

## Algebra Activities for Years 4-7

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This session focuses on the manipulation of mathematics materials, collecting data, making tables, interpreting results and making generalisations. These skills are needed before students are introduced to formal algebra.

## Algebra Activities for Years 4-7

## 1. Pattern 1 : Replicate with counters

Position	1	2	3	4	5	6
Number of counters	2	4	6	8	10	

What is happening in the pattern?

State the rule in your own terms?

Predict the 12 position?

## 2. Pattern 2 Use the table below to write the rule describing the relationship between the set of IN and OUT numbers.

IN	15	16	17	18	19
OUT	6	7	8	9	10

Rule:

## 3. Pattern 3

POSITION	1	2	3	4	5	6	7
PATTERN	15	13	11	9	7	5	3

What is happening in the pattern?

State the rule in your own terms?

Predict the 10 position?

## 4. Pattern 4

POSITION	1	2	3	4	5	6	7
PATTERN	104	100	96	92	88	84	80

What is happening in the pattern?

State the rule in your own terms.

Predict the 10<sup>th</sup> position.

## 5. Pattern 5

POSITION	1	2	3	4	5	6	7
PATTERN	2	5	11	23	47	95	

What is happening in this pattern?

State the rule in your own words.

Predict the 7<sup>th</sup> position

Now look at these

POSITION	1	2	3	4	5	6
PATTERN	3	4	6	10	18	34

What is happening in this pattern?

State the rule in your own words.

Predict the 10<sup>th</sup> position

## 6. Pattern 6

POSITION	1	2	3	4	5	6	7
PATTERN	5	10	15	20	25	30	35

What is happening in the pattern?

State the rule in your own terms?

Can you see a link between the position and pattern? Predict 12 Th position

Write a generalization in your own terms?

## 7. Pattern 7

POSITION	1	2	3	4	5	6	7
PATTERN	7	12	17	22	27	32	37

What is happening in the pattern?

State the rule in your own terms?

Can you see a link between the position and pattern?

Write a generalization in your own terms?

Predict the 10<sup>th</sup> position?

Predict the 20 position?

**8. Mathematics / Year 6 / Number and Algebra / Patterns and algebra**

- Continue and create sequences involving whole numbers, fractions and decimals.  
Describe the rule used to create the sequence

## Pattern Decimals

POSITION/ELEMENT	1	2	3	4	5	6	7
PATTERN	0.2	0.4	0.6	0.8			

What is happening in the pattern?

Continue the pattern to the 7<sup>th</sup> position

State the rule in your own terms?

Can you see a link between the position and pattern?

Write a generalization in your own terms?

Predict 10<sup>th</sup> position

Predict 20<sup>th</sup> position

## 9. Pattern fractions

POSITION/ELEMENT	1	2	3	4	5	6	7
PATTERN	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	

What is happening in the pattern?

Continue the pattern to the 7<sup>th</sup> position

State the rule in your own terms?

Can you see a link between the position and pattern?

Write a generalization in your own terms?

Predict the 10<sup>th</sup> position?

Predict the 20<sup>th</sup> position?

10. Make a triangular pattern with matchsticks like the one shown

Record information in the table

Position number (element)	1	2	3	4	5	6
Number of triangles	1	2				
Number of matchsticks used	3	5				

How many matchsticks are used to make 6 linear triangles? \_\_\_\_\_

How many matchsticks are used to make 10 linear triangles? \_\_\_\_\_

What is the rule for the number of matchsticks used? \_\_\_\_\_

11. Now do the same for square pattern

Record information in the table

Position number (element)	1	2	3	4	5	6
Number of squares	1	2				
Number of matchsticks used	4	7				

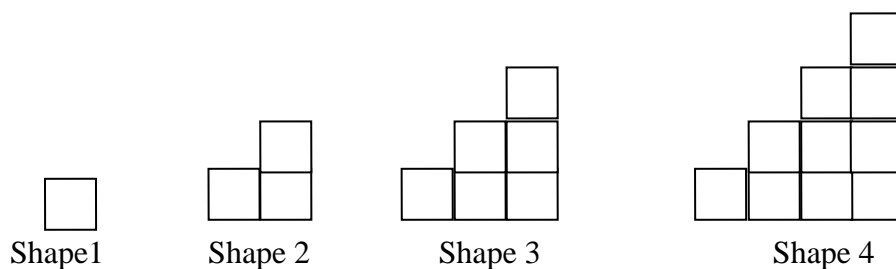
How many matchsticks are used to make 6 linear squares?

How many matchsticks are used to make 10 linear squares?

What is the rule for the number of matchsticks used?

See what students come up for as a pentagon linear sequence (See Perso (2003), *Everything you want to know about Algebra Outcomes for your class, K-9*)

12. These shapes have been made using toothpicks



Position number (element)	Shape 1	Shape 2	Shape 3	Shape 4	Shape 5	Shape 6
Number of matchsticks used	4	10	18	28		
Perimeter	4	8	12	16		

What is the perimeter of the 5 th shape?

What is the perimeter of the 6 th shape?

Can you see a pattern in the number of matches being used?

Can you see a pattern in calculating the perimeter?

13. How long does it take to walk 10 kilometre (to the nearest min)? Materials needed : trundle wheel, a stop watch and a calculator

Distance	2 km	4km	5km	8km	10km	15km	100km
Time							

14. Look at how you can change a linear triangular pattern to a non - linear triangle pattern.  
Are the generalisations that can be made about non – linear triangular patterns the same as the linear triangular pattern? Investigate

Position number (element)	1	2	3	4	5	6
Number of triangles	1	4	9			
Number of matchsticks used	3	9	18			

- Make the pattern with matchsticks
- Draw the pattern on triangular paper
- Predict how many triangles in the 10th element. How many matchsticks are used
- Predict how many triangles in the 20th element. How many matchsticks are used?
- What is the rule for the number of triangles?
- What is the rule for the number of matchsticks?

15. Caterpillar growing pattern using Cubes

Children put down 1 cube, then two cubes, then three cubes

Children fill in this table and then predict

Position	1	2	3	4	5	6	7	8	9	10
Days old	2	4	6	8	10	12				
Number of cubes	1	2	3	4	5	6				

Predict: How many cubes long is a 20 day old caterpillar? Explain your reasoning

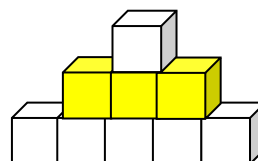
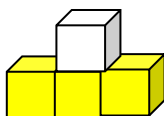
How many days old is a 30 cube long caterpillar? Explain your reasoning

How long will it take for the caterpillar to grow to 100 blocks?

Adapted from T Perso (2003) Everything you want to know about Algebra Outcomes in your class, K-9

- 16. ASSESSMENT:** Design a table; Make some predictions. What is the rule? Make a generalisation in your own words

Make the pattern with blocks



## 17. Grid Pattern 1

Draw around 3 square grids (linear), then six and then nine and record results in the table.

Position number (element)	1	2	3	4	5	6
Number of squares	3	6	9			

What is the rule for each new element in the pattern there are an extra \_\_\_\_ squares added so the rule is \_\_\_\_\_.

Look at the relationship between the top number and the numbers in bottom row .

Write a rule using words and symbols

Number of squares = \_\_\_\_\_

Predict: Number of squares in the 10th element \_\_\_\_\_

Predict: Number of squares in the 30th element \_\_\_\_\_

Predict: What element (position) will have 54 squares \_\_\_\_\_

(See Perso p 75)

## 18. Grid pattern 2

Make a 1x1, 2x2, 3x3....., draw onto grid paper

Fill in the table

Position number (element)	1	2	3	4	5	6
Number of squares	1	4	9			
Number of matchsticks used	4	12	24			

Predict: Number of squares for the 10 element (position) \_\_\_\_\_

Predict: Number of squares for the 50 element \_\_\_\_\_

What element will have 225 squares? \_\_\_\_\_

What is your rule? \_\_\_\_\_

19. **ASSESSMENT:** Make the pattern, draw the pattern. Design a table. Make some predictions, What is the rule? Develop a generalisation in your own terms.

L- shaped square pattern



20. Using pronumerals

x	1	2	3	4	5		x	4	5	6	7	8
y	5	7	9	11	13		y	16	19	22	25	28

$$y = 2x + \underline{\quad}$$

$$y = 3x + \underline{\quad}$$

21. Use a table to use guess, check and improve to solve  $4x+7= 22$

Guess for x	Left side $4x + 7 =$	Right side Result needed	Check Is left = right	Evaluation
3	$12+7 = 19$	22	no	x is too small
4	$16+7= 23$	22	no	x is not a whole number . It is between 3 and 4
3.5	$14+7=21$	22	no	It is bigger than 3.5
3.75	$15+7=22$	22	yes	

Therefore  $x= 3.75$

Practice

22. Use the table to guess, check and improve to solve  $2x-5=14$

Guess for x	Left side $2x - 5$	Right side Result needed	Check Is left = right	Evaluation

ASSESSMENT

23. Use a table to solve this equation  $5x + 4 = 31$

Guess for x	Left side	Right side Result needed	Check Is left = right	Evaluation