

hailstone (5)

Table trace diagram
Variables: n, series

(n is int, series string)

Loop #	Variable	Value
—	n series	5 "5 "
1	n series	16 "5 16 "
2	n series	8 "5 16 8 "
3	n series	4 "5 16 8 4 "
4	n series	2 "5 16 8 4 2 "
5	n series	1 "5 16 8 4 2 1 "

```
public static String hailstone(int n) {
    String series = n + " ";
    while(n != 1){
        if(n % 2 == 0) {
            n = n / 2;
        } else {
            n = (3 * n) + 1;
        }
        series += n + " ";
    }
    return series;
}
```

$\text{gcd}(39, 24)$

Variables:

$\begin{matrix} a \\ b \\ r \end{matrix} \left. \vphantom{\begin{matrix} a \\ b \\ r \end{matrix}} \right\} \text{all ints}$

```
public static int gcd(int a, int b) {  
    int r = 0;  
    while (a % b != 0) {  
        r = a % b;  
        a = b;  
        b = r;  
    } // mod check loop  
    return b;  
} // gcd  
  
gcd(39, 24)
```

Loop #	a	b	r	Work it out
	39	24	0	(parameters, declaration & initialization of r)
1	24	15	15	$a \% b \neq 0$ TRUE $r = a \% b = 39 \% 24 = 15$ $a = b = 24$ $b = r = 15$
2	15	9	9	$a \% b \neq 0$ TRUE $r = a \% b = 24 \% 15 = 9$ $a = b = 15$ $b = r = 9$
3	9	6	6	$a \% b \neq 0$ TRUE $r = a \% b = 15 \% 9 = 6$ $a = b = 9$ $b = r = 6$
4	6	3	3	$a \% b \neq 0$ TRUE $r = a \% b = 9 \% 6 = 3$ $a = b = 6$ $b = r = 3$
5				$a \% b \neq 0$ FALSE ↳ return b → return 3