Maths Outreach

Objective

To provide opportunities for pupils in key stage 2, particularly Year 6, to develop their reasoning and problem solving skills through Mathematics. To increase confidence in their mathematical skills, improve willingness to fail and persist with tricky problems and to generally be enthused about Mathematics.

Methodology

A set of 12 resource packs aimed at developing higher order maths skills, suitable for pupils with high prior attainment in Maths. The pack contains activities that can be drawn on as extension tasks or discreet lessons. A Caterham teacher will visit schools to coach groups of students through alternative and 'smart' approaches to the problems in the pack.

Resources

Speed test x 1: The purpose of the speed test is to make pupils familiar with the idea that they will not, and cannot, complete all of the questions and expect to get them right. Instead, a target of 3 or 4 correct should be seen as a victory. Pupils can set themselves realistic targets knowing that the likelihood of failure is high but that the process of developing ideas and approaching problems in a creative way is important. Use of *intuition* is important here.

Sudoku x 3: Designed to draw out mathematical reasoning skills including *logical thinking* and *rigour*, these puzzles provide excellent grounding for success in Mathematics.

Short activities x 6: These activities promote a range of skills including mathematical intuition along with tenacity and bravery to attempt unusual problems.

Fact file: Designed to promote awe and wonder, these will focus on challenging concepts in Mathematics that will confuse, inspire and challenge those who read them.

Caterham 'Christmaths' competition: A competition designed for Year 6, 7 and 8 pupils to attempt. Solutions are valued, not only for reaching the correct answer, but for the elegance of the method used and for the presentation of the solution to the reader.

Speed Test

- Time allowed is 20 minutes.

- There are 20 questions to try to answer in the time allowed.

- You will not get all of these right! Two or three correct answers would be great!

- You will need to prioritise, choosing questions that you like the look of.

Question 1
What is the value of 9 - 8 + 6 - 5 + 4 - 3 + 2 - 1 ?

Question 2
In a class of 30 pupils, 60% are boys. How many girls are in the class?

Question 3
I buy 3 CD's at £5.29 each and pay with a £20 note. How much change should I get?

Question 4
What is the smallest number of coins needed to make up the amount of change in question 3?

Question 5
What is $\frac{1}{3}$ of 45 + $\frac{1}{5}$ of 55 + $\frac{1}{13}$ of 65?

Question 6
In a class of 30 pupils, 20 pupils like rock music, 15 like rap music, including 10 who like both. How many do not like either rock or rap music?

Question 7
We know that 9 X 8 = 72. What is the value of 7200 ÷ 8000?

Question 8
What is the value of $\frac{2}{3} + \frac{5}{7}$ **?**

Question 9
What is the value of 1 + $\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$?

Question 10
What is 20% of 20% of 350?

Question 11
A train arrives in York at 15:05 after a journey of 2 hours 15 minutes from London. At what time did the train leave London?

Question 12
3 choc boxes and 2 drinks cost £3.40 while 2 choc boxes and 3 drinks cost £3.10. How much will 1 choc box and 1 drink cost?

Question 13
I have to run 1500 metres in 10 minutes for my gold award. I run at an average of 3m/s. By how many seconds do I succeed or fail in my quest for a gold award?

Question 14
You are told that x = 2 and y = 3. What is the value of $2x^2 + 3y^2$?

Question 15
What is $\frac{1}{2}$ of $\frac{1}{3}$ of 96?

Question 16
What is the sum of all the square numbers greater than 100 but less than 200?

Question 17
We know that 11^2 is 121. What is the value of 111^2?

Question 18
What 3-digit number is both a square number and a cube number?

Question 19
It takes 7.5 hours to fly to New York. The return flight takes 90% of the outward flight time. How long is the return flight?

Question 20
A computer priced at £325 has its price increased by 25%. A month later it is reduced by 20% in the sale. What is the sale price?

Sudoku 1

Sudoku Rules

- Each *row* should contain all of the digits from 1 to 6.
- Each *column* should contain all of the digits from 1 to 6.
- Each *block* should contain all of the digits from 1 to 6.

					6
		6	1		2
2				6	
	4				1
1		5	3		
3					

Sudoku 2

Sudoku Rules

- Each *row* should contain all of the digits from 1 to 9.
- Each *column* should contain all of the digits from 1 to 9.
- Each *block* should contain all of the digits from 1 to 9.

				4				
	2		9		3		7	
	3		6		7		4	
5			2		1			7
8		2				1		5
	8	9	7		4	3	5	
6								4
2				1				9

Sudoku 3

Sudoku Rules

- Each *row* should contain all of the digits from 1 to 9.
- Each *column* should contain all of the digits from 1 to 9.
- Each *block* should contain all of the digits from 1 to 9.

				3	8	6	1	
8			1				4	
	6				5			8
		5					6	
6		7	9			5		
1			6				9	
5	4			7	1	9	2	
9								4
	1	3		4	9	7	8	

Activity 1

$$\Omega \times \Delta = \Delta$$
$$\Delta \div \Delta = \Omega$$

$$\Sigma \times \Delta = \Sigma$$
$$\Delta - \Delta = \Sigma$$

$$\Omega\Sigma \times \Delta = \Delta\Sigma$$
$$\Omega\Sigma - \Delta = \Delta$$

$$\Delta \times \Delta = \Psi\Delta$$
$$\Psi\Sigma \times \Delta = \Omega\Sigma\Sigma$$

Each symbol represents a one digit number.

Find the values of Σ, Δ, Ω and Ψ.

Activity 2

Fill the bottom row with the number 1 – 5 in any order.

The bricks above are found by adding the 2 numbers directly below it.

What arrangement gives the largest total in the top brick of the pyramid?

What arrangement gives you the smallest total?

What is the highest total for the following sets of numbers?

6, 7, 8, 9, 10

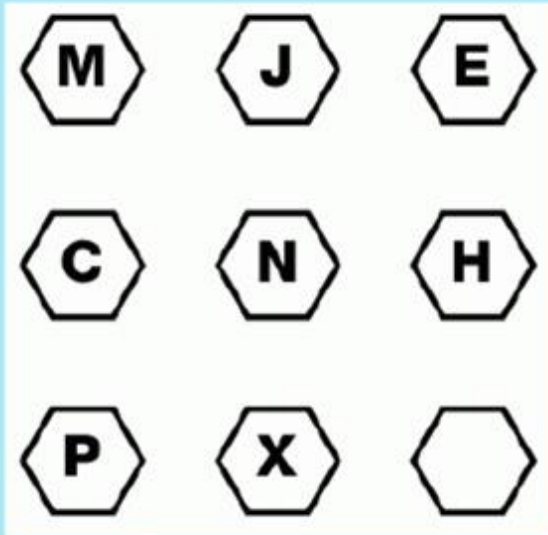13, 14, 15, 16, 17

23, 24, 25, 26, 27

101, 102, 103, 104, 105

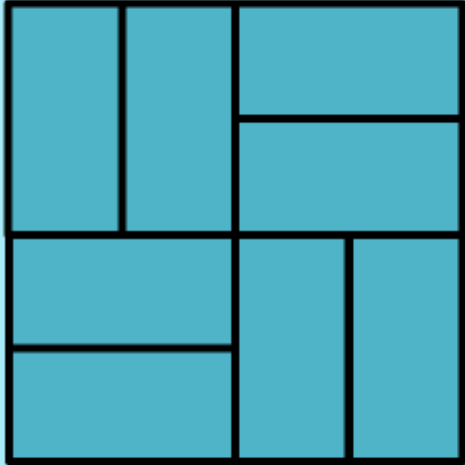**Activity 3**

3861 8712 5247 4356 1485 3645

Which number is the odd one out?

Activity 4

M	J	E
C	N	H
P	X	

Which letter completes the puzzle?

Activity 5

How many rectangles?

How many squares?

Activity 6

Place the numbers 1-17 in the circles so that all the straight lines of 5 numbers add up to the same amount.

Fact File

Zero!

Who invented Zero
Zero was invented by Brahmagupta(Hindu astronomer and mathematician) in 628 AD in India , used later by the Persians and Arabs and later in Europe.

What is Zero
0 (zero) is both a number and the numerical digit used to represent that number in numerals.

Symbol of Zero
The zero number is denoted with the **0** symbol.

What do you know about 'zero'?

- Zero addition: what is a number plus zero equal to?
  - $x + 0 = ?$

- Zero subtraction: what is a number minus zero equal to?
  - $x - 0 = ?$

- Zero multiplication: what is a number multiplied by zero equal to?
  - $x \times 0 = ?$

- Zero division part 1: what is zero divided by a number equal to?
  - $0 \div x = ?$

- Zero division part 2: what is a number divided by zero equal to?
  - $x \div 0 = ?$

Check your answer above with some actual numbers. Are you confident in your answers? Provide some examples to show why you are correct.

Further questions:

- Is zero an odd or even number? How do you know?

- What type of number is zero? Is it an *integer* (a whole number)? Positive or negative? Is it *rational* (can it be written as a fraction)?
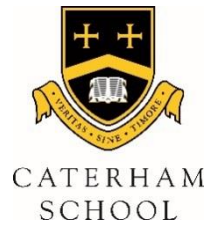
Caterham School Christmaths Competition 2020

Attempt as many of these questions as you can and write up your solutions on paper. The work must be entirely your own, with prizes being awarded for the best entries in various year groups. Credit will be given for clear and mathematically pleasing solutions.

To enter, hand your solutions to your Mathematics teacher by Friday 15 January.

1. There are 240 elves working in Santa's workshop. The ratio of the number of elves who like mince pies to the number who do not is 5:3. The ratio of the number of elves who like Christmas pudding to the number who do not is 7:5. The number of elves who like both mince pies and Christmas pudding is 86.

   How many elves dislike both mince pies and Christmas pudding? Explain your answer.

   A: 32   B: 36   C:40   D:48

2. Three elves make the following statements.

   Ben says, 'Exactly one of Dan and Cam is telling the truth.'
   Dan says, 'Exactly one of Ben and Cam is telling the truth.'
   Cam says, 'Neither Ben nor Dan is telling the truth.'

   Which of the three elves is lying? Give reasons for your answer.
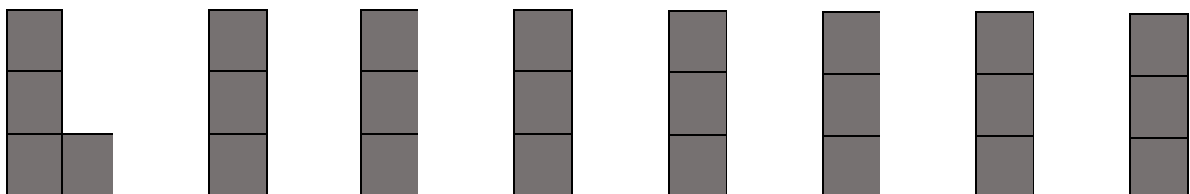
   A: Just Ben   B: Just Dan   C: Just Cam   D: Each of Ben and Cam
   E: Each of Ben, Cam and Dan

3. Use some of the pieces below to make a 3x3 square (easy), then use the remaining pieces to make a 4x4 square. Now use ALL the pieces to make a 5x5 square.

4. Five elves who were tired of living with Father Christmas move to the country and built five houses. The houses were built in a straight line, each one being 100m from its neighbour. 100m from the house marked E is a water well, marked W.

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┌─────┬─────┬─────┬─────┬─────┐
A     B     C     D     E     W
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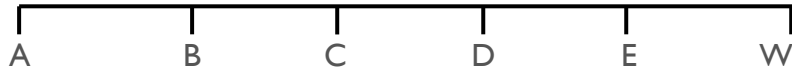
The occupant of A goes to the well each morning to fill his bucket. He has offered to collect an empty bucket from each of the other houses and deliver it filled back to its owner. He can carry up to two empty or two full buckets at a time. Assuming that he took the shortest possible route, what distance would he have walked in order to supply himself and his neighbours with a filled bucket of water?

Merry Christmas from the Maths department! Ho ho ho!