

Sequence starts with 5 and has a 10% increase,

(a) 5, 5.5, 6.05, 6.655, 7.3205, 8.05255

(b)  $f(x) = f(x-1) \times 1.1$   $f(1) = 5$

(c)  $f(x) = 5(1.1^{x-1})$

x	1	2	3
y	5	8	11

$\downarrow$   
+3

x	1	2	3	4	5
y	18	11	4	-3	-10

$\downarrow$   
-7

x	1	2	3	4	5	6	7
y	12	9	6	3	0	-3	-6

$\downarrow$   
-3

x	1	2	3	4
y	50	62	74	86

$\downarrow$   
 $36 : 3 = 12$

x	1	2	3	4	5	6
y	40	34	28	22	16	10

$\downarrow$   
 $30 : 5 = 6$

x	1	2	3	4	5	6	7	8
y	-23	-19	-15	-11	-7	-3	1	5

$\downarrow$   
 $28 : 7 = 4$

### Rule In Words

Arithmetic mean  $\rightarrow$

Find the total distance between numbers you know  
Divide the number of jumps by distance

$\frac{\Delta y}{\Delta x} = \text{slope}$

x	1	2	3
y	3	6	12

$\downarrow$   
 $\times 2$   
 $12 : 3 = 4 : 2 = 2$

x	1	2	3	4
y	7	35	175	875

$\downarrow$   
 $875 : 7 = 125$

x	1	2	3	4	5
y	6	12	24	48	96

$\downarrow$   
 $96 : 6 = 16$

x	1	2	3	4	5	6
y	4	12	36	108	324	972

$\downarrow$   
 $972 : 6 = 162$

Ratio:  $\times 10$ , Ratio:  $\times 10$

Sequence starts w/ 5 and has a 10% increase

A) first 4 terms

x	y	f(x)
1	5	$f(1) = 5$
2	5.5	$f(2) = f(1) \cdot 1.1$
3	6.05	$f(3) = f(2) \cdot 1.1$
4	6.655	$f(4) = f(3) \cdot 1.1$

B) Recursive:  $f(x) = f(x-1) \cdot 1.1$   $f(1) = 5$

C) Explicit:  $5(1.1)^{x-1}$

x	1	2	3
y	5	11	22

$n=2=8$

x	1	2	3	4
y	5	6	7	8

$$\frac{3 \cdot 6}{3} = 12$$

x	1	2	3	4	5	6	7	8
y	40	34	28	22	16	10	4	0

$$\frac{30}{5} = 6$$

x	1	2	3	4	5	6	7	8
y	28	19	15	11	7	3	1	0

$$\frac{28}{2} = 14$$

Arithmetic Mean

x	1	2	3	4	5
y	4	11	14	17	20

x	1	2	3	4	5	6	7
y	4	9	16	25	36	49	64

$$\frac{18}{2} = 9$$

RULE:

Find total distance between the #5 and know # of jumps = constant diff

$$\frac{y_2 - y_1}{x_2 - x_1} = m \frac{\Delta y}{\Delta x}$$

GEOMETRIC

Ratio =  $\frac{y_2}{y_1}$  or  $\frac{y_3}{y_2}$

x	1	2	3
y	3	6	12

$$\frac{6}{3} = 2$$

x	1	2	3	4
y	7	28	112	448

$$\frac{879}{7} = \frac{125}{3}$$

x	1	2	3	4	5
y	6	12	24	48	96

$$\frac{14}{2} = 7$$

x	1	2	3	4	5	6
y	9	12	16	21	27	36

$$\frac{14}{2} = 7$$

$$\frac{24}{3} = 8$$

$$\frac{9 \cdot 9}{3 \cdot 3} = 9$$

$$3 = 5\sqrt{243}$$



X	1	2	3
Y	5	8	11

Take the difference of two given numbers and count the jumps and divide the difference  
Jumps

X	1	2	3	4	5
Y	18	11	4	-3	-10

X	1	2	3	4	5	6	7
Y	12	9	0	3	0	-3	-6

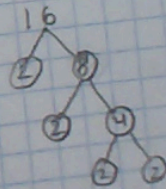
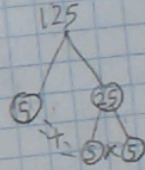
X	1	2	3
Y	3	6	12

$\times 2$   $\times 2$

X	1	2	3	4
Y	7	35	175	875

X	1	2	3	4	5
Y	6	12	24	48	96

X	1	2	3	4	5	6
Y	12	36	48	108	324	472



X	1	2	3	4	5	6
Y	4					972

$\times 3$   $\times 3$   $\times 3$   $\times 3$   $\times 3$

X	1	2	3	4	5
Y	6				96

Rule to find Constant Ratio

$$-16$$

$$4 - 4^2 = 16$$

$$-2 \times 2 \times 2 = 0$$

To find the total factor take the second value and divide by the first then take the Root # of jumps

Constant Ratio =  $\sqrt[x_2 - y_1]{\frac{y_2}{y_1}}$  Total factor



9-15-15

Sequence starts with 5 and has a 10% increase

Arithmetic

A)

x	y	Recursive	Explicit
1	5	$f(1) = 5$	5
2	5.5	$f(2) = 5.5$	$5(1.1)$
3	6.05	$f(3) = 6.05$	$5(1.1)^2$
4	6.655	$f(4) = 6.655$	$5(1.1)^3$

$f(x) = 5(1.1)^{x-1}$

B)  $f(1) = 5; f(x) = f(x-1) \times 1.1$

C)  $f(x) = 5(1.1)^{x-1}$

x	1	2	3
y	5	8	11

$+3 \quad +3$

x	1	2	3	4	5
y	18	11	4	-3	10

$-7 \quad -7$

x	1	2	3	4	5	6	7
y	12	9	6	3	0	-3	-6

$-3 \quad -3 \quad -3$

$-6 - 12 = -18$

Arithmetic Means  $\rightarrow$  Rule In Words

Constant Difference = Take the difference of two given Numbers  
# of Jumps

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = \text{slope}$

Geometric

1

x	1	2	3
y	3	6	12

$\times 2$

$3 \times 2 = 6$   
 $6 \times 2 = 12$

x	1	2	3	4	5
y	6	12	24	48	96

2

x	1	2	3	4
y	7	35	175	875

$\times 5$

3

x	1	2	3	4	5
y	6	12	24	48	96

$\times 2$

$16$   
 $\uparrow$   
 $4 \times 4$   
 $\uparrow \uparrow$   
 $2 \times 2 \times 2$

4

x	1	2	3	4	5	6
y	4	12	36	108	324	972

$\times 3$

$243$   
 $\uparrow$   
 $81 \times 3$

Rule to find constant ratio  
 constant ratio: Total factor  
 then we take the second y

$\Rightarrow 4$  is the square root of 16  
 $\Rightarrow 24 = 16$  2 is the 4th root



2	5.5	$f(2) = 5.5 = 5(1)^1$
3	6.05	$f(3) = 6.05 = 5(1+1)^2$
4	6.655	$f(4) = 6.655 = 5(1+1)^3$
		$f(x) = 5(1+1)^{n-1}$

$f(x) = 5(1+1)^{n-1}$

x	1	2	3
y	5	6	11

$+3$   
 $+3$

x	1	2	3	4	5
y	11	14	17	20	23

$+3$   
 $+3$

x	1	2	3	4	5	6	7
y	12	18	24	30	36	42	48

$+6$   
 $+6$   
 $+6$   
 $+6$

$+6 - 12 = +18$

Arithmetic Means  $\rightarrow$  Rule In words

Constant Difference =  $\frac{\text{Take the difference of two given numbers}}{\text{\# of jumps}}$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 12}{4 - 1} = \frac{-18}{3} = -6$$

Geometric

1

x	1	2	3
y	3	6	12

$\times 2$

$3 \times 2 = 6$   
 $6 \times 2 = 12$

x	1	2	3	4	5
y	6	12	24	48	96

2

x	1	2	3	4
y	7	28	112	448

$\times 4$   
 $\times 4$   
 $\times 4$

$\times 125$

3

x	1	2	3	4	5
y	6	12	24	48	96

$\times 16$   
 $\times 16$   
 $\times 16$

$16 \div 6 = 16$

$16$   
 $\wedge$   
 $44$   
 $\wedge \wedge$   
 $2222$

4

x	1	2	3	4	5	6
y	4	16	64	256	1024	4096

$\times 243$   
 $\times 243$   
 $\times 243$   
 $\times 243$

$972 \div 4 = 243$

$243$   
 $\wedge$   
 $81$   
 $\wedge$   
 $3$

How to find constant ratio  
Constant ratio: Total factor  
Then we take the second y  
value and divide by the  
first y. Then take the  
blank y root  $\times$  # of jumps

$\Rightarrow 4$  is the square root of 16  
 $\Rightarrow 2^4 = 16$  2 is the 4th root

ARITHMETIC MEANS

x	1	2	3
y	3	6	12

$x-2$   $x-2$

constant ratio =  $\frac{y_2 - y_1}{x_2 - x_1} \times \frac{y_2}{y_1}$

If this is even  
The positive/negative  
ratio

$81 = 3^{x-1}$

what are you multiplying by  
 $\rightarrow 1 \div 3 = 0.3$

- Pattern = 3 Ratio =  $x \frac{1}{3}$
- = 2 Ratio =  $x \frac{1}{2}$  or  $x.05$
- $\nearrow 10$  Ratio =  $x \frac{1}{10}$
- pat = 215
- over 2 Ratio =  $x \frac{5}{2}$