Exercise 280

For the following exercises, solve the exponential equation exactly.

$$3^{x/14} = \frac{1}{10}$$

Solution

Take the logarithm of both sides.

$$\log 3^{x/14} = \log \frac{1}{10}$$

Evaluate the logarithm on the right: $\log \frac{1}{10} = -1$ because $10^{-1} = \frac{1}{10}$.

$$\log 3^{x/14} = -1$$

Use the property of logarithms that allows the exponent to be brought down in front.

$$\left(\frac{x}{14}\right) \log 3 = -1$$

Divide both sides by $\log 3$.

$$\frac{x}{14} = -\frac{1}{\log 3}$$

Multiply both sides by 14.

$$x = -\frac{14}{\log 3} \approx -29.3$$