

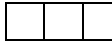
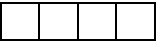


SYLLABUS RELATIONSHIPS

Activities that teach Patterns & Algebra

Workbook activities relate to outcomes of the NSW Syllabus as follows:

OUTCOME	Workbook Activities
<u>PAS4.1 - Algebraic Techniques</u>	
Knowledge and skills. Students learn about:	
<ul style="list-style-type: none"> using letters to represent numbers and developing the notion that a letter is used to represent a variable 	2 - 2 3 - 1,2,3
<ul style="list-style-type: none"> using concrete materials such as cups and counters to model: <ul style="list-style-type: none"> expressions that involve a variable and a variable plus a constant eg $a, a + 1$ expressions that involve a variable multiplied by a constant eg $2a, 3a$ sums and products eg $2a + 1, 2(a + 1)$ equivalent expressions such as $x + x + y + y + y = 2x + 2y + y = 2(x + y) + y$ and to assist with simplifying expressions, such as $(a + 2) + (2a + 3) = (a + 2a) + (2 + 3)$ $= 3a + 5$ 	3 - 2 8 - 6 9 - 3
<ul style="list-style-type: none"> recognising and using equivalent algebraic expressions eg $y + y + y + y = 4y$ $w \times w = w^2$ $a \times b = ab$ $a \div b = \frac{a}{b}$ 	9 - 1,2,4,5,6,7,8, 9,10,11,13 10 - 1,2,3,4,5,6,7, 8, 9,10,11,12 13, 14,15
<ul style="list-style-type: none"> translating between words and algebraic symbols and between algebraic symbols and words 	2 - 2 3 - 2,3,4,5,6,7,8,9 9 - 1,2,3,4,5,6,7 8,9,10,11,12 10 - 1,2,3,4,5,7,8,9 10,11,12,13,14
<u>PAS4.1 – Algebraic Techniques</u>	
Working Mathematically. Students learn to:	
<ul style="list-style-type: none"> generate a variety of equivalent expressions that represent a particular situation or problem (<i>Applying Strategies</i>) 	9 - 1,2,4,5,6,7,8, 9,10,11,13 10 - 1,2,3,4,5,6,7, 8, 9,10,11,12 13, 14,15 13 - 2 14 - 1
<ul style="list-style-type: none"> describe relationships between the algebraic symbol system and number properties (<i>Reflecting, Communicating</i>) 	9 - 1,2,4,5,6,7,8, 9,10,11,13 10 - 1,2,3,4,5,6,7, 8, 9,10,11,12 13, 14,15
<ul style="list-style-type: none"> link algebra with generalised arithmetic eg for the commutative property, determine that $a + b = b + a$ (<i>Reflecting</i>) 	9 - 1,2,4,5,6,7,8, 9,10,11,13 10 - 1,2,3,4,5,6,7, 8, 9,10,11,12 13, 14,15
<ul style="list-style-type: none"> determine equivalence of algebraic expressions by substituting a given number for the letter (<i>Applying Strategies, Reasoning</i>) 	9 - 3,5,6,10 10 - 11,13

OUTCOME	Workbook Activities																
<p>PAS4.2 - Number Patterns Knowledge and skills. Students learn about:</p>																	
<ul style="list-style-type: none"> using a process that consists of building a geometric pattern, completing a table of values, describing the pattern in words and algebraic symbols and representing the relationship on a graph: <ul style="list-style-type: none"> modelling geometric patterns using materials such as matchsticks to form squares eg  ,  ,  ,  , ... describing the pattern in a variety of ways that relate to the different methods of building the squares, and recording descriptions using words forming and completing a table of values for the geometric pattern eg <table border="1" data-bbox="229 577 751 701"> <tr> <td>Number of squares</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>10</td> <td>100</td> </tr> <tr> <td>Number of matchsticks</td> <td>4</td> <td>7</td> <td>10</td> <td>13</td> <td>-</td> <td>-</td> <td>-</td> </tr> </table> representing the values from the table on a number grid and describing the pattern formed by the points on the graph (note – the points should not be joined to form a line because values between the points have no meaning) determining a rule in words to describe the pattern from the table – this needs to be expressed in function form relating the top-row and bottom-row terms in the table describing the rule in words, replacing the varying number by an algebraic symbol using algebraic symbols to create an equation that describes the pattern creating more than one equation to describe the pattern using the rule to calculate the corresponding value for a larger number 	Number of squares	1	2	3	4	5	10	100	Number of matchsticks	4	7	10	13	-	-	-	<p>3 - 3,4,5,6</p>
Number of squares	1	2	3	4	5	10	100										
Number of matchsticks	4	7	10	13	-	-	-										
<ul style="list-style-type: none"> using a process that consists of identifying a number pattern (including decreasing patterns), completing a table of values, describing the pattern in words and algebraic symbols, and representing the relationship on a graph: <ul style="list-style-type: none"> completing a table of values for the number pattern eg <table border="1" data-bbox="209 1279 683 1373"> <tr> <td><i>a</i></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>10</td> <td>100</td> </tr> <tr> <td><i>b</i></td> <td>4</td> <td>7</td> <td>10</td> <td>13</td> <td>-</td> <td>-</td> <td>-</td> </tr> </table> describing the pattern in a variety of ways and recording descriptions using words representing the values from the table on a number grid and describing the pattern formed by the points on the graph determining a rule in words to describe the pattern from the table – this needs to be expressed in function form relating the top-row and bottom-row terms in the table describing the rule in words, replacing the varying number by an algebraic symbol using algebraic symbols to create an equation that describes the pattern creating more than one equation to describe the pattern using the rule to calculate the corresponding value for a larger number 	<i>a</i>	1	2	3	4	5	10	100	<i>b</i>	4	7	10	13	-	-	-	<p>2 - 1,2,3,4,5,6,7,8,9 3 - 2,7,8,9</p>
<i>a</i>	1	2	3	4	5	10	100										
<i>b</i>	4	7	10	13	-	-	-										

OUTCOME	Workbook Activities
PAS4.2 - Number Patterns Working Mathematically. Students learn to:	
<ul style="list-style-type: none"> ask questions about how number patterns have been created and how they can be continued (<i>Questioning</i>) 	1 - 3,6,7,8,9 3 - 1,2,3,4,5,6,7,8,9
<ul style="list-style-type: none"> generate a variety of number patterns that increase or decrease and record them in more than one way (<i>Applying Strategies, Communicating</i>) 	3 - 2,3,4,5 5 - 1
<ul style="list-style-type: none"> model and then record number patterns using diagrams, words and algebraic symbols (<i>Communicating</i>) 	2 - 2,3,4,5,6 3 - 1,2,3,4,5,6,7,8,9
<ul style="list-style-type: none"> check pattern descriptions by substituting further values (<i>Reasoning</i>) 	2 - 2,3,4,5,6,7 3 - 1,2,3,4,5,6,7,8,9
<ul style="list-style-type: none"> describe the pattern formed by plotting points from a table and suggest another set of points that might form the same pattern (<i>Communicating, Reasoning</i>) 	5 - 1,2,3,4,5 6 - 1,2,3,4,5
<ul style="list-style-type: none"> describe what has been learnt from creating patterns, making connections with number facts and number properties (<i>Reflecting</i>) 	1 - 1,2,3,4,5,6,7,8,9
<ul style="list-style-type: none"> play 'guess my rule' games, describing the rule in words and algebraic symbols where appropriate (<i>Applying Strategies, Communicating</i>) 	2 - 10
<ul style="list-style-type: none"> represent and apply patterns and relationships in algebraic forms (<i>Applying Strategies, Communicating</i>) 	2 - 2,3,4,5,6,7,8,9 3 - 1,2,3,4,5,6,7,8,9 5 - 1,2,3,4,5
<ul style="list-style-type: none"> explain why a particular relationship or rule for a given pattern is better than another (<i>Reasoning, Communicating</i>) 	13 - 2 14 - 1
<ul style="list-style-type: none"> distinguish between graphs that represent an increasing number pattern and those that represent a decreasing number pattern (<i>Communicating</i>) 	5 - 4
<ul style="list-style-type: none"> determine whether a particular number pattern can be described using algebraic symbols (<i>Applying Strategies, Communicating</i>) 	6 - 1

OUTCOME	Workbook Activities																		
PAS4.3 - Algebraic Techniques Knowledge and skills. Students learn about:																			
<ul style="list-style-type: none"> recognising like terms and adding and subtracting like terms to simplify algebraic expressions eg $2n + 4m + n = 4m + 3n$ 	9 - 3,12,13 11 - 3,5,6 12 - 8																		
<ul style="list-style-type: none"> recognising the role of grouping symbols and the different meanings of expressions, such as $2a+1$ and $2(a+1)$ 	7 - 6 9 - 1,8,9,10,11,13 10 - 3,5,6,11,12,13,14,15																		
<ul style="list-style-type: none"> simplifying algebraic expressions that involve multiplication and division eg $12a \div 3$ $4x \times 3$ $2ab \times 3a$ 	10 - 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15																		
<ul style="list-style-type: none"> simplifying expressions that involve simple algebraic fractions eg $\frac{a}{2} + \frac{a}{3}$ $\frac{2x}{5} - \frac{x}{3}$ 	12 - 1,2,3,4,5,6,7,8																		
<ul style="list-style-type: none"> expanding algebraic expressions by removing grouping symbols (the distributive property) eg $3(a+2) = 3a+6$ $-5(x+2) = -5x-10$ $a(a+b) = a^2 + ab$ 	11 - 4																		
<ul style="list-style-type: none"> factorising a single term eg $6ab = 3 \times 2 \times a \times b$ 	10 - 1,2,3,4,5,6																		
<ul style="list-style-type: none"> factorising algebraic expressions by finding a common factor eg $6a+12 = 6(a+2)$ $x^2 - 5x = x(x-5)$ $5ab+10a = 5a(b+2)$ $-4t-12 = -4(t+3)$ 	11 - 1,2,3,4																		
<ul style="list-style-type: none"> distinguishing between algebraic expressions where letters are used as variables, and equations, where letters are used as unknowns 	13 - 1																		
<ul style="list-style-type: none"> substituting into algebraic expressions 	11 - 3																		
<ul style="list-style-type: none"> generating a number pattern from an algebraic expression eg <table border="1" data-bbox="209 1417 718 1496"> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>10</td> <td>100</td> </tr> <tr> <td>$x+3$</td> <td>4</td> <td>5</td> <td>6</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> </table>	x	1	2	3	4	5	6	10	100	$x+3$	4	5	6	-	-	-	-	-	6 - 7 7 - 2
x	1	2	3	4	5	6	10	100											
$x+3$	4	5	6	-	-	-	-	-											
<ul style="list-style-type: none"> replacing written statements describing patterns with equations written in algebraic symbols eg 'you add five to the first number to get the second number' could be replaced with '$y = x+5$' 	7 - 3,4,5,6 13 - 2 14 - 4,5,6,7,8																		
<ul style="list-style-type: none"> translating from everyday language to algebraic language and from algebraic language to everyday language 	7 - 3,4,5,6 11 - 1,2,3,5 12 - 2,3,4 13 - 2,3,4,8 14 - 1,2,3,4,5,6,7,8																		

OUTCOME	Workbook Activities
PAS4.3 - Algebraic Techniques Working Mathematically. Students learn to:	
<ul style="list-style-type: none"> generate a variety of equivalent expressions that represent a particular situation or problem (<i>Applying Strategies</i>) 	13 - 2 14 - 1
<ul style="list-style-type: none"> determine and justify whether a simplified expression is correct by substituting numbers for letters (<i>Applying Strategies, Reasoning</i>) 	9 - 6,11 10 - 11,12,13 14 - 2,9
<ul style="list-style-type: none"> check expansions and factorisations by performing the reverse process (<i>Reasoning</i>) 	11 - 4
<ul style="list-style-type: none"> interpret statements involving algebraic symbols in other contexts eg creating and formatting spreadsheets (<i>Communicating</i>) 	8 - 1,2,3,4,5,6,7
<ul style="list-style-type: none"> explain why a particular algebraic expansion or factorisation is incorrect (<i>Reasoning, Communicating</i>) 	13 - 6 14 - 2
<ul style="list-style-type: none"> determine whether a particular pattern can be described using algebraic symbols (<i>Applying Strategies, Communicating</i>) 	6 - 1

OUTCOME	Workbook Activities
PAS4.4 - Algebraic Techniques Knowledge and skills. Students learn about:	
<ul style="list-style-type: none"> solving simple linear equations using concrete materials, such as the balance model or cups and counters, stressing the notion of doing the same thing to both sides of an equation 	13 - 3
<ul style="list-style-type: none"> solving linear equations using strategies such as guess, check and improve, and backtracking (reverse flow charts) 	7 - 1,2,7,8
<ul style="list-style-type: none"> solving equations using algebraic methods that involve up to and including three steps in the solution process and have solutions that are not necessarily whole numbers eg $3x + 4 = 13$ $5(a + 3) = 14$ $\frac{3t - 2}{5} = 6$ $3g - 5 = g + 7$	7 - 3,4,5,6,7,8 13 - 2,3,4,5,6,7
<ul style="list-style-type: none"> checking solutions to equations by substituting 	7 - 5,6,7 13 - 3,4,5 14 - 2
<ul style="list-style-type: none"> translating a word problem into an equation, solving the equation and translating the solution into an answer to the problem 	7 - 3,4,5,6,7,8 13 - 2,3,4,5,6,7
<ul style="list-style-type: none"> solving equations arising from substitution into formulae eg given $P = 2l + 2b$ and $P = 20$, $l = 6$, solve for b 	13 - 5,7
<ul style="list-style-type: none"> finding a range of values that satisfy an inequality using strategies such as 'guess and check' 	13 - 8
<ul style="list-style-type: none"> solving simple inequalities such as $6a \leq 18$ $5y < 14$ $\frac{t}{5} \geq -2$ 	13 - 8
<ul style="list-style-type: none"> representing solutions to simple inequalities on the number line 	13 - 8
PAS4.4 - Algebraic Techniques Working Mathematically. Students learn to:	
<ul style="list-style-type: none"> compare and contrast different methods to solve a range of linear equations (<i>Reasoning</i>) 	7 - 1,2 8 - 6 13 - 2
<ul style="list-style-type: none"> create equations to solve a variety of problems, clearly stating the meaning of introduced letters as 'the number of ...', and verify solutions (<i>Applying Strategies, Reasoning</i>) 	7 - 3,4,5,6,7,8 13 - 3,4,5,6,7 14 - 5,6,7,8
<ul style="list-style-type: none"> use algebraic techniques as a tool for problem solving (<i>Applying Strategies</i>) 	7 - 3,4,5,6,7,8 13 - 3,4,5,6,7 14 - 5,6,7,8
<ul style="list-style-type: none"> construct formulae for finding areas of common geometric figures eg area of a triangle (<i>Applying Strategies</i>) 	6 - 5 8 - 7 13 - 7
<ul style="list-style-type: none"> determine equations that have a given solution eg find equations that have the solution $x = 5$ (<i>Applying Strategies</i>) 	14 - 3
<ul style="list-style-type: none"> substitute into formulae used in other strands of the syllabus or in other key learning areas and interpret the solutions eg $c^2 = a^2 + b^2$ $S = \frac{D}{T}$ $C = \frac{5}{9}(F - 32)$ (<i>Applying Strategies, Communicating</i>)	13 - 5,7
<ul style="list-style-type: none"> describe the process of solving simple inequalities and justifying solutions (<i>Communicating, Reasoning</i>) 	13 - 8

OUTCOME	Workbook Activities
PAS4.5 - Linear Relationships Knowledge and skills. Students learn about:	
<ul style="list-style-type: none"> interpreting the number plane formed from the intersection of a horizontal x - axis and vertical y -axis and recognising similarities and differences between points located in each of the four quadrants 	4 - 1,2,3,
<ul style="list-style-type: none"> identifying the point of intersection of the two axes as the origin, having coordinates (0,0) 	4 - 3
<ul style="list-style-type: none"> reading, plotting and naming ordered pairs on the number plane including those with values that are not whole numbers 	4 - 3,4,5,6
<ul style="list-style-type: none"> graphing points on the number plane from a table of values, using an appropriate scale 	4 - 6 5 - 1,3,5 6 - 2,3,4,5
<ul style="list-style-type: none"> extending the line joining a set of points to show that there is an infinite number of ordered pairs that satisfy a given linear relationship 	4 - 6 5 - 1,3,5 6 - 2,3,4,5
<ul style="list-style-type: none"> interpreting the meaning of the continuous line joining the points that satisfy a given number pattern 	4 - 6 5 - 1,2 8 - 5
<ul style="list-style-type: none"> reading values from the graph of a linear relationship to demonstrate that there are many points on the line 	5 - 3
<ul style="list-style-type: none"> deriving a rule for a set of points that has been graphed on a number plane by forming a table of values or otherwise 	2 - 9 8 - 3,4,6
<ul style="list-style-type: none"> forming a table of values for a linear relationship by substituting a set of appropriate values for either of the letters and graphing the number pairs on the number plane eg given $y = 3x + 1$, forming a table of values using $x = 0, 1$ and 2 and then graphing the number pairs on a number plane with appropriate scale 	5 - 2,5 8 - 5,6
<ul style="list-style-type: none"> graphing more than one line on the same set of axes and comparing the graphs to determine similarities and differences eg parallel, passing through the same point 	5 - 1,3,5
<ul style="list-style-type: none"> graphing two intersecting lines on the same set of axes and reading off the point of intersection 	5 - 4 8 - 6,7

PAS4.5 - Linear Relationships Working Mathematically. Students learn to:	
<ul style="list-style-type: none"> relate the location of points on a number plane to maps, plans, street directories and theatre seating and note the different recording conventions eg 15°E (<i>Communicating, Reflecting</i>) 	4 - 1,2
<ul style="list-style-type: none"> compare similarities and differences between sets of linear relationships (<i>Reasoning</i>) eg $y=3x$, $y=3x+2$, $y=3x-2$ $y=x$, $y=2x$, $y=3x$ $y=-x$, $y=x$ 	2 - 8 5 - 1,3,5
<ul style="list-style-type: none"> sort and classify equations of linear relationships into groups to demonstrate similarities and differences (<i>Reasoning</i>) 	2 - 8
<ul style="list-style-type: none"> question whether a particular equation will have a similar graph to another equation and graph the line to check (<i>Questioning, Applying Strategies, Reasoning</i>) 	6 - 3,4
<ul style="list-style-type: none"> recognise and explain that not all patterns form a linear relationship (<i>Reasoning</i>) 	6 - 1,2,3
<ul style="list-style-type: none"> determine and explain differences between equations that represent linear relationships and those that represent non-linear relationships (<i>Applying Strategies, Reasoning</i>) 	5 - 1
<ul style="list-style-type: none"> explain the significance of the point of intersection of two lines in relation to it being a solution of each equation (<i>Applying Strategies, Reasoning</i>) 	5 - 4 8 - 6,7
<ul style="list-style-type: none"> question if the graphs of all linear relationships that have a negative x term will decrease (<i>Questioning</i>) 	2 - 8 8 - 3
<ul style="list-style-type: none"> reason and explain which term affects the slope of a graph, making it either increasing or decreasing (<i>Reasoning, Communicating</i>) 	2 - 8 8 - 3
<ul style="list-style-type: none"> use a graphics calculator and spreadsheet software to graph and compare a range of linear relationships (<i>Applying Strategies, Communicating</i>) 	8 - 3