# Differentiation – Product Rule:

The **Product Rule** is used when differentiating two or more functions that are being multiplied together. We use it to determine the derivative of the product of two functions

In some cases, it will be possible to simply multiply them out but in others the functions are either more difficult or impossible to expand and so a new technique needed.

This is where the **Product Rule** is used.

**Product Rule**

If where *u* and *v* are functions of *x*, then

## Example 1

Differentiate:

If we apply the **Product Rule** here, then:

;

Then fill in the **Product Rule**:

With more complex products then only the **Product Rule** will work.

## Notation

When y = f(x) there are alternative ways of writing this function

read as dee y by dee x

or read as f dash

Read as a symbol for y = f(x) rather than a fraction. It is not a fraction.

**Helpful Hint**

Read as a symbol for y = f(x) rather than a fraction.

It is not a fraction

## Finding the Value

Once you have differentiated the functions you can also find the value of if you allocate an appropriate value to x.

For example:

at x = 1

## Example 2

Differentiated function from Example 1 above:

at x = 1