Picking Patterns

You need ☑ a classmate ☑ a computer

Activity One

1. Eseta and Tony are investigating number patterns.
They start by entering 3, 6, 9, 12, and 15 into a spreadsheet program.

	A	B
1	3	
2	6	
3	9	
4	12	
5	15	
6		

It's easy to see what's happening in this pattern!

a. What pattern does Eseta see?

Can we find a way to link the pattern to the row numbers on the side?

b. i. Describe the number pattern that links each number in column A to its row number.

   ii. What number comes next in column A?

   iii. What row number would be beside the number 39 in column A?

Using generalisations and formulae to make predictions

2. Eseta and Tony's teacher is talking to them about formulae.

You'll be able to make patterns much faster if you use formulae.

He gives them some instructions to follow.

Step 1:

	A	B
		=A1+1
1	1	
2	2	
3		
4		

	A	B
		=A1+1
1	1	
2	2	
3		
4		*Drag down to A15*

Put the counting numbers 1 to 15 into column A like this:

- Type 1 into cell A1.

- In cell A2, type =A1+1 and press enter. This adds 1 onto whatever is in cell A1. (The spreadsheet cell will show 2.)

- Click on cell A2, put the cursor on the bottom right-hand corner of that cell, wait until it changes its shape, and then drag down to highlight from cell A2 down to A15. This will fill the formula down the column and give the counting numbers. (This is called the Fill Down function.)

The spreadsheet symbol for multiplication is *.

Step 2:

	A	B
		=3*A1
1	1	3
2	2	
3	3	
4	4	

- Type =3*A1 into cell B1 and press enter. The spreadsheet program will put 3 into cell B1.

- Fill down to cell B15 (see step 1 above).

Wow, that gives the pattern all the way to row 15 in a split second!

a. On a spreadsheet, complete the steps above.

b. If you want column B to display the numbers 4, 8, 12, 16 …, you only need to change part of the formula. What do you need to change?

3. a.

	A	B
1	1	8
2	2	
3	3	
4	4	

Formula bar: =8*A1

    i.   What multiplication table will this spreadsheet formula give?

    ii.   Fill down the first 10 rows in columns A and B. When you are sure that the pattern works, use the Fill Down function to find what number multiplied by 8 gives 192.

b.   i.   Change the formula in B1 to =3*A1+1. (This is the same as 3 x 1 + 1 = 4.) Fill down. The numbers in column B are now 4, 7, 10, 13 …

    ii.   Work out the 20th number in this pattern.

    iii.   Use the spreadsheet to find what number multiplied by 3, plus 1, gives an answer of 202.

Activity Two

Tony and Eseta play a game using their spreadsheet patterns and formulae similar to =3*A1+1.

1.   Eseta looks away while Tony changes the numbers in the formula. (He can only use single digits.) Tony fills down to cell B10 and then clicks on a empty cell to hide his formula. Eseta has to guess the formula. She checks her answer by clicking in cell B1. (This will show the formula in the formula bar.)

If she's correct, it's her turn to change the formula.
If she's wrong, Tony gets another turn.

> This is going up in twos.
> So 2 x 1 = 2 plus what gives 5? 2 x 1 + 3 = 5.
> So the formula is …

	A	B
1	1	5
2	2	7
3	3	9
4	4	11
5	5	
6		

What formula will be in cell B1 in the spreadsheet above?

Using generalisations and formulae to make predictions

2. **a.** It's Eseta's turn to change the formula. Work out her pattern.

	A	B
1	1	6
2	2	10
3	3	14
4	4	18
5	5	22

Hmm …

☐ x 1 + ☐ = 6
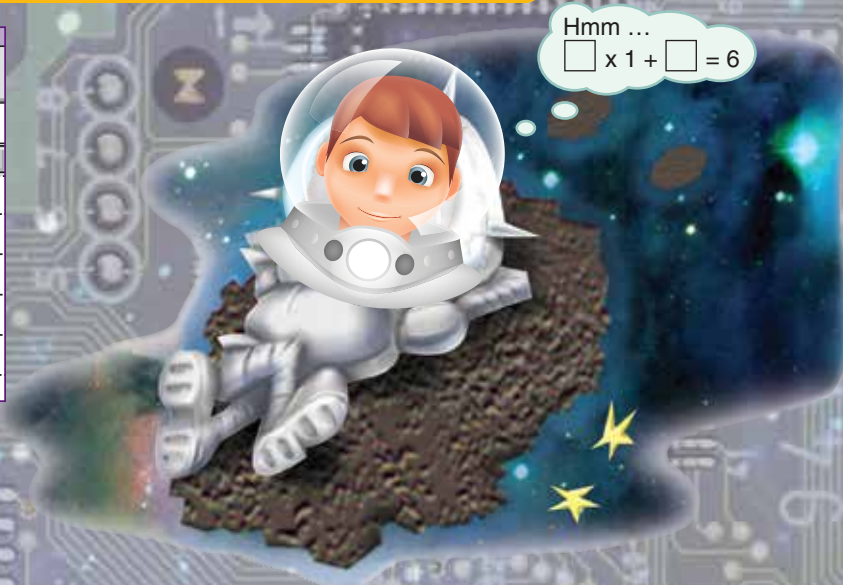
b. Play Tony and Eseta's game with a classmate.

- If your classmate can't work out three patterns in a row, you win.

- If you both keep getting the patterns right, mix up the order of the numbers in column A to make the game harder. To do this, you will need to enter the numbers directly into column A instead of using a formula and filling down.

3. The formula in the spreadsheet below includes division.
Work out the formula and then play the game above using division formulae.

	A	B
1	8	2
2	11	3.5
3	100	48
4	7	1.5
5	26	11

The spreadsheet symbol for division is /.