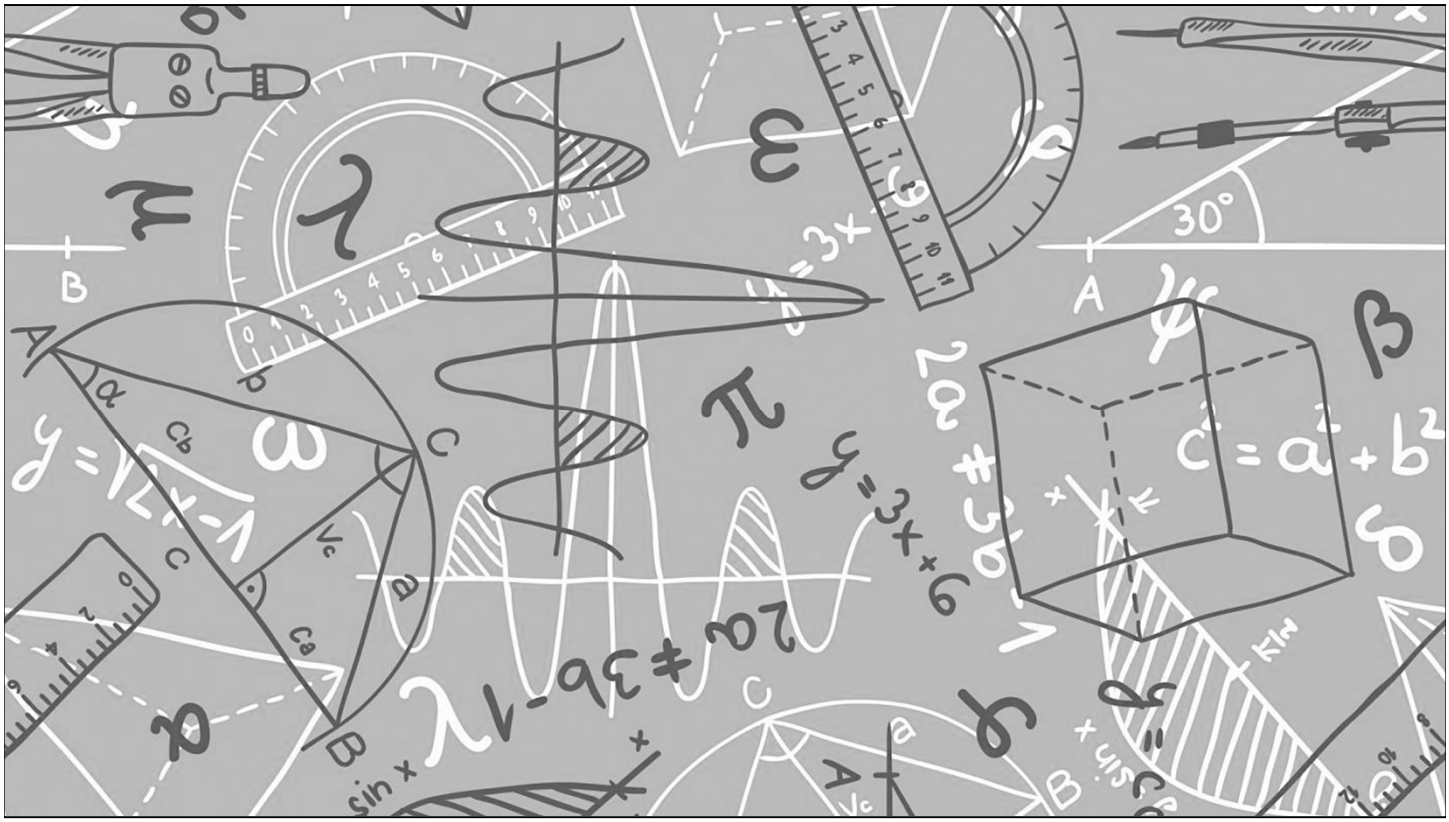
Cliff Park
ORMISTON ACADEMY

Maths



We can't wait to meet you...

All the Maths teachers at Cliff Park Ormiston Academy are very much looking forward to meeting you. Normally during transition weeks you find out about us, we find out about you and together we do some Maths. Unfortunately due to transition being cancelled we won't meet in person; however, hopefully completing this booklet you will be able to find out some facts about the Maths teachers at CPOA, do some research into some of our favourite mathematicians and do some maths either on your own or with your family/carers.

Meet the department…

In the Maths department we have nine Maths Teachers. Throughout this booklet you will find out about some of our favourite Maths related things. Come back to this page to fill them in when you spot them. Can you find them all?

MRS STENSON

Special Number:
Favourite Maths area:
Favourite Mathematician:

MS CLARKE

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MS HUNTER

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MISS HANZELYOVA

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MS RUSSELL

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MR PILLAR

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MR CAMERON

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MISS YATES

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

MISS ESCRIBANO

Favourite Number:
Favourite Maths area:
Favourite Mathematician:

Complete this booklet and bring it in September. You will get some CPOA credits!

Ms Clarke's Favourite Number

Ms Clarke likes all numbers equally, however there is one special number that she thinks is the answer to the Universe. Can you work it out using the clues?

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

Guess my number 1

The number is a multiple of 3

AIM

Guess my number 1

The digital sum is 6

AIM

Guess my number 1

Find the number between 1 and 99

AIM

Guess my number 1

It is more than 5 squared

AIM

Guess my number 1

One of the digits is a 2

AIM

Guess my number 1

It is less than 55

AIM

Guess my number 1

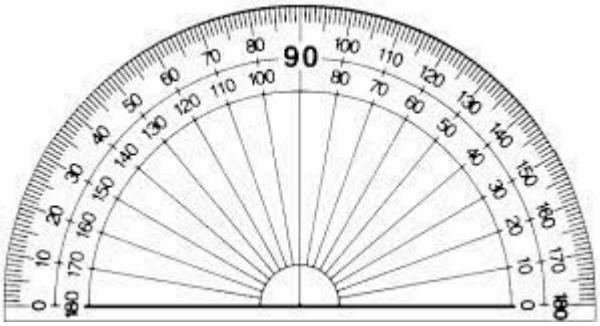
It is not a square number

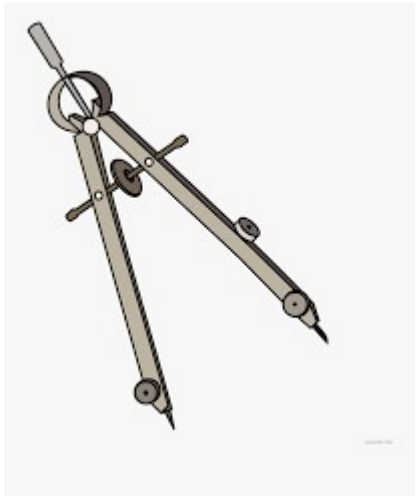
AIM

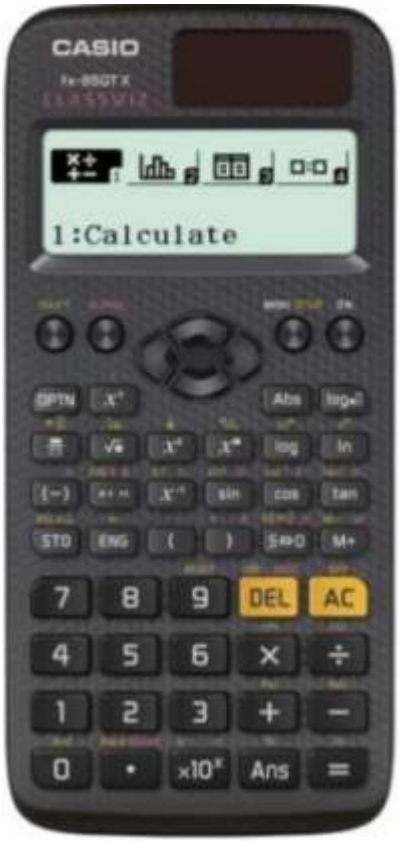
This number is also Ms Hunter's favourite number

Maths Equipment

Make sure you are prepared for Maths lessons with adequate equipment. At some point you will need to use a ruler, a compass, a protractor and/or a scientific calculator. Bring these to every lesson so you are always ready. The easiest calculators to use are the Casio FX-83GTX or FX-85GTX, as seen on the picture.







Ms. Russell's favourite number is $6^2 - 3 \times 11$

Key Skills...

When you get to a page like this, spend 10 minutes completing the skills check questions based on topics from Y6.

Question 1 Write in figures : thirteen thousand, five hundred and two units	**Question 2** Write in figures : seventy seven thousand, eight tens and three units	**Question 3** List the factors of 51	**Question 4** List the factors of 36
Question 5 Work out 7 × 10 =	**Question 6** Work out 10 × 10 =	**Question 7** Simplify $\frac{8}{16}$	**Question 8** Simplify $\frac{12}{42}$
Question 9 Find 50% of £180	**Question 10** Find 25% of £120	**Question 11** Round 2084 to the nearest 100	**Question 12** Round 3372 to the nearest 10
Question 13 Work out 86 × 8 =	**Question 14** Work out 630 × 9 =	**Question 15** Simplify 5c + 5c + 6c	**Question 16** Simplify 10a + 2b + 8a + 7b
Question 17 Work out 39253 + 15736 =	**Question 18** Work out 30730 + 18364 =	**Question 19** Work out 8 × 2 - 5	**Question 20** Work out 6 + 11 × 3

SKILLS CHECK

Score

Mrs Stenson is the Learning Support Assistant in the Maths department at CPOA. She has two favourite topics that are linked to each other; one of them is Trigonometry. This is also Miss Hanzelyova's favourite topic.

Perfect Numbers

The Perfect Number Challenge

The factors of 6 are 1, 2, 3 and 6.
If you ignore the 6, then the other factors add up to make 6: 1 + 2 + 3 = 6.
6 is called a **perfect number** because its factors (not including itself) add up to itself.
Can you find any other perfect numbers? Use the space below for rough working.

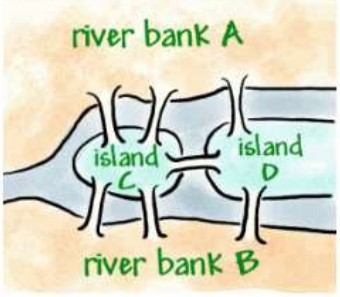
Hint: the next one is between 20 and 35, and the one above that is between 480 and 500

The second perfect number is Mrs Stenson's favourite number.

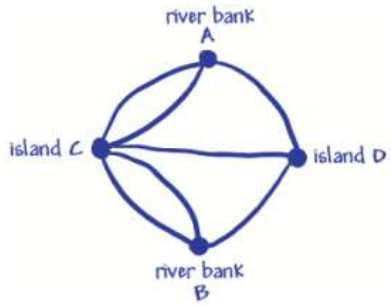
Ms Hunter's favourite Mathematician is **Florence Nightingale**, or 'The Lady with the Lamp', who is most famous for her contributions to nursing and hygiene. In fact, it was maths – specifically statistics – that helped her to transform the practice of nursing! Florence vowed to help improve hospital conditions, using statistics to help her do so. She published a book which used statistical evidence to prove that high mortality in hospitals was due to the poor conditions. Florence Nightingale developed her Polar Area Graph which was later tweaked and became better known as the pie charts we use today.

The Seven Bridges of Königsberg

Konigsberg is a town on the Preger River, which in the 18th century was a German town, but now is Russian. Within the town are two river islands that are connected to the banks with seven bridges (as shown below).



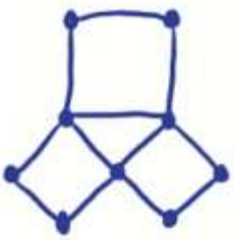
It became a tradition to try to walk around the town in a way that only crossed each bridge once, but it proved to be a difficult problem. Leonhard Euler, a Swiss mathematician in the service of the Russian empress Catherine the Great, heard about the problem. In 1736 Euler proved that the walk was not possible to do. He proved this by inventing a kind of diagram called a network, that is made up of vertices (dots where lines meet) and arcs (lines).



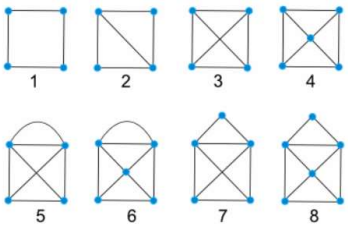
Leonhard Euler is Mr Pillar's favourite Mathematician

He used four dots (vertices) for the two riverbanks and the two islands. These have been marked A, B and C, D. The seven lines (arcs) are the seven bridges. You can see that 3 bridges (arcs) join to riverbank A, and 3 join to riverbank B. 5 bridges (arcs) join to island C, and 3 join to island D. This means that all the vertices have an odd number of arcs, so they are called odd vertices. (An even vertex would have to have an even number of arcs joining to it).

Remember that the problem was to travel around town crossing each bridge only once. On Euler's network this meant tracing over each arc only once, visiting all the vertices. Euler proved it couldn't be done because he worked out that to have an odd vertex you would have to begin or end the trip at that vertex. (Think about it). Since there can only be one beginning and one end, there can only be two odd vertices if you're going to be able to trace over each arc only once. Since the bridge problem has 4 odd vertices, it just isn't possible to do! What happens if there are no odd vertices at all? Can this network be traced?



Now try these. Draw all the lines, but never go over any line more than once, and don't remove your pencil from the paper.) put the results on the table.

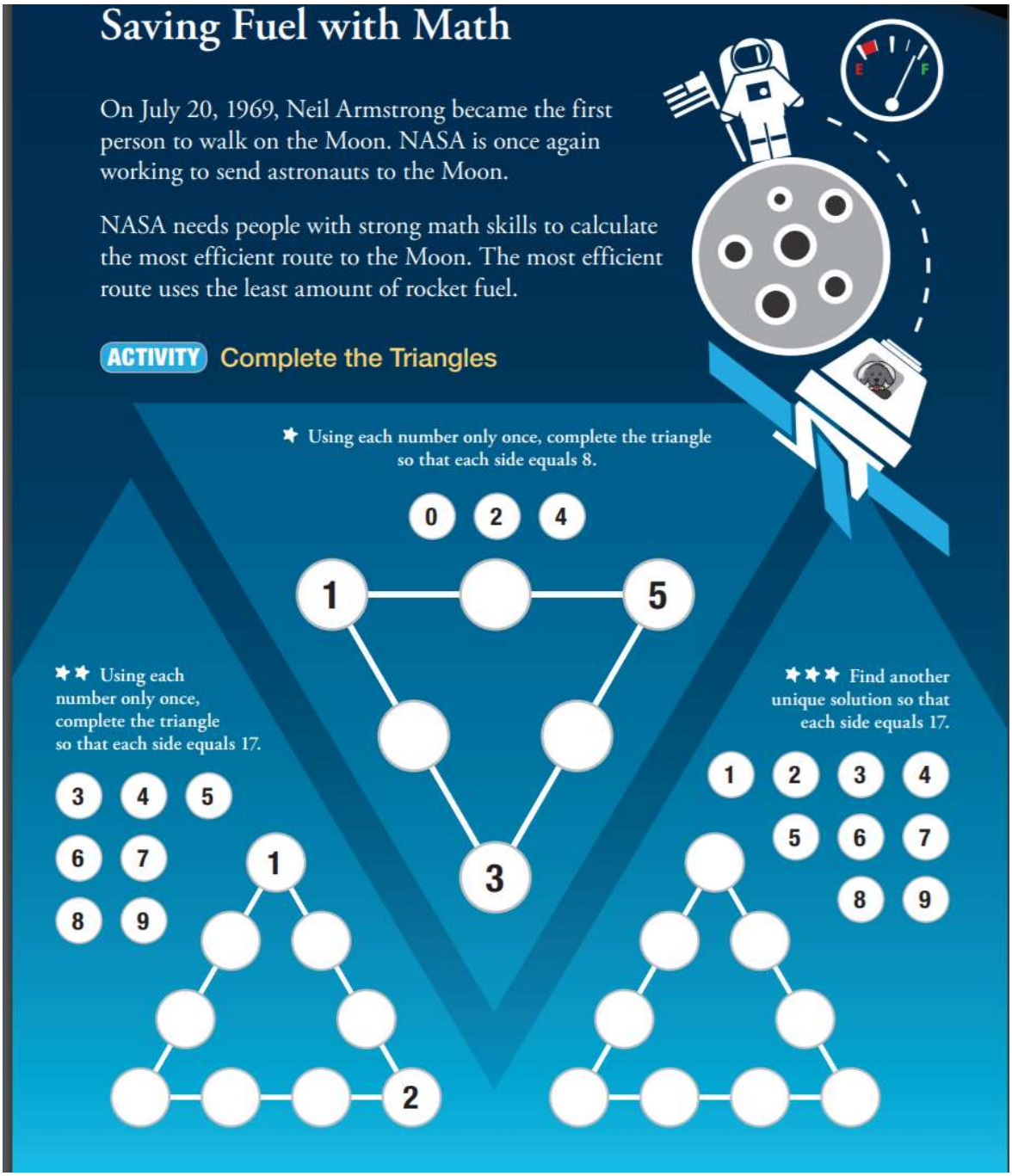


Shape	Success?
1	Yes
2	
3	
4	
5	
6	
7	
8	

The invention of networks began a whole new type of geometry called Topology. Topology is now used in many ways, including for planning and mapping railway networks. (Ahhh! Trains had to come into it....)

Katherine Johnson

Katherine Johnson (born August 26, 1918, White Sulphur Springs, West Virginia, U.S.—died February 24, 2020), American mathematician who calculated and analysed the flight paths of many spacecraft during her more than three decades with the U.S. space program. Her work helped send astronauts to the Moon. She became the first woman in the Flight Research Division to be credited as an author on a research report.
Katherine Johnson is Miss Hanzelyova's favourite Mathematician.



Key Skills…

When you get to a page like this, spend 10 minutes completing the skills check questions based on topics from Y6.

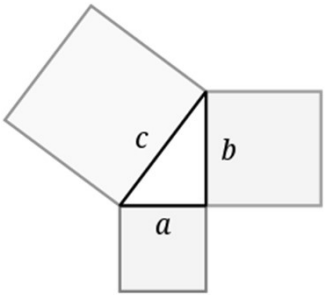
Name : 61.2

Question 1 Write in figures : six thousand, four tens and six units	**Question 2** Write in figures : One hundred and twenty six thousand, nine tens and three units	**Question 3** List the factors of 30	**Question 4** List the factors of 20
Question 5 Work out 306 × 1000 =	**Question 6** Work out 34 × 1000 =	**Question 7** Simplify $\frac{20}{70}$	**Question 8** Simplify $\frac{18}{63}$
Question 9 Find 75% of £720	**Question 10** Find 75% of £500	**Question 11** Round 6199 to the nearest 100	**Question 12** Round 2096 to the nearest 1000
Question 13 Work out 77 × 9 =	**Question 14** Work out 397 × 6 =	**Question 15** Simplify 9x + 4x - 3x	**Question 16** Simplify 10a + 3b + 7a + 6b
Question 17 Work out 37959 + 32050 =	**Question 18** Work out 24509 + 19451 =	**Question 19** Work out 5 × 2 + 2	**Question 20** Work out 5 × 4 + 3

SKILLS CHECK

Score

www.mathsbox.org.uk



Mrs Stenson's and Mr. Cameron's favourite mathematician

Pythagoras of Samos was a famous Greek mathematician and philosopher (c. 570 – c. 495 BC). He is known best for the proof of the important Pythagorean theorem, which is about right angled triangles. He started a group of mathematicians, called the Pythagoreans, who worshiped numbers and lived like monks.

Can you find out what the Pythagorean theorem is?

Fibonacci

One of Miss Escribano's favourite Mathematician is Leonardo Bonacci, most famously known as Fibonacci. He was an Italian mathematician from the 11th century considered to be "the most talented Western mathematician of the Middle Ages". He introduced Europe to a pattern found in nature (now called the Fibonacci sequence) . It's a series of numbers that starts with 0 and 1, and each number after is found by adding the two previous numbers (0, 1, 1, 2, 3, 5…)The sequence just keeps going on and on.

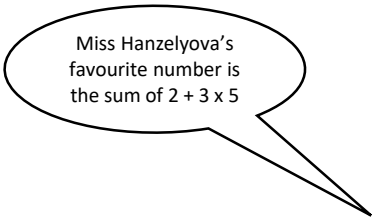
Can you find the first 10 numbers in the sequence?

However, Fibonacci's biggest contribution to Mathematics wasn't the sequence named after him but the fact that he popularized the Hindu–Arabic numeral system in the Western World , which, unlike the Roman numerals used at the time, allowed easy calculation using a place-value system.
Try these calculations using Roman numerals as it was the norm before Fibonacci brought the "new" system:

III + II = VII + XII = LI – XL =

LXXIV + XXIII + XCV = DCCXVIII – CCCLI =

DCCLIII ÷ III = MMDXX ÷ XXIV =



Maths Keywords…

Can you find all the keywords you will need for your first half term at Cliff Park Ormiston Academy?

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Y R Y A P F F T Z P M M D Q U M Z L N U
F I J X F U D M E E B U D O N D I M X E
B D P J B K C D B R U F I H I B Y V W J
C K H U T U G Z I I Z M D L T V F S F S
Y P I Z P L N M G M I Q A W S Y V D R Q
H X A T M Y K O P E L S Q W R E P E W K
C O D K Q I A Q D T C T E E S M H R U T
P L A C E V A L U E G Q B T D Z D D M J
J V B S H U K I N R S M D D A T M N K N
Z T R K F S L D L P U C M M N M O U G M
W O O Z D A I P C N R Q E X Z P I H J M
E M N T M N V Y E C C C Q N A R J T Q N
U K E I G T V R C F R N B H D Q H Z S X
P N C X A U A L G N S L B W V I D I D E
S E T F O U K L W Q C T I R Q N N P N E
D Z J D Q P T C A R T B U S O R K G B F
F V N S N I T G B P K G L R W U D J R V
O F V S G P O L Y G O N Q I X R N R O L
O U J V F K T B N Q V Z U D U V A D K O
E L E F T K D W E F Y A C L J T J N R L
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Mrs Clarke's favourite Maths topic is Mechanics

ADD
ASCENDING
DECIMAL
DESCENDING
ESTIMATE
HUNDREDS
PERIMETER
PLACEVALUE
POLYGON
ROUND
SQUARENUMBER
SUBTRACT
TENS
UNITS

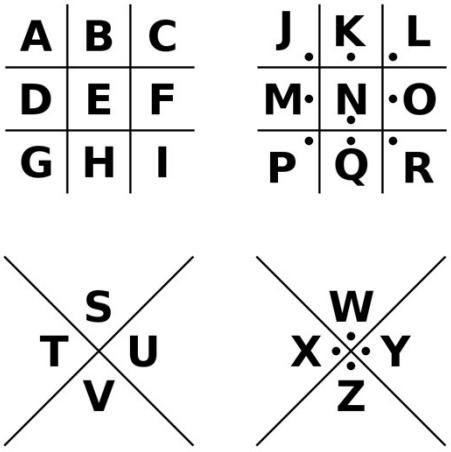
Mr Pillar's favourite number is i (as in the letter) Can you find out what type of number i is?

Code Breaking…

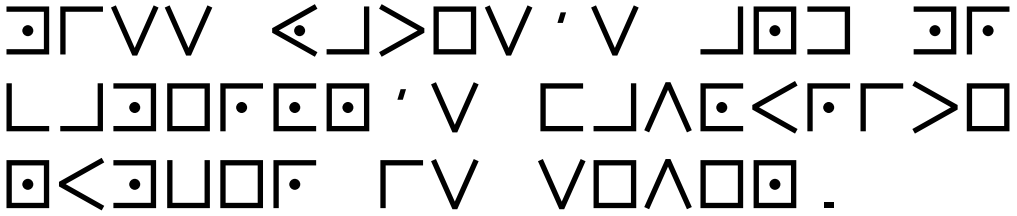
Alan Turing was a British mathematician. He made major contributions to the fields of mathematics, computer science, and artificial intelligence. In September 1939 Great Britain went to war against Germany. During the war, Turing worked at the Government Code and Cypher School at Bletchley Park. Turing and others designed a code-breaking machine known as the Bombe. They used the Bombe to learn German military secrets. By early 1942 the code breakers at Bletchley Park were decoding about 39,000 messages a month. At the end of the war, Turing was made an Officer of the Most Excellent Order of the British Empire.
Cliff Park Ormiston Academy has taken students to Bletchley Park in the past and hopefully you will be able to participate when the trip gets organised again.
Alan Turin is Mrs Clarke's, Miss Yates's and Ms Russell's favourite mathematician.

Can you crack the code to reveal another answer?

Clue:



Mr Pillar's favourite topic is Geometry because of the relationships you can find through it. Can you research what the Euler line is?



Can you write your name using this Cipher code?

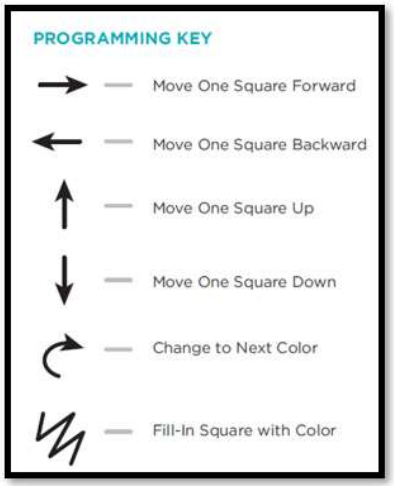
Can you make up your own message for a friend to decode?

Can you find what this popular Cipher code is called?

Hannah Fry

Ms Russell is the Head of Maths at CPOA. Another of her favourite mathematicians is Dr Hannah Fry. She is an Associate Professor in the Mathematics of Cities at the Centre for Advanced Spatial Analysis at UCL. She works alongside a unique mix of physicists, mathematicians, computer scientists, architects and geographers to study the patterns in human behaviour - particularly in an urban setting. Her research applies to a wide range of social problems and questions, from shopping and transport to urban crime, riots and terrorism. She is also an author, lecturer, radio and television presenter, podcaster and public speaker. Fry delivered the 2019 Royal Institution Christmas Lectures where she tried to show the strengths and weaknesses of algorithms.

An algorithm is a series of instructions to complete a task.
Can you create a drawing algorithm for someone in your family so they can draw the intended picture?

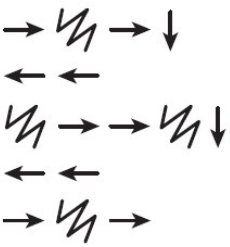


The key on the left is what you'll use to create the algorithm. For example:

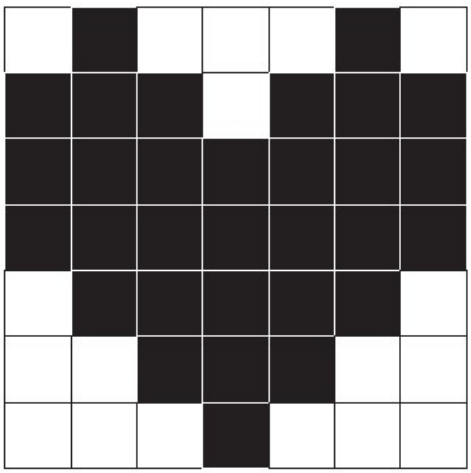
"Move one square forward, Move one square forward, Fill-in square with colour"

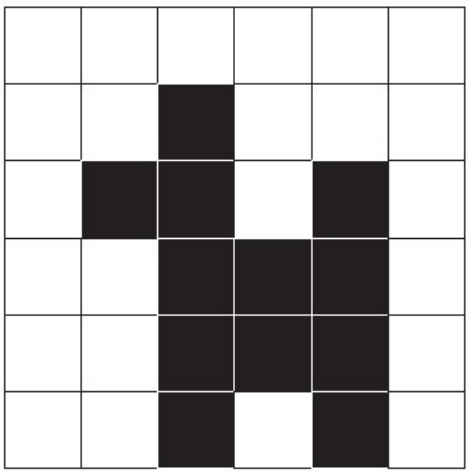
would be → → ↯

Or a full example:



Your turn! Write an algorithm in symbols for each of these drawings:





Puzzles and Recreational Maths

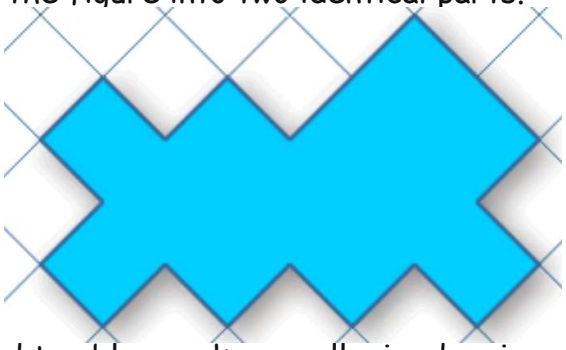
Martin Gardner created the long-running *Mathematical Games* column for Scientific American and became the twentieth century's greatest populariser of mathematics.

A passionate enemy of pseudoscience, he was a prime mover in founding the sceptic movement and authored over 70 books on subjects as diverse as mathematics, pseudoscience, philosophy, magic tricks, and Lewis Carroll.

Although Martin Gardner didn't complete Further Education in Mathematics, his work on puzzles and recreational Maths makes him one of Miss Escribano's favourite mathematicians.

Try to work out some of his puzzles below:

1) You are to make one cut (or draw one line) – of course it needn't be straight – that will divide the figure into two identical parts.



2) Ten red socks and ten blue socks are all mixed up in a dresser drawer. The 20 socks are exactly alike except for their colour. The room is in pitch darkness and you want two matching socks. What is the smallest number of socks you must take out of the drawer in order to be certain that you have a pair that match?

3) A logician vacationing in the South Seas finds himself on an island inhabited by two proverbial tribes of liars and truth-tellers. Members of one tribe always tell the truth, members of the other always lie. He comes to a fork in a road and has to ask a native bystander which branch he should take to reach a village. He has no way of telling whether the native is a truth-teller or a liar. The logician thinks a moment, then asks one question only. From the reply he knows which road to take. What question does he ask?

4) An explorer walks one mile due south, turns and walks one mile due east, turns again and walks one mile due north. He finds himself back where he started. He shoots a bear. What colour is the bear?

Miss Escribano's favourite number is 4

Mr Cameron's favourite topic is statistics.

Triangles, squares and circles…

Complete the following questions:

1) a) Substitute the values given for each shape to work out the values of each expression.

△ = 3 □ = 5 ○ = 8

i) ○ + □ + △ _____

ii) △ − ○ _____

b) Draw the missing shape so that this expression has a value of 21.

○ + □ + _____

2) a) Use substitution to work out the values of these expressions. $a = 6$ $b = 2.5$ $c = 12$

$b + 9$ _____

$c - b$ _____

ac _____

$a + c + b$ _____

$b - 3$ _____

b) Give the missing value so that the following expression has a value of 6. $c -$ _____

3) By using substitution, give each of the shapes a different value so that the value of the expression will be a multiple of 6. Find at least four different possibilities.

○ = a square number ♡ = a prime number △ = a multiple of 4

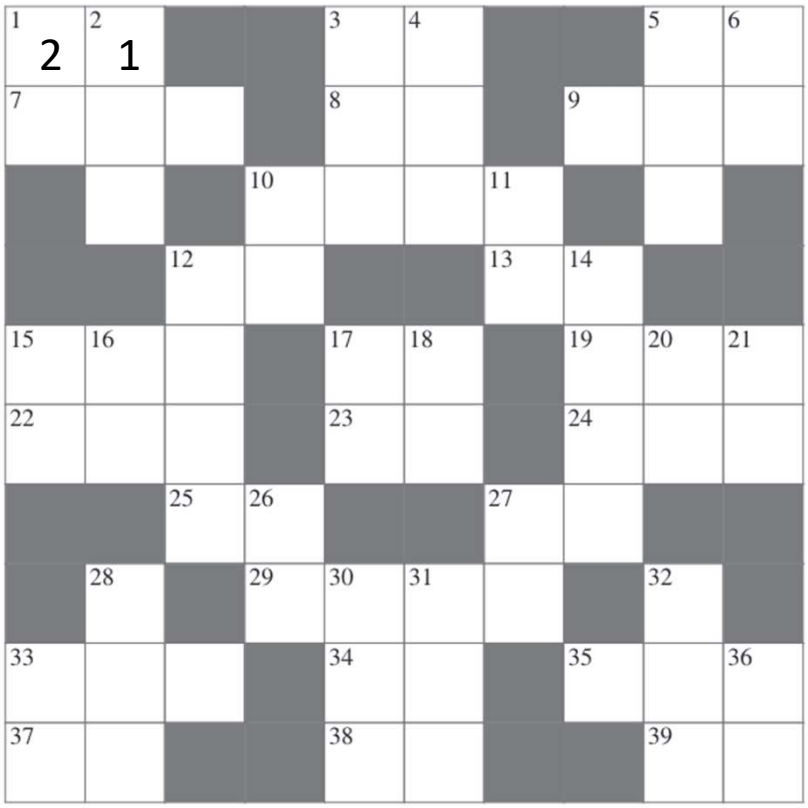
○ + ♡ + △

The questions you have just completed are part of Algebra. This is the favourite topic of quite a few teachers in the Maths department: Ms Hunter, Ms Russell and Miss Yates.
Miss Yates is the second in charge in the Maths department.

Cross Number...

Mrs Escribano's favourite topic is surds.

USE THE QUESTIONS BELOW TO COMPLETE THE CROSS NUMBER.



ACROSS

1. The number of spots on a standard dice (2)
3. The largest two-digit multiple of 13 (2)
5. One more than 8 Across (2)
7. One quarter of the square of 6 Down (3)
8. $2 \times 2 \times 2 \times 2 \times 2$ (2)
9. A cube number (3)
10. 15 Across + 3 Down + 6 Down + 21 Down + 36 Down (4)
12. 39 Across − 33 Down (2)
13. Twice (1 Across + 1 Down) (2)
15. 1 Down × 38 Across (3)
17. 36 Down − 8 Across (2)
19. A square number (3)
22. The smallest three-digit square number with all its digits different (3)
23. 1 Across + 6 Down (2)
24. A multiple of 4 Down (3)
25. 27 Across + 37 Across (2)
27. 39 Across + 1 Down (2)
29. 200 × 12 Across + 27 Down (4)
33. 10 times 2 dozen (3)
34. A square of a square number (2)
35. 5 × 1 Across + one-seventh of 12 Across (3)
37. A half of 8 Across (2)
38. A cube number (2)
39. One less than 6 Down (2)

DOWN

1. A prime number (2)
2. The sum of the first ten prime numbers (3)
3. The number of hours in 39 days (3)
4. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ (3)
5. 22 Across + 28 Down (3)
6. The number of minutes in three-fifths of an hour (2)
10. A multiple of 7 (2)
11. 3 × 37 Across (2)
12. (22 Across − 6 Down) × 9 (4)
14. A number all of whose digits are the same (4)
15. A prime number (2)
16. 27 Across − 8 Across (2)
17. A multiple of 9 (2)
18. A prime number (2)
20. A square number (2)
21. The square of a square number (2)
26. 3 × 12 Across (2)
27. Two-thirds of 36 Down (2)
28. 22 Across − 1 Down (3)
30. 1 Across × 26 Down (3)
31. 25 Across + 4 Down + 5 Down (3)
32. 17 Down + 27 Across (3)
33. The sum of the digits of 1 Down, 17 Across and 17 Down (2)
36. One and a half times 27 Down (2)