$$\frac{9^x - 1}{3^x + 1} = 8$$

$$x = ?$$

---------- Q U E S T I O N ----------

$$\frac{9^x - 1}{3^x + 1} = 8$$

x = ?

---------- R É P O N S E ----------

$$\frac{9^x - 1}{3^x + 1} = 8$$

$$\frac{9^x - 1}{3^x + 1} = \frac{8}{1}$$

$9^x - 1 = 8\cdot(3^x + 1)$

soit $3^x = y$

note: si $y = 3^x$ alors $y^2 = 3^x\cdot 3^x = (3\cdot 3)^x = 9^x$

si $3^x = y$ alors $9^x - 1 = 8\cdot(3^x + 1)$ devient:

$y^2 - 1 = 8(y + 1)$

$y^2 - 1 = 8y + 8$

$y2 - 8y - 9 = 0$

$\Delta = (-8)^2 - 4\cdot 1\cdot -9 = 64 + 36 = 100$

$\sqrt{\Delta} = \sqrt{100} = 10$ et $-10$

- cas $\Delta = +10$: $y = (-(-8) + 10)/2\cdot 1 = 18/2 = 9$
- cas $\Delta = -10$: $y = (-(-8) - 10)/2\cdot 1 = -2/2 = -1$

$3^x = y = 9 \Rightarrow x = 2$

$3^x = y = -1 \Rightarrow$ pas de solution pour $y = -1$

$$\boxed{x = 2}$$