

REINFORCEMENT 6.4

$$1a) 56^{2x} = 48$$

$$2x \log 56 = \log 48$$

$$x = \frac{\log 48}{2 \log 56}$$

$$x = 0,481$$

$$b) 7(2^x) = 40$$

$$2^x = \frac{40}{7}$$

$$x \log 2 = \log \frac{40}{7}$$

$$x = \frac{\log \frac{40}{7}}{\log 2}$$

$$x = 2,515$$

$$c) 5^{x+1} = 8$$

$$(x+1) \log 5 = \log 8$$

$$x+1 = \frac{\log 8}{\log 5}$$

$$x = \left(\frac{\log 8}{\log 5} \right) - 1$$

$$x = 0,292$$

$$d) 8^{3x} = 67^{0,5}$$

$$3x \log 8 = 0,5 \log 67$$

$$x = \frac{0,5 \log 67}{(3 \log 8)}$$

$$x = 0,337$$

$$e) \left(\frac{3}{7} \right)^x = \frac{7}{9}$$

$$x \log \frac{3}{7} = \log \left(\frac{7}{9} \right)$$

$$x = \frac{\log \left(\frac{7}{9} \right)}{\log \left(\frac{3}{7} \right)}$$

$$x = 0,297$$

$$2. a) 4^{3x+5} = 7^{4x}$$

$$(3x+5) \log 4 = 4x \log 7$$

$$3x \log 4 + 5 \log 4 = 4x \log 7$$

$$5 \log 4 = 4x \log 7 - 3x \log 4$$

$$5 \log 4 = x(4 \log 7 - 3 \log 4)$$

$$\frac{5 \log 4}{(4 \log 7 - 3 \log 4)} = x \Rightarrow x = 1,91$$

$$b) \left(\frac{3}{4} \right)^{x+1} = \left(\frac{7}{2} \right)^x$$

$$(x+1) \log A = x \log B$$

$$x \log A + \log A = x \log B$$

$$\log A = x \log B - x \log A$$

$$\log A = x (\log B - \log A)$$

$$\frac{\log A}{\log B - \log A} = x$$

$$x = \frac{\log \left(\frac{3}{4} \right)}{\log \left(\frac{7}{2} \right) - \log \left(\frac{3}{4} \right)}$$

$$x = -0,19$$

$$\begin{aligned}
 c) \quad \sqrt{2^x} &= \sqrt[3]{9^{x-1}} \\
 2^{x/2} &= 9^{x/3} \\
 \log 2^{x/2} &= \log 9^{x/3} \\
 x \log 2^{1/2} &= (x-1) \log 9^{1/3} \\
 x \log 2^{1/2} &= x \log 9^{1/3} - \log 9^{1/3} \\
 x \log 2^{1/2} - x \log 9^{1/3} &= -\log 9^{1/3} \\
 x (\log 2^{1/2} - \log 9^{1/3}) &= -\log 9^{1/3}
 \end{aligned}$$

$$\rightarrow x = \frac{-\log 9^{1/3}}{\log 2^{1/2} - \log 9^{1/3}}$$

$$x = 1,90$$

$$\begin{aligned}
 3. \quad 3^{4-x} &= 8^x \\
 (4-x) \log 3 &= x \log 8 \\
 4 \log 3 - x \log 3 &= x \log 8 \\
 4 \log 3 &= x \log 8 + x \log 3 \\
 4 \log 3 &= x (\log 8 + \log 3) \\
 \frac{4 \log 3}{\log 24} &= x \Rightarrow x = 1,38
 \end{aligned}$$

$$\begin{aligned}
 4a) \quad -3e^{2x-1} + 9 &= 0 \\
 -3e^{2x-1} &= -9 \\
 e^{2x-1} &= 3 \\
 (2x-1) \ln e &= \ln 3 \\
 2x-1 &= \ln 3 \\
 x &= \frac{(\ln 3 + 1)}{2} \\
 x &= 1,049
 \end{aligned}$$

$$\begin{aligned}
 b) \quad 5e^{6x+7} + 25 &= 0 \\
 5e^{6x+7} &= -25 \\
 e^{6x+7} &= -5 \\
 (6x+7) \ln e &= \ln -5 \\
 &\uparrow \\
 &\text{impossible}
 \end{aligned}$$

$$\emptyset$$

$$\begin{aligned}
 6. \text{ Paul: } y &= 16000 (0,85)^x & \text{Arthur: } y &= 20000 (0,8)^x \\
 16000 (0,85)^x &= 20000 (0,8)^x \\
 (0,85)^x &= 1,25 (0,8)^x \\
 \log (0,85)^x &= \log 1,25 (0,8)^x \\
 x \log 0,85 &= \log 1,25 + \log (0,8)^x \\
 x \log 0,85 - x \log 0,8 &= \log 1,25 \Rightarrow x = \frac{\log 1,25}{\log 0,85 - \log 0,8} \\
 x &= 3,68 \text{ (en 1999)}
 \end{aligned}$$

$$\begin{aligned}
 \text{no: 7} \quad 5000 (1,075)^x &= 8000 (1,05)^x \\
 \log (1,075)^x &= \log 1,6 (1,05)^x \\
 x \log (1,075) &= \log 1,6 + x \log (1,05) \\
 x \log (1,075) - x \log (1,05) &= \log 1,6 \\
 &\rightarrow x = \frac{\log 1,6}{\log (1,075) - \log (1,05)} \\
 x &= 19,97 \approx 20 \text{ ans.}
 \end{aligned}$$