HYPOTENEUS

THE RIGHT ANGLE

CREATED BY SHARYN MILNES AND ELIZABETH BLACK.

HEARTBROKEN MARIA VANISHES

BOLOGNA 1738 – Maria Gaetana Agnesi - the female mathematician has become a recluse. It is rumoured that she has joined an order of nuns in the North, although this has not been substantiated.

The first news of Ms Agnesi's withdrawal from "intellectual life" came from a young french mathematician, M. Laplace. When asked to review a paper he had written, she wrote back stating "such matters no longer occupy my mind".

Maria Agnesi

The cause of this seclusion is allegedly due to devastation at her father's recent death. Mr Agnesi, formerly the Chair of Mathematics at Bologna University has been described as Maria's inspiration.

Born in 1718, Maria Agnesi has never married. Since her mother died some 20 years ago, Maria - the eldest of 21 children - has been mother, tutor and housemaid in the Agnesi household.

Some of her early mathematical publications were originally written as texts for her younger brothers' education.

Maria has always been a gifted individual. She mastered four languages fluently before her teenage years, and was the star attraction at gatherings of her father's scholarly friends, discussing philosophy and mathematics.

A reliable source stated that Maria's incredible intellectual talents even operated subconsciously - she continues to solve mathematical problems in her sleep, waking up to find the solutions in her own handwriting.

The University of Bologna has been unable to confirm whether Ms Agnesi has been appointed to the Chair of Mathematics and Natural Philosophy, nor whether she has actually lectured there.

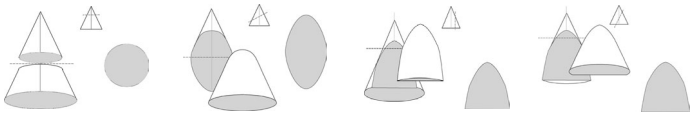
Ms Agnesi is currently best known for her 1748 two-volume publication of algebraic analysis, titled "Analytical Institutions" These brought together the material of Leibniz and Newton's earlier work on "calculus". Her work applies these theories in a form that has been widely translated and used as study texts.

The most famous application of this work is the curve first described in 1665 by French mathematician M. Fermat. It is a versed sine curve, called a versiera, a word derived from the Latin vertere, meaning 'to turn', but it was also an abbreviation for the Italian word avversiera, meaning 'the wife of the devil' When Maria's text was translated into English the word versiera was confused with "witch", and the curve came to be known as the Witch of Agnesi.

FREE!

Witch of Agnesi Clip-Out Flip Book!

See "DIVERSIONS" over the page.



Circle

The path of all points the same distance from the fixed point.

The equation: $(x-a)^2 + (y-b)^2 = r^2$

Ellipse

The path of all points whose total distances from two fixed points are equal.

Hyperbola

The path of all points whose distances from two fixed points have equal differences.

The equation: $y=(a \div (x-b))+c$

Parabola

The path of all points the same distance from a fixed point and a fixed line.

The equation: $ax^2 + bx + c = y$

HANDY READY RECKONER

Sometimes you have an equation that you just know has to result in a whole number. Well, you're in good company. Diophantus, an early Alexandrian mathematician, also worked with equations with answers restricted to integers. Consider, for example, the problem of working out how to make up your child's pocket money of ten dollars from the mountains of change in your purse.

Do what Diophantus did! Write your problem out as an equation and solve it... Assuming that you have only coins of 20¢ or greater value, an equation which would tell you the combinations of coin required is $20a + 50b + 100c + 200d = 1000$.

Although Diophantus did some work with equations with a unique solution, this equation has 113 solutions! So to save you the effort, use our handy tear-out change guide on the right.

To use the guide, look in your purse and see what denominations of coin you have. If, for example, you have only one $2 coin, look down the $2 coin column until you come to '1'. This will show you every combination of coins that will make up ten dollars using only one $2 coin. What a time-saver!

To make your own ready reckoner for other amounts of pocket money, firstly work out the change you usually have, and the amount it needs to total, and write it in equation form as you've seen above. There will probably be lots of solutions, so make sure you have a big piece of paper handy! The most logical way to work through this kind of problem is to pick one coin, and begin simultaneous equations using the maximum possible number of this coin until you have exhausted all possibilities. Then begin equations using one less of that coin, until all combinations using any of that denomination of coin have been used. Then start with the maximum number of the next coin until all possible combinations of all coins are exhausted. Remember, no fractions!

For more information on Diophantine equations, check out Hypatia's excellent commentary on Diophantus' Arithmetica.

20¢	50¢	$1	$2
0	0	0	5
0	0	2	4
0	2	1	4
5	0	1	4
0	0	4	3
0	2	3	3
0	4	2	3
5	2	2	3
10	0	2	3
0	6	1	3
5	4	1	3
10	2	1	3
15	0	1	3
0	8	0	3
5	6	0	3
10	4	0	3
15	2	0	3
20	0	0	3
0	0	6	2
0	2	5	2
5	0	5	2
0	4	4	2
5	2	4	2
10	0	4	2
0	6	3	2
5	4	3	2
10	2	3	2
15	0	3	2
0	8	2	2
5	6	2	2
10	4	2	2
15	2	2	2
20	0	2	2
0	10	1	2
5	8	1	2
10	6	1	2
15	4	1	2
20	2	1	2
25	0	1	2
0	0	8	2
0	2	7	1
5	0	7	1
0	4	6	1
5	2	6	1
10	0	6	1
0	6	5	1
5	4	5	1
10	2	5	1
15	0	5	1
0	8	4	1
5	6	4	1
10	4	4	1
15	2	4	1
20	0	4	1
0	10	3	1
5	8	3	1
10	6	3	1
15	4	3	1
20	2	3	1
25	0	3	1
0	12	2	1
5	10	2	1
10	8	2	1
15	6	2	1
20	4	2	1
25	2	2	1
30	0	2	1
0	14	1	1
5	12	1	1
10	10	1	1
15	8	1	1
20	6	1	1
25	4	1	1
30	2	1	1
35		1	1
0	16	0	1
5	14	0	1
10	12	0	1
15	10	0	1
20	8	0	1
25	6	0	1
30	4	0	1
35	2	0	1
40	0	0	1
0	16	2	0
5	14	2	0
10	12	2	0
15	10	2	0
20	8	2	0
25	6	2	0
30	4	2	0
35	2	2	0
40	0	2	0
0	18	1	0
5	16	1	0
10	14	1	0
15	12	1	0
20	10	1	0
25	8	1	0
30	6	1	0
35	4	1	0
40	2	1	0
45	0	1	0
0	20	0	0
5	18	0	0
10	16	0	0
15	14	0	0
20	12	0	0
25	10	0	0
30	8	0	0
35	6	0	0
40	4	0	0
45	2	0	0
50	0	0	0

CONIC BOOKS

Appolonius was one of the first to write about conic sections – the shape resulting from a plane being passed through a cone. As the angle of the plane varies, so does the shape of the section.

Each conic section can be described as a set of points that have a particular relationship to a fixed line (the central axis from the vertex of the cone) and a fixed point (the centre of the circular base). Any set of points that satisfy a given condition such as this can be termed a locus.

Because each locus satisfies some given condition, this condition can be described in the form of an equation, so each conic section's particular path of points has its own equation.

Some popular conic sections and their equations are shown on the left. To create your own conic section, use a Cartesian plane, choose a fixed point and fixed line then simply plot the equation.

HYPATIA BRUTALLY MURDERED

ALEXANDRIA 415 AD – Leading mathematician and Platonist, Hypatia of Alexandria, was brutally murdered on her way to Alexandria University in the early hours of this morning.

Her murder was allegedly committed by Nitrian monks, a fanatical sect of Christians. It is believed that they are loyal to Cyril, the new patriarch of Alexandria, who is committed to wiping out all rationalist thought and teachings in order for Christianity to overtake traditional Greek beliefs.

A well-known traditionalist (called 'pagan' by the new patriarch), Hypatia had many enemies among the Christians in Alexandria. The Bishop himself has been publicly resentful of the influence Hypatia had with the government, both as an official adviser and Chair of Platonic Philosophy at Alexandria University. She was also close to Orestes, the pagan Prefect of Egypt.

Within Alexandria University, Hypatia was an immensely popular and well-respected lecturer, whose belief in science and skills in teaching in Mathematics, Astronomy, and Philosophy inspired students from as far away as Asia to participate in her classes. Her books include commentaries on Diophantus' Arithmetica. and an original work On the Conics of Appolonius. She was widely talented, even able to instruct Synesius of Cyrene, on how to construct astronomical equipment.

Hypatia's father, Theon, is also a mathematician and not a Christian. Grave fears are held for his safety, and for the future of Hypatia's written works. Indeed, all of Alexandria fears for its scientists and philosophers at this time.

Hypatia, daughter of Theon