

# **Year 6 SATs Booster**

## **Maths 8**

### **Sequences**

## Objectives:

- Recognise and extend number sequences.
- Generate sequences from practical contexts.
- Recognise squares of numbers to at least  $12 \times 12$ .

## Vocabulary:

odd  
pattern

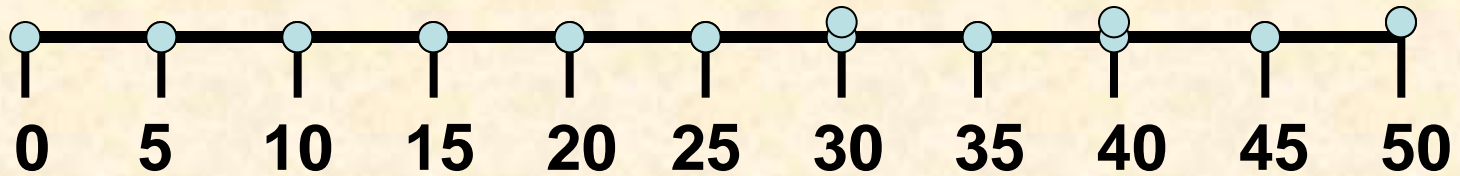
even

position

term

square

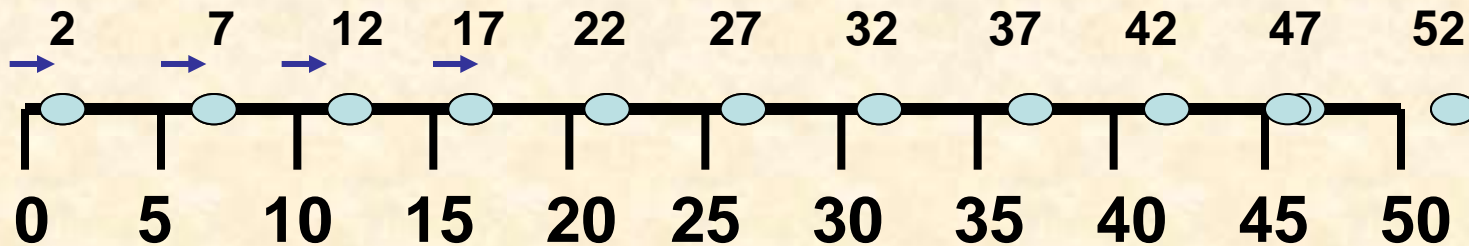
Here is a number line with the 5 times tables marked along it.



**Count from 0, in 5's, up to 50 and then back down to 0.**

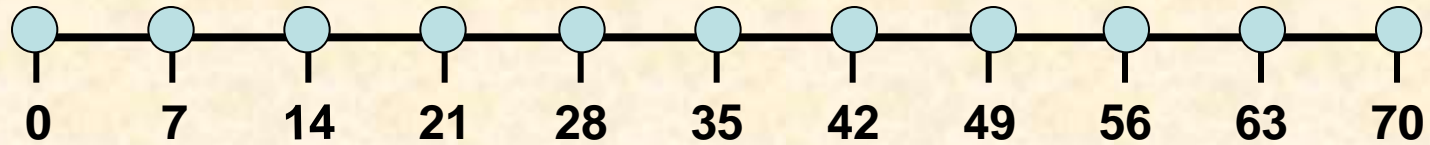
Now count from 2, in steps of 5, up to 52 and back down to 2.

2, 7, 12.....



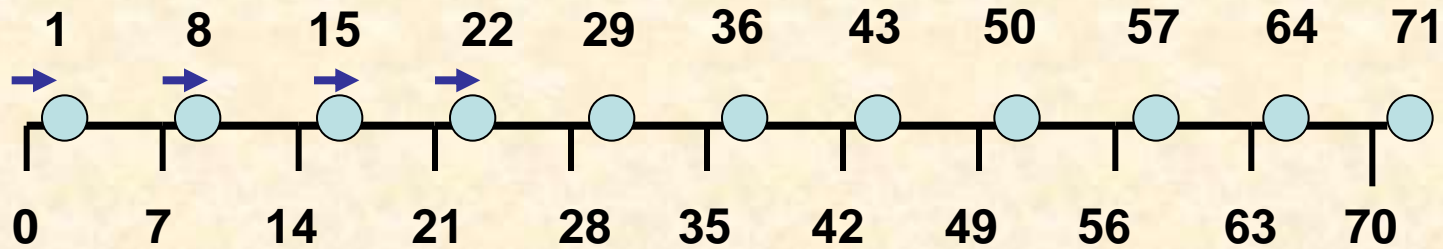
How is the sequence 2, 7, 12 related to the numbers on the number line (multiples of 5)?

**Here is a number line with the 7 times table:**



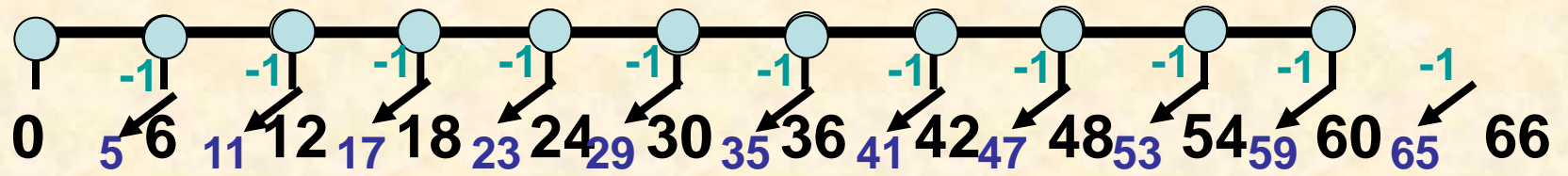
**Say the 7 times tables out loud from 0 to 70 and then from 70 to 0.**

Now count from 1 and go up in 7's, and then count down in 7's to 1.     1, 8, 15, 22....



How is the sequence 1,8,15 ... related to the multiples of 7 on the number line?

Here is a number line with the six times tables marked upon it.



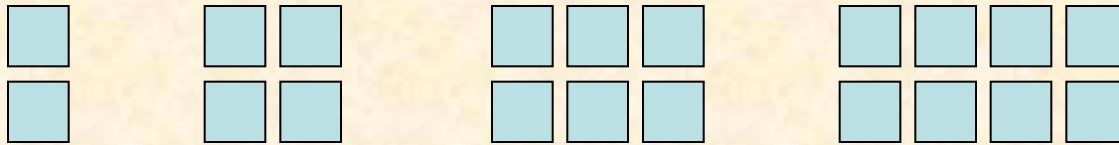
Count, out loud, up and down from 0 in sixes.

Now count up from 5, in sixes 5, 11, 17.....

How is this sequence related to the numbers on the number line above?

**Think about even numbers 2, 4, 6, 8....Can you picture this sequence?**

**Here is a picture of the even number sequence:**

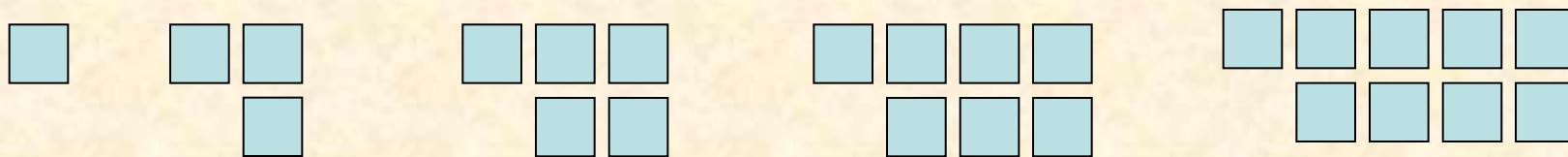


**What is the link between the numbers and the pictures?**



**Think about odd numbers. Can you picture the odd number sequence?**

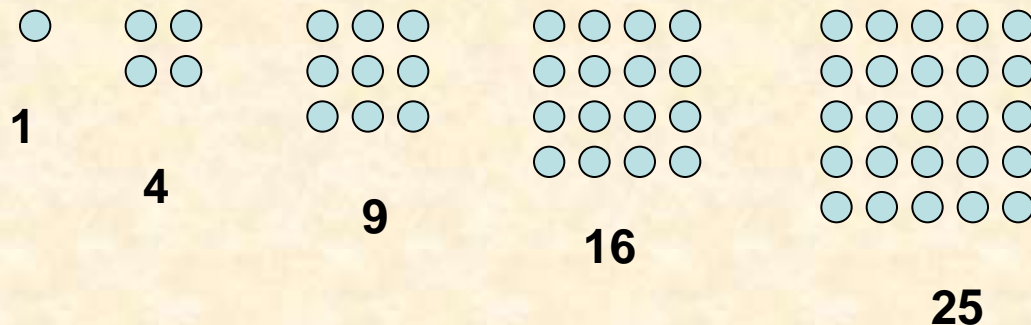
**Here is a diagram of the odd number sequence:**



**Explain how the numbers and the pictures are linked.**

Think about square numbers 1, 4, 9, 16, 25..... Can you picture the square numbers?

Here is a diagram showing square numbers:



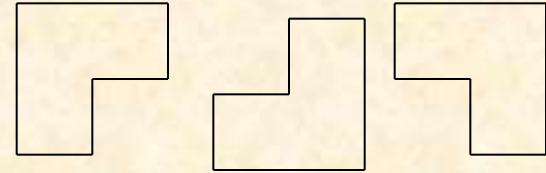
Can you explain how the diagrams grow?

The first diagram is a 1 dot by 1 dot square, the 2<sup>nd</sup> diagram is 2 dots by 2 dots square and so on.....

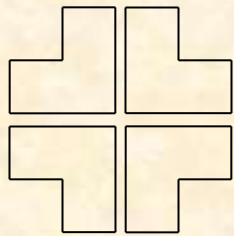
If you can't remember the sequence of square numbers try to remember the diagrams and how they grow. This will help you to find the square numbers.

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

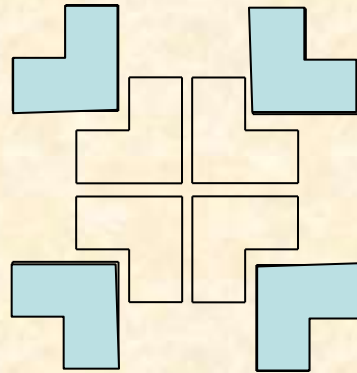
Owen has some tiles like these:



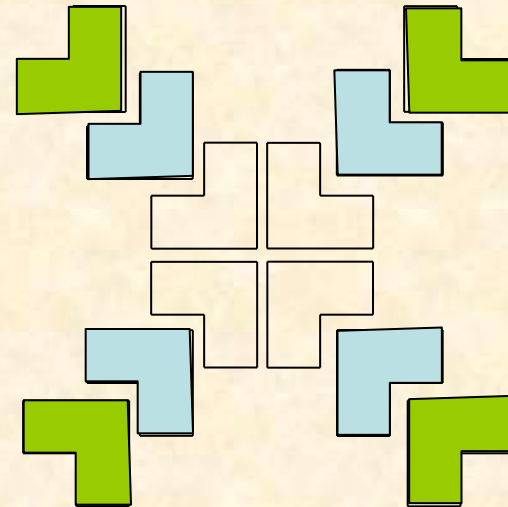
He uses them to make a series of patterns.



Pattern no. 1



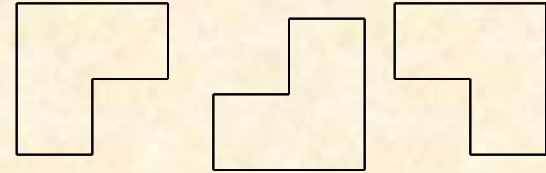
Pattern no. 2



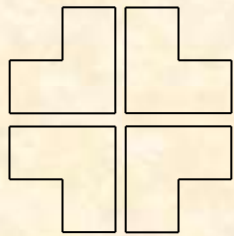
Pattern no. 3

1. Each new pattern has **more tiles** than the one before. The number of tiles goes up by the same amount each time. How many **more** tiles does Owen add each time he makes a new pattern?

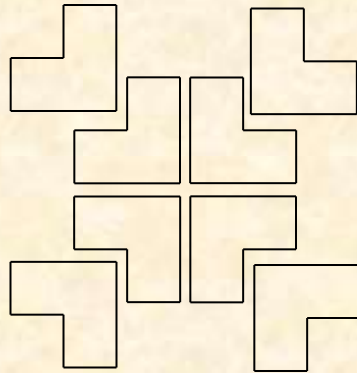
Owen has some tiles like these:



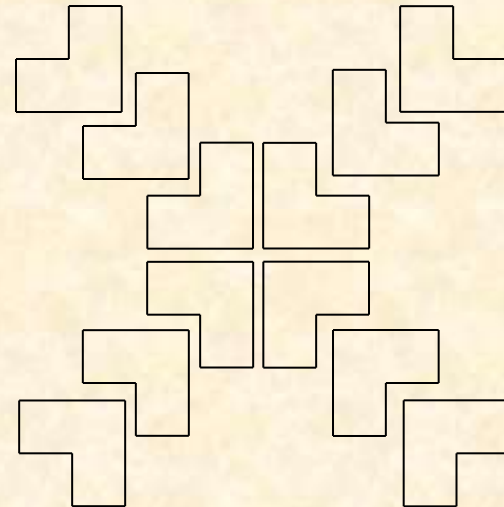
He uses them to make a series of patterns.



Pattern no. 1



Pattern no. 2

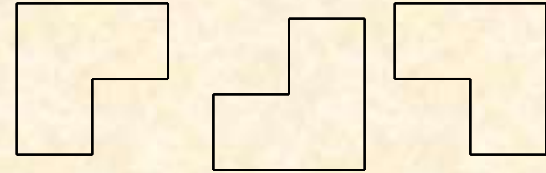


Pattern no. 3

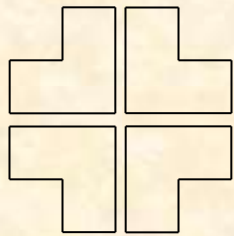
2. How many tiles will Owen need altogether to make **pattern number 6**?

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 4     | 8     | 12    | ?     | ?     | 24    |
| 1 x 4 | 2 x 4 | 3 x 4 | 4 x 4 | 5 x 4 | 6 x 4 |

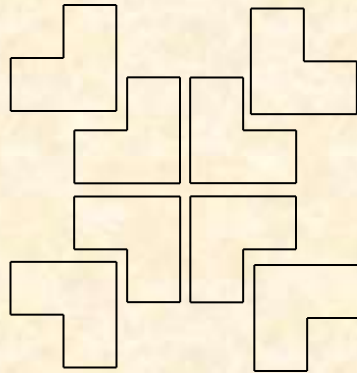
Owen has some tiles like these:



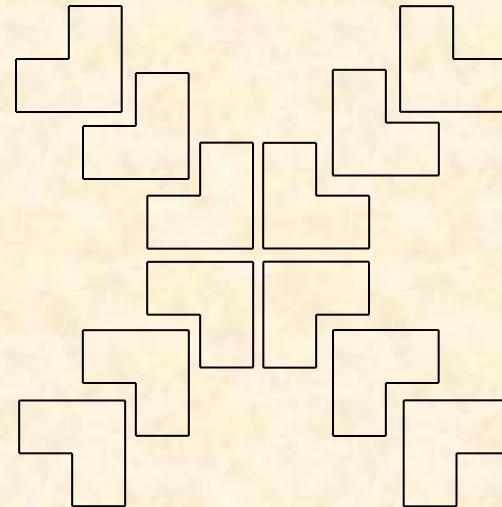
He uses them to make a series of patterns.



Pattern no. 1



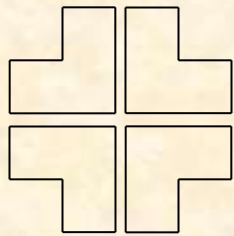
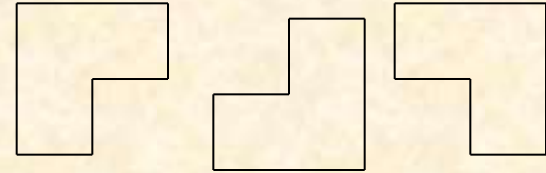
Pattern no. 2



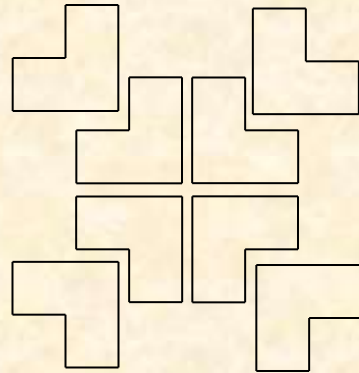
Pattern no. 3

3. **How many tiles** will Owen need altogether to make **pattern number 9?**

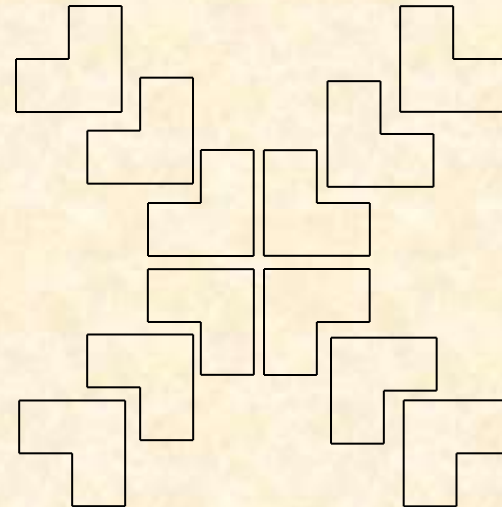
Owen has some tiles like these:



Pattern no. 1



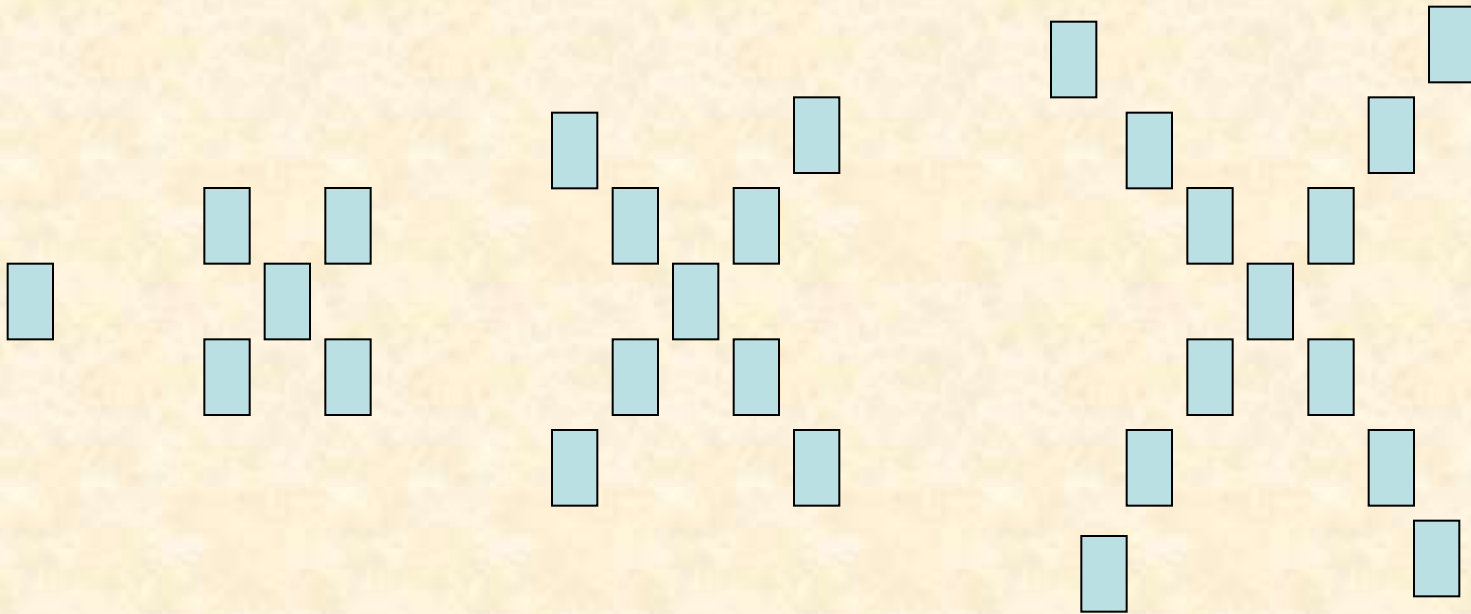
Pattern no. 2



Pattern no. 3

4. Owen uses **40 tiles** to make a pattern. What is the **number** of the **pattern** he makes?

**Investigate this growing pattern:**

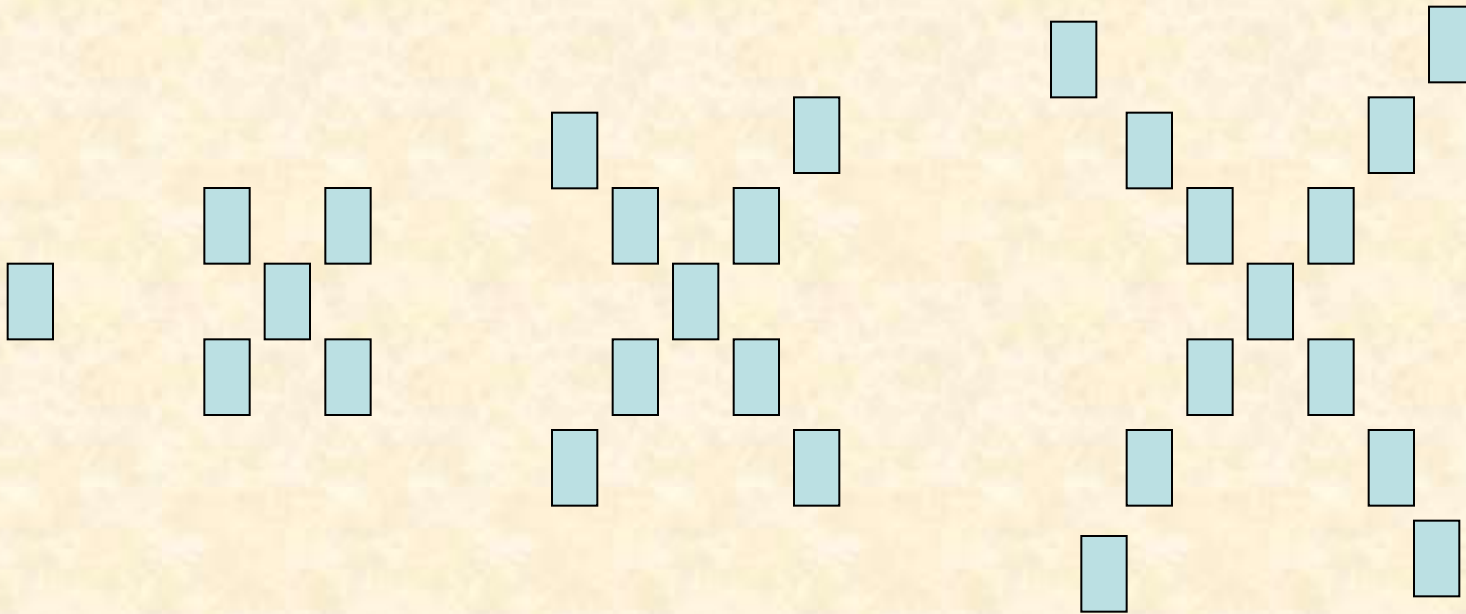


**Here is a table to record the number of tiles in each pattern:**

<b>Pattern</b>	<b>1</b>	<b>2</b>	<b>3</b>		
<b>Number of tiles</b>	<b>1</b>	<b>5</b>	<b>9</b>		



Investigate this growing pattern:



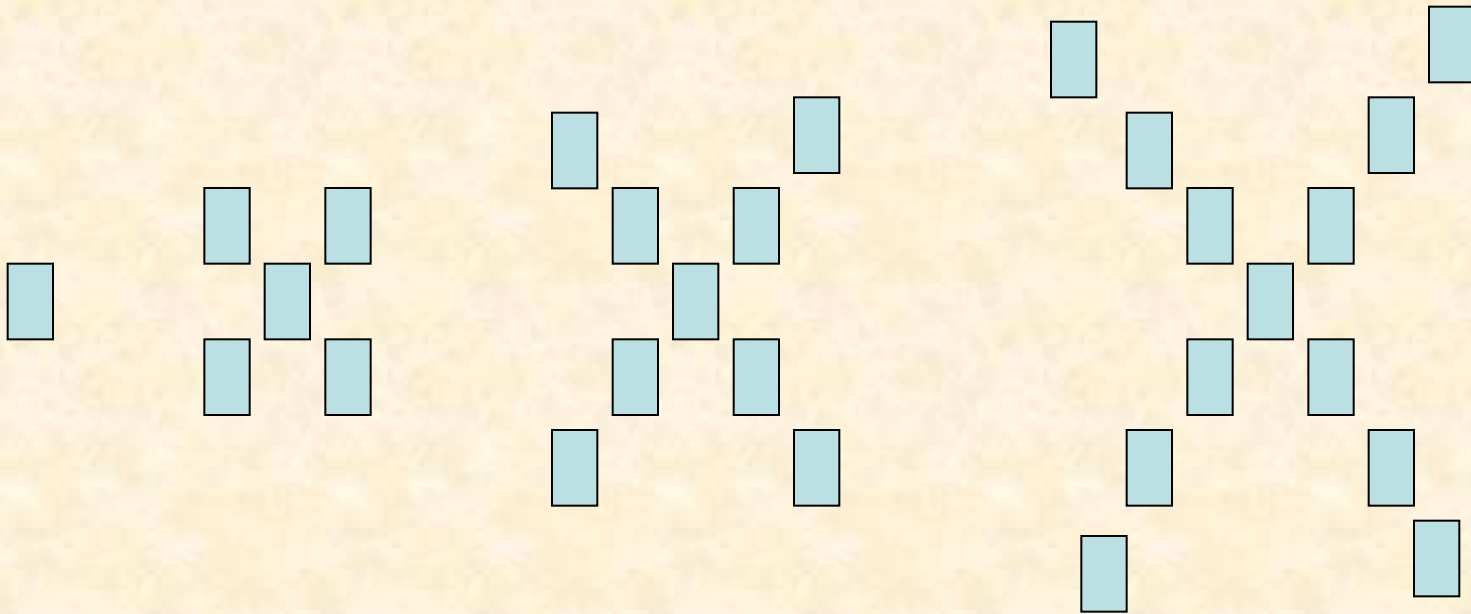
Here is a table to record the number of tiles in each pattern:

Pattern	1	2	3		
Number of tiles	1	5	9		

$-3$   $-3$   $-3$   $-3$   $21$   
 $4$   $8$   $12$   $16$   $24$

How many tiles will there be in pattern 6?

Investigate this growing pattern:



Here is a table to record the number of tiles in each pattern:

Pattern	1	2	3		
Number of tiles	1	5	9		

$$\begin{array}{r}
 29 \\
 32 \quad + \quad 3
 \end{array}$$

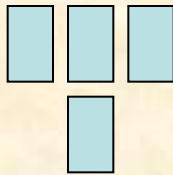
If my pattern uses **29** tiles, which **pattern number** is it?

Investigate this growing pattern:

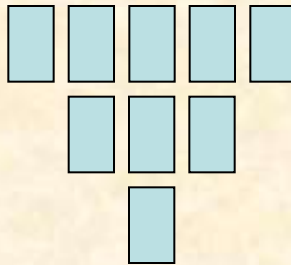
pattern 1



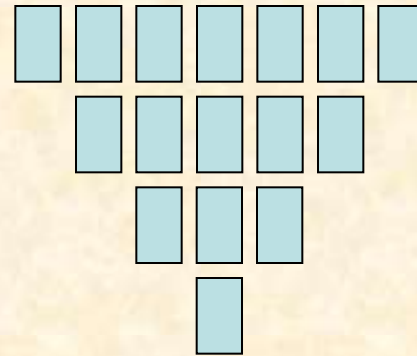
pattern 2



pattern 3



pattern 4



Can you fill in the table below to record this pattern.

<b>Pattern number</b>	1	2	3	4	
<b>Number of tiles</b>	1	4	9	16	

Can you remember where you have met this sequence of numbers?

How many tiles will there be in the 5<sup>th</sup>, 6<sup>th</sup> and 10<sup>th</sup> patterns. How did you calculate the values?

How many tiles will there be in the 20<sup>th</sup>, 60<sup>th</sup> and 76<sup>th</sup> patterns?

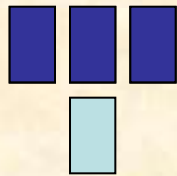
How many tiles will there be in the 3<sup>rd</sup>, 5<sup>th</sup> and 10<sup>th</sup> rows?

Investigate this growing pattern:

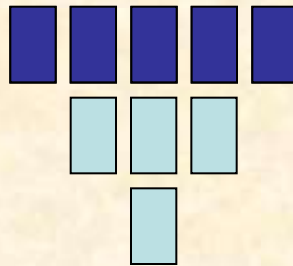
pattern 1



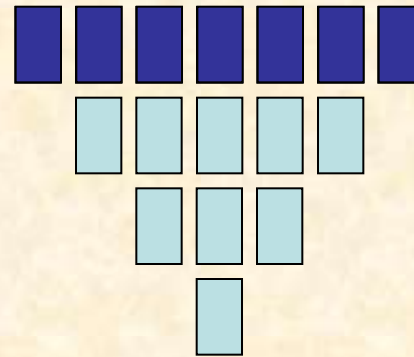
pattern 2



pattern 3



pattern 4



Can you fill in the table below to record this pattern.

<b>Pattern number</b>	1	2	3	4	
<b>Number of tiles</b>	1	4	9	16	

Can you remember where you have met this sequence of numbers?

How many tiles will there be in the 3<sup>rd</sup>, 5<sup>th</sup> and 10<sup>th</sup> rows?

**Find the next two terms for each of the sequences below.**

**1. 12, 14, 16, 18, 20, .....**

**2. 2, 4, 6, 8, 10, .....**

**3. 15, 20, 25, 30, 35, .....**

**4. 19, 24, 29, 34, 39, .....**

**5. 41, 39, 37, 35, 33, .....**

**6. 21, 24, 27, 30, 33, .....**

**7. -2, 0, 2, 4, 6, .....**

**8. 21, 16, 11, 6, 1, .....**

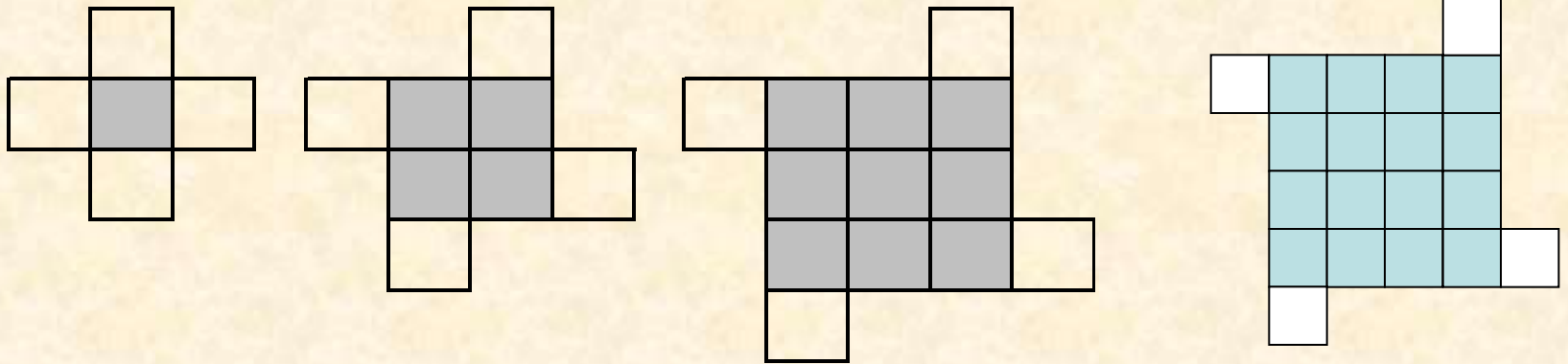
**9. 15, 10, 5, 0, -5, .....**

**10. 1, 2, 4, 8, 16, .....**

**Explain for each question how you found the missing numbers.**

## Answers:

1. 12, 14, 16, 18, 20, 22, 24 the numbers go up in two's
2. 2, 4, 6, 8, 10, 12, 14 the numbers go up in two's
3. 15, 20, 25, 30, 35, 40, 45 the numbers go up in five's
4. 19, 24, 29, 34, 39, 44, 49 the numbers go up in five's
5. 41, 39, 37, 35, 33, 31, 29 the numbers go down in two's
6. 21, 24, 27, 30, 33, 36, 39 the numbers go up in three's
7. -2, 0, 2, 4, 6, 8, 10 the numbers go up in two's
8. 21, 16, 11, 6, 1, -4, -9 the numbers go down in five's
9. 15, 10, 5, 0, -5, -10, -15 the numbers go down in five's
10. 1, 2, 4, 8, 16, 32, 64 the numbers are doubling each time



Copy the sequence

How many grey squares in each pattern?

**The grey squares are square numbers – 1, 4, 9,.....**

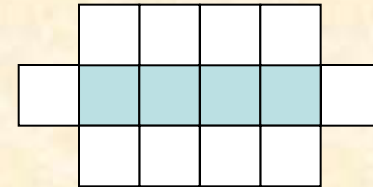
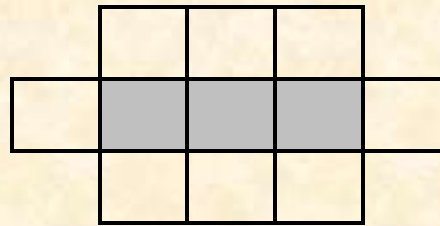
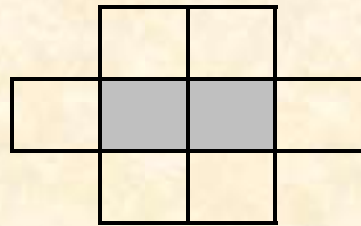
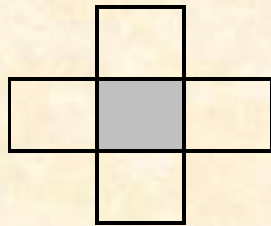
How many white squares in each pattern?

**There are always 4 white tiles**

Find a rule for the next pattern?

**Grey  $4^2$  and white 4. There will be 16 grey and 4 white tiles**

Draw your pattern and see if your prediction was correct.



Copy the sequence

How many grey squares in each pattern?

**The grey squares go up in 1's – 1, 2, 3.....**

How many white squares in each pattern?

**The white squares go up in 2's – 4, 6, 8,....**

Find a rule for the next pattern?

**There will be 4 grey and 10 white.**

Draw your pattern and see if your prediction was correct.