October 1, 2025

Exponential Functions

$$\frac{(a^2 b^3)(a^{-5} b^2)^3}{a^{-4} b^2}$$

$$\frac{(a^2 b^3)(a^{-15} b^6)}{a^{-4} b^2}$$

$$\frac{a^{-13} b^{9-2}}{a^{-9+13} b^2}$$

$$\frac{b^7}{a^9}$$

$$\sqrt[5]{a^2} = a^{2/5}$$

$$\left(4^{-3/2} + 2^{-1}\right)^{-1}$$

$$\left(\frac{1}{4^{3/2}} + \frac{1}{2^1}\right)^{-1}$$

$$\left(\frac{1}{\sqrt{4^3}} + \frac{1}{2}\right)^{-1}$$

$$\left(\frac{1}{2^3} + \frac{1}{2}\right)^{-1}$$

$$\left(\frac{1}{8} + \frac{1}{2}\right)^{-1}$$

$$\left(\frac{5}{8}\right)^{-1}$$

$$= \boxed{\frac{8}{5}}$$

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Exponential Functions

$y = 2^x$

$y = b^x \quad b > 0, \; b \neq 1$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Solve. Make common base

$\left(\frac{1}{9}\right)^{3x} = \left(\sqrt[4]{27}\right)^{x+3}$

$\left(\frac{1}{3^2}\right)^{3x} = \left(\sqrt[4]{3^3}\right)^{x+3}$

$\left(3^{-2}\right)^{3x} = \left(3^{\frac{3}{4}}\right)^{x+3}$

$3^{-6x} = 3^{\frac{3}{4}x + \frac{9}{4}}$

$4\left[-6x = \frac{3}{4}x + \frac{9}{4}\right]$

$-24x = 3x + 9$

$+24x \quad +24x$

$\frac{-9}{27} = \frac{27x}{27}$

$-\frac{1}{3} = x$

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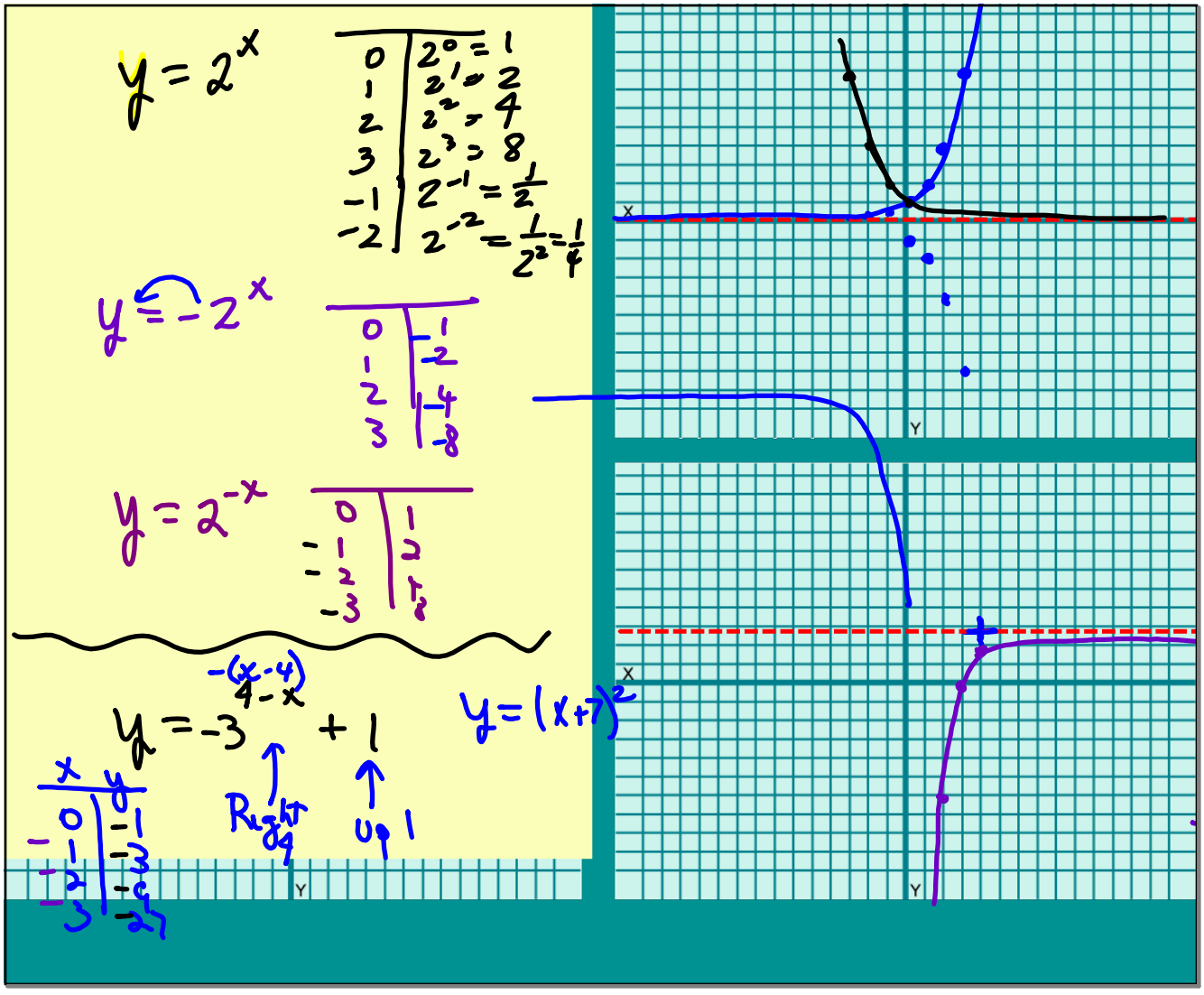

$e = \left(1 + \frac{1}{n}\right)^n$ Leonard Euler

of Nature Number

$n=1$	2
$n=2$	2.25
$n=3$	2.37
$n=4$	2.44

$e \simeq 2.718$

Culture of Bacteria

20 bacteria present now.

$K = 0.42$

How many in 12 hours?

$$N = N_0 e^{Kt}$$

$$N = 20 \cdot e^{(0.42)(12)}$$

$$\approx 3089$$

When will there be 5000 bacteria.

$$5000 = 20 \cdot e^{0.42t}$$

$$f_1 = 20 e^{0.42x}$$

$$f_2 = 5000$$