Maths Topics for Bumblebee: 16-18 Years Old

Mathematics Knowledge Test will assess the following topics:

Algebra
Algebraic concepts and notation: equations, expressions, formulae, and functions.
Simplifying expressions.
Solving linear and quadratic equations.
Graphing linear and quadratic functions.
Advanced algebra: logarithms, exponentials, matrices, and complex numbers.

Calculus
Limits and continuity.
Differentiation: techniques and applications (optimization, related rates).
Integration: techniques and applications (area, volume, accumulation).
Differential equations: formation and solutions.

Trigonometry
Right triangle trigonometry.
Unit circle and trigonometric functions.
Solving problems involving trigonometric ratios and angles.
Links between trigonometry and geometry.

Vectors
Vector algebra: addition, subtraction, scalar multiplication.
Vector products (dot product and cross product).
Vector geometry: direction, magnitude, and applications.

Series
Arithmetic and geometric series.
Binomial series expansions.
Series of functions.
Taylor series.

Coordinate Geometry
Graphing points and curves on the coordinate plane.
Using coordinates to prove geometric theorems.
Polar coordinates.

Number Theory
Number systems and properties.
Prime numbers, factors, and multiples.
Theorems in number theory.

Proofs and Mechanics
Mathematical reasoning and logic.
Proof techniques including induction.
Mechanics: applying mathematics to physical systems and motion.