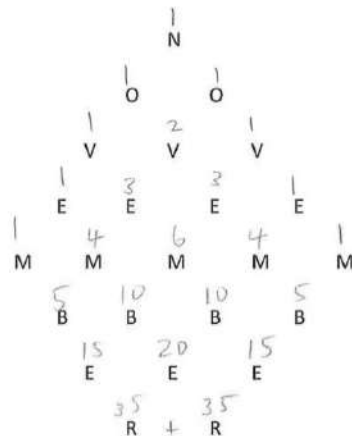### 3.6 Pascal's Triangle (Day 2)

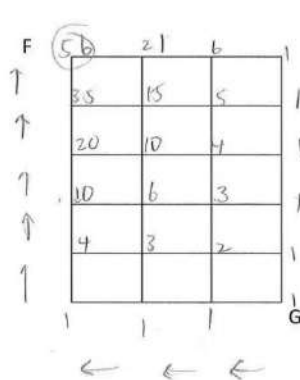**APPLYING PASCAL'S METHOD**

EXAMPLE 1 How many paths will spell November if you start at the top and proceed diagonally?

```
                  N
              O       O
          V       2       V
              V
          1       3       3       1
          E       E       E       E
      1       4       6       4       1
      M       M       M       M       M
          5      10      10       5
          B       B       B       B
             15      20      15
             E       E       E
                 35     35
                  R   +   R
```

∴ 70 ways.

EXAMPLE 2 Gandalf is three blocks east and five blocks south of his friend Frodo Baggins' house. How many paths through the Shire are possible if he only walks west and north?

F	56	21	6	1
↑	35	15	5	1
↑	20	10	4	1
↑	10	6	3	1
↑	4	3	2	1
↑	1	1	1	G

← ← ←

N
W ← ↕ → E
S

← ← ← ↑ ↑ ↑ ↑ ↑

(OR)

$$\frac{8!}{3!\,5!} = 56 \text{ ways}$$

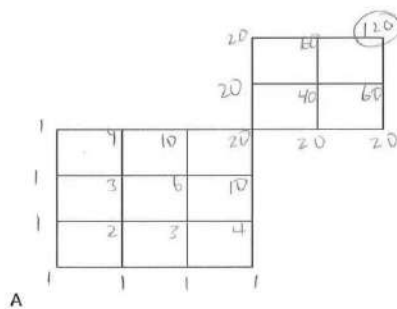* Note this works b/c each "block" or grid is the same size (compare to last lesson Ex. 2, where blocks/grids are **not** all evenly sized).

1

EXAMPLE 3 If you can only travel north or east, determine the number of pathways from A to B in the following street arrangement.
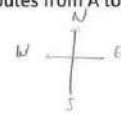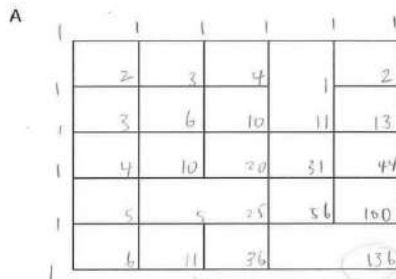

DD ways

OR

$$\rightarrow \rightarrow \rightarrow \nearrow \uparrow \uparrow \qquad \rightarrow \rightarrow 9 \uparrow$$

$$\frac{6!}{3! \, 3!} \times \frac{4!}{2! \, 2!}$$

$$= 120 \text{ ways}$$

EXAMPLE 4 Determine the number of possible routes from A to B if you only travel south or east.

136 ways.