Main Ideas/Questions	Notes/Examples	
SOLVING EXPONENTIAL EQUATIONS	(1)	Use the properties of exponents to **SIMPLIFY** each side of the equation.
	(2)	Rewrite the equation so both sides have the **SAME BASE.**
	(3)	Drop the bases and **SET THE EXPONENTS EQUAL TO EACH OTHER.**

Type 1 – Equations with a Common Base

1. $2^{x+1} = 2^9$

$x + 1 = 9$

$x = 8$

2. $5^{4n+5} = 5^{n-7}$

$4n + 5 = n - 7$

$-n \quad -n$

$3n + 5 = -7$

$3n = -12$

$n = -4$

3. $3^{k} \cdot 3^{k+2} = 3^{5k-1}$

$2k + 2 = 5k - 1$

$-5k \quad -5k$

$-3k + 2 = -1$

$-3k = -3$

$k = 1$

4. $10^{-4} \cdot 10^{9} = 10^{v+4} \cdot 10^{2v-11}$

$5 = 3v - 7$

$+7 \quad +7$

$12 = 3v$

$v = 4$

Type 2 – Equations without a Common Base

5. $6^{2x-10} = 36$

$6^{2x-10} = 6^2$

$2x - 10 = 2$

$2x = 12$

$x = 6$

6. $2^{p-7} = 8$

$2^{p-7} = 2^3$

$p - 7 = 3$

$p = 10$

7. $7^{4x+11} = \frac{1}{7}$

$7^{4x+11} = 7^{-1}$

$4x + 11 = -1$

$4x = -12$

$x = -3$

8. $32 = 2^{2m-9}$

$2^5 = 2^{2m-9}$

$5 = 2m - 9$

$+9 \quad +9$

$14 = 2m$

$m = 7$

9. $27^{2x+6} = 3^{2x}$

$3^{3(2x+6)} = 3^{2x}$

$6x + 18 = 2x$

$-6x \quad -6x$

$18 = -4x$

$x = -18/4 = -9/2$

10. $4^{y+2} = 16^{y-3}$

$4^{y+2} = 4^{2(y-3)}$

$y + 2 = -2y - 6$

$+2y \quad +2y$

$3y + 2 = -6$

$3y = -8$

$y = -8$

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11. $125^y = 25$

$5^{3y} = 5^2$

$3y = 2$

$y = 2/3$

12. $16^{3x} = 8^{x+2}$

$2^{4(3x)} = 2^{3(x+2)}$

$12x = 3x + 6$

$-3x \quad -3x$

$9x = 6$

$x = \frac{6}{9} = \frac{2}{3}$

13. $4^{3x} = 8^{x-1}$

$2^{2(3x)} = 2^{3(x-1)}$

$6x = 3x - 3$

$-3x \quad 3x$

$3x = -3$

$x = -1$

14. $81^{2x+5} = \left(\frac{1}{3}\right)^{2x}$

$3^{4(2x+5)} = 3^{-1(2x)}$

$8x + 20 = -2x$

$-8x \quad -8x$

$20 = -10x$

$x = -2$

15. $8^{2a-1} = 32^{2a+1}$

$2^{3(2a-1)} = 2^{5(2a+1)}$

$6a - 3 = 10a + 5$

$-10a \quad -10a$

$-4a - 3 = 5$

$+3 \quad +3$

$-4a = 8$

$a = -2$

16. $27^{2x} = 243^{x-2}$

$3^{3(2x)} = 3^{5(x-2)}$

$6x = 5x - 10$

$-5x \quad -5x$

$x = -10$

17. $64 = 4 \cdot 4^{4x}$

$4^3 = 4^1 \cdot 4^{4x}$

$3 = 1 + 4x$

$-1 \quad -1$

$2 = 4x$

$x = 2/4 = 1/2$

18. $9^{2x+4} \cdot 9^{2x} = \frac{1}{81}$

$9^{2x+4} \cdot 9^{2x} = 9^{-2}$

$4x + 4 = -2$

$-4 \quad -4$

$4x = -6$

$x = -6/4 = -\frac{3}{2}$

19. $\frac{1}{7} = 49^{x-5} \cdot 7^{x-9}$

$7^{-1} = 7^{2(x-5)} \cdot 7^{x-9}$

$-1 = 2x - 10 + x - 9$

$-1 = 3x - 19$

$+19 \quad +19$

$+18 = 3x$

$x = 6$

20. $4^{2x} \cdot \frac{1}{16} = 4^{6x+18}$

$4^{2x} \cdot 4^{-2} = 4^{6x+18}$

$2x - 2 = 6x + 18$

$-6x \quad -6x$

$-4x - 2 = 18$

$-4x = 20$

$x = -5$

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