The Sutton Academy

Knowledge Rich Curriculum Plan

Course/Unit

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Assessment
To learn how to integrate standard functions.	• *Students will know that integration is the opposite of differentiation.* • *Students will know to integrate both terms separately when integrating something in the form f(x) + g(x)* • *Students will know how to integrate standard functions.*		Students will need to know how to use formula Students will need to have a knowledge of differentiation Students will need to know trigonometric identities.	
To learn how to use the reverse chain rule to integrate multiple functions.	• Students will know that $\int f'(ax+b)\,dx = \frac{1}{a}f(ax+b)+c$ • Students will know how that to integrate f(ax+b), you use the reverse of the chain rule.		*Students will need to know how to use the chain rule* *Students will need to know how to differentiate basic functions.*	
To learn how to use trigonometric identities to simplify expressions in order to integrate.	• Students will know that trigonometric identities can be used to integrate expressions. • Students will know to use trigonometric identities to manipulate a function that cannot be integrated.		*Students will need to know all trigonometric identities.* *Students will need to know how to integrate trigonometric functions*	
To learn how to use the reverse chain rule on more complex functions.	• Students will know that if a function can be written in the form $k\frac{f'(x)}{f(x)}$ you can integrate it using the reverse of the chain rule for differentiation. • Students will know that to integrate expressions in the form $\int k\frac{f'(x)}{f(x)}$dx try $ln\lvert f(x)\rvert$ • Students will know you can do a similar method with functions in the form $kf'(x)\big(f(x)\big)^n$ • Students will know that $\int kf'(x)\big(f(x)\big)^n\,dx\; kf'(x)\; try\; f((x))^{n+1}$		*Students will know to differentiate using the chain rule* *Students will need to know how to integrate basic functions*	
To learn how to integrate by substitution	• Students will know that that you can simplify an' integral by changing the variable. • Students will know how to solve an integral by changing the variable.		*Students will know how to rearrange formula* *Students will know how to differentiate functions* *Students will know how to integrate functions.*	

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To learn how to integrate by parts.	• Students will know that $\int u\frac{dv}{dx}dx = uv - \int v\frac{du}{dx}dx$ • Students will know that u and v are both functions x • Students will know how to integrate by parts.		Students will know how to integrate all basic functions including trig Students will know to differentiate basic formulas. Students will need to know how to use radians.	
To learn how to integrate using partial fractions.	• Students will know you can split an expression into partial fractions to integrate. • Students will know that when the degree of the polynomial in the numerator is greater than or equal to the degree of the denominator, it is necessary to first divide the numerator by the denominator, before splitting the function into a partial fraction.		Students will know how to write an expression as a partial fraction. Students will know how to integrate using laws of logarithms.	
To learn how to use integration techniques to find areas under curves.	• Students will know that the area bounded by two curves can be found using the formula, $\int_a^b (f(x) - g(x))dx = \int_a^b f(x) - \int_a^b g(x)dx$ • Students will know how to integrate with limits to find area. • Students will know that to find the area when the curve passes through the negative y axis, you need to find the area of each separately and then add the answers, remembering areas cannot be negative.		Students will need to know how to integrate Students will need to know how to how to substitute into a formula. Students will need to know how to use radians.	
To learn how to solve differential equations.	• Students will know that you can solve first order differential equations by separating the variables. • Students will know that when $\frac{dy}{dx} = f(x)g(y)$ you can write $\int \frac{1}{g(y)}dy = \int f(x)dx$ • Students will know how to solve differential equations.		Students will need to know how to integrate. Students will need to know how to integrate.	
To learn how to model with differential equations.	• Students will know how to model volume problems using differential equations. • Students will know how to model population problems using differential equations. • Students will know how to model temperature problems using differential equations.		Students will need to know how to find volumes of different solids. Students will need to know how to solve differential equations.	

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Students will know how to use the trapezium rule to approximate integration.	• Students will know that if you cannot integrate a function algebraically, you can use a numerical method to approximate the area beneath a curve. • Students will know that to approximate the area given by $\int_a^b ydx$ you can divide the area into n equal strips. Each strip will be of width h where $h = \frac{b-a}{n}$ • Students will know that $\int_a^b ydx \approx \frac{1}{2}h(y_0 + 2(y_1 + y_2 \dots + y_{n-1}) + y_n)$ where $h = \frac{b-a}{n}$ and $y_i = f(a + ih)$ • Students will know if there answer is an overestimate (convex) or underestimate.		Students will need to know the area of a trapezium. Students will need to know how to substitute into a formula Students will need to know how to use radians.	