

1. (a) $x = 7$
 (b) $x = -1$
 (c) $x = -3$
 (d) $x = -3$

2. (a) $n = -4$
 (b) $27^n = 9^{n-1} \rightarrow (3^3)^n = (3^2)^{n-1} \rightarrow 3^{3n} = 3^{2(n-1)} \Rightarrow 3n = 2(n-1) \rightarrow n = -2$
 (c) $4^{n-2} = 16^{7-n} \rightarrow 4^{n-2} = (4^2)^{7-n} \Rightarrow n-2 = 2(7-n) \rightarrow n = 16/3$
 (d) $49^{3n} \times 7^{2n-5} = 343 \rightarrow (7^2)^{3n} \times 7^{2n-5} = 7^3 \rightarrow 7^{6n+2n-5} = 7^3 \Rightarrow 6n+2n-5 = 3 \rightarrow n = 1$

3. $(5^n \times 27^2)^m = 5^{12} \times 9^2 \rightarrow 5^{mn} \times 3^{3 \times 2 \times m} = 5^{12} \times (3^2)^2 \rightarrow 5^{mn} \times 3^{6m} = 5^{12} \times 3^4 \Rightarrow mn = 12$
 and $6m = 4$. First solve for m : $m = \frac{2}{3}$. Now solve $mn = 12$ for n : $\frac{2}{3}n = 12 \rightarrow n = 18$.
 $m = \frac{2}{3}, n = 18$

4. (a) $x = 13$
 (b) $x = 3/4$
 (c) $\frac{3}{x^2} = 16\frac{1}{3} \rightarrow \frac{3}{x^2} = \frac{49}{3}$. Now cross multiply and solve for x^2 : $9 = 49x^2 \rightarrow \frac{9}{49} = x^2$. Now square root both sides: $\sqrt{x^2} = \sqrt{\frac{9}{49}} = \sqrt{\frac{3^2}{7^2}} \rightarrow x = \frac{3}{7}$
 (d) $x = -1/8$

5. (a) $(0.1)^x = 100 \rightarrow (10^{-1})^x = 10^2 \rightarrow 10^{-x} = 10^2 \Rightarrow x = -2$
 (b) $x = -2$
 (c) $x = 3$
 (d) $x = 1/2$

6. (a) $a^x \times a^{3x-1} = a \rightarrow a^{x+3x-1} = a^1 \Rightarrow x + 3x - 1 = 1 \rightarrow x = 1/2$
 (b) $b^{x-3} \div b^{3-x} = b \rightarrow b^{x-3-(3-x)} = b^1 \Rightarrow x - 3 - 3 + x = 1 \rightarrow x = 7/2$
 (c) $(\frac{a}{b})^{2x} \times (\frac{b}{a})^{1-x} = (\frac{a}{b})^3 \rightarrow (\frac{a}{b})^{2x} \times (\frac{a}{b})^{-(1-x)} = (\frac{a}{b})^3 \rightarrow (\frac{a}{b})^{2x-(1-x)} = (\frac{a}{b})^3 \Rightarrow 2x - 1 + x = 3 \rightarrow x = 4/3$