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| **Year 2 pure unit 10: Numerical methods** | **Road Map** | | | | | |
| In this unit you will learn about pure maths. The aims are as follows:  **LG1**: Knowledge  **LG2**: Application  **LG3**: Skills | Assessment Grades |  |  | | | |
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| **Themes** | **Learning Goals/Outcomes/Content** | | |  |  |  |
| **10a. Location of roots** | be able to locate roots of f(*x*) = 0 by considering changes of sign of f(*x*); | | |  |  |  |
| be able to use numerical methods to find solutions of equations. | | |  |  |  |
| **10b. Iteration including ‘staircase’ & ‘cobweb’ diagrams** | understand the principle of iteration; | | |  |  |  |
| appreciate the need for convergence in iteration; | | |  |  |  |
| be able to use iteration to find terms in a sequence; | | |  |  |  |
| be able to sketch cobweb and staircase diagrams; | | |  |  |  |
| be able to use cobweb and staircase diagrams to demonstrate convergence or divergence for equations of the form *x* = g(*x*). | | |  |  |  |
| **10c. Newton-Raphson method** | be able to solve equations approximately using the Newton-Raphson method; | | |  |  |  |
| understand how the Newton-Raphson method works in geometrical terms. | | |  |  |  |
| **10d. Problem solving** | be able to use numerical methods to solve problems in context. | | |  |  |  |

**Links:**

LG1: You will learn how to use the change of sign rule for locating roots, and understand how such methods can fail. You will learn how to find approximate solutions to equations using iterative methods and be able to draw cobweb and staircase diagrams. You will learn how to solve equations using the Newton-Raphson method and other recurrence relations.

LG2: You will be able to apply your knowledge of numerical methods to solve problems in context and evaluate which approximation method might give the most efficient solution.

LG3: You will be able to solve a variety of routine and non-routine problems, by combining several Mathematical skill sets. For example, by linking your knowledge of non-continuous graphs such as reciprocal graphs or graphs of the tan function to explain why some functions might not have roots in a given interval despite a change of sign.