

## How to Make a Rule for a Pattern

To find a rule for a pattern, start with these steps:

**Step 1:** Note whether the numbers are increasing or decreasing.

Increasing =  $\times$  or  $+$  (usually)

Decreasing =  $-$  or  $\div$  (usually)

**Step 2:** Pick an operation to try.

**Step 3:** Does it work for all numbers in the pattern? YES = You're Done! NO = Keep going!

**Step 4:** If one operation does not work, try the other. Does it work for all numbers in the pattern?

YES = You're Done! NO = Keep going!

**Step 5:** Look for a combination of operations (i.e. add then multiply). Look for combinations of terms (i.e. add the two previous terms to get the next term)

### Example 1

4, 9, 14, 19...



**Step 1:** Think about the pattern.  
The numbers are getting larger,  
so the pattern rule probably  
includes  $\times$  or  $+$ .

**Step 2:** Try an operation. Let's try addition.

$$4 + ? = 9$$

$$4 + 5 = 9$$

**Step 3:** Does it work for all terms?

$$4 + 5 = 9 \text{ YES}$$

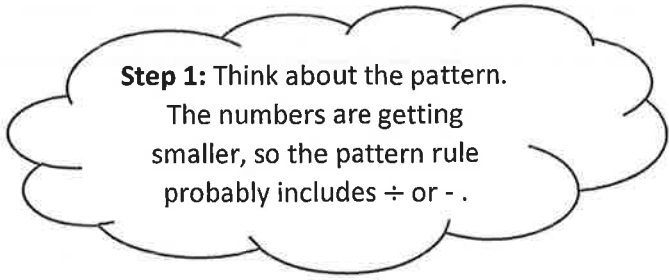
$$9 + 5 = 14 \text{ YES}$$

$$14 + 5 = 19 \text{ YES}$$

**YES IT WORKS! The rule is +5!**

**Example 2**

567, 189, 63, 21... ○ ○ ○



**Step 2:** Try an operation. Let's try subtraction.

$$567 - ? = 189$$

$$567 - 378 = 189$$

**Step 3:** Does it work for all terms?

$$189 - 378 = 63?$$

**NO, IT DOESN'T WORK!** The rule is NOT -378.

**Step 4:** Try a different operation. Let's try division.

$$567 \div ? = 189$$

$$567 \div 3 = 189$$

**Step 5:** Does it work for all terms?

$$567 \div 3 = 189 \text{ YES}$$

$$189 \div 3 = 63? \text{ YES}$$

$$63 \div 3 = 21 \text{ YES}$$

**YES, IT WORKS!** The rule is  $\div 3$ .

Sometimes a pattern might have a rule with more than one operation!

Example 3 & 4

1, 3, 4, 12, 13...  
 $\underbrace{1 \times 3}_{x3} + 1 = 3$   
 $\underbrace{3 + 1}_{+1} = 4$   
 $\underbrace{4 \times 3}_{x3} + 1 = 12$   
 $\underbrace{12 + 1}_{+1} = 13$

Rule:  $\overset{\text{first \#}}{\downarrow} n \cdot 3, \overset{\text{next \#}}{\downarrow} (n+1) + 1$  ← or first number times 3, next number + 1, Repeat.

1, 6, 5, 10, 9, 14...  
 $\underbrace{1 + 5}_{+5} = 6$   
 $\underbrace{6 - 1}_{-1} = 5$   
 $\underbrace{5 + 5}_{+5} = 10$   
 $\underbrace{10 - 1}_{-1} = 9$   
 $\underbrace{9 + 5}_{+5} = 14$

Rule:  $n + 5, (n+1) - 1$  ← or first number + 5, next number - 1, repeat.

Sometimes a pattern might have a rule that is best explained with words!

Example 5

1, 1, 2, 3, 5, 8...  
 $\underbrace{1 + 1}_{+1} = 2$   
 $\underbrace{1 + 2}_{+2} = 3$   
 $\underbrace{2 + 3}_{+3} = 5$   
 $\underbrace{3 + 5}_{+5} = 8$

Rule: Add two previous terms

