Integration 2

Area under a Curve

Calculating the area under a curve.

**Definite Integrals**

So far when integrating, there has always been a constant term left. For this reason, such integrals are known as indefinite integrals. With definite integrals, we integrate a function between 2 points, and so we can find the precise value of the integral and there is no need for any unknown constant terms [the constant cancels out].

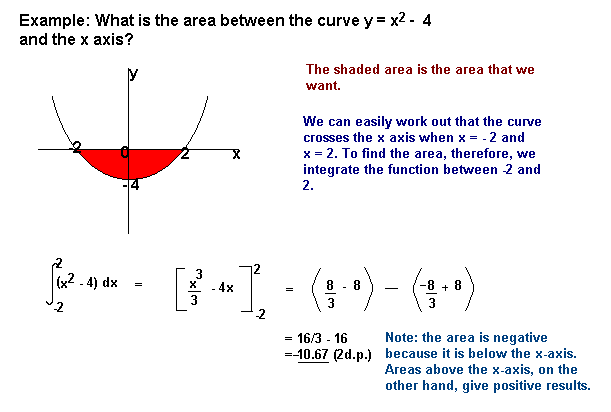


**The Area Under a Curve**

The area under a curve between two points can be found by doing a definite integral between the two points.

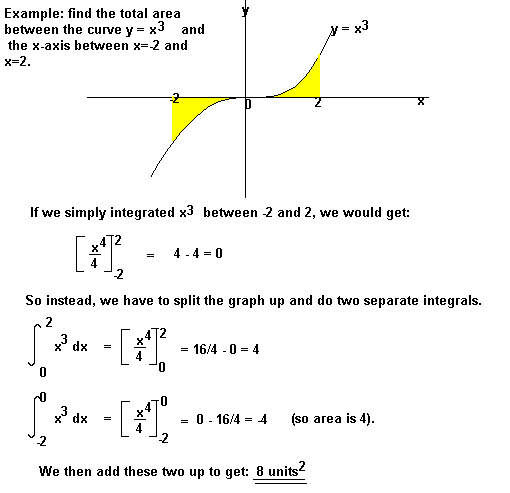
To find the area under the curve y = f(x) between x = a and x = b, integrate y = f(x) between the limits of a and b.

**Example 1**



**Example 2**

Areas under the x-axis will come out negative and areas above the x-axis will be positive. This means that you have to be careful when finding an area which is partly above and partly below the x-axis.

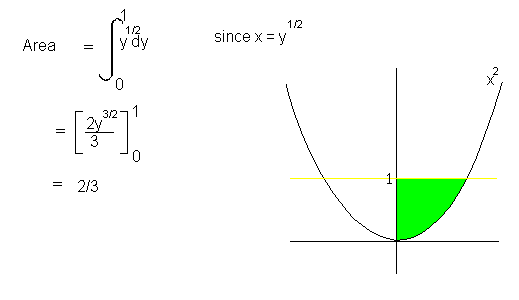


You may also be asked to find the area between the curve and the y-axis. To do this, integrate with respect to y.

**Example 3**

***Example***

Find the area bounded by the lines y = 0, y = 1 and y = x2.

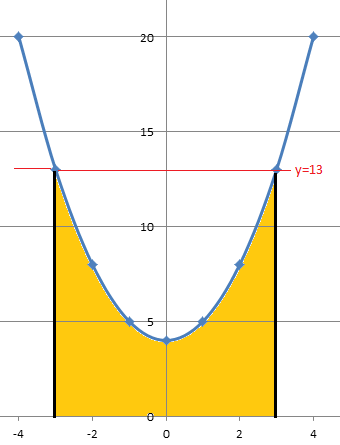


**Exercise**

Find the coordinates of the points (eg a and b) of intersection of the curve and the line

Find the area bounded by the by , the x-axis and the lines x=a and x=b.

**Solution**



= for

Substituting we get

= (+c and –c cancel out)

Area = 42units2