# Outcome 1 – The Euclidean algorithm

**Key Facts/Formulae:**

The greatest common divisor (g.c.d.) of two integers is the largest integer that divides into both of them with no remainder.

This was previously called the highest common factor (h.c.f.) way back in 3rd Level Maths!

The Euclidean algorithm is a tidy method to help us find the greatest common divisor (or g.c.d.) of two integers without having to list all the divisors of each number.

## Worked Example:

Use the Euclidean algorithm to find the greatest common divisor of 1159 and 488.

1. Express the larger number in the form;
   larger number = quotient × smaller number + remainder
2. Keep repeating the process until the remainder is 0
3. State the g.c.d. (the greatest common divisor is the last NON ZERO remainder)

$1159 = 2 \times 488 + 183$

$488 = 2 \times 183 + 122$

$183 = 1 \times 122 + 61$ $\quad \gcd(1159, 488) = 61$

$122 = 2 \times 61 + 0$

## Questions…

Use the Euclidean algorithm to find the greatest common divisor of the pairs of numbers below.

1. 224 and 96
2. 629 and 119
3. 1160 and 899
4. 3567 and 1558
5. 2225 and 801
6. 2603 and 969

# Answers

1 $\gcd(224, 96) = 32$

2 $\gcd(629, 119) = 17$

3 $\gcd(1160, 899) = 29$

4 $\gcd(3567, 1558) = 41$

5 $\gcd(2225, 801) = 89$

6 $\gcd(2603, 969) = 19$