} \quad \underline{4}$$