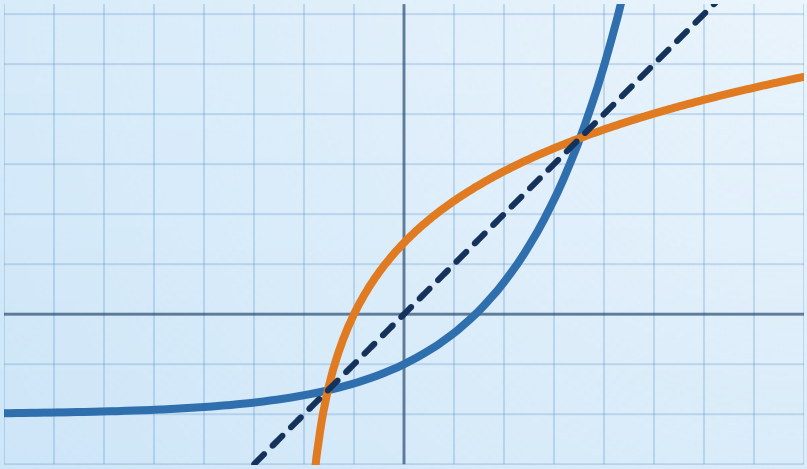
KECUDO

2026 EDITION · COLLEGE MATH SERIES



COLLEGE ALGEBRA & PRECALCULUS

Class A3

Exponential & Logarithmic Functions

Growth, decay and the power of logs

PREMIUM EDITION · KECUDO · A3

13 CHAPTERS · 120 SELF-ASSESSMENT QUESTIONS

INTERACTIVE EDITION + PRINT PDF

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FOUNDATION

Chapter 1

Exponent Rules Review

Exponential functions put the variable in the exponent, so you need the exponent rules at your fingertips. Each rule below works only when the **bases are the same**.

Rule	In symbols	Example
Product	$a^m \cdot a^n = a^{m+n}$	$2^3 \cdot 2^4 = 2^7 = 128$
Quotient	$a^m / a^n = a^{m-n}$	$5^6 / 5^4 = 25$
Power	$(a^m)^n = a^{mn}$	$(3^2)^3 = 3^6 = 729$
Product to a power	$(ab)^n = a^n b^n$	$(2x)^3 = 8x^3$
Zero exponent	$a^0 = 1$	$7^0 = 1$
Negative exponent	$a^{-n} = 1/a^n$	$2^{-3} = 1/8$
Fractional exponent	$a^{m/n} = (\sqrt[n]{a})^m$	$8^{2/3} = 2^2 = 4$

WORKED EXAMPLE **Simplify $(2x^3 y)^2 / (4x^4 y^5)$**

1. Square the top: $4x^6 y^2$.
2. Divide: $4/4 = 1$, $x^{6-4} = x^2$, $y^{2-5} = y^{-3}$.

✓ x^2 / y^3

WORKED EXAMPLE **Evaluate $27^{-2/3}$**

1. Negative exponent: $1/27^{2/3}$.
2. Cube root of 27 is 3; then square: 9.

✓ **1/9**

KEY IDEA

A fractional exponent is a root: the denominator is the root, the numerator the power.

WATCH OUT

$-3^2 = -9$ but $(-3)^2 = 9$. And $(a + b)^2 \neq a^2 + b^2$.

FOUNDATION

Chapter 2

Exponential Functions

An **exponential function** has the form $f(x) = a \cdot b^x$ with $b > 0$ and $b \neq 1$. Here a is the **initial value** $f(0)$ and b is the **growth factor**: growth when $b > 1$, decay when $0 < b < 1$.

x	−2	−1	0	1	2	3
2^x	1/4	1/2	1	2	4	8
$(1/2)^x$	4	2	1	1/2	1/4	1/8

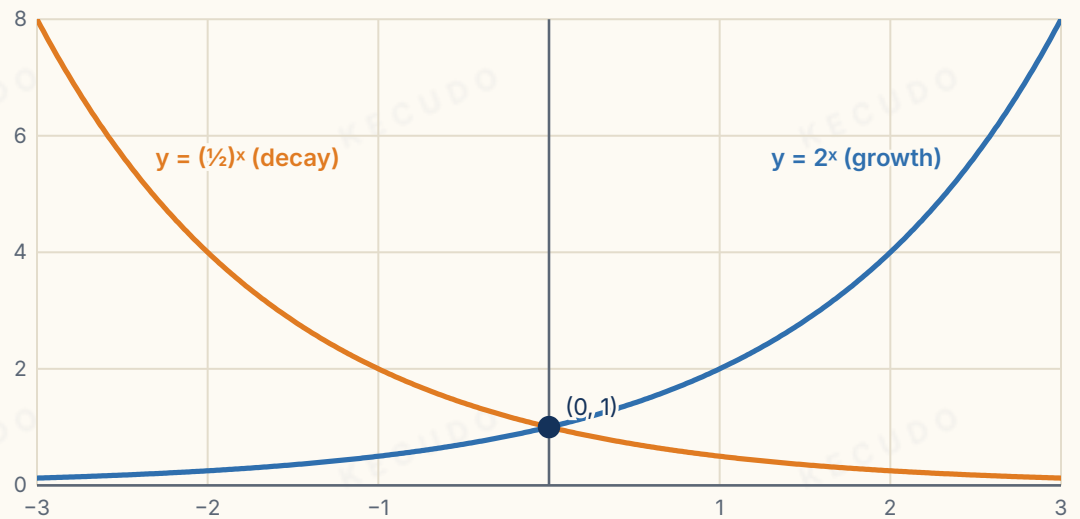


FIG 2.1 Mirror images across the y-axis, both through (0, 1).

KEY IDEA

A linear function **adds** the same amount each step. An exponential function **multiplies** by the same factor each step.

CHECK YOUR UNDERSTANDING

Chapter 1: Exponent Rules Review

5 questions · your answer locks when you choose it

1. Simplify $x^5 \cdot x^3$.

- **A** x^2
- **B** x^{15}
- **C** $2x^8$
- **D** x^8

2. Simplify $(x^4)^3$.

- **A** x^{12}
- **B** x^7
- **C** $3x^4$
- **D** x^{64}

3. What is 4^{-2}?

- **A** −16
- **B** 1/16
- **C** 1/8
- **D** −8

4. What is $16^{3/4}$?

- **A** 4
- **B** 12
- **C** 64
- **D** 8

5. Simplify $6x^5 / (2x^2)$.

- **A** $12x^3$
- **B** $3x^3$
- **C** $4x^3$
- **D** $3x^7$

FINAL EXAM

25 Questions on the Whole Book

Parts A–E · 5 questions each

Part A · Basics

1. Which function is exponential?

A $y = 3 \cdot 2^x$ **B** $y = 2x^3$

C $y = 3x + 2$ **D** $y = x^2$

2. What is $\log_b 1$ for any valid base b?

A 1 **B** undefined

C b **D** 0

3. What is the horizontal asymptote of $y = 4^x$?

A None **B** $y = 4$

C $y = 0$ **D** $y = 1$

4. $\ln x$ is the logarithm with base:

A 10 **B** e

C 1 **D** 2

5. What is the domain of $\log x$?

A All real numbers **B** $x > 0$

C $x \geq 0$ **D** $x > 1$

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Thank you for learning with Kecudo.

NEXT IN THE SERIES

Class A4 · Trigonometry