MATH 0120 Competency Test Topics

The Math 12 Competency Test assesses the mathematical topics and skills listed below. Once you have registered for a test, you will be emailed a sample test.

1 Functions transformations and inverses

- Using function notation and connecting equations with graphs.
- Describing translations, reflections, and stretches of function graphs.
- Determining domain and range, and sketching a transformed square-root function with exact coordinates.
- Finding an inverse function, stating its domain and range, and explaining why a domain restriction may be necessary.
- Describing the reflection relationship between a function and its inverse.

2 Polynomial functions and equations

- Applying the factor theorem and remainder theorem.
- Factoring a cubic polynomial completely and solving a polynomial equation.
- Identifying degree, leading coefficient, intercepts, and end behaviour.
- Connecting root multiplicity with whether a graph crosses or touches the x-axis.
- Sketching polynomial graphs and identifying local maximum and minimum behaviour.

3 Rational functions

- Simplifying rational expressions while retaining restrictions from the original denominator.
- Finding holes, vertical and horizontal asymptotes, and intercepts.
- Sketching rational graphs and describing behaviour near asymptotes and as x becomes large positively or negatively.
- Identifying local maximum or minimum behaviour from a provided graph.
- Comparing functions with the same simplified expression but different domains.

4 Exponential and logarithmic equations and applications

- Solving exponential equations using common bases and logarithms.
- Applying product, quotient, and power laws of logarithms.
- Using logarithms with different bases, including natural logarithms.
- Solving logarithmic equations, stating restrictions, and checking proposed solutions.
- Using percentage-decay and natural-exponential models to determine quantities, rates, and elapsed time.
- Interpreting model parameters and rounding answers appropriately in context.

5 Geometric sequences and series

- Finding a common ratio and a formula for the nth term.
- Connecting a geometric sequence to an exponential function with an appropriate discrete domain.
- Using sigma notation and calculating finite geometric sums.
- Determining convergence and calculating the sum of an infinite geometric series.

6 Angles trigonometric graphs and equations

- Converting degrees to radians and working with angles in standard position.
- Finding reference and coterminal angles and exact sine, cosine, and tangent values.
- Identifying amplitude, period, phase shift, and midline, and sketching a transformed sine graph.
- Sketching a transformed tangent graph and identifying its period and vertical asymptotes.
- Solving first- and second-degree trigonometric equations over specified intervals in radians or degrees.

7 Trigonometric identities and modelling

- Using reciprocal, quotient, Pythagorean, double-angle, and sum or difference identities as appropriate.
- Proving identities, simplifying trigonometric expressions, and stating restrictions from original expressions.
- Calculating exact trigonometric values using a sum or difference identity.
- Constructing a cosine model of periodic motion from maximum and minimum heights, period, and initial position.
- Using a periodic model to solve word problems.

Across all topics, students should show their reasoning, state restrictions where appropriate, give exact answers unless approximations are requested, label key graph features, and use appropriate units and rounding in applications.

The actual competency test may differ in its questions, difficulty, and distribution of topics.