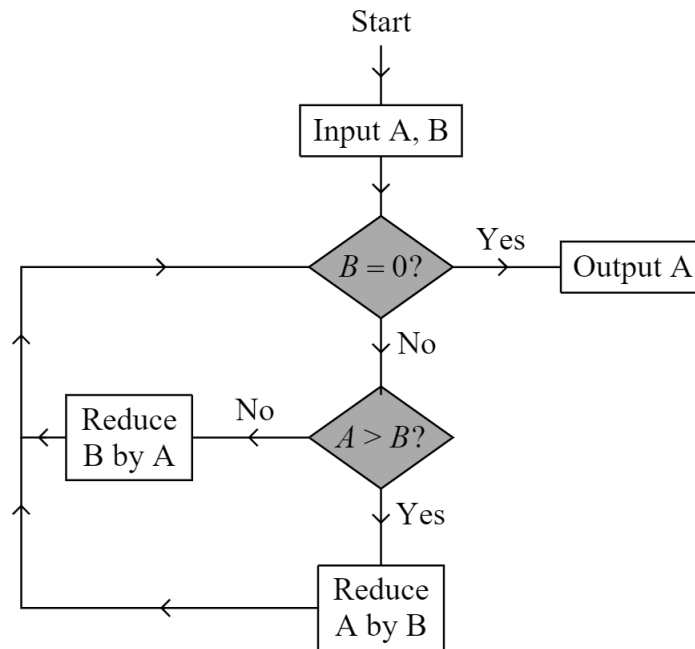**1.** *[Length: 36 minutes]*

In this problem you will investigate Euclid's Algorithm.

The following diagram demonstrates *Euclid's Algorithm* which accepts two positive whole numbers A and B.

Start

Input A, B

$B = 0?$ — Yes → Output A

No

$A > B?$ — No → Reduce B by A

Yes

Reduce A by B

For example let $A = 2$ and $B = 3$.

Is $B = 0$? No.

Is $A > B$? No.

Reduce B by A. So the new value of B is $3 - 2 = 1$.

Is $B = 0$? No.

Is $A > B$? Yes.

Reduce A by B. So the new value of A is $2 - 1 = 1$.

Is $B = 0$? No.

Is $A > B$? No.

Reduce B by A. So the new value of B is $1 - 1 = 0$.

Is $B = 0$? Yes.

So the output is 1.

(a)   Show that the output when $A = 3$ and $B = 6$ is 3.   [4]

(b)   Show that the output when $A = 6$ and $B = 4$ is 2.   [5]

(c)   Investigate three more pairs of values of A and B and their output.   [15]

(d)   Suggest the relationship between the values of A and B and the output.   [2]

(e)   Verify whether your relationship works with two more pairs of values of A and B.   [10]

Task Specific Rubric for Criterion B: Investigating Patterns

Level	Descriptor
1 – 2	The student is able to ○ determine the output when $A = 3$ and $B = 6$ (a)
3 – 4	The student is able to ○ determine the output when $A = 6$ and $B = 4$ (b)
5 – 6	The student is able to ○ investigate three more pairs of values of A and B (c) ○ suggest a relationship between the values of A and B and the output (d) ○ verify whether the relationship works for another pair of values of A and B (e)
7 – 8	The student is able to ○ suggest the correct relationship between the values of A and B and the output (d) ○ verify whether the relationship works for two more pairs of values of A and B (e)