

Unit 2

Exponential Functions

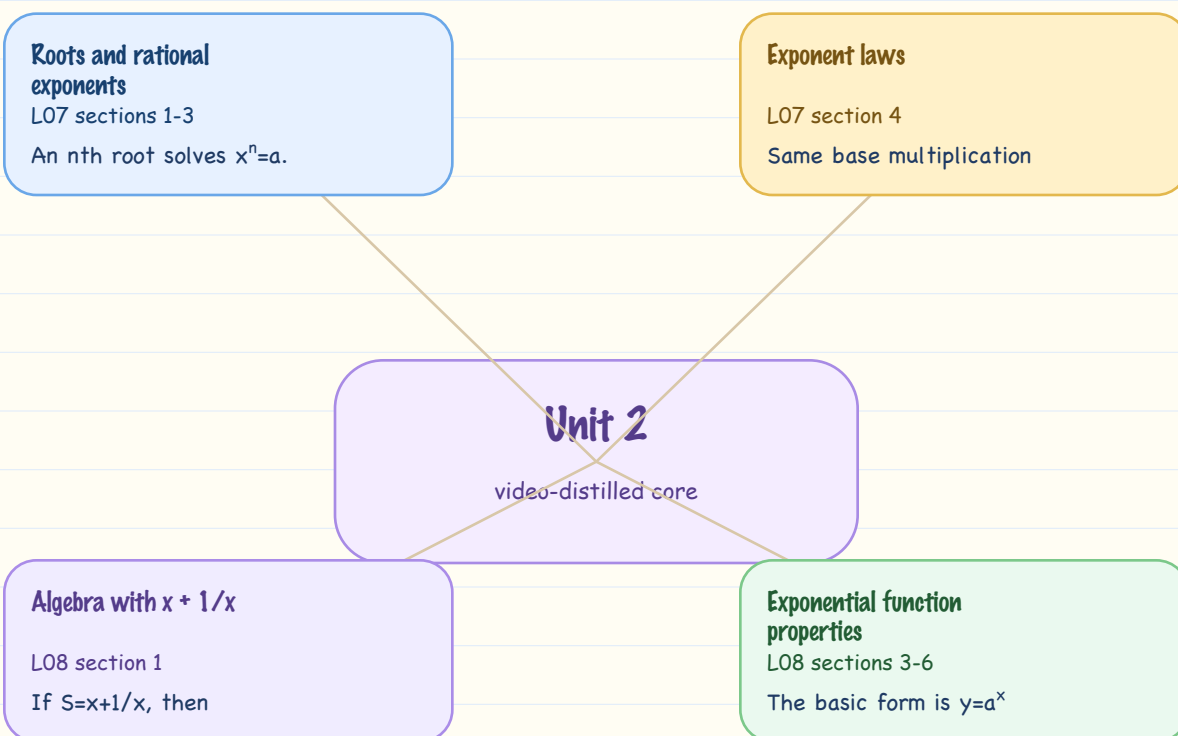
SOURCE LOCK

2 distilled lessons

RULE FOR THIS PREVIEW

Only translated/condensed material from the video-distilled lesson notes is used.

Unit map



Teacher Moves

how to attack problems

Strategy moves distilled from the teacher's worked explanations.

One language for powers

L07

MOVE 1

- Convert radicals into rational exponents before combining expressions.
- After that, use exponent laws instead of juggling roots by eye.

Even roots need absolute value

L07

MOVE 2

- When the root index is even, n th root of a^n gives $|a|$.
- This is where many sign mistakes enter.

Keep the plus-or-minus

L08

MOVE 3

- If a square only tells you $(x-1/x)^2$, do not choose a sign too early.
- Keep +/- until the problem determines the sign.

Teacher Moves

Base side of 1

L08

MOVE 4

- When comparing exponential values, first decide whether the base is above 1 or between 0 and 1.
- Then use increasing/decreasing behavior.

Zero-power conditions

L08

MOVE 5

- A nonzero base to the 0 power equals 1.
- Zero to a nonpositive power is not meaningful.

Anchor every exponential graph

L08

MOVE 6

- All basic exponential graphs pass through (0,1).
- In Quadrant I, the larger base rises faster.

Rewrite the hidden base

L08

MOVE 7

- For b^{ax} , rewrite it as $(b^a)^x$ first.
- The new base b^a decides whether the graph increases or decreases.

Teacher Moves

Growth is multiplicative

L08

MOVE 8

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- Continuous percentage growth uses a multiplication model.
 - Do not treat each period as adding the same amount.

Approximation has a job

L08

MOVE 9

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- Use the first-order approximation only for quick estimates.
 - Return to the original exponential expression for exact results.

Cornell Notes

cue

Roots and
rational
exponents

L07 sections 1-3

Roots and rational exponents

- An nth root solves $x^n=a$.
- Odd roots keep the sign. Even roots of positive numbers come in opposite pairs.
- Negative numbers have no real even root.
- nth root of a^n becomes a for odd n , and $|a|$ for even n .
- $a^{m/n}$ is the nth root of a^m , under the stated positive-base condition.

cue

Exponent laws

L07 section 4

Exponent laws

- Same base multiplication adds exponents.
- Same base division subtracts exponents.
- A power of a power multiplies exponents.
- Products inside a power can be split when the base conditions are satisfied.
- A nonzero number to the 0 power equals 1.

cue

Algebra with $x + 1/x$

L08 section 1

Algebra with $x + 1/x$

- If $S=x+1/x$, then $x^2+1/x^2=S^2-2$.
- Also $x^3+1/x^3=S^3-3S$.
- When $x+1/x=3$, $x^2+1/x^2=7$.
- For x^2-1/x^2 , keep the plus-or-minus sign unless the problem fixes it.

cue

Exponential
function
properties

L08 sections 3-6

Exponential function properties

- The basic form is $y=a^x$ with $a>0$ and a not equal to 1.
- Domain is all real numbers. Range is $(0,+\infty)$.
- The graph always passes through $(0,1)$.
- If $a>1$, the function increases. If $0<a<1$, it decreases.
- $y=a^x$ and $y=(1/a)^x$ are symmetric about the y-axis.

Worked Example Cards

video example card

L07 example

Simplify fourth root of $(3-\pi)^4$

1. The root index is even.
2. Use absolute value: fourth root of $(3-\pi)^4=|3-\pi|$.
3. Since $\pi>3$, the value is $\pi-3$.

video example card

L08 example

If $y=a^x$ passes through $(3, \pi)$

1. Substitute the point: $a^3=\pi$.
2. So $a=\pi^{1/3}$.
3. Then $f(x)=\pi^{x/3}$.