



Question

Exponential Equation 1

Pre-Uni Maths for Sciences E3.1

Subject & topics: Maths | Functions | General Functions

Stage & difficulty: A Level P2

Solve the following for y : $4^y = 8^{y+1}$

Created for isaacphysics.org by Julia Riley.



Question

Three Exponential Equations

Subject & topics: Maths | Functions | General Functions

Stage & difficulty: A Level P2

Solve the following exponential equations.

Part A

Solve for a

Solve the equation below to find a

$$\sqrt{4^3} = 2^{\frac{a}{9}}$$

Part B

Solve for x

Solve the equation below to find x

$$5^{2(x+1)} = \frac{25^{3x+\frac{1}{2}}}{125}$$

Part C

Solve for n

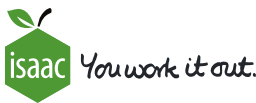
Solve the equation below to find n

$$\frac{1}{49^n} = \frac{\sqrt[3]{7}}{343^{\frac{5}{9}n}}$$

Created for isaacscience.org by Jonathan Waugh

Question deck:

STEM SMART Single Maths 8 - Logarithms



Question

Logarithm Basics

A-level Maths Topic Summaries - Logarithms

Subject & topics: Maths | Functions | General Functions Stage & difficulty: A Level P2

Without using a calculator, fill in the blanks to complete the notes on logarithms below.

Logarithms are written in the form $\log_a b$ where a and b are both numbers. a is the of the logarithm.

A logarithm asks a question: "To what power does a have to be raised to get b ?"

$9 = 3^2$	$\log_3 9 =$ <input type="text"/>
$27 = 3^3$	$\log_3 27 =$ <input type="text"/>
$\frac{1}{9} = 3^{-2}$	$\log_3 \left(\frac{1}{9}\right) =$ <input type="text"/>
$\frac{1}{27} = 3^{-3}$	$\log_3 \left(\frac{1}{27}\right) =$ <input type="text"/>
$1 = 3^0$	$\log_3 1 =$ <input type="text"/>
$\sqrt{3} = 3^{\frac{1}{2}}$	$\log_3 \sqrt{3} =$ <input type="text"/>

We can write the following equivalent statements:

$$b = a^p \quad \Leftrightarrow \quad \log_a b =$$

Items:

base

exponent

negative

positive

p

-3

-2

0

$\frac{1}{2}$

2

3

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Question

Laws of Logarithms

A-level Maths Topic Summaries - Logarithms

Subject & topics: Maths | Functions | General Functions Stage & difficulty: A Level P2

Fill in the blanks to complete the summary of the laws of logarithms below.

$a = a^1$ and $1 = a^0$. Therefore,

$\log_a a =$

$\log_a 1 =$

3 rules for manipulating logarithms:

$\log_a p + \log_a q =$

$\log_a p - \log_a q =$

$\log_a p^q =$

$\log_a x$ and a^x are inverse functions. Therefore,

$\log_a a^p =$

$a^{\log_a p} =$

Items:

p

1

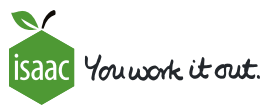
0

$q \log_a p$

$\log_a (p \times q)$

$\log_a \left(\frac{p}{q}\right)$

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Question

Log Laws 2ii

Subject & topics: Maths **Stage & difficulty:** A Level P2

Part A

Express $\log_a 2 + \log_a 3$

Express $\log_a 2 + \log_a 3$ as a single logarithm.

Note that $\log_a b$ can be typed as `log(b,a)`.

The following symbols may be useful: `a`, `log()`

Part B

Express $2 \log_{10} x - 3 \log_{10} y$

Express $2 \log_{10} x - 3 \log_{10} y$ as a single logarithm.

The following symbols may be useful: `log()`, `x`, `y`

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STEM SMART Single Maths 8 - Logarithms



Question

Log Laws 1ii

Subject & topics: Maths **Stage & difficulty:** A Level P2

Part A

Express $\log_2(x^2)$

Express $\log_2(x^2)$ in terms of $\log_2(x)$.

When you are entering your answer, note that $\log_a b$ can be written using `log(b,a)`.

The following symbols may be useful: `ln()`, `log()`, `x`

Part B

Express $\log_2(8x^2)$

Express $\log_2(8x^2)$ in terms of $\log_2(x)$.

When you are entering your answer, note that $\log_a b$ can be written using `log(b,a)`.

The following symbols may be useful: `ln()`, `log()`, `x`

Part C

Find $\log_3 y$

Given that $y^2 = 27$, find the value of $\log_3 y$.

The following symbols may be useful: $\ln()$, $\log()$, y

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STEM SMART Single Maths 8 - Logarithms



Question

Solving Equations & Logs 1ii

Subject & topics: Maths **Stage & difficulty:** A Level P2

Part A

Solve exponential equation

Use logarithms to solve the equation $5^{x-1} = 120$ for x , giving your answer correct to 3 significant figures.

Part B

Solve logarithmic equation

Solve the equation $\log_2 x + 2\log_2 3 = \log_2(x + 5)$. Give the value of x correct to 3 significant figures.

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STEM SMART Single Maths 8 - Logarithms



Question

Solving Equations & Logs 3ii

Subject & topics: Maths **Stage & difficulty:** A Level P2

Part A

Express log

Express $\log_3(4x + 7) - \log_3 x$ as a single logarithm.

When you are entering your answer, note that $\log_a b$ can be written using `log(b,a)`.

The following symbols may be useful: `ln()`, `log()`, `x`

Part B

Solve equation

Hence solve the equation $\log_3(4x + 7) - \log_3 x = 2$. Give your answer in decimal form.

Part C

Use logs

Use logarithms to solve the equation $7^x = 2^{x+1}$, giving the value of x correct to 3 significant figures.

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STEM SMART Single Maths 8 - Logarithms



Question

Log Laws 1i

Subject & topics: Maths **Stage & difficulty:** A Level P2

It is given that $\ln x = p + 2$ and $\ln y = 3p$

Part A

Log laws

Express $\ln(xy)$ in terms of p .

The following symbols may be useful: p

Part B

Simplify 1

Express $\ln(x^3)$ in terms of p .

The following symbols may be useful: p

Part C

Simplify 2

Express $\ln\left(\frac{y}{e}\right)$ in terms of p .

The following symbols may be useful: p

Part D

Solve equation

Express y in terms of x and e , simplifying your answer.

The following symbols may be useful: e , x , y

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Question

Solving Equations & Logs 3i

Subject & topics: Maths

Stage & difficulty: A Level P2

Part A

Solve equation

Solve the equation $2^{4x-1} = 3^{5-2x}$, giving your answer in the form $\frac{\log_{10} a}{\log_{10} b}$.

When you are entering your answer, note that $\log_a b$ can be written using `log(b,a)`.

The following symbols may be useful: `log()`, `x`

Part B

Find integer

Find the smallest integer n which satisfies the inequality $7^{2n} > e^{600}$.

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