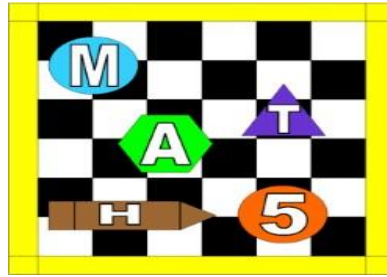# Summer Maths Challenges

Your maths teachers all love doing puzzles and challenges, so we thought we would give you a few to think about over the summer…

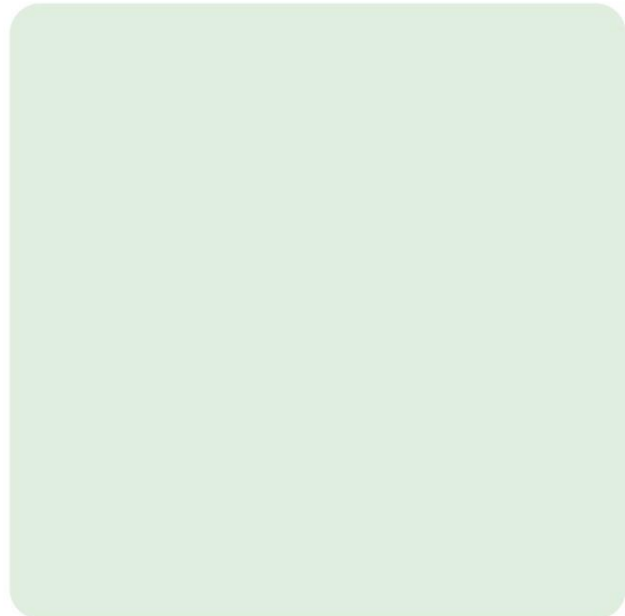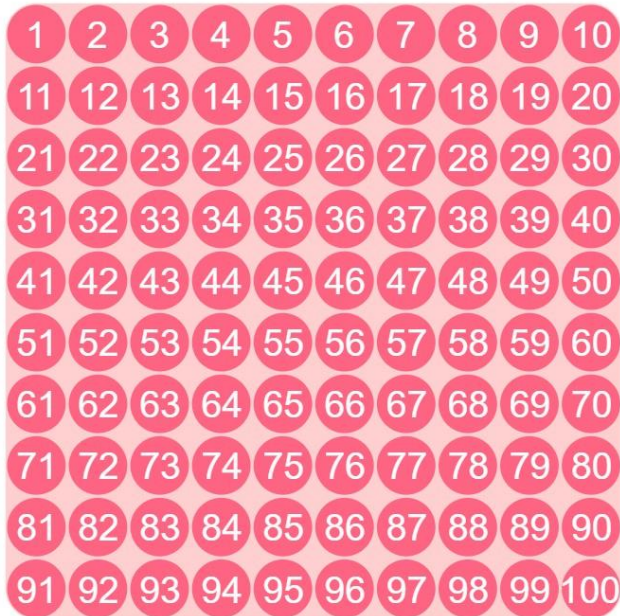If you have a go at any of them, please share them with your maths teacher in September – there will be prizes!

Factors and Multiples

We in the Maths department are very competitive and have been challenging each other and our classes to have a go at this factors and multiples game. The aim is to make the longest chain you can, and strategy is very important. Take a screenshot of your efforts for us!

https://nrich.maths.org/factorsandmultiples

Factors and Multiples

Longest Chain 0 [Start again]

Click on a number to move it between the left and right squares. Numbers in the right grid can be dragged to reorder them. Aim to make the longest possible chain where each number is a factor or a multiple of its predecessor. Each number may be used once only. Chains are bracketed in green. Blue numbers are not part of a chain

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The Tower of Hanoi

This is an addictive challenge to get you thinking systematically and problem solving.
It also offers an opportunity for you to do a mathematical investigation! The site also tells you a bit of the history behind this puzzle.
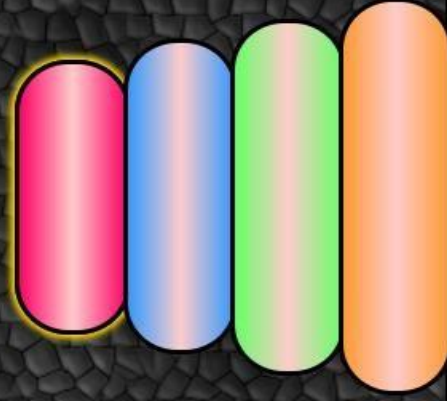
https://www.transum.org/Maths/Investigation/Tower_Of_Hanoi/Default.asp?Level=1

TOWER OF HANOI

The objective of this puzzle is to move the discs, one at a time, from start to finish.

You are not allowed to put a disc on top of a smaller disk though.

You will be awarded a trophy if you can complete the puzzle in the minimum number of moves.

Start by moving this disk.

START | FREE PARKING | FINISH

Codes, Cyphers and Secret Messages

These websites have all sorts of different fun and challenging activities all related to the secret world of codes and the history behind them. We often explore these types of codes as part of our enrichment activities.

https://nrich.maths.org/2197

The Secret World of Codes and Code Breaking

Age 7 to 16
Article by NRICH team
Published March 2004, April 2004, December .

When you think of spies and secret agents, you might think of lots of things; nifty gadgets, foreign travel, dangerous missiles, fast cars and being shaken but not stirred. You probably wouldn't think of mathematics. But you should.

Cracking codes and unravelling the true meaning of secret messages involves loads of maths, from simple addition and subtraction, to data handling and logical thinking. In fact, some of the most famous code breakers in history have been mathematicians who have been able to use quite simple maths to uncovered plots, identify traitors and influence battles.

The Roman Geezer

Let me give you an example. Nearly 2000 years ago, Julius Caesar was busy taking over the world, invading countries to increase the size of the Roman Empire. He needed a way of communicating his battle plans and tactics to everyone on his side without the enemy finding out. So Caesar would write messages to his generals in code. Instead of writing the letter 'A', he would write the letter that comes three places further on in the alphabet, the letter 'D'. Instead of a 'B', he would write an 'E', instead of a 'C', he would write an 'F' and so on. When he got to the end of the alphabet, however, he would have to go right back to the beginning, so instead of an 'X', he would write an 'A', instead of a 'Y', he'd write a 'B' and instead of 'Z', he'd write a 'C'.

Complete the table to find out how Caesar would encode the following message:

Caesar's message	A	T	T	A	C	K		A	T		D	A	W	N
	B	U												
	C	V												
Coded message	D													

https://science.howstuffworks.com/code-breaker.htm

Polybius Squares and Caesar Shifts

« PREV   NEXT »

Although historical findings show that several ancient civilizations used elements of ciphers and codes in their writing, code experts say that these examples were meant to give the message a sense of importance and formality. The person writing the message intended for his audience to be able to read it.

The Greeks were one of the first civilizations to use ciphers to communicate in secrecy. A Greek scholar named Polybius proposed a system for enciphering a message in which a cryptographer represented each letter with a pair of numbers ranging from one to five using a 5-by-5 square (the letters I and J shared a square). The Polybius Square (sometimes called the checkerboard) looks like this:

	1	2	3	4	5
1	A	B	C	D	E
2	F	G	H	I/J	K
3	L	M	N	O	P
4	Q	R	S	T	U
5	V	W	X	Y	Z

https://www.topspysecrets.com/secret-codes-for-kids.html

Easy Way to Make Secret Codes, for Kids