Autograph version 3 and Foundations for CM

Autograph is spectacular dynamic software from the UK that allows teachers to visualise many of the mathematical topics in the Ontario Grade 11 FOUNDATIONS FOR COLLEGE MATHEMATICS course [MBF3C].
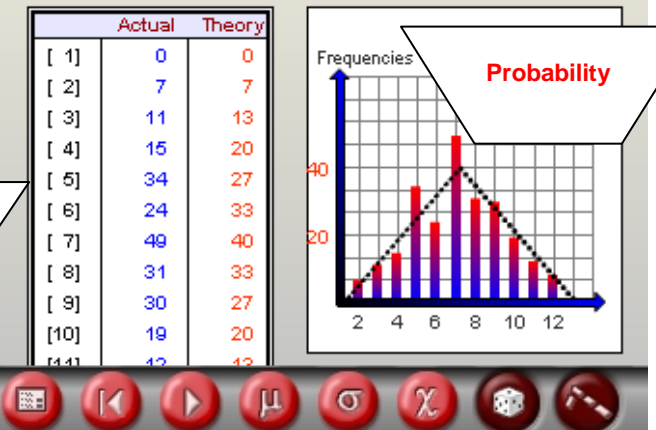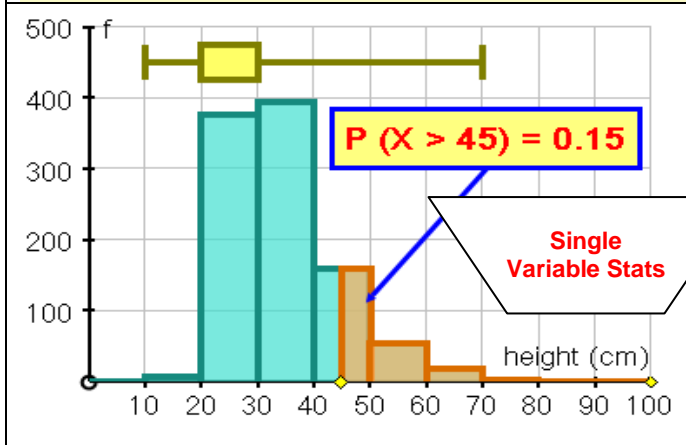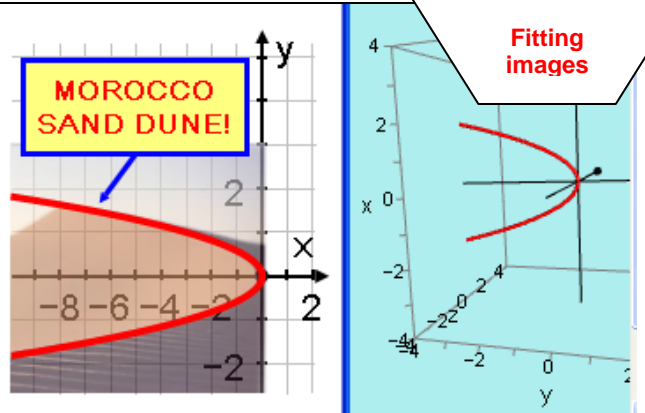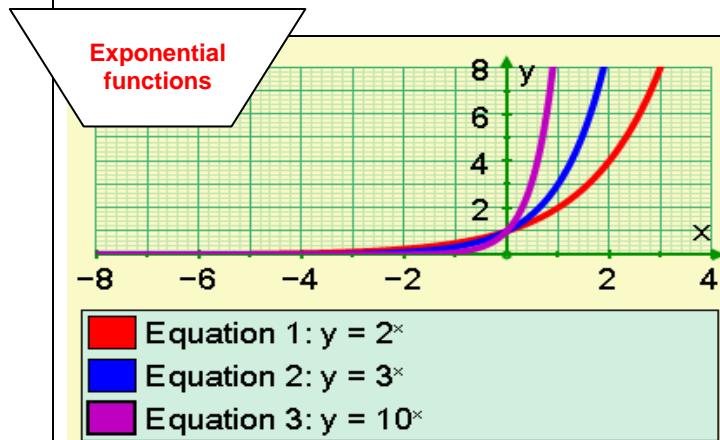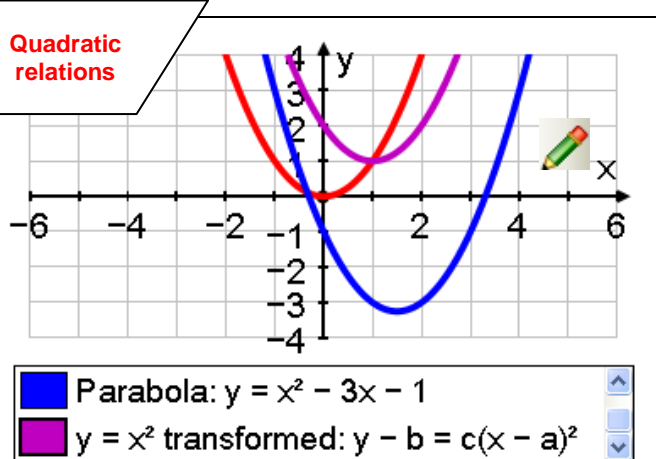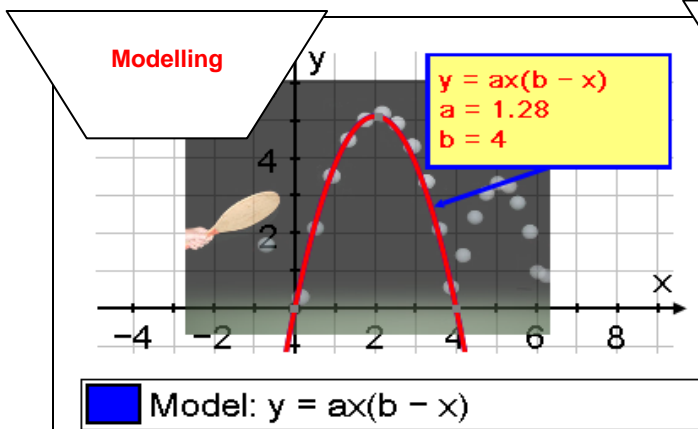
Modelling

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

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

Quadratic relations

Parabola: $y = x^2 - 3x - 1$

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

Exponential functions

Equation 1: $y = 2^x$
Equation 2: $y = 3^x$
Equation 3: $y = 10^x$

MOROCCO SAND DUNE!

Fitting images

Single Variable Stats

$P(X > 45) = 0.15$

height (cm)

	Actual	Theory
[1]	0	0
[2]	7	7
[3]	11	13
[4]	15	20
[5]	34	27
[6]	24	33
[7]	49	40
[8]	31	33
[9]	30	27
[10]	19	20
[11]	13	13

Probability

Frequencies

FOUNDATIONS FOR COLLEGE MATHEMATICS
Grade 11 - College Preparation   MBF3C

Edited to show Autograph associations (in red) [*]

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A. MATHEMATICAL MODELS

1. CONNECTING GRAPHS AND EQUATIONS OF QUADRATIC RELATIONS

1.1 construct tables of values and graph quadratic relations arising from real-world applications   2D

1.2 determine and interpret meaningful values of the variables, given a graph of a quadratic relation arising from a real-world application

1.3 the roles of a, h, and k in quadratic relations of the form $y = a(x - h)^2 + k$, and describe these roles in terms of transformations on the graph of $y = x^2$ 2D

1.4 sketch graphs of quadratic relations represented by the equation $y = a(x - h)^2 + k$

1.5 expand and simplify quadratic expressions in one variable involving multiplying binomials

1.6 express the equation of a quadratic relation in the standard form $y = ax^2 + bx + c$, given the vertex form $y = a(x - h)^2 + k$ 2D

1.7 factor trinomials of the form $ax^2 + bx + c$

1.8 the connection between the factors of a quadratic expression and the x-intercepts of the graph of the corresponding quadratic relation   2D

1.9 solve problems given equations of quadratic relations

2. CONNECTING GRAPHS AND EQUATIONS OF EXPONENTIAL RELATIONS

2.1 looking for patterns in tables of values, and describe the meaning of negative exponents and of zero as an exponent

2.2 evaluate numeric expressions containing integer exponents and rational bases

2.3 the exponent rules for multiplying and dividing numerical expressions involving exponents

2.4 graph simple exponential relations, using paper and pencil, given their equations [e.g., $y = 2^x$, $y = 10^x$, $y = (½)^x$]   2D

2.5 connections between representations of an exponential relation (i.e., numeric in a table of values; graphical; algebraic)

2.6 distinguish exponential relations from linear and quadratic relations by making comparisons in a variety of ways   2D

FOUNDATIONS FOR COLLEGE MATHEMATICS [Grade 11] ===	AUTOGRAPH PAGE ==============

3. SOLVING PROBLEMS INVOLVING EXPONENTIAL RELATIONS

3.1 collect data that can be modelled as an exponential relation
3.2 describe exponential relations arising from real-world applications
3.3 problems involving exponential relations from real-world
3.4 problems using exponential relations from real-world applications

 2D
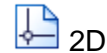
B. PERSONAL FINANCE
1. SOLVING PROBLEMS INVOLVING COMPOUND INTEREST
1.1 the compound interest for a given investment
1.2 the relationship between compound interest and exponential growth
1.3 solve problems that involve the compound interest formula
1.4 calculate the total interest earned on an investment
1.5 solve problems that involve the calculation of the interest rate
1.6 the effect on the future value of a compound interest investment
2. COMPARING FINANCIAL SERVICES
2.1 information about the various savings alternatives
2.2 information about investment alternatives
2.3 costs and incentives with various credit cards and debit cards
2.4 information about current credit card interest rates and regulations
2.5 problems involving applications of the compound interest formula
3. OWNING AND OPERATING A VEHICLE
3.1 the procedures and costs involved in insuring a vehicle
3.2 the procedures and costs in buying or leasing a new vehicle
3.3 fixed costs and variable costs of owning and operating a vehicle

C. GEOMETRY AND TRIGONOMETRY

1. REPRESENTING 2D SHAPES AND 3D FIGURES

1.1 real-world applications of geometric shapes and figures (e.g., by importing digital photos into dynamic geometry software)
1.2 represent 3D objects in a variety of ways (e.g., orthographic projections)
1.3 create nets, plans, and patterns from physical models
1.4 solve design problems that satisfy given constraints

 2D

2. APPLYING THE SINE LAW AND THE COSINE LAW IN ACUTE TRIANGLES

2.1 solve problems using the primary trigonometric ratios
2.2 verify the sine law / cosine law (e.g. using dynamic geometry)
2.3 conditions when appropriate to use the sine law or the cosine law
2.4 solve problems that arise from real-world applications that require the use of the sine law or the cosine law in acute triangles

 2D

FOUNDATIONS FOR COLLEGE MATHEMATICS [Grade 11]

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D.   DATA MANAGEMENT

1.   WORKING WITH ONE-VARIABLE DATA

1.1   identify situations involving one-variable data and design questionnaires

1.2   collect one-variable data from secondary sources; organize/store using a variety of tools (e.g., spreadsheets, statistical software)   STATISTICS

1.3   explain the distinction between the terms population and sample,

1.4   describe and compare sampling techniques (e.g., random, stratified, clustered, convenience, voluntary); collect one-variable data from primary sources, and organize and store the data   STATISTICS

1.5   identify different types of one-variable data (i.e., categorical, discrete, continuous), and represent in appropriate graphical forms (e.g., histograms, bar graphs, circle graphs, pictographs)

1.6   identify and describe properties associated with common distributions of data (e.g., normal, bimodal, skewed)   STATISTICS

1.7   calculate, using formulas and/or technology; interpret measures of central tendency, and measures of spread.

1.8   explain the appropriate use of measures of central tendency (i.e., mean, median, mode) and measures of spread (i.e., range, SD)   STATISTICS

1.9   compare two or more sets of one-variable data

1.10 problems using one-variable data collected from secondary sources

2.   APPLYING PROBABILITY

2.1   identify examples of the use of probability in the media and various ways in which probability is represented

2.2   determine the theoretical probability of an event

2.3   perform a probability experiment (e.g., tossing a coin several times), represent the results using a frequency distribution, and use the distribution to determine the experimental probability of an event   STATISTICS

2.4   compare theoretical probability with experimental probability

2.5   experimental probability approaching theoretical probability

2.6   the use of probability and statistics in the media   2-Dice
[EXTRAS PAGE]

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[*] **The Ontario Curriculum, Grades 11 and 12**
The full document, Revised 2007 is at:
www.edu.gov.on.ca/eng/curriculum/secondary/math1112currb.pdf