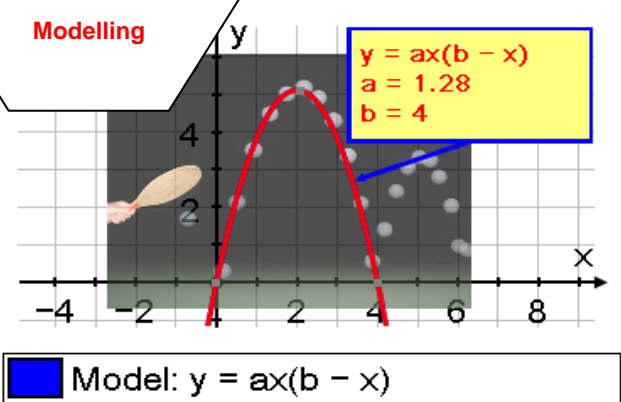


CHILE: Differentiated Mathematics, Middle Grade 3/4

Autograph is spectacular dynamic software from the UK that allows teachers to visualise many of the mathematical topics in the CHILE MIDDLE GRADES 3 and 4 courses for 16-year olds.

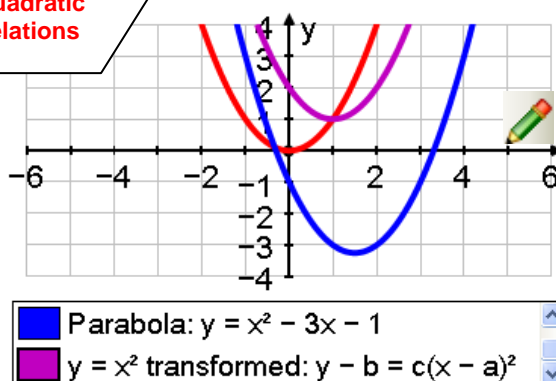
Modelling



$y = ax(b - x)$
 $a = 1.28$
 $b = 4$

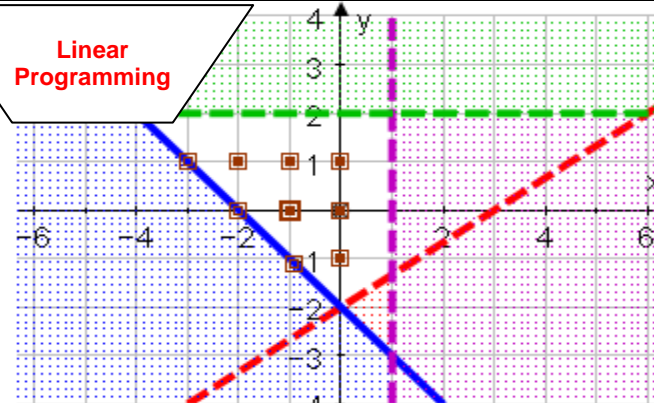
Model: $y = ax(b - x)$

Quadratic relations

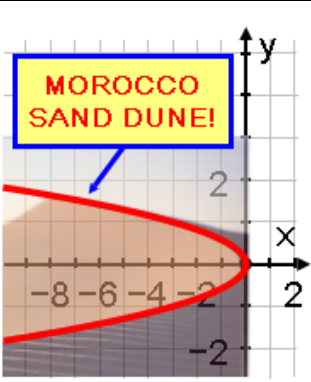


Parabola: $y = x^2 - 3x - 1$
 $y = x^2$ transformed: $y - b = c(x - a)^2$

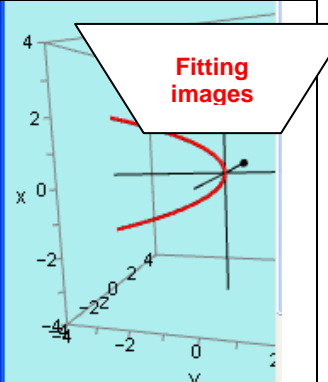
Linear Programming



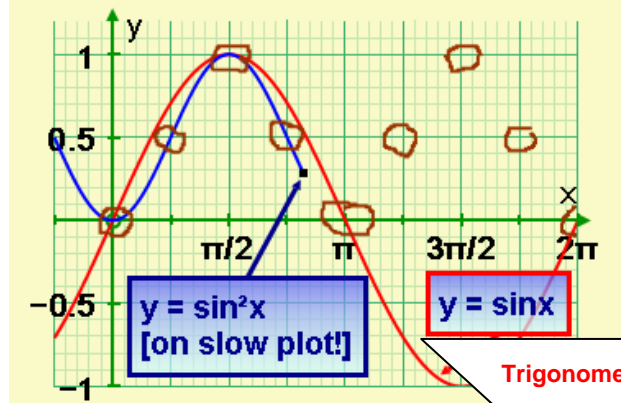
MOROCCO SAND DUNE!



Fitting images

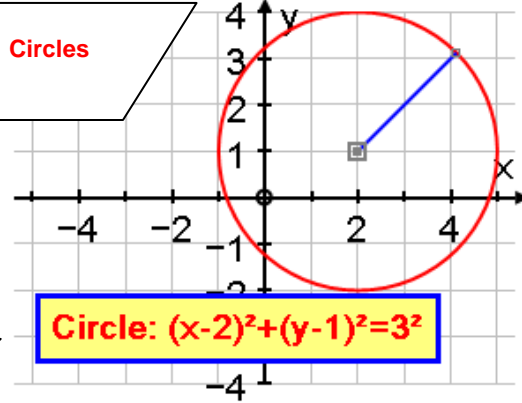


Trigonometry



$y = \sin^2 x$ [on slow plot!]
 $y = \sin x$

Circles



Circle: $(x-2)^2 + (y-1)^2 = 3^2$



CHILE: Units of the differentiated mathematics syllabus for Middle Grade 3

Algebra and Analytical Modeling (16 year olds)

Edited to show Autograph associations (in red)

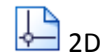


AUTOGRAPH PAGE

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1. Additional understanding of the algebraic language

- a. Rational expressions, Algebraic operators, Factoring, simplification, rationalization. Simple equations with rational numbers.
- b. N-Roots of positive numbers. Fractional powers. Operators. Relationship between powers and roots.
- c. Second degree equations. Deduction of the formula for the solution of quadratic equations. **Analysis of solutions and their relationship to the corresponding graph of the function. Graphical study of the quadratic function and the sign of the discriminant.**

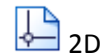


2D

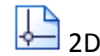
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2. Geometric Places

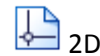
- a. **Distance between two points on the plane.**
- b. **The circle as a geometrical place. Deduction of the circle with a center at the graphic origin. Equation of the translated circle.**
- c. **Relationship of the function $f(x) = \sqrt{r^2 - x^2}$ and the circle. Analysis of the possible values of x.**
- d. **Graphical and analytical solutions to simple problems involving straight lines, the circle and the parabola.**



2D



2D

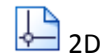


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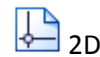
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3. Linear Programming

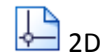
- a. **Linear inequalities with two unknowns. Description of a semi plane by a linear inequality with two unknowns. Graphic of semi planes and their intersections. Relationship between lineal equations and inequalities.**
- b. **Graphical solution of lineal inequality systems with two unknowns.**
- c. **Linear programming in two variables. Object Function. Proposition and graphical solution to simple lineal programming problems**
- d. **Use of computer programs and algebraic manipulation through graphics.**



2D



2D



2D

CHILE: Units of the differentiated mathematics syllabus for Middle Grade 4

Functions and Infinite Processes (17 year olds)

Edited to show Autograph associations (in red)

AUTOGRAPH PAGE

1. Infinite Processes

- a. Proposition of some geometrical problems involving probability or financial mathematics on the notion of Summation. Introduction to the Symbol for Summation. Properties of linearity, association, and telescopic ability. Application of these to calculation of some specific additions, as with the first n natural numbers, their squares, and those of odd numbers.
- b. Arithmetical and geometric progressions. Addition of their terms. Application to the solution of a few geometric problems on compound interest, radioactive decay and populations.
- c. Geometric and telescopic series. Intuitive convergence of successions and series.
- d. Iterations. Fractals notions. Finite areas with infinite perimeters.
- e. Use of computer programs on algebraic, graphic and process simulation data manipulation.



2. Polynomials

- a. Single variable polynomials with Real coefficients. Degree. Algorithm of the division. Polynomial function associated to another polynomial. Roots or zeroes in polynomials. Condition for a polynomial to be divisible by x-a: Factor Theorem and Theorem of the residual.
- b. Factoring of polynomials as product of lineal and quadratic factors. Rational roots of polynomial with integer coefficients. Application to the solution of some equations above the second degree.
- c. Historical notes on 3rd and 4th degree equations. Comments on equations of higher or equal degree of 5.



3. Trigonometric Functions

- a. **Angle measuring. Radians, the sine, Cosine and Tangent in the unit circle. Periods. Demonstration of the fundamental identities : $\sin^2 A + \cos^2 A = 1$ $\sin(A+B)$ and $\cos(A+B)$.**
- b. **Graph of the Sine, Cosine and Tangent functions for some angles. Values of the complementary angles. Preimaging of some of the values for the function, and solution of simple trigonometric equations.** Use of scientific calculator.



2D + 'Extras'



2D

CHILE: Mathematics for Colleges and 1st year University

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1. **Differential Calculus**
Derivatives, Applications of the Derivative,
2. **Integral Calculus**
Definite and Indefinite Integrals
3. **1st and 2nd Order Differential Equations**

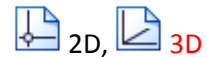
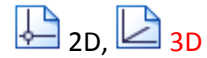
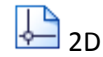
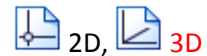
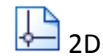
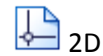
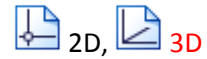
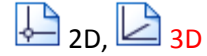
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4. **Relations and Functions, Limits and continuity**
 5. **Linear Algebra**
 6. Series

-
7. **Trigonometry**
 8. **Polar and parametric plotting**
 9. **Vectors in 2D and 3D**

-
10. **Statistics and Probability.**

AUTOGRAPH PAGE

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August 2009