

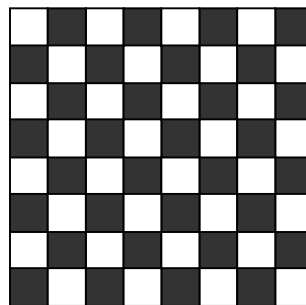
24/06/2020

# Chessboard Investigation

WALT

Solve a mathematical problem by recognising patterns.

How many squares are there on a chessboard?



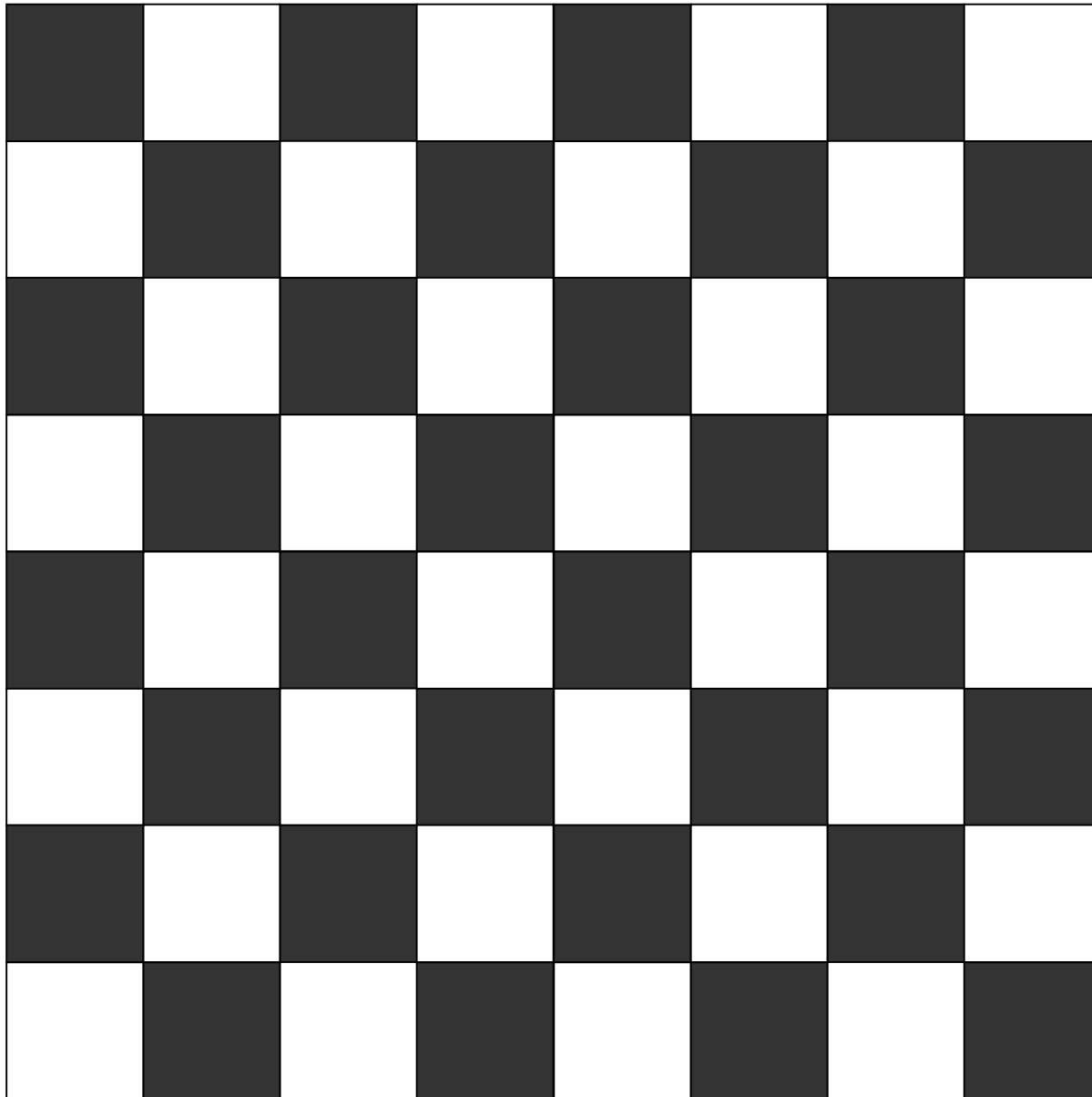
How many squares  
there are

**HINT:**

**The answer is  
greater than 64!**



Have a go, count how many there are!  
Don't forget that the chessboard is also a square.

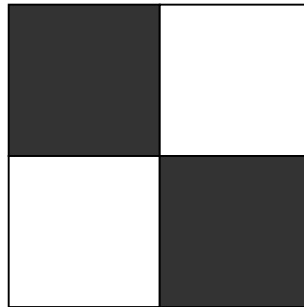


Have a go, count how many there are!  
Don't forget that the chessboard is also a square.

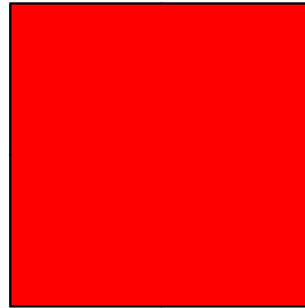


To investigate this problem it is best to examine a smaller chessboard first.

How many squares are there in a 2 by 2 chessboard?

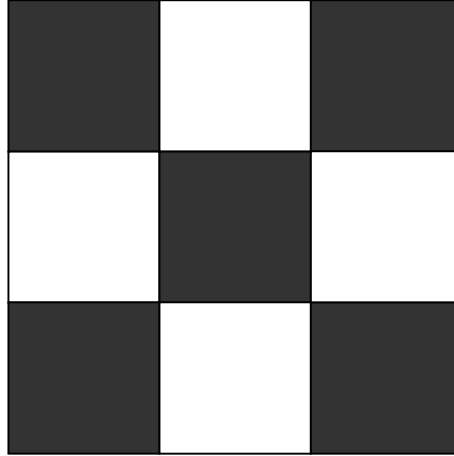


How many squares are there in a 2 by 2 chessboard?



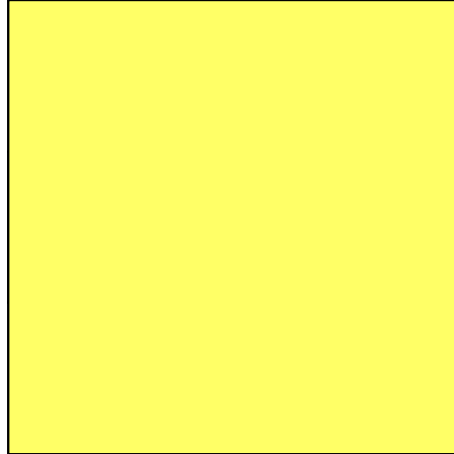
Size of square	Number of squares
1 by 1	4
2 by 2	1

How many squares are there in a 3 by 3 chessboard?



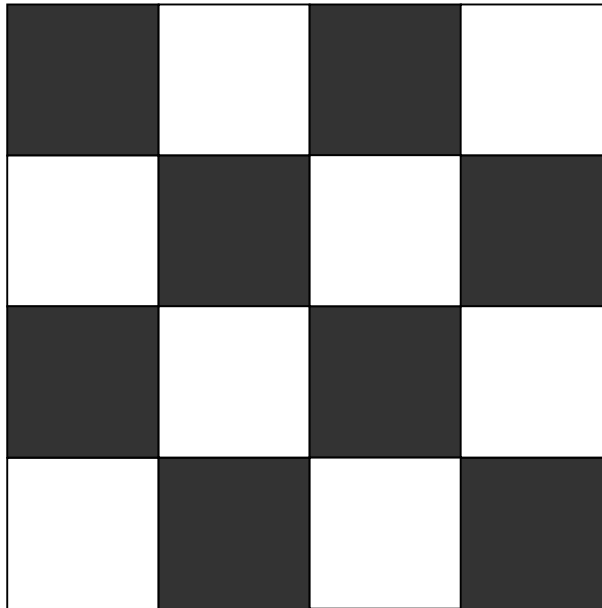


How many squares are there in a 3 by 3 chessboard?

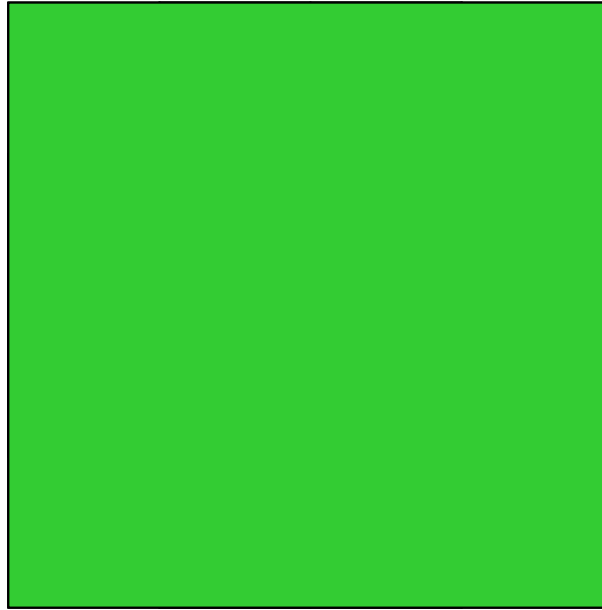


Size of square	Number of squares
1 by 1	9
2 by 2	4
3 by 3	1

How many squares are there in a 4 by 4 chessboard?



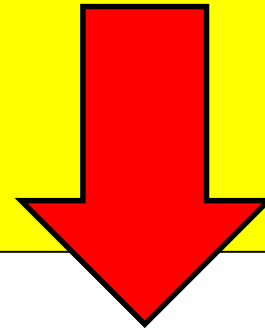
How many squares are there in a 4 by 4 chessboard?



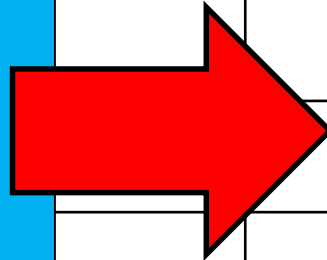
Size of square	Number of squares
1 by 1	16
2 by 2	9
3 by 3	4
4 by 4	1

Can you see the pattern?

1, 4, 9, 16, ...

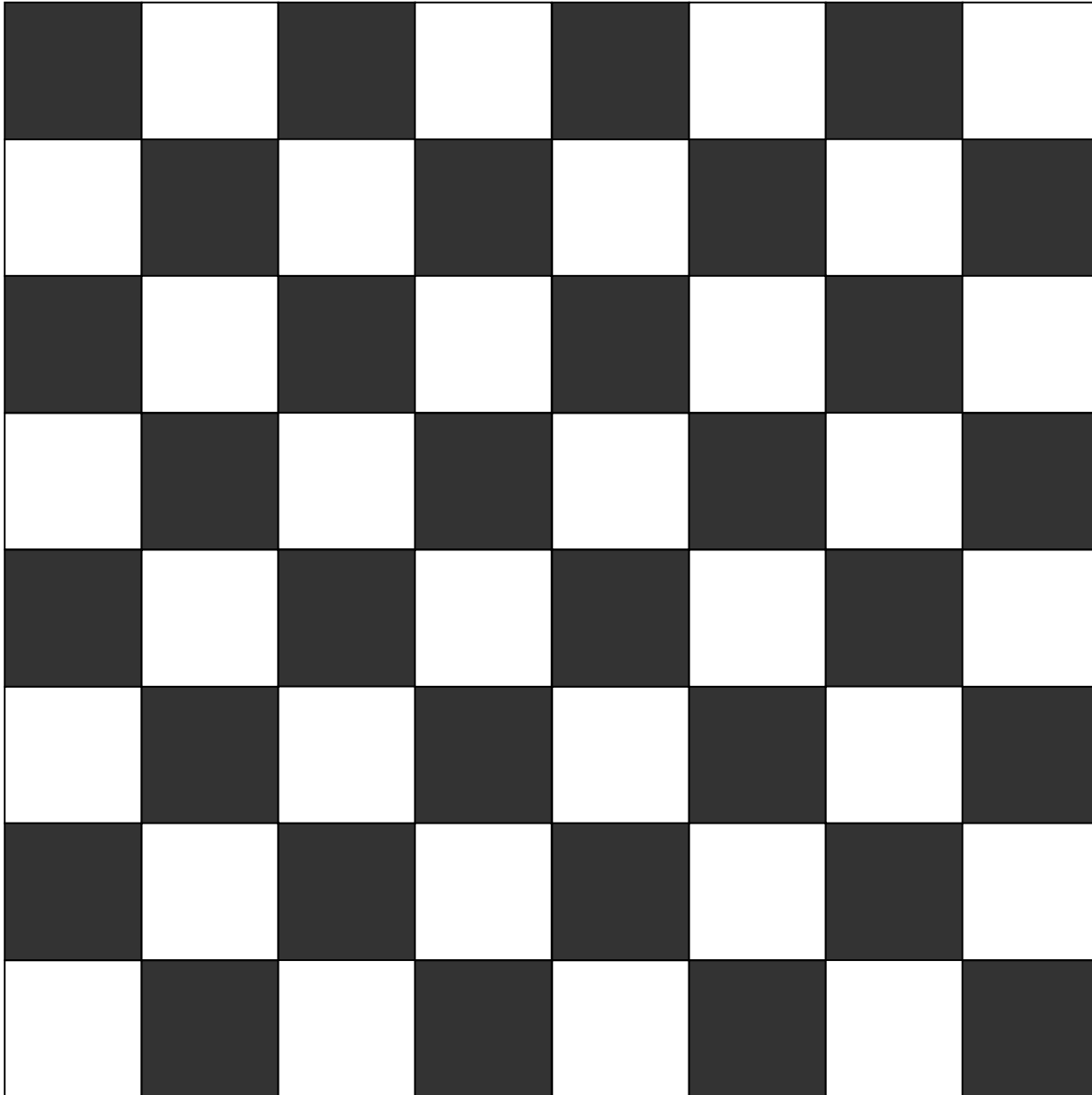


**SQUARE  
NUMBERS!**



re	Number of squares
	16
	9
	4
	1

So, how many squares are there in a 8 by 8 square?



You know how many in a 1 by 1, and a 2 by 2, and a 3 by 3, and a 4 by 4!

Size of square	Number of squares
1 by 1	
2 by 2	
3 by 3	
4 by 4	
5 by 5	
6 by 6	
7 by 7	
8 by 8	

Just complete the table and add them up!

Size of square	Number of squares
1 by 1	64
2 by 2	49
3 by 3	36
4 by 4	25
5 by 5	16
6 by 6	9
7 by 7	4
8 by 8	1

$$64 + 49 + 36 + 25 + 16 + 9 + 4 + 1 = 204$$

Different Board Dimensions		Number of squares in each of the different size boards
1 by 1	$1^2$	1
2 by 2	$1^2 + 2^2$	5
3 by 3	$1^2 + 2^2 + 3^2$	14
4 by 4	$1^2 + 2^2 + 3^2 + 4^2$	30
5 by 5		55
6 by 6		91
7 by 7		140
8 by 8		204



How many squares are there in an  
8 by 8 square?

$$1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2$$



Three people enjoy a meal at a restaurant. The waiter brings the bill for £30 so each person pays £10.

Later the chef realises that the bill should have only been £25 so she sends the waiter back to the table with £5.

The waiter was not very good at maths and could not figure out how to divide the £5 so he gave each person a £1 and kept £2 for himself.



The three people have paid £9 each for the meal:

$$9 \times 3 = \text{£}27$$

The waiter kept £2

$$27 + 2 = \text{£}29$$

*What happened to the other pound?*

