

# DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Number and Algebra: Patterns  
and Relationships

Level 3 (Year 5/6)

Copy Masters

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

**Task 1**

Litea has a giant bag of M & Ms. She likes to eat her M & Ms in a specific order: red, orange, green, yellow, blue, brown.

What will be the colour of the 87<sup>th</sup> M & M that she eats?

Find two different ways of solving the task and representations to prove your solutions.

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

**Task 1 (independent)**

At Te Oro the Siva Samoa group is learning a maulu'ulu. As part of the dance, they used these movements:

tap, tap, arm, arm, arm, arm, arm, clap

They repeat these moves lots of times throughout the dance.

If they repeat the moves two times, how many taps would there be?  
How many arms would there be? How many claps would there be?

Complete the table below:

Number of movement sequence	Tap	Arm	Clap
1			
			2
		20	
9			
			15
	40		
26			
			30

What rules could you use to find the number of specific movements for any number of movement sequences?

## Task 2

Tivaevae



*A group of Mamas are working on a tivaevae design.*

This is the 1st position.



How many leaves does it have?

This is the 2nd position.



How many leaves does it have?

This is the 3rd position.



How many leaves does it have?

They want to turn the pattern from the cushion cover into a bedspread and keep the pattern the same.

How do you see the pattern growing? Represent the pattern using numbers.

How many leaves would the next position have?

How many leaves would the 7<sup>th</sup> position have?

How many leaves would the 12<sup>th</sup> position have?

Represent this using a diagram and numbers.

**Task 2 (independent)**

Litea has a giant bag of M & Ms. She likes to eat her M & Ms in a specific order: green, red, brown, blue, yellow, orange.

What will be the colour of the 55<sup>th</sup> M & M that she eats?

Find two different ways of solving the task and representations to prove your solutions.

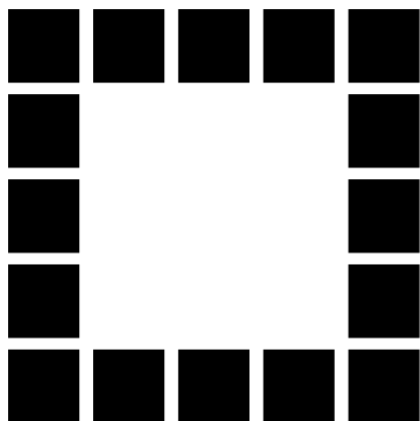
What do you notice about all of the green M & Ms in relation to their pattern position?

What rule could you use to find the location of every green M & M?

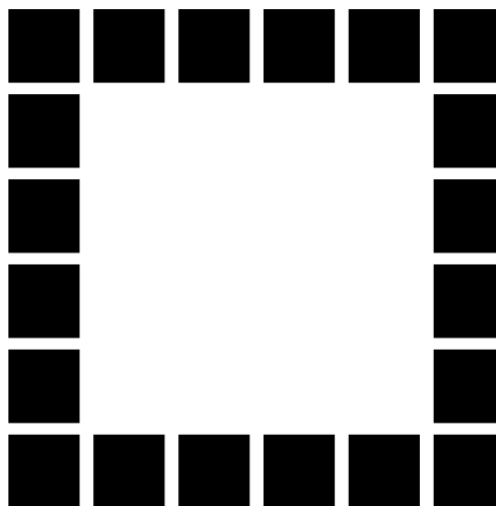
What rule could you use to find the location of every yellow M & M?

**Task 3**

Melvin is designing a square garden plot with a tile border. He is wondering how many tiles he will need for gardens of different sizes.



Garden 3



Garden 4

Draw what the square garden plot would look like for Garden 1 and Garden 2.

How many tiles would be used for Garden 5?

How many tiles would be used for Garden 8?

What do you notice?

Represent the parts of the pattern that are staying the same and the part of the pattern that changes as it grows using different colours.

How many tiles would be used for Garden 15?

**Task 3 (independent)**

Mele is helping her Mum build a fence around their house.



This is the third section of the fence.

Build and then draw what the first, second, and fourth section would look like.

Complete the table:

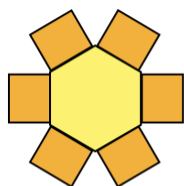
Fence section	Number of posts
1	
2	
3	
4	
5	
8	
10	
13	
21	
25	

What patterns do you notice?

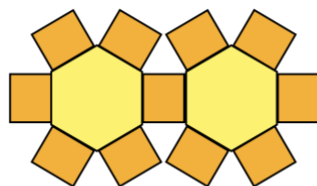
Can you develop a rule for the number of posts for the fence section of any size?

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

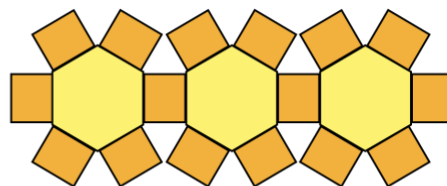
**Task 4**



Position 1



Position 2



Position 3

Use the shape cards to build Position 4 and 5.

Complete the table:

Position Number	Hexagons	Squares	Total pieces
1			
2			
3			
4			
5			
6			
7			
8			

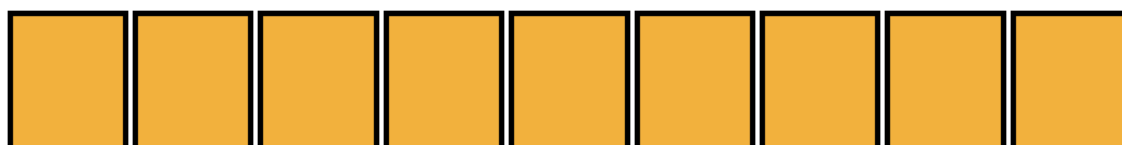
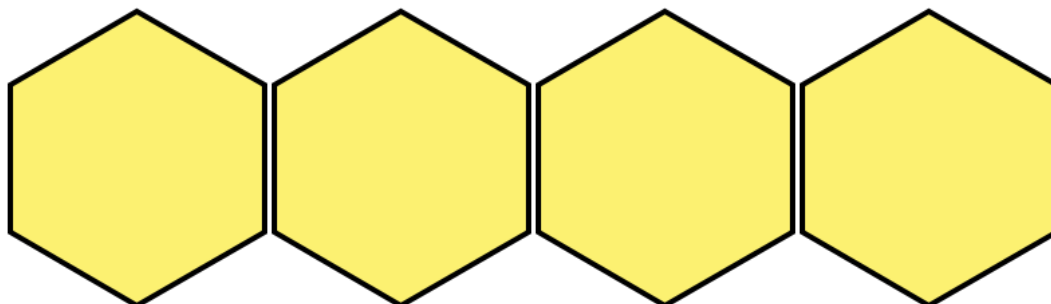
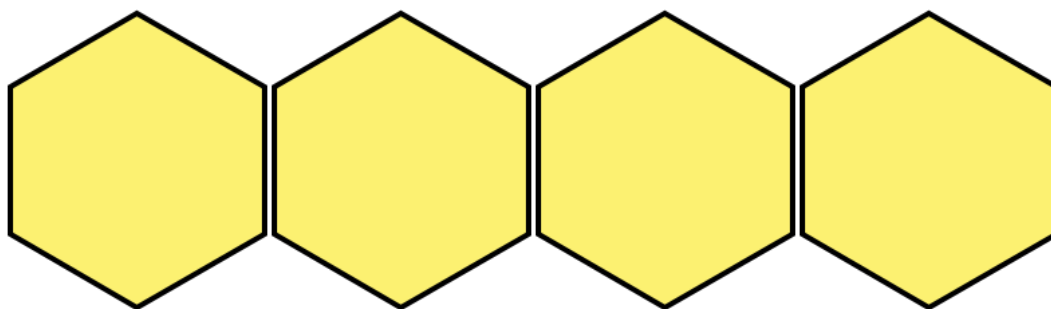
Identify three patterns across the table and three patterns down the table.

How many hexagons would there be for the 10th sequence?

How many squares would there be for the 10th sequence?

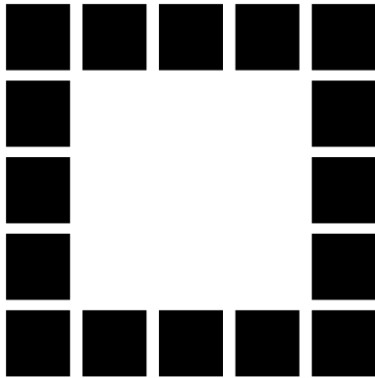
How many shapes in total would there be for the 10<sup>th</sup> sequence?



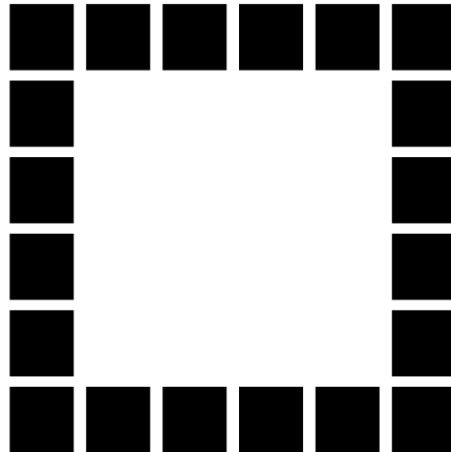
**Task 4 (resource)**

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships***Task 4 (independent)**

Melvin is designing a square garden plot with a tile border. He is wondering how many tiles he will need for gardens of different sizes.



Garden 3



Garden 4

Complete the table:

Garden	Number of tiles
1	
2	
3	
4	
5	
8	
10	
11	
16	
21	

Melvin has 108 tiles, what garden number can he make? Would he have any left over?

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

### Task 5

Pacific people are voyagers and developed clever ways construct vaka. An example is the vaka at Matauala Hall in Porirua which has a pattern where the fauato (coconut fibre twine) joins the planks. As the vaka gets longer, it needs more fauato.



Tahi



Lua

Can you build and draw the next pattern?

How many pieces of fauato would there be if the pattern went up to iva (nine)?

How many pieces of fauato would there be if the pattern went up to hefuluiva (nineteen)?

What about ivahefulu (ninety)?

**Task 5 (independent)**

Tane is cutting up pieces of string for weaving.

If he cuts the string in half, he has two pieces.

If he cuts the two pieces together again, he has four pieces.

If he keeps putting the pieces together again before cutting how many pieces would he get with....

Three cuts?

Four cuts?

Use a table of data and a graph to show how many pieces of string Tane would have if he cut it up to 12 times.

What rule could Tane use to work out how many pieces he would get if no matter how many times he cut the string?

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships***Task 6**

Amazon Prime is currently offering two deals for watching movies.

Plan A costs \$18 monthly membership plus \$2 per movie.

Plan B costs \$9 monthly membership plus \$3 per movie.

Use a number sentence to represent the two deals.

Show the results for Plan A and Plan B in a table.

Number of movies	Deal 1	Deal 2
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Which deal is better?

What advice would you give to someone considering both the plans?

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships***Task 6 (independent)**

Develop a growing pattern to match these rules:

$$\text{Squares} = (2 \times n) + 1$$

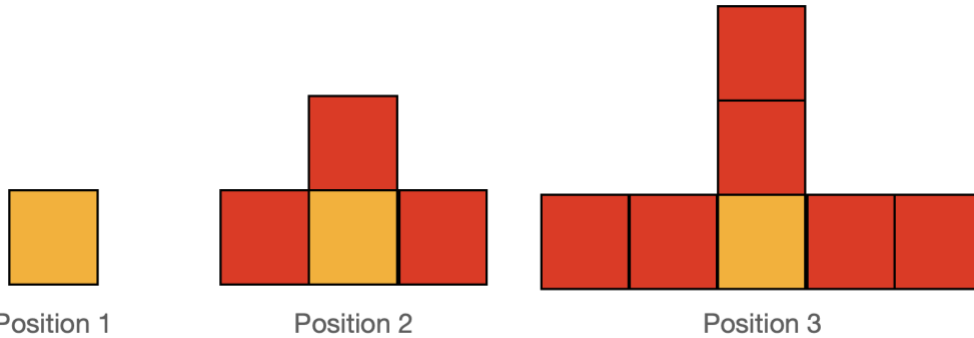
$$\text{Ice-block sticks} = (5 \times h) + 3$$

$$\text{Tiles} = (3 \times g) - 2$$

Develop your own growing patterns and write a rule to match them.

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships***Task 7**

Tayla builds a pattern with the blocks:



Use the square shapes to create Position 4, Position 5, and Position 6 and draw these.

How many blocks would they each use?

Tayla is wondering what position she could build if she had 85 blocks and whether she would have any blocks left over?

**Task 7 (independent)**

Ta'ase and Lina are selling different types of chocolate bars to fundraise for camp.

Ta'ase gets \$3 for each chocolate bar.

Lina has saved \$15. Additionally, for each chocolate bar she sells, she gets \$2.

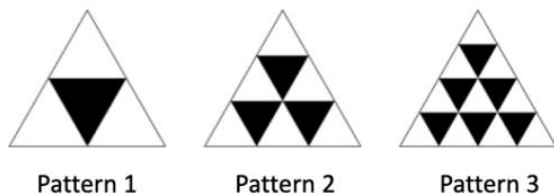
Write a number sentence to represent each situation.

Use a table of data and graph to show when Ta'ase and Lina will have the same amount of money and how many chocolate bars Ta'ase will need to sell to have more money.



**Task 8**

Mātua and Whaea are looking at designs for the Kapa Haka uniform. They like the triangular patterns which represent peaks and valleys.



What do you notice about the pattern and how it grows?

Draw or describe Pattern 4 and Pattern 5.

Can you show the way the pattern grows for the different elements? Think about the white triangles, the black triangles, and the total number of triangles.

Represent your ideas using pictures, numbers, and a table of data.

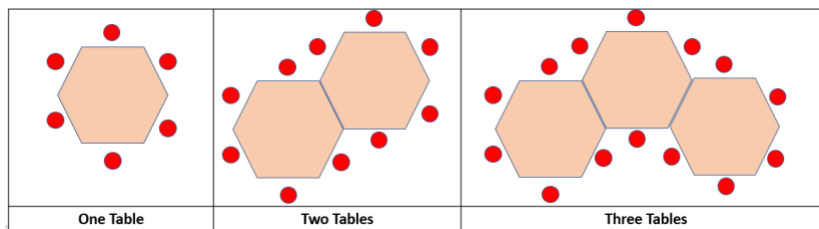
What rules could Mātua and Whaea use to find the different elements?

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

**Task 8 (independent)**

Eva and Hone have been put in charge of organising tables and seats for their school graduation night dinner.

They've worked out that 242 people are coming.



How many people can be seated at 6 tables, 12 tables, 24 tables?

Represent how the pattern grows using a table of data or graph.

How many tables do Eva and Hone need to organise for 242 people?

Can you find the relationship between the number of tables and chairs in words or symbols and justify how the rule works with your representation.

**Task 9 (optional task)**

Tasha is making smiley face rods for market day by joining cubes together and putting smiley face stickers on each side that you can see:



Rod 1

Rod 2

Rod 3

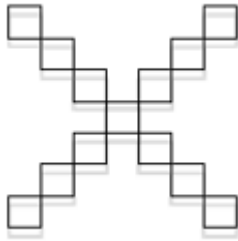
How many smiley face stickers would Tasha need for rods of length 1 – 10?

How many stickers would Tasha need for a rod of length 27?

How many stickers would Tasha need for a rod of length 40?

How many stickers would Tasha need for a rod of length 111?

What rule could Tasha use to work out how many stickers she would need for a rod of any length?

**Task 9 (independent optional task)**

This is Pattern 3.

Draw what you think Pattern 2 and Pattern 1 would look like.

How many different patterns can you see in this drawing?

Show all the patterns that you can see.

Continue the pattern for Pattern 4 – 10.

Use a table of data to represent the pattern and explain the patterns that you have found.

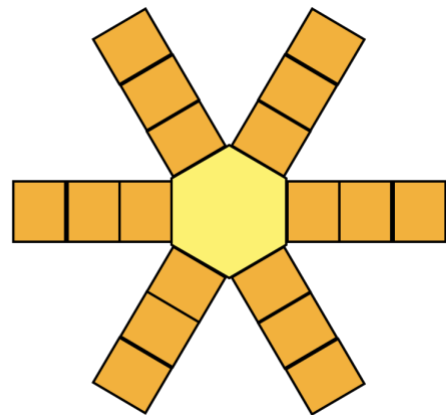
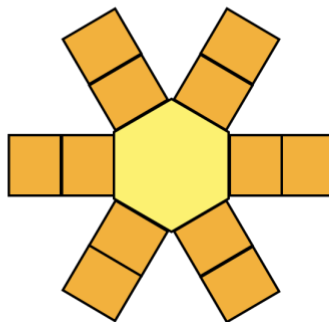
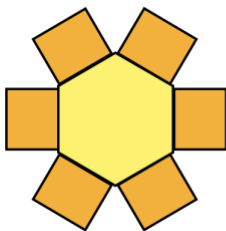
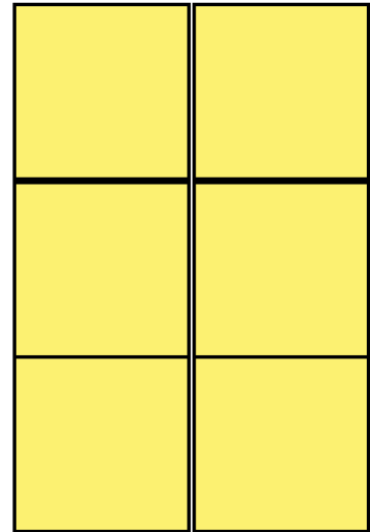
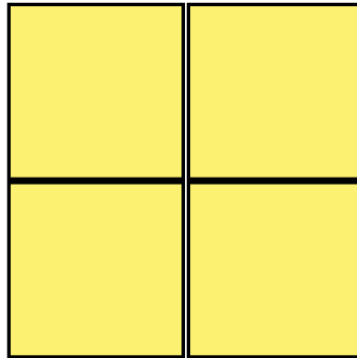
**Task 10 (optional task)**

How many telephone calls could be made among 5 friends if each person spoke with each friend exactly once on the telephone?

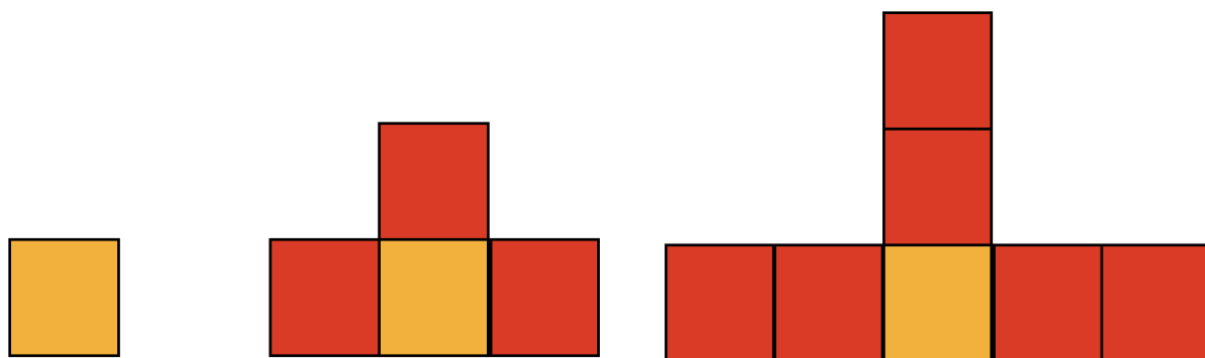
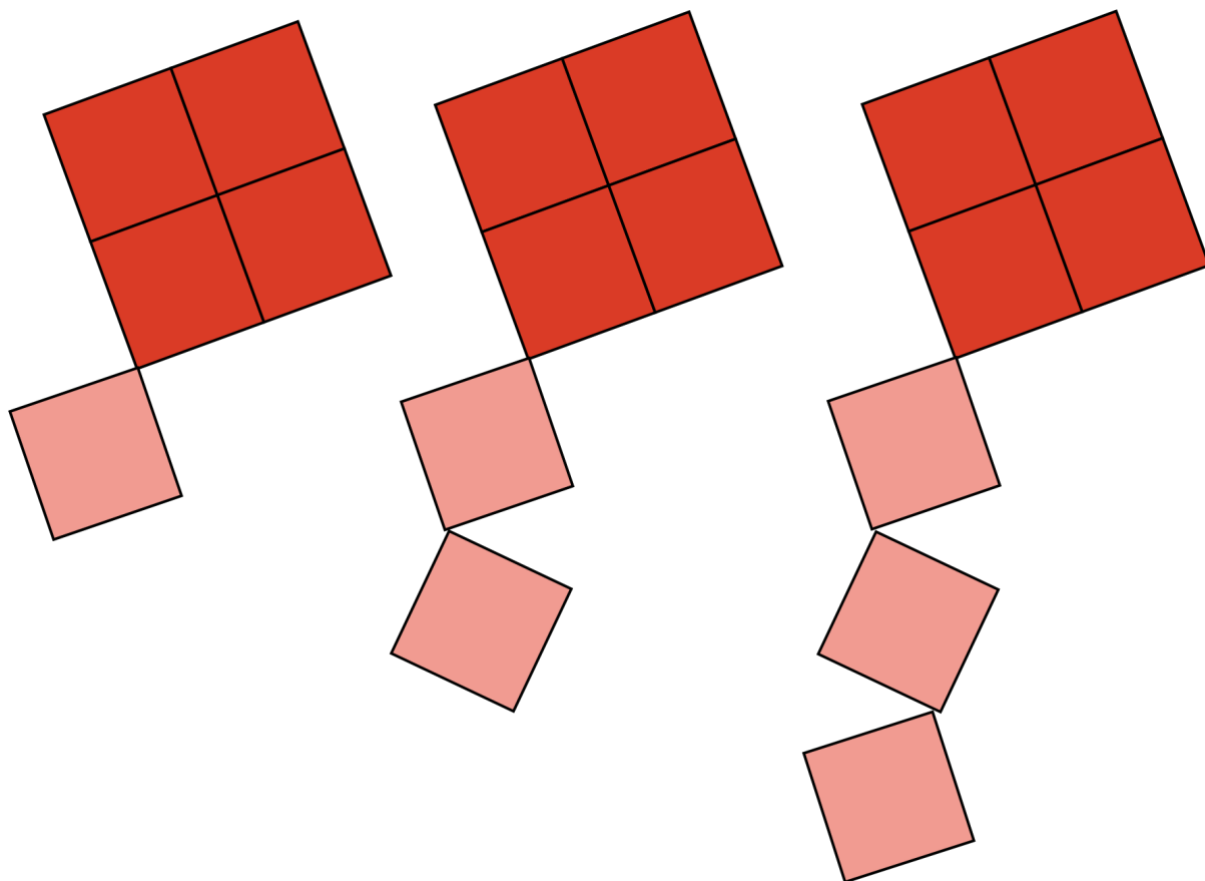
How many telephone calls would there be if there were 6 friends? Seven friends? Eight friends? Twenty friends? One hundred friends?

Organize your data in a table.

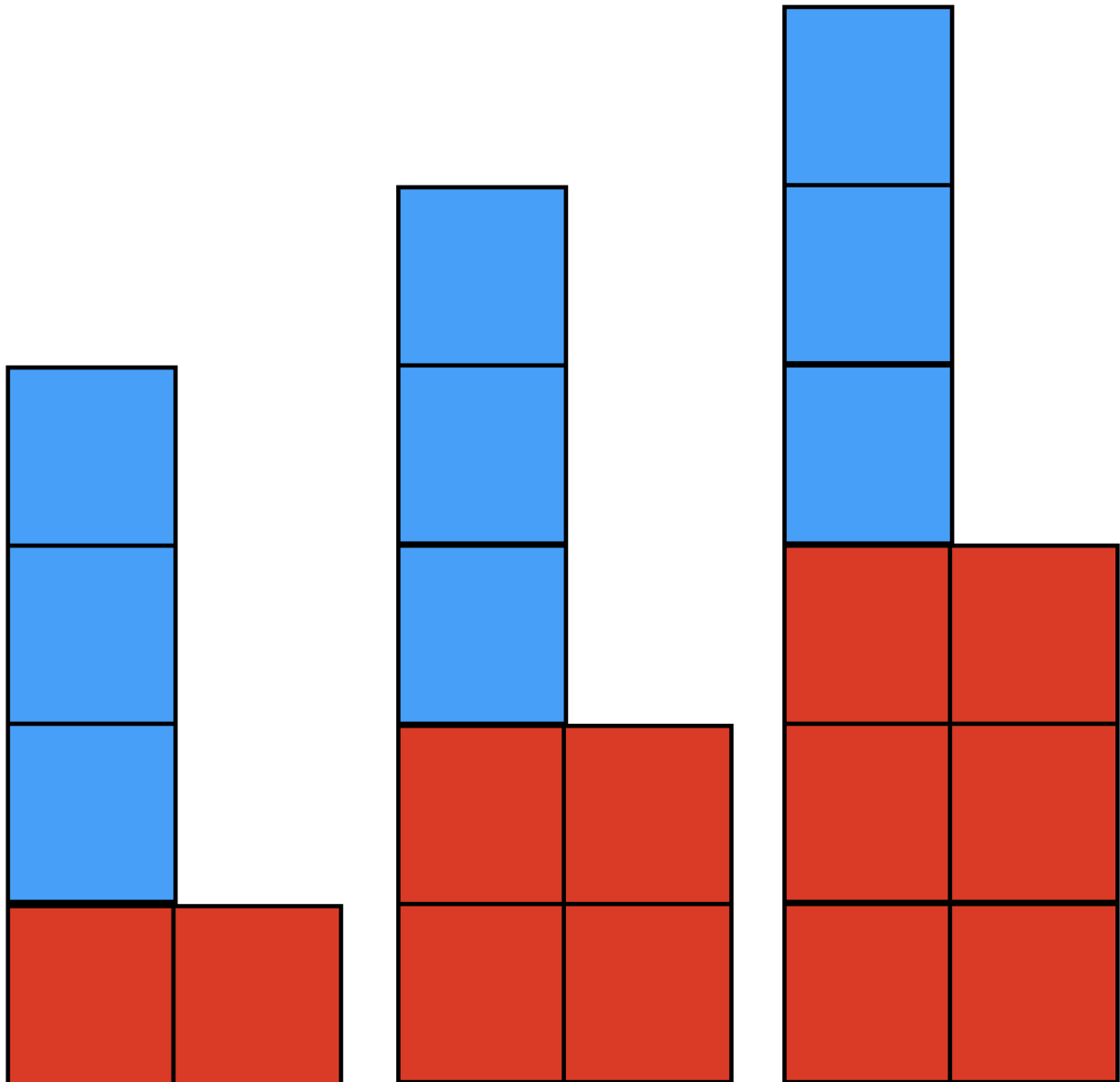
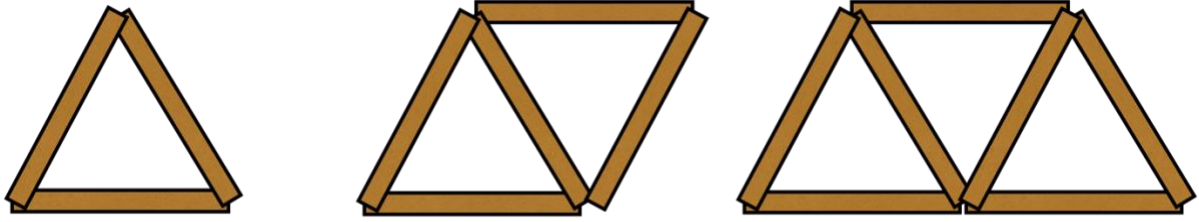
Describe any relationship you see between the number of phone calls and the number of friends in the group.

**Quick Images (Warm Ups)**

*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*



*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*





*Level 3 Year 5/6: Number and Algebra: Patterns and Relationships*

