

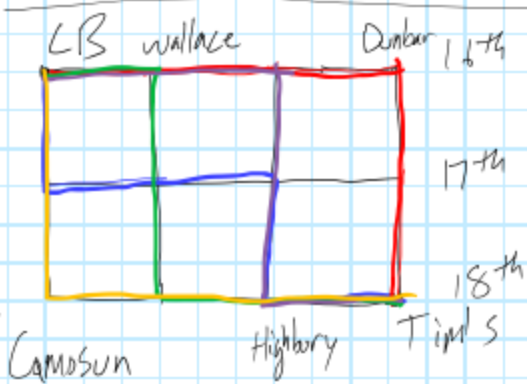
Warm-up:

① How many ways can you rearrange all the letters of the word 'TORONTO'?

$$\begin{array}{l} 7 \text{ total} \Rightarrow 7! \\ 3 \text{ O's} \\ 2 \text{ T's} \end{array} \Rightarrow \frac{7!}{2! 3!} = \underline{420}$$

② A grocery store has 3 boxes of apples, 5 boxes of bananas, 1 box of peaches and 2 boxes of pears to display for sale. How many ways can they arrange them in a line on a shelf?

$$\begin{array}{l} 11 \text{ boxes} \Rightarrow 11! \\ 5 \text{ Bananas} \\ 2 \text{ pear} \\ 3 \text{ apple} \end{array} \Rightarrow \frac{11!}{5! 2! 3!} = \underline{27,720}$$



How many ways could we get to Tim's?

(No going backwards)
 (Right/Down)

- You have to go 3 right and 2 down.

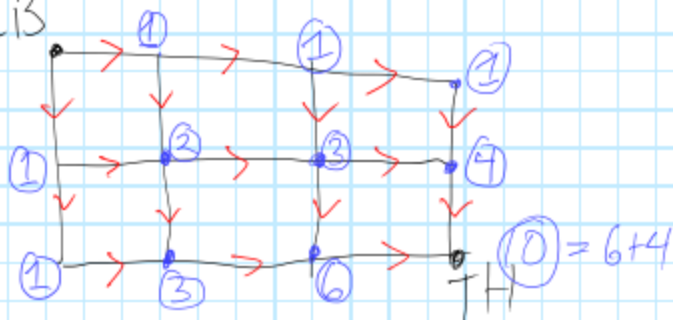
① \Rightarrow 5 total Steps



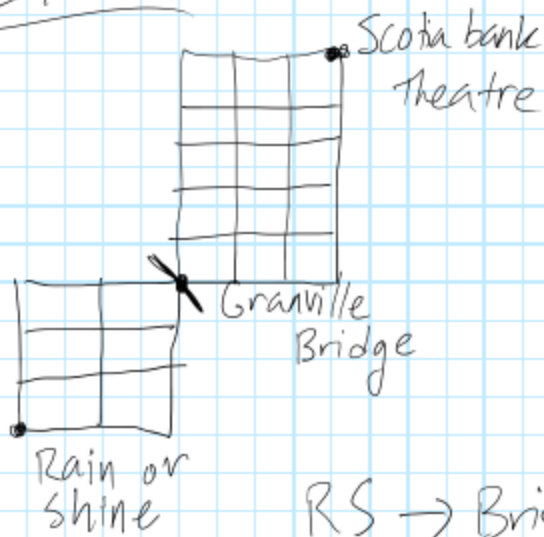
every possible route² is
an arrangement of R's and D's

$$\Rightarrow \frac{5!}{3! 2!} = 10$$

② LB



Ex 2



RS \rightarrow Bridge

5!

Rain or
shine

$$\begin{aligned} RS \rightarrow \text{Bridge} &\Rightarrow \frac{5!}{2!3!} \\ 2R, 3UP & \\ &= \underline{10} \end{aligned}$$

$$\begin{aligned} \text{Bridge} \rightarrow \text{Theatre} &\Rightarrow \frac{8!}{3!5!} = \underline{56} \\ 3R, 5UP & \end{aligned}$$

$$\begin{aligned} 56 \otimes 10 \\ = 560 \end{aligned}$$

$$\begin{aligned} \text{or } \cancel{56 \oplus 10} \\ = \end{aligned}$$

Because we
are going from
RS to Bridge **AND**
Bridge to theatre

Ex 3 where the factorial method
doesn't work



4R, 5D

RRRR DDDDD

↑
this doesn't
work

Draw picture

#8

Lesson 4: #1-10 (skip #8 if you want)