

Solve the following and leave the answer as an exact value

1. $3^x = 25$

$$\log 3^x = \log 25$$

$$x \log 3 = \log 25$$

$$x = \frac{\log 25}{\log 3}$$

2. $10^{x-4} = 7^x$

$$\log 10^{(x-4)} = \log 7^x$$

$$(x-4) \log 10 = x \log 7$$

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

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

$$-4 = x(\log 7 - 1)$$

$$x = \frac{-4}{\log 7 - 1}$$

$$= 25.822$$

3. $4^{2x} = 15^{x-1}$

$$\log 4^{2x} = \log 15^{(x-1)}$$

$$2x \log 4 = x \log 15 - \log 15$$

$$2x \log 4 - x \log 15 = -\log 15$$

$$x(2 \log 4 - \log 15) = -\log 15$$

$$x = \frac{-\log 15}{2 \log 4 - \log 15}$$

$$= -41.960$$

4. $9^{2x+3} = 568$

$$\log 9^{2x+3} = \log 568$$

$$2x \log 9 + 3 \log 9 = \log 568$$

$$\frac{2x \log 9}{2 \log 9} = \frac{\log 568 - 3 \log 9}{2 \log 9}$$

$$x = \frac{\log 568 - 3 \log 9}{2 \log 9}$$

$$= -0.056$$

5. $2^{-x} = 6$

$$\log 2^{-x} = \log 6$$

$$\frac{-x \log 2}{-\log 2} = \frac{\log 6}{-\log 2}$$

$$x = \frac{\log 6}{-\log 2} \text{ or } -\log_2 6$$

$$= -2.5854$$

6. $8^{\frac{x}{3}} = 20$

$$\log 8^{-x/3} = \log 20$$

$$\frac{-x/3 \cdot \log 8}{-x/3 \log 8} = \frac{\log 20}{-x/3 \log 8}$$

$$x = \frac{-3 \log 20}{\log 8}$$

$$= -4.321$$

7. $2^{x+3} = 17^x$

$$\log 2^{(x+3)} = \log 17^x$$

$$x \log 2 + 3 \log 2 = x \log 17$$

$$x \log 2 - x \log 17 = -3 \log 2$$

$$x(\log 2 - \log 17) = -3 \log 2$$

$$x = \frac{-3 \log 2}{\log 2 - \log 17}$$

$$= 0.971$$

8. $17^{x+4} = 196^{3x-2}$

$$\log 17^{(x+4)} = \log 196^{(3x-2)}$$

$$x \log 17 + 4 \log 17 = 3x \log 196 - 2 \log 196$$

$$x \log 17 - 3x \log 196 = -2 \log 196 - 4 \log 17$$

$$x(\log 17 - 3 \log 196) = -2 \log 196 - 4 \log 17$$

$$x = \frac{-2 \log 196 - 4 \log 17}{\log 17 - 3 \log 196}$$

$$= 1.683$$

9. $4^{x+1} = 5^{x-2}$

$$\log 4^{(x+1)} = \log 5^{(x-2)}$$

$$x \log 4 + \log 4 = x \log 5 - 2 \log 5$$

$$x \log 4 - x \log 5 = -2 \log 5 - \log 4$$

$$x(\log 4 - \log 5) = -2 \log 5 - \log 4$$

$$x = \frac{-2 \log 5 - \log 4}{\log 4 - \log 5}$$

$$= 20.638$$

10. $3(2^x) = 6^{x-2}$

$$\log [3(2^x)] = \log 6^{(x-2)}$$

$$\log 3 + x \log 2 = x \log 6 - 2 \log 6$$

$$x \log 2 - x \log 6 = -2 \log 6 - \log 3$$

$$x(\log 2 - \log 6) = -2 \log 6 - \log 3$$

$$x = \frac{-2 \log 6 - \log 3}{\log 2 - \log 6}$$

$$= 4.262$$