

Math B Topic Headings

(Revised October 2002)

1 Mathematical Reasoning

- 1.1 direct Euclidean proof
- 1.2 direct analytic proof
- 1.3 indirect Euclidean proof

2 Numbers and Numeration

- 2.1 nature of the roots/sum and product of the roots
- 2.2 rationalize denominators
- 2.3 simplifying algebraic fractions (polynomial denominators)
- 2.4 simplify complex fractions
- 2.5 imaginary unit
- 2.6 standard form of complex number

3 Operations

- 3.1 +, -, \cdot , \div , with fractions with polynomial denominators
- 3.2 apply composition of transformations
- 3.3 identify graphs symmetric to an axes or origin
- 3.4 identify isometries, both direct and opposite
- 3.5 graphically represent the inverse of a function
- 3.6 apply transformations on figures and functions in the coordinate plane
- 3.7 use slope and midpoint to demonstrate transformations
- 3.8 use transformations to investigate relationships of two circles
- 3.9 use translation and reflection to investigate parabolas
- 3.10 absolute value of complex numbers
- 3.11 evaluate expressions with fractional exponents
- 3.12 operations with complex numbers
- 3.13 simplify square roots with negative numbers
- 3.14 multiply complex number and its conjugate
- 3.15 cyclic nature of the powers of i
- 3.16 solve quadratic equations
- 3.17 laws of rational exponents
- 3.18 determine value of compound (composite) functions

4 Modeling/Multiple Representations

- 4.1 express quadratic, circular, exponential, and logarithmic functions in problems
- 4.2 use symbolic form to represent an explicit rule for a sequence
- 4.3 define and graph an inverse variation (hyperbola)
- 4.4 use positive, negative and zero exponents
- 4.5 scientific notation
- 4.6 rewrite $\log_b a = c$ as $a = b^c$
- 4.7 solve log equations and exponential equations
- 4.8 rewrite expressions involving exponents and logarithms
- 4.9 recognize conic sections: circles, parabolas, hyperbola and ellipse

- 4.10 solve systems of equations: linear, quadratic, and trigonometric and exponential
- 4.11 use Law of Sines and Law of Cosines in a variety of problems involving the resolution of forces
- 4.12 represent graphically the sum and difference of two complex numbers
- 4.13 model quadratic inequalities both algebraically and graphically
- 4.14 model composition of transformations
- 4.15 sketch the effects of changing the value of a in the function $y=a^x$ and emphasize domain, range, the point $(0,1)$ and the function is one-to-one; if $y = a^x$ graph rises, but if $0 < a < 1$ graph falls
- 4.16 note that the graphs $y = a^x$ and $y = a^{-x}$, $a > 0$ and $a \neq 1$, are reflections of each other in the y -axis
- 4.17 note log function is inverse of the exponential function and emphasize domains, ranges, $(1,0)$
- 4.18 note the graphs $y = a^x$ and $x = a^y$, $a > 0$ and $a \neq 1$, are reflections in the line $y = x$
- 4.19 solve real world problems using linear, quadratic, trigonometric, and exponential functions
- 4.20 write equation of circles given center and radius and determine radius and center given equation.
- 4.21 recognize parabola by equation and be able to graph, find axis of symmetry, y intercepts, turning point, maximum or minimum
- 4.22 unit circle including use of radian measure, sine, cosine, tangent and reciprocal trig functions
- 4.23 use reference angle, amplitude and period
- 4.24 graph quadratics noting where the graph crosses the x -axis or that it does not

5 Measurement

- 5.1 unit circle, including sine, cosine, tangent and their reciprocals, coordinates $(\cos A, \sin A)$
- 5.2 radian measure definition
- 5.3 degree-radian conversion
- 5.4 reference and coterminal angles
- 5.5 derivation for sine, cosine, tangent and their reciprocals
- 5.6 sum and difference of two angles
- 5.7 double and half angles for sine and cosine
- 5.8 vectors
- 5.9 angles formed by arcs, chords, tangents and secants/measure of segments related to a circle
- 5.10 special angles 30° , 45° , and 60°
- 5.11 amplitude and period
- 5.12 inverse functions
- 5.13 reflections in the line $y = x$
- 5.14 Law of Sines
- 5.15 Law of Cosines
- 5.16 ambiguous case
- 5.17 area of triangle using trigonometry
- 5.18 normal curve (interpretations based on Mathematics B Regents examination sheet)

- 5.19 normal curve/distribution
- 5.20 standard deviation
- 5.21 Pythagorean theorem, perimeter, circumference, area, and volume
- 5.22 bias / random sample
- 5.23 choose appropriate statistical measures
- 5.24 scatter plots
- 5.25 lines of best fit
- 5.26 right triangle proportions

6 Uncertainty

- 6.1 determine effects of changing the parameters of graphs of linear, quadratic, exponential, trigonometric and circular functions
- 6.2 probability of exactly, or at least, at most r successes in n trials of a Bernoulli experiment
- 6.3 binomial theorem
- 6.4 linear, logarithmic, exponential and power regressions
- 6.5 linear correlation coefficient
- 6.6 measures of central tendency
- 6.7 sigma notation (Σ)
- 6.8 measures of dispersion
- 6.9 range
- 6.10 mean absolute deviation
- 6.11 variance and standard deviation using the calculator for population and sample data
- 6.12 normal approximation for the binomial distribution
- 6.13 domain and range
- 6.14 interpolate and extrapolate from graphs of linear, quadratic, trigonometric, circular, exponential and logarithmic functions

7 Patterns/Functions

- 7.1 definition of a relation and function
- 7.2 determining if a relation is a function
- 7.3 definition of inverse function
- 7.4 notation for absolute value, composite functions
- 7.5 expressing exponential functions as logs
- 7.6 functions: inverses, exponential, logarithmic
- 7.7 represent and analyze exponential, logarithmic, quadratic, and trigonometric functions
- 7.8 relate algebraic expressions to the graphs of functions
- 7.9 use transformations to investigate the relationships between functions
- 7.10 find the solution of quadratic equations both algebraically and graphically
- 7.11 use the quotient identities, reciprocal identities and Pythagorean identities
- 7.12 discriminant used to determine roots as rational, irrational, or imaginary
- 7.13 evaluate composite functions
- 7.14 solve:
 - a. quadratic equations
 - b. fractional equations

- c. radical equations
 - d. logarithmic equations
 - e. exponential equations
 - f. absolute value equations
 - g. linear inequalities
 - h. absolute value inequalities
 - i. quadratic inequalities
 - j. first-degree trig equations
 - k. quadratic trig equations
- 7.15 transformations that provide congruence: reflections, translations and rotations
- 7.16 direct isometrics
- 7.17 opposite (indirect) isometrics
- 7.18 dilations
- 7.19 inverse functions which are reflections in the line $y = x$
- 7.20 standard deviation for grouped data
- 7.21 use of double-and half-angle formulas