Exponential Equations – Practice and Answers

Exponential equation can sometimes be solved by exploiting that one-to-one property of exponential functions. For example

\[ 2^{(4x-3)} = 16 \]

We can solve this by first writing both sides of the equation in terms of the same base. We know \( 16 = 2^4 \) so re-writing

\[ 2^{(4x-3)} = 2^4 \]

Using the one-to-one property

\[ 4x - 3 = 4 \]
\[ 4x = 7 \]
\[ x = \frac{7}{4} \]

Solve each of the following equations by using the one-to-one property of exponential functions.

1) \( 2^{2x+1} = 8 \)  
5) \( 5^{2x} = 625 \)  
9) \( 2^{5x} = 1024 \)

2) \( 5^{2x-1} = 125 \)  
6) \( 8^{2x} = 32 \)  
10) \( 2^{x^2} \times 3^{x^2} = 36^{x \frac{1}{2}} \)

3) \( 3^{2x-1} = 81 \)  
7) \( 4^{x^2+2x+1} = 16 \)

4) \( 4^{3x} = 128 \)  
8) \( 9^{6x} = 243 \)
Answers

1) $x = 1$

2) $x = 2$

3) $x = \frac{5}{2}$

4) $x = \frac{7}{6}$

5) $x = 2$

6) $x = \frac{5}{6}$

7) $x = -1 \pm \sqrt{2}$

8) $x = \frac{5}{12}$

9) $x = 2$

10) $x = 1$