Exercise walk-through

2.11
Logarithmic Functions

AP Precalculus

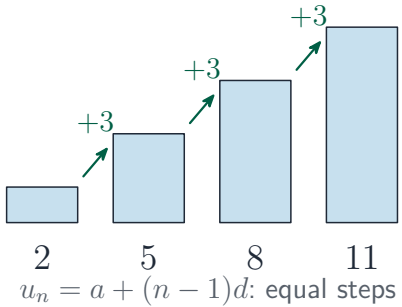
What we will cover

1. Arithmetic & geometric sequences
2. Linear vs exponential change
3. Exponential functions
4. Composition & inverses
5. Logarithms
6. Solving equations
7. Modelling & semi-log plots

Arithmetic and geometric sequences

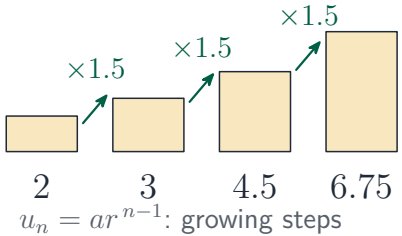
A **sequence** maps whole numbers to reals: its graph is discrete points.
Arithmetic adds the same amount; geometric multiplies by the same ratio.

arithmetic: add d each step



$u_n = a + (n-1)d$: equal steps

geometric: multiply by r each step



$u_n = ar^{n-1}$: growing steps

arithmetic	: $a_n = a_0 + dn$ with **common difference**	d
geometric	: $g_n = g_0\, r^n$ with **common ratio**	r

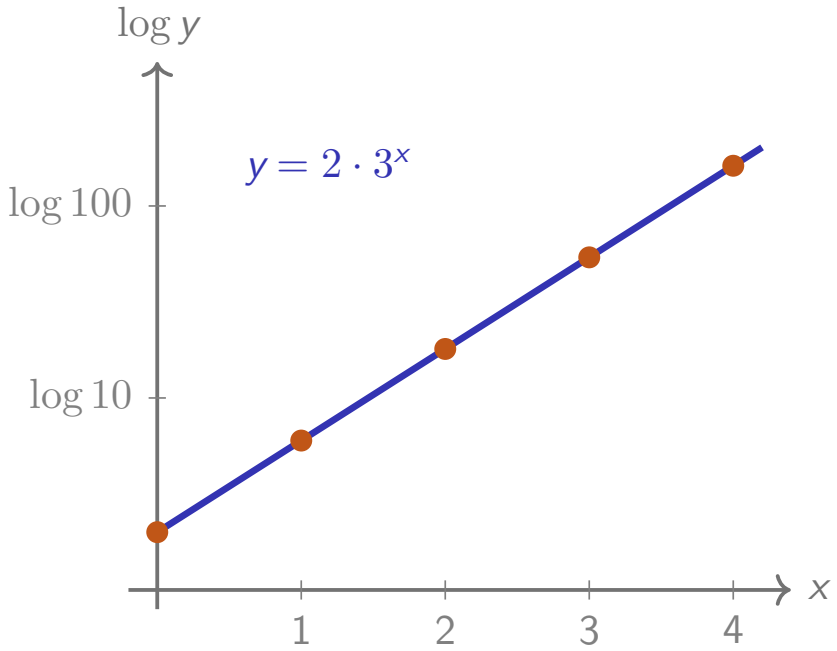
Semi-log plots

On a logarithmic scale, each unit is a multiplicative step $(10^0, 10^1, 10^2, \dots)$.

$$y = ab^x \;\Rightarrow\; \log y = \log a + x \log b$$

slope $\log b$, intercept $\log a$

An exponential becomes a straight line.



Exercises 2.1·2.3

2.1 State the domain of $f(x) = \log_b(x)$. [1]

2.2 State the vertical asymptote of the log function. [1]

2.3 State the point every $\log_b$ graph passes through. [2]

Exercises 2.1–2.3

2.1 State the domain of $f(x) = \log_b(x)$. [1]

2.1

- $x > 0$

2.2 State the vertical asymptote of the log function. [1]

2.2

- $x = 0$

2.3 State the point every $\log_b$ graph passes through. [2]

2.3

- $(1, 0)$

Exercises 3.1·3.2

3.1 The domain of $f(x) = \log_b(x)$ is [1]

- **A** all real numbers
- **B** $x > 0$
- **C** $x \geq 0$
- **D** $x \neq 0$

3.2 The graph of $\log_b(x)$ has a vertical asymptote at [1]

- **A** $x = 0$
- **B** $x = 1$
- **C** $y = 0$
- **D** $y = 1$

Exercises 3.1·3.2

3.1 The domain of $f(x) = \log_b(x)$ is [1]

- **A** all real numbers
- **B** $x > 0$
- **C** $x \geq 0$
- **D** $x \neq 0$

3.1 B

- $x > 0$.

3.2 The graph of $\log_b(x)$ has a vertical asymptote at [1]

- **A** $x = 0$
- **B** $x = 1$
- **C** $y = 0$
- **D** $y = 1$

3.2 A

- $x = 0$.

Exercise 3.3 (a)

3.3 $f(x) = \log_2(x)$.

(a) State $f(1)$. [1]

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(a) State $f(1)$. [1]

(a)

- 0

Exercise 3.3 (b)

3.3 $f(x) = \log_2(x)$.

(b) State $f(2)$. [1]

Exercise 3.3 (b)

3.3 $f(x) = \log_2(x)$.

(b) State $f(2)$. [1]

(b)

- 1

Exercise 3.3 (c)

3.3 $f(x) = \log_2(x)$.

(c) State $f(4)$. [1]

x	1	2	4
$\log_2 x$			

Exercise 3.3 (c)

3.3 $f(x) = \log_2(x)$.

(c) State $f(4)$. [1]

x	1	2	4
$\log_2 x$			

(c)

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