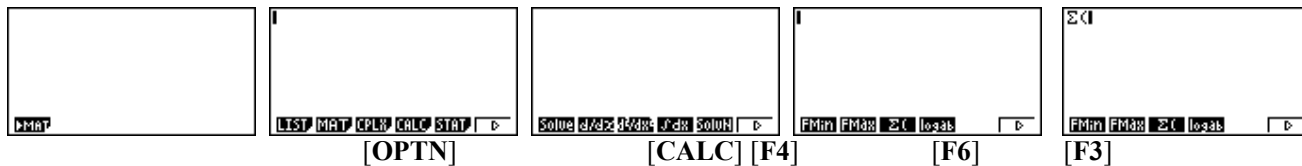
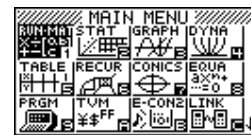


# How can I solve this on the graphic calculator?

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$$\sum_{n=1}^n n \sum_{m=1}^m m = \frac{1}{2} n(n+1) \frac{1}{2} m(m+1)$$

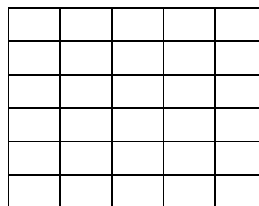
Select **RUN-MAT** mode from the **Main Menu** by using the arrow keys to highlight the **RUN-MAT** icon or by pressing 1.



**Note:**  $1 + 2 + 3 + 4 + 5 = 15 = \frac{1}{2} \times 5 \times 6$

**In general:**  $1 + 2 + 3 + \dots + (n-2) + (n-1) + n = \frac{1}{2} \times n \times (n+1)$

**Example:** How many rectangles do you see in this picture?



Let's break it down into smaller components... row  $\times$  column

- How many  $1 \times 1$ ,  $1 \times 2$ ,  $1 \times 3$ ,  $1 \times 4$ ,  $1 \times 5$  do you see?
- How many  $2 \times 1$ ,  $2 \times 2$ ,  $2 \times 3$ ,  $2 \times 4$ ,  $2 \times 5$  do you see?
- How many  $3 \times 1$ ,  $3 \times 2$ ,  $3 \times 3$ ,  $3 \times 4$ ,  $3 \times 5$  do you see?
- How many  $4 \times 1$ ,  $4 \times 2$ ,  $4 \times 3$ ,  $4 \times 4$ ,  $4 \times 5$  do you see?
- How many  $5 \times 1$ ,  $5 \times 2$ ,  $5 \times 3$ ,  $5 \times 4$ ,  $5 \times 5$  do you see?
- How many  $6 \times 1$ ,  $6 \times 2$ ,  $6 \times 3$ ,  $6 \times 4$ ,  $6 \times 5$  do you see?

Collating this information:

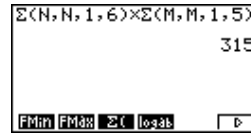
	Columns					
Rows		1	2	3	4	5
1		30	24	18	12	6
2		25	20	15	10	5
3		20	16	12	8	4
4		15	12	9	6	3
5		10	8	6	4	2
6		5	4	3	2	1

Which can be changed to:

	Columns					
Rows		1	2	3	4	5
1		$6 \times 5$	$6 \times 4$	$6 \times 3$	$6 \times 2$	$6 \times 1$
2		$5 \times 5$	$5 \times 4$	$5 \times 3$	$5 \times 2$	$5 \times 1$
3		$4 \times 5$	$4 \times 4$	$4 \times 3$	$4 \times 2$	$4 \times 1$
4		$3 \times 5$	$3 \times 4$	$3 \times 3$	$3 \times 2$	$3 \times 1$
5		$2 \times 5$	$2 \times 4$	$2 \times 3$	$2 \times 2$	$2 \times 1$
6		$1 \times 5$	$1 \times 4$	$1 \times 3$	$1 \times 2$	$1 \times 1$

Summarising the total number of rectangles are:

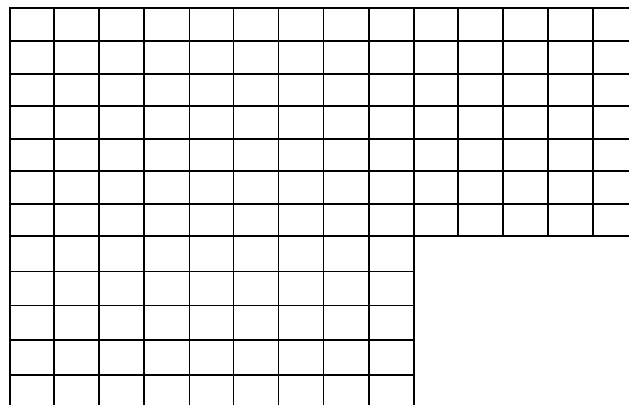
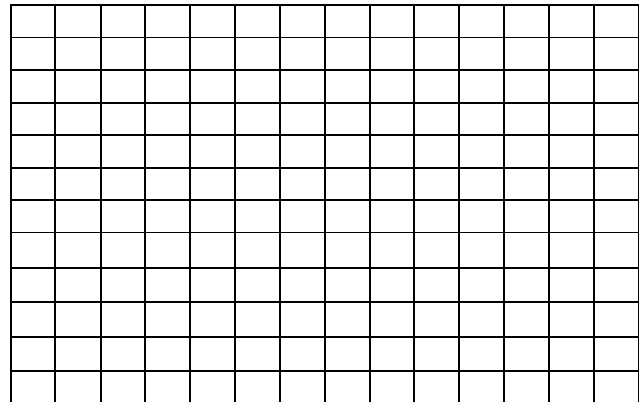
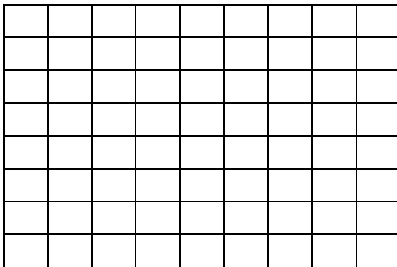
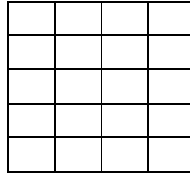
$$\begin{aligned}
 &6 \times 5 + 6 \times 4 + 6 \times 3 + 6 \times 2 + 6 \times 1 + 5 \times 5 + 5 \times 4 + 5 \times 3 + 5 \times 2 + 5 \times 1 + 4 \times 5 + 4 \times 4 + 4 \times 3 + 4 \times 2 + 4 \times 1 + 3 \times 5 \\
 &+ 3 \times 4 + 3 \times 3 + 3 \times 2 + 3 \times 1 + 2 \times 5 + 2 \times 4 + 2 \times 3 + 2 \times 2 + 2 \times 1 + 1 \times 5 + 1 \times 4 + 1 \times 3 + 1 \times 2 + 1 \times 1 \\
 &= (6 + 5 + 4 + 3 + 2 + 1) \times (5 + 4 + 3 + 2 + 1) \\
 &= \left(\frac{1}{2} \times 6 \times 7\right) \times \left(\frac{1}{2} \times 5 \times 6\right) = 315.
 \end{aligned}$$



Hence: 
$$\sum_{n=1}^n n \sum_{m=1}^m m = \frac{1}{2} n(n+1) \frac{1}{2} m(m+1)$$

**Try these:**

Calculate the number of rectangles in:



How many rectangles are on one page of your mathematics QUAD book?