Solving Exponential Equations & Inequalities

Solving Exponential Equations

Step 1 – Isolate the base
Step 2 – Write both sides of the equation as exponential expressions with LIKE
bases *Make the "Big" number small*
Step 3 – Set the EXPONENTS equal to each other (or use the same inequality)
Step 4 – Solve for the unknown

1. $3^{2x-5} = 3^{x+3}$

$2x - 5 = x + 3$

$x - 5 = 3$

$\boxed{x = 8}$

2. $2^{7x-6} > 2^{5x+2}$

$7x - 6 > 5x + 2$

$2x - 6 > 2$

$2x > 8$

$\boxed{x > 4}$

3. $3^{2x-5} = 27^{x+2}$

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

$2x - 5 = 3x + 6$

$-5 = x + 6$

$\boxed{-11 = x}$

4. $4^{3x} = 2^{x+1}$

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

$6x = x + 1$

$5x = 1$

$\boxed{x = \frac{1}{5}}$

5. $216 = 36^{2x+3}$

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

$3 = 4x + 6$

$-3 = 4x$

$\boxed{-\frac{3}{4} = x}$

6. $16^x \le 4^{3x-2}$

$(4^2)^x \le 4^{3x-2}$

$2x \le 3x - 2$

$0 \le x - 2$

$\boxed{2 \le x}$

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

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

$2x = -x + 3$

$3x = 3$

$\boxed{x = 1}$

8. $81 = \left(\frac{1}{3}\right)^{5x-6}$

$3^4 = (3^{-1})^{5x-6}$

$4 = -5x + 6$

$-2 = -5x$

$\boxed{\frac{2}{5} = x}$