

Outcome	AEq12	Student can consistently:	Solve equations involving powers of x
How the topic is examined	<ul style="list-style-type: none"> This topic is not currently examined on GCSE but certain aspects are on Level 2 Further Maths, AS/A2 mathematics and additional maths qualifications. It is likely that students would have a calculator to solve problems involving logarithms. However the ones involving powers can usually be solved without the use of one. Questions may ask students to: <ul style="list-style-type: none"> Solve a basic equation where they have to find a missing power (Level 2 further maths) Use logs to solve more complicated problems. (AS/A level) 		
Prior knowledge	<ul style="list-style-type: none"> Students should be confident with: <ul style="list-style-type: none"> Index laws (AEx3) Positive and negative powers and fractional powers. Solving basic equations (AEq1) 		
Suggested tuition approaches	<ul style="list-style-type: none"> Explain to students that they have the ability to solve many different types of equations. This section covers equations where is in the power (e.g. $3^{x+1} = 27^x$) There are two types of problems that students might come across <ol style="list-style-type: none"> Basic ones: <ul style="list-style-type: none"> These problems are characterised by the fact that the numbers can all be written as powers of a particular number, usually 2, 3, 4, 5, or 10 The steps involved are: <ul style="list-style-type: none"> Find the number that each can be written as a power of. Write each number as a power of this number. Compare the powers and solve for x Before tackling any problems like the following, students should be confident with index laws (AEx3). They should also know about fractional and negative indices. 		

	<p>Solve</p> $2^{3x-2} = 4\sqrt{2}$ <p>Each one of these numbers can be written as a power of 2</p> $2^{3x-2} = 2^2 \times 2^{0.5}$ $2^{3x-2} = 2^{2.5}$ <p>We can now equate the powers</p> $3x - 2 = 2.5$ $3x = 4.5$ $x = 1.5$	<p>Solve</p> $25^{x+2} = \frac{1}{\sqrt{125}}$ <p>Each one of these numbers can be written as a power of 5</p> $(5^2)^{x+2} = 5^{-1.5}$ $5^{2x+4} = 5^{-1.5}$ <p>We can now equate the powers</p> $2x + 4 = -1.5$ $2x = -5.5$ $x = -2.75$
<p>Common errors and misconceptions</p>	<p>2) Ones that require logarithms to solve:</p> <ul style="list-style-type: none"> Although the problems that require logarithms to solve may look easier, they require a branch of maths that students will not have met. Students often think about logarithms as the opposite of index laws. These are used when you cannot write both numbers as a power of the other number. (e.g. $2^x = 5$). The following resources will help you teach certain aspects of logarithms to students from the basics upwards. <ul style="list-style-type: none"> http://www.purplemath.com/modules/solvexpo2.htm https://www.mathsisfun.com/algebra/logarithms.html 	
<p>Suggested resources</p>	<ul style="list-style-type: none"> Questions and notes <ul style="list-style-type: none"> http://www.kutasoftware.com/FreeWorksheets/Alg2Worksheets/Solving%20Exponential%20Equations%20with%20Logarithms.pdf 	

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