

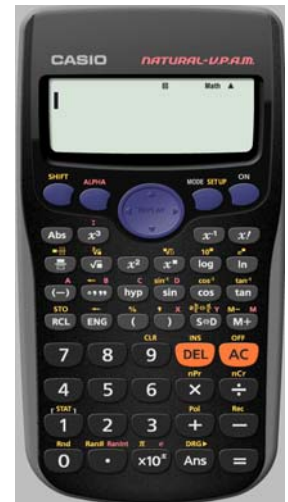
How many triangles are there?

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Tukutuku panelling is a distinctive art form of Māori people, a traditional latticework used to decorate the whareniui (meeting houses). This illustration to the right, Niho Taniwha has been identified as a pattern of Te Arawa and Waikato iwi. The teeth-like triangular shapes of Niho Taniwha are 'dragon's' teeth, usually arranged in rows with the apex at the top.



Row	▲	▼	▲ and ▼ in each row	Cumulative sum of rows from row 1
1	1	0	1	1
2	2	1	3	4
3	3	2	5	9
4	4	3	7	16
5	5	4	9	25
6	6	5	11	36
7	7	6	13	49
8	8	7	15	64
9	9	8	17	81
10	10	9	19	100
...
n	n	$n - 1$	$2n - 1$	n^2



Turn the calculator on, then press **SHIFT SETUP** and arrow down to **STAT**, then **[3]** and **[2]** for **OFF**.

1:MthIO 2:LineIO 3:Deg 4:Rad 5:Gra 6:Fix 7:Sci 8:Norm	1:ab/c 2:d/c 3:STAT 4:Disp 5:CONT	Frequency? 1:ON 2:OFF
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Press **Mode** then **[2]** and **[1]** for $y = A + Bx$.

1:COMP 2:STAT	1:1-VAR 2:A+BX 3:_+CX ² 4:ln X 5:e ^X 6:A·B ^X 7:A·X ^B 8:1/X
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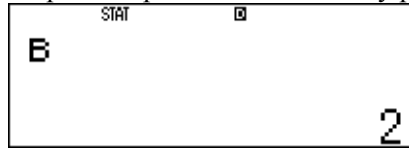
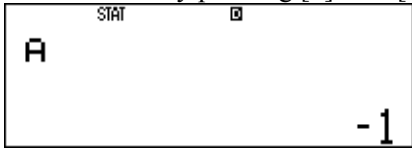
Enter the row number in x column and the totals for the rows, i.e. '▲ and ▼ in each row' in the y column.

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Now press **[AC]**, then **SHIFT [1]** for **STAT**istics and **[5]** for **Reg**ression.

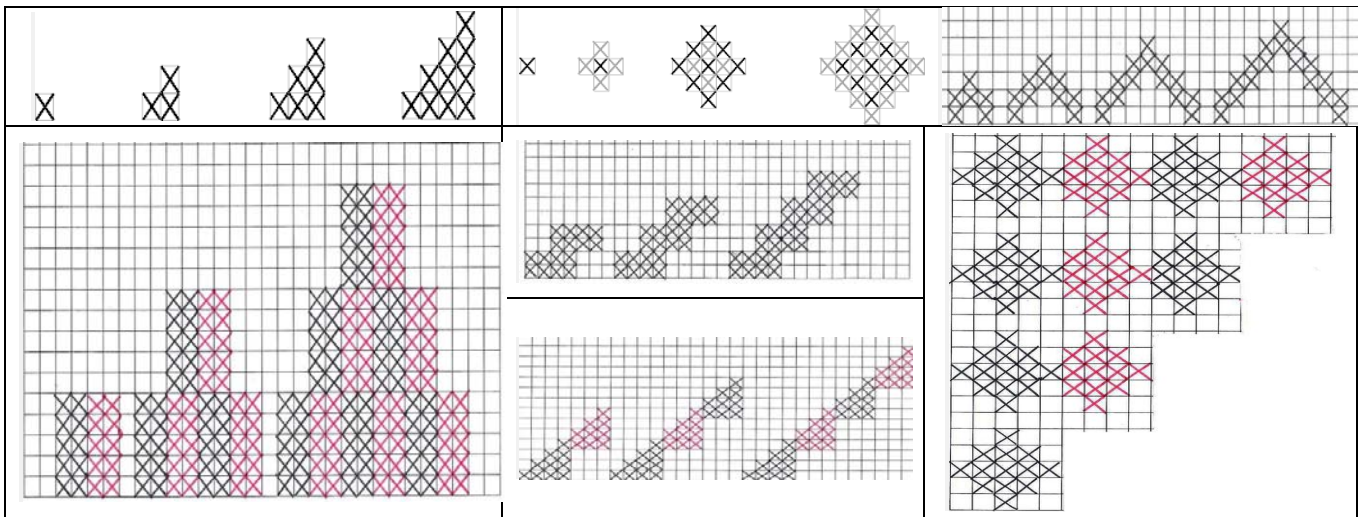
STAT 0	1:Type 2:Data 3:Sum 4:Var 5:Reg 6:MinMax	1:A 2:B 3:r 4:z 5:
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Now select **A** by pressing [1] then [=] and repeat the process to select **B** by pressing [2] then [=].



Relationship is linear: $y = Ax + B$, i.e. $y = -1 + 2x = 2x - 1$

Other Tukupuku patterns that you can find linear, quadratic or other mathematical relationships.



Template:

Row	Shape 1	Shape 2	Shape 1 and Shape 2 in each row	Cumulative sum of rows from row 1
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
...
n				

Visit these websites for more information on Tukupuku patterns and their history:

- <http://www.teara.govt.nz/en/artwork/7950/ranginui-papatuanuku-and-offspring>
- <http://christchurchcitylibraries.com/Maori/Puawaitanga/Stories/>
- <https://www.aucklandmuseum.com/getmedia/b7e43921-8963-4372-811c-c59257f58cc0/auckland-museum-education-kit-tukupuku-tuturu-maori>
- <http://nzmaths.co.nz/resource/tukupuku-patterns-0>
- <http://christchurchcitylibraries.com/Heritage/Photos/Libraries/Central/TukupukuPanels/Thumbnails/>

For further tips, more information and software support visit our websites:
www.casio.edu.monacocorp.co.nz or <http://graphic-technologies.co.nz>