Exponential equations

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $2^x = 32$. [2 marks]

$32 = 2^5$.

Answer: $x = 5$

2. Solve $9^x = 27$. [2 marks]

$3^{2x} = 3^3$, so $2x = 3$.

Answer: $x = \frac{3}{2}$

3. Solve $5^{x-1} = 125$. [2 marks]

$125 = 5^3$, so $x - 1 = 3$.

Answer: $x = 4$

4. Solve $(\frac{1}{2})^x = 8$. [2 marks]

$(\frac{1}{2})^x = 2^{-x}$ and $8 = 2^3$, so $-x = 3$.

Answer: $x = -3$

5. Solve $2^x = 7$ to 3 decimal places. [3 marks]

$x = \frac{\log 7}{\log 2} = 2.807354\ldots$.

Answer: $x \approx 2.807$

6. Explain whether $4^x + 2 = 1$ has a real solution. [3 marks]

It would require $4^x = -1$, but 4^x is positive for every real x.

Answer: No real solution.