14. A minimum of 30% assessment of AS further mathematics must address this core content; this must include the content shown in bold text within square brackets. Assessment of the bold content must represent 20% of the overall assessment of AS further mathematics.

A Complex numbers

	Content
A1	**[Solve any quadratic equation with real coefficients; solve cubic or quartic equations with real coefficients (given sufficient information to deduce at least one root for cubics or at least one complex root or quadratic factor for quartics)]**
A2	**[Add, subtract, multiply and divide complex numbers in the form $x+\mathrm{i}y$ with x and y real]**
A3	**[Understand and use the complex conjugate; know that non-real roots of polynomial equations with real coefficients occur in conjugate pairs]**
A4	**[Use and interpret Argand diagrams]**
A5	**[Evaluate the modulus and argument of a complex number]**
A6	**[Multiply and divide complex numbers in modulus-argument form]**
A7	**[Construct and interpret simple loci in the Argand diagram such as $\lvert z-a\rvert=r$ and $\arg(z-a)=\theta$]**
A8	Understand de Moivre's theorem and use it to find multiple angle formulae and sums of series
A9	Know and use the definition $\mathrm{e}^{i\theta}=\cos\theta+i\sin\theta$ and the form $z=r\mathrm{e}^{i\theta}$
A10	Find the n distinct nth roots of $r\mathrm{e}^{i\theta}$ for $r\neq 0$ and know that they form the vertices of a regular n-gon in the Argand diagram.
A11	Use complex roots of unity to solve algebraic and geometric problems

B Matrices

	Content
B1	**[Add, subtract and multiply conformable matrices; multiply a matrix by a scalar]**
B2	**[Understand and use zero and identity matrices]**
B3	**[Use matrices to represent linear transformations in 2-D; successive transformations; single transformations in 3-D (3-D transformations confined to reflection in one of $x=0$, $y=0$, $z=0$ or**

	value in the range of integration or the range of integration extends to infinity
D2	Derive formulae for and calculate volumes of revolution
D3	Understand and evaluate the mean value of a function
D4	Integrate using partial fractions (extend to quadratic factors $ax^2 + c$ in the denominator)
D5	Differentiate inverse trigonometric functions
D6	Integrate functions of the form $\left(a^2 - x^2\right)^{-\frac{1}{2}}$ and $\left(a^2 + x^2\right)^{-1}$ and be able to choose trigonometric substitutions to integrate associated functions

E Further vectors

	Content
E1	Understand and use the vector and cartesian forms of an equation of a straight line in 3D
E2	Understand and use the vector and cartesian forms of the equation of a plane
E3	Calculate the scalar product and use it in the equations of planes, for calculating the angle between two lines, the angle between two planes and the angle between a line and a plane
E4	Check whether vectors are perpendicular by using the scalar product
E5	Find the intersection of a line and a plane Calculate the perpendicular distance between two lines
E6	Interpret the solution and failure of solution of three simultaneous linear equations geometrically
E7	Calculate the vector product of two vectors including link to 3x3 determinant and understand the properties of the vector product

F Polar coordinates

	Content
F1	Understand and use polar coordinates and be able to convert between polar and cartesian coordinates
F2	Sketch curves with r given as a function of θ ; including use of trigonometric functions from A level Mathematics
F3	Find the area enclosed by a polar curve