Year 12: Half Term 6 – Integration and Variable acceleration

Integration

1

Integration is the reverse of differentiation

$\int x^n \, dx = \frac{x^{n+1}}{n+1} + c$ (c is the constant of integration)

2

Given that f'(x) = $8x^3 - 6x$ and that f(2) = 9, find f(x)

f(x) = $\int 8x^3 - 6x \, dx = 2x^4 - 3x^2 + c$

f(2) = 9 $2\times2^4 - 3\times2^2 + c = 9$

$20 + c = 9$

$c = -11$

f(x) = $2x^4 - 3x^2 - 11$

3

The area under the graph of y=f(x) bounded by x = a. x = b and the x-axis is found by evaluation the **definite integral** $\int_a^b f(x)dx$

4

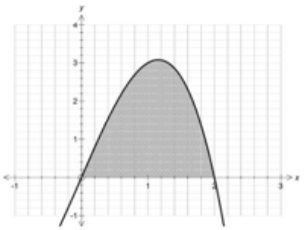
Calculate the area under the graph y = $4x - x^3$ between x = 0 and x = 2

$\int_0^2 4x - x^3 dx$

$= \left[2x^2 - \frac{x^4}{4}\right]_0^2$

$= (8 - 4) - (0 - 0)$

$= 4$



Variable Acceleration

1

Position r (m)	Velocity v (ms^{-1})	Acceleration a (ms^{-2})
	DIFFERENTIATING →	
r = f(t)	$v = \frac{dr}{dt}$	$a = \frac{dv}{dt}$ $(\frac{d^2r}{dt^2})$
	← INTEGRATING - Don't forget to include + c	
$r = \int v \, dt$	$v = \int a \, dt$	a = f(t)

2

Remember

- Area under a velocity time graph = displacement
- Gradient at a point on positive/time graph = velocity
- Gradient at a point on velocity/time graph = acceleration

How do we use Knowledge Organisers in Mathematics?

How can you use knowledge organisers at home to help us?

- **Retrieval Practice:** Read over a section of the knowledge organiser, cover it up and then write down everything you can remember. Repeat until you remember everything.
- **Flash Cards:** Using the Knowledge Organisers to help on one side of a piece of paper write a question, on the other side write an answer. Ask someone to test you by asking a question and seeing if you know the answer.
- **Mind Maps:** Turn the information from the knowledge organiser into a mind map. Then reread the mind map and on a piece of paper half the size try and recreate the key phrases of the mind map from memory.
- **Sketch it:** Draw an image to represent each fact; this can be done in isolation or as part of the mind map/flash card.
- **Teach it:** Teach someone the information on your knowledge organiser, let them ask you questions and see if you know the answers.

How will we use knowledge organisers in Mathematics?

Knowledge organisers will be used before I complete a Learning Check or Common Assessment. I will spend part of the lesson looking over each of the key topics of the half term before completing the Learning Check or Common Assessment.
I will also use these at home to complete my own independent learning and revision of these key topics.

GLUE HERE