

Draw or print a 15 by 15 multiplication square.

**Pick any 2 by 2 square and add the numbers on each diagonal.**

For example, if you take:

32	36
40	45

the numbers along one diagonal add up to 77 ( $32+45$ ) and the numbers along the other diagonal add up to 76 ( $36+40$ ).

Try a few more examples.

What do you notice?

Can you show (prove) that this will always be true?

**Now pick any 3 by 3 square and add the numbers on each diagonal.**

For example, if you take:

72	84	96
78	91	104
84	98	112

the numbers along one diagonal add up to 275 ( $72+91+112$ ) and the numbers along the other diagonal add up to 271 ( $84+91+96$ ).

Try a few more examples.

What do you notice this time?

Can you show (prove) that this will always be true?

**Now pick any 4 by 4 square and add the numbers on each diagonal.** Try a few examples.

What do you notice now?

Can you show (prove) that this will always be true?

**Can you predict what will happen if you pick a 5 by 5 square, a 6 by 6 square ... an  $n$  by  $n$  square, and add the numbers on each diagonal?**

**Can you prove your prediction?**