Dear All

I hope this letter finds you all save and well.

I cannot believe that how quickly this year has gone but I hope to see those of you in year 10 in September 2020.

To all of the year 11 students it has been a pleasure to teach you all and whether you are moving into post 16 or onto college I wish you all the very best, I am sure you will all go onto to do great things.

This math pack contains some investigations for you to have fun solving. I hope you all find something fun within this pack.

From

Mrs Holman

Elf Houses Maths Investigation

The elves in the Elf Village live in houses. Every house has three storeys (floors) so that the elves can use some of the space as a workshop and to store all the toys that they make. Each different storey must be painted either with a different colour or the same colours – that's the rule in Elf Village.

How many ways could the houses be painted if you have two colours?

For example, imagine the two colours are red and blue.

This might be a good way to start.

B
B
B

All the storeys are painted blue, so this is the first way the house can be painted.

B
B
R

The first two storeys are blue, with the bottom floor red, so this is the second way the house can be painted.

B
R
R

This might be the third way to paint the houses.

Can you carry this on and work out how many different ways there are to paint the houses?

Elf Houses Maths Investigation

The elves in the Elf Village live in houses. Every house has three storeys (floors) so that the elves can use some of the space as a workshop and to store all the toys that they make.

How many ways could the houses be painted if you have:

Two colours?

Three colours?

Four colours?

Five colours?

Investigation

Can you keep investigating with more and more colours? Do you see any patterns? Can you explain any patterns to a friend? Is there any advantage in working systematically on this problem?

Box of Chocolate Maths Investigations

Choose one of these suggestions to work through or think of your own investigation and complete it. Plan carefully to help you decide how to complete your investigation and be ready to demonstrate, explain and prove your findings.

One box of chocolates = infinite mathematical possibilities. What will you investigate?

How many teaspoons of sugar are in the box? How does it compare to 2 litres of fizzy drink?

Draw a bar chart to show how many of each type there are. Draw a bar chart to show what people's favourite chocolate is.

How quickly could you eat them all?

How many chocolates would you need to make a stack as high as the Eiffel Tower? How about a line one mile long?

Find out which is the most common letter on packaging.

How many calories are there in total in the whole box? How far would you need to run to burn them off? How many slices of pizza would be equivalent?

An Amazing Fact a Day

Ice Cream Maths

Amazing Fact

The ice cream cone was invented at the 1904 World's Fair in St. Louis. Previously, ice cream had only been eaten with bowls and spoons but the invention of the cone enabled people to eat ice cream on the move.

Challenge

Try this ice cream maths challenge.

The ice cream stall sells chocolate, peach, mint, lemon, strawberry and vanilla flavour.

What combinations can be created for a double cone?

Be sure to work systematically and record your solutions in an order. How will you know once you have found all the possibilities? Use the space below for your working out.

You could also try to find out:

- how the first ice cream cone was made;
- how big the biggest ever ice cream cone was;
- what the most popular flavour of ice cream is;
- what some of the strangest flavours that have been made are.

Join the Dots

In this investigation, you will investigate the number of lines that can be used to join a different number of dots.

- Here is one dot. No lines can join a single dot.

Here are 2 dots that can be joined by 1 line.

Draw 3 dots. How many lines can be used to join the 3 dots?

Continue with 4, 5 and 6 dots.

Join the Dots

Draw a table and record your results. Use the example to help you.

Number of dots	Number of lines
1	0
2	1

Can you spot any patterns?

Can you predict the number of lines used with 7, 8, 9 and 10 dots?

Test your answers.

Dots

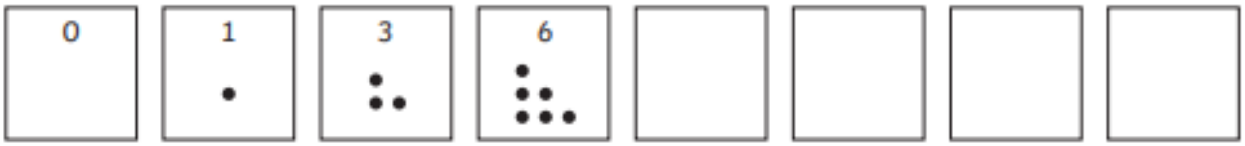
Triangles

Here is a pattern of dots as triangles.

0 1 3 6

Note: the first triangle has no dots.

Write the number of dots and find the difference between each number. Continue the pattern for the next 4 triangles.



difference:

What do you notice about the difference in the number of dots in each triangle?

Can you explain why?

Dots

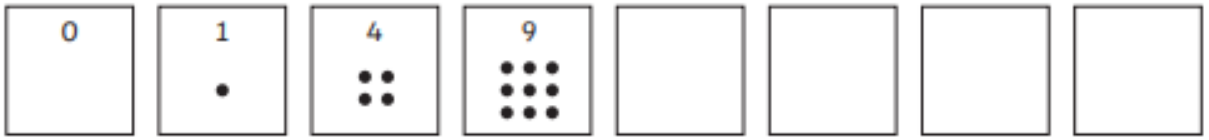
Squares

Here is a pattern of dots as squares.

0 1 4 9

Note: the first square has no dots.

Write the number of dots and find the difference between each number. Continue the pattern for the next 4 squares.



difference:

What do you notice about the difference in the number of dots in each square?

Can you explain why?

Sticks

Collect a number of sticks. The investigation is to find the maximum number of intersections as the sticks cross.

With one stick, no sticks cross.

With 2 sticks, there is one intersection.

With 3 sticks, how many intersections are there? _____

Record the maximum number of intersections for each number of sticks.

Number of sticks	Number of intersections
1	0
2	1
3	

Can you spot the pattern?

_____

_____

Can you explain the reason for the pattern?

_____

_____

Predict the next number of intersections and test your idea.

_____

_____