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| **Year 1 pure unit 9: Exponentials and logarithms** | **Road Map** |
| In this unit you will learn about pure mathematics. The aims are as follows:**LG1**: Knowledge**LG2**: Application**LG3**: Skills | Assessment Grades |  |  |
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| **Themes** | **Learning Goals/Outcomes/Content** |  |  |  |
| **9. Exponentials and Logarithms** | know and be able to use the function $a^{x}$and its graph, where *a* is positive; |  |  |  |
| know and be able to use the function $e^{x}$ and its graph; |  |  |  |
| know that the gradient of $e^{kx}$ is equal to $ke^{kx}$ and hence understand why the exponential model is suitable in many applications; |  |  |  |
| know and be able to use the definition of $log\_{a}x$ as the inverse of $a^{x}$, where a is positive and $ x\geq 0$ ; |  |  |  |
| know and be able to use the function $ln x$ and its graph; |  |  |  |
| know and be able to use ln *x* as the inverse function of $e^{x}$ ; |  |  |  |
| understand and use the laws of logarithms:$$log\_{a}x+log\_{a}y=log\_{a}(xy)$$$$log\_{a}x-log\_{a}y=log\_{a}\left(\frac{x}{y}\right)$$$klog\_{a}x=log\_{a}x^{k}$(including, for example, $k=$–1 and $k=-\frac{1}{2}$) |  |  |  |
| be able to solve equations of the form $a^{x}=b$; |  |  |  |
| be able to use logarithmic graphs to estimate parameters in relationships of the form $y=ax^{n}$ and $y=kb^{x}$, given data for *x* and *y*; |  |  |  |
| understand and be able to use exponential growth and decay in modelling, giving consideration to limitations and refinements of exponential models. |  |  |  |

**Links:**

LG1: You should know the graphs of exponential functions, and know how to use the exponential function itself. You will learn the rules of logs, and know that lnx is the inverse of e^x. You should know how to differentiate e^x.

LG2: You should be able to apply your knowledge of logarithms to be able to solve exponential equations.

LG3: You will use exponential functions to model real-life situations such as population growth in a species of animal, including when using logarithmic graphs to estimate parameters in those functions. You should be able to evaluate the reliability of these models and assess their limitations.