**Y13 Pure Further Maths Self-Assessment Sheets**

Chapter 1 – Complex Numbers

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| **Progress Descriptor** | **☺** | **☹** |
| Express a complex number in exponential form |  |  |
| Multiply and divide complex numbers in exponential form |  |  |
| Understand de Moivre’s theorem |  |  |
| Use de Moivre’s theorem to derive trigonometric identities |  |  |
| Use de Moivre’s theorem to find sums of series |  |  |
| Know how to solve completely questions of the form $z^{n}-a-ib=0$, giving special attention to cases where $a=1$ and $b=0$ |  |  |
| Use complex roots of unity to solve geometric problems |  |  |
| What I need to do to improve… |

Chapter 2 – Series

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| **Progress Descriptor** | **☺** | **☹** |
| Understand and use the method of differences to sum finite series |  |  |
| Find and use higher derivatives of functions |  |  |
| Know how to express functions as an infinite series in ascending powers using Maclaurin series expansions |  |  |
| Be able to find the series expansions of compound functions |  |  |
| What I need to do to improve… |

Chapter 3 – Methods in calculus

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| **Progress Descriptor** | **☺** | **☹** |
| Evaluate improper integrals |  |  |
| Understand and evaluate the mean value of a function |  |  |
| Differentiating inverse trigonometric functions |  |  |
| Integrating rational functions using an inverse trigonometric function for substitution |  |  |
| Integrating using partial fractions |  |  |
| What I need to do to improve… |

Chapter 4 – Volumes of revolution

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| **Progress Descriptor** | **☺** | **☹** |
| Find volumes of revolution around the x-axis |  |  |
| Find volumes of revolution around the y-axis |  |  |
| Find volumes of revolution for curves defined parametrically |  |  |
| Model real-life applications of volumes of revolution |  |  |
| What I need to do to improve… |

Chapter 5 – Polar coordinates

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| **Progress Descriptor** | **☺** | **☹** |
| Understand and use polar coordinates |  |  |
| Convert between polar and Cartesian coordinates |  |  |
| Sketch curves with *r* given as a function of *ϴ* |  |  |
| Find the area enclosed by a polar curve |  |  |
| Find tangents to, or at rights angles to, the initial line |  |  |
| What I need to do to improve… |

Chapter 6 – Hyperbolic functions

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| **Progress Descriptor** | **☺** | **☹** |
| Understand the definitions of hyperbolic functions |  |  |
| Sketch the graphs of hyperbolic functions |  |  |
| Understand and use the inverse hyperbolic functions |  |  |
| Prove identities and solve equations using hyperbolic functions |  |  |
| Differentiate and integrate hyperbolic functions |  |  |
| What I need to do to improve… |

Chapter 7 – Methods in differential equations

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| **Progress Descriptor** | **☺** | **☹** |
| Solve first-order differential equations using an integrating factor |  |  |
| Solve second-order homogeneous differential equations using the auxiliary equation |  |  |
| Solve second-order non-homogeneous differential equations using the complimentary function and the particular integral |  |  |
| Find particular solutions to differential equations using given boundary conditions |  |  |
| What I need to do to improve… |

Chapter 8 – Modelling with differential equations

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| **Progress Descriptor** | **☺** | **☹** |
| Model real-life situations with first-order differential equations |  |  |
| Use differential equations to model simple harmonic motion |  |  |
| Model damped and forced oscillations using differential equations |  |  |
| Model real-life situations using coupled first-order differential equations |  |  |
| What I need to do to improve… |