Patterns

Investigate and extend patterns

Reminder

Patterns can be represented as number patterns, in tables, as flow diagrams and explained in words.

1. Extend the patterns on both sides with three terms.

a) ; ; ; –50; 0; 50; 150; 200; ; ;

b) ; ; ; –32; 16; –8; 4; ; ;

c) ; ; ; $\frac{4}{5}$; $\frac{5}{6}$; $\frac{6}{7}$; ; ;

d) ; ; ; $3^4 \times 7^7$; $3^5 \times 7^6$; $3^6 \times 7^5$; $3^7 \times 7^4$; ; ;

2. The first two numbers of each number pattern are given. Create two different number patterns by writing out the next three numbers in each pattern. For each pattern, explain the rule.

Pattern 1: 1; 4; ; ;

Explanation:

Pattern 2: 1; 4; ; ;

Explanation:

3. The tables with number patterns in **a)** and **b)** work in pairs. Complete the tables in **a)**. These values will help you to complete the tables in **b)**.

a) i)

Position of term	Value of term
1	3
2	6
3	9
4	
10	
n	

ii)

Position of term	Value of term
1	
2	
3	–15
	–40
10	
m	$-5m$

iii)

Position of term	Value of term
1	1
	4
3	9
	36
10	100
a	

iv)

Position of term	Value of term
1	
2	8
3	27
5	125
10	
q	

b) i)

Position of term	Value of term
1	2
2	5
3	8
	11
10	
n	

ii)

Position of term	Value of term
1	–3
2	–8
3	
8	–38
10	
m	

iii)

Position of term	Value of term
1	
2	8
3	18
6	
10	200
a	

iv)

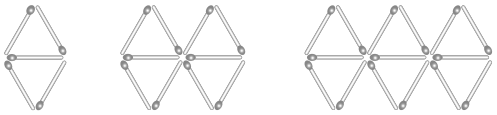
Position of term	Value of term
1	2
2	
3	28
5	126
	1 001
q	

4. Match the number patterns in row 1 to the general rules in row 2.

Number pattern	**a)** 5; 25; 125; …	**b)** –3; –11; –19; …	**c)** –2; –8; –18; …	**d)** –3; 1; 5; …
General rule	**i)** $-2n^2$	**ii)** $4n - 7$	**iii)** 5^n	**iv)** $-8n + 5$

Patterns
General rules

1. Godfrey used matchsticks to pack triangles.



1 2 3 4 5

a) Draw pattern number 4 and pattern number 5 in the spaces above.

b) Complete the table below.

Pattern number	1	2	3	4	5	n
i) Number of triangles	2					
ii) Number of matchsticks		10				

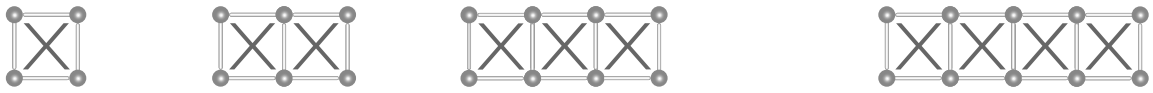
c) How many triangles will there be in pattern number 17?

d) In which pattern will there be 56 triangles?

e) How many matchsticks will there be in pattern 50?

f) In what pattern will there be 50 matchsticks?

2. Melissa used lollipop sticks to pack squares with an X inside each square.



1 2 3 4

a) Complete.

Pattern number	1	2	3	4	5	6
Number of sticks			16			

b) Complete the general rule for Melissa's pattern in words:

The number of sticks in a pattern is equal to that pattern number

c) Now write down the general rule for the number of lollipop sticks in Melissa's pattern. (Use n for the number of the pattern.)

d) How many lollipop sticks will make up:

i) pattern number 10? **ii)** pattern number 25? **iii)** pattern number q?

e) In which pattern number will there be:

i) 86 lollipop sticks? **ii)** 246 lollipop sticks? **iii)** 151 lollipop sticks?