



WORKBOOK

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Subject: Mathematics

Student:

School year:/.....

Exponential equation

An **exponential equation** is one in which a variable occurs in the exponent.

An exponential equation in which each side can be expressed in terms of the same base can be solved using the property:

If $b^x = b^y$ then $x = y$ where $b > 0$ and b



Solve:

1. $5^x = 5^3$
2. $10^{1-x} = 10^4$
3. $3^x = 9$
4. $3^{2x-1} = 27$
5. $3^{x^2-3x} = 81$
6. $4^{2x^2+2x} = 8$
7. $4^{x+1} = -$
8. $2^x = -4$

Examples:

	Solve for x.	Answer
1.	$7^{2x+1} = 7^{3x-2}$	Since the bases are the same, set the exponents equal to one another: $2x + 1 = 3x - 2$ $3 = x$
2.	$3^{2x-1} = 27^x$	27 can be expressed as a power of 3: $3^{2x-1} = (3^3)^x = 3^{3x}$ $2x - 1 = 3x$ $-1 = x$
3.	$5^{3x-8} = 25^{2x}$	25 can be expressed as a power of 5: $5^{3x-8} = (5^2)^{2x} = 5^{4x}$ $3x - 8 = 4x$ $-8 = x$

Solving Exponential equation by logarithm

Unfortunately, not all exponential equations can be expressed in terms of a common base. For these equations, logarithms are used to arrive at a solution. (You may solve using common **log** or natural **ln**.)

To solve most exponential equations:

1. Isolate the exponential expression.
2. Take log or ln of both sides.
3. Solve for the variable.

