

"Why was Papa Shoe mad at his son?"

Solve each equation. The answer to each problem will match a letter that will allow you to figure out the joke.

1. $3^x = 243$ $x = 5$ A: 16
2. $2^x = \left(\frac{1}{16}\right)$ $\frac{1}{2^4} = 2^{-4} \rightarrow x = -4$ W: -7
3. $\left(\frac{1}{3}\right)^x = 3$ $\frac{1}{3} = (3^{-1})^x = 3^{-x} = 3^1$ $x = -1$ S: $\frac{7}{2}$
4. $5^{x+2} = 25^x = 5^{2x} = 5^{x+2}$ $2x = x+2$ $x = 2$ R: -1
5. $8^{2x} = 16$ $2^{6x} = 2^4$ $6x = 4$ $x = \frac{2}{3}$ A: 5
6. $\left(\frac{1}{27}\right)^4 = 9^{2x}$ $\frac{1}{27} = \frac{1}{3^3} \mid 3^{-12} = 3^{4x}$ $x = -3$ A: -3
7. $10^{x+3} = 0.0001$ $10^{-4} = 10^{x+3}$ $x = -7$ H: 2
8. $7^x = 49^8$ $7^{16} = 7^x$ $x = 16$ F: $\frac{1}{2}$
9. $\left(\frac{4}{9}\right)^{x-2} = \frac{8}{27}$ $\left(\frac{2}{3}\right)^{2x-4} = \left(\frac{2}{3}\right)^3$ $x = \frac{7}{2}$ E: 1
10. $\left(\frac{1}{2}\right)^{x-2} = 2^x$ $2^{-x+2} = 2^x$ $x = 1$ O: -4
11. $\left(\frac{64}{125}\right)^{2x-8} = \left(\frac{25}{16}\right)^x$ $\left(\frac{4}{5}\right)^{6x-24} = \left(\frac{4}{5}\right)^{-2x}$ $x = 3$ E: $\frac{2}{3}$
12. $(2^{3x})(2^{5x}) = 16$ $2^{8x} = 2^4$ $x = \frac{1}{2}$ L: 3

H E N A S A L O A F E R
4 10 7 1 9 6 11 2 8 12 5 3

Using common bases to solve equations

Joke #12