

Powers and Scale



A Spire Maths Activity

<https://spiremaths.co.uk/>

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Powers and Scales – IWB files

Interactive whiteboard file information

For this pdf file

<https://spiremaths.co.uk/wp-content/uploads/PowersScale.pdf>

For an ActivInspire (Promethean) flipchart file

<https://spiremaths.co.uk/wp-content/uploads/PowersScale.flipchart>

For a Smart Notebook file

<https://spiremaths.co.uk/wp-content/uploads/PowersScale.notebook>

Pictures of pages and activities

You will possibly need to view this resource in full screen mode.

The Scale of the Universe 2

By Cary Huang
Technical support by Michael Huang
Copyright © 2012 Cary and Michael Huang (http://cjhms.org)
Music: "Phantom" by Kroyd Music (http://kroydmusic.com)

Start

Objectives related to this topic are:

- use index notation for small positive integer powers (Year 8)
- use index notation for integer powers; know and use the index laws for multiplication and division of positive integer powers (Year 9)
- use index notation with negative and fractional powers, recognising that the index laws can be applied to these as well (Year 10)
- know that $n^2 = \sqrt{n}$ and $n^3 = \sqrt[3]{n}$ for any positive number n (Year 11)

N12 Using Indices

Introduction

This Revision Bite covers:

- Powers
- Using a calculator

Overview

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Indices

Indices for Higher Tier

Lesson Ideas

All these provide ideas to help make work on Powers, Indices and Scale more relevant to pupils.

See page 4 onwards for resources that include videos, interactives, revision sources, historical information, and an active lesson plan. Also supplied links to National Centre for Excellence in the Teaching of Mathematics Departmental workshop on Index numbers (not all links work in this NCETM resource).

POWERS OF 10

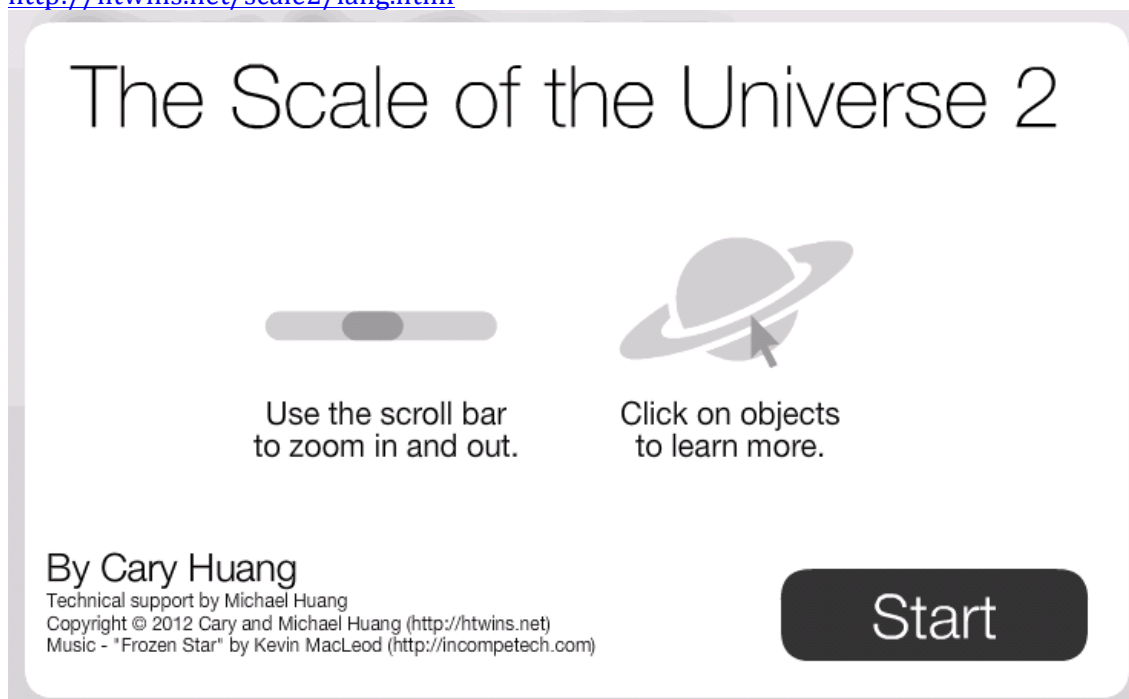
<http://www.mathstube.org.uk/watch.php?vid=34a91cc4a>



For more work from the creators of this, including mathematics content see:
<http://www.eamesoffice.com/>

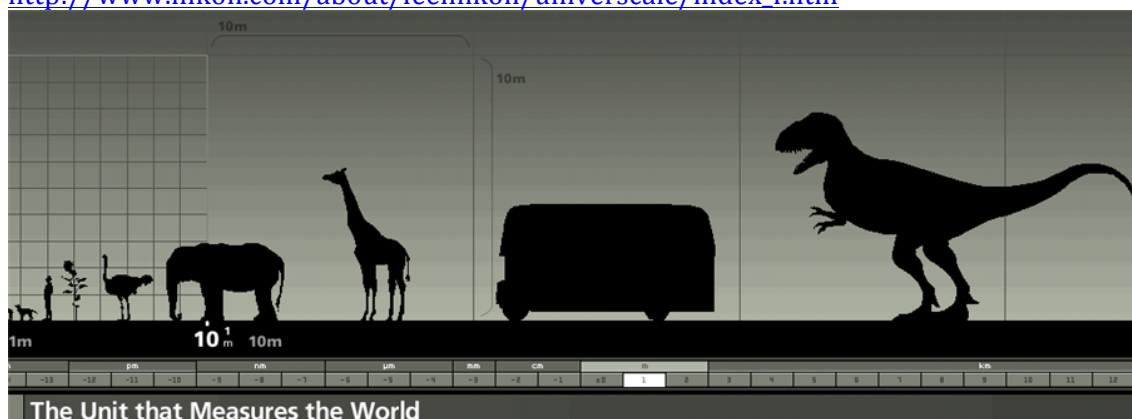
POWERS OF 10

<http://htwins.net/scale2/lang.html>



THE UNIVERSAL SCALE

http://www.nikon.com/about/feelnikon/universcale/index_f.htm



A QUESTION OF SCALE

<http://nrich.maths.org/6349>

You will possibly need to view this resource in full screen mode.

Power of 10m	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	
-1	
-2	
-3	
-4	
-5	
-6	
-7	
-8	
-9	
-10	

← Diameter of ribosome
← Diameter of a strand of cotton
← Length of a mosquito
← Width of a soccer pitch
← Depth of Mariana Trench
← Diameter of the Earth
← Distance between base pairs in a DNA
← Diameter of smallest bacterium
← Diameter of largest known bacterium
← 1 yard
← Height of the tallest redwood tree
← Height of orbit of space shuttle
← Diameter of Jupiter
← Diameter of a glucose molecule
← Size of lymphocyte
← 1 millimetre

How many are correct?


Show numbers

Get new questions

Drag the cards into place, rounding the length down to the nearest whole power of 10 m.
Standard units of length are indicated on the scale.

BBC BITESIZE REVISION

http://www.bbc.co.uk/bitesize/ks3/maths/number/powers_roots/revision/1/

Powers and roots


Page 1 | 2 | 3 | 4 | 5
Next

Squaring, cubing and higher powers are shown by small digits called indices, like 10^2 and 5^3 .

The opposite of squaring a number is finding the square root, and the same is true for cubing and cube roots.



Introduction

This Revision Bite covers:

- Powers
- Using a calculator
- Square root and cube root
- Index laws for multiplication and division

Page 1 | 2 | 3 | 4 | 5
Next

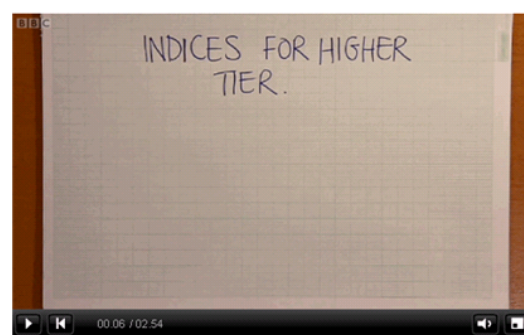
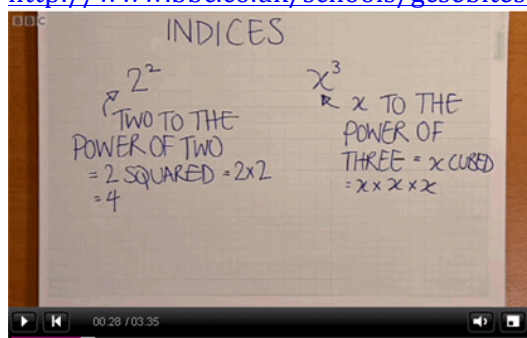
More from Powers and roots :

 Activity
 Test

TWO BBC BITESIZE REVISION VIDEOS ON INDICES

http://www.bbc.co.uk/schools/gcsebitesize/maths/videos/indices_video1.shtml

http://www.bbc.co.uk/schools/gcsebitesize/maths/videos/indices_higher_video1.shtml



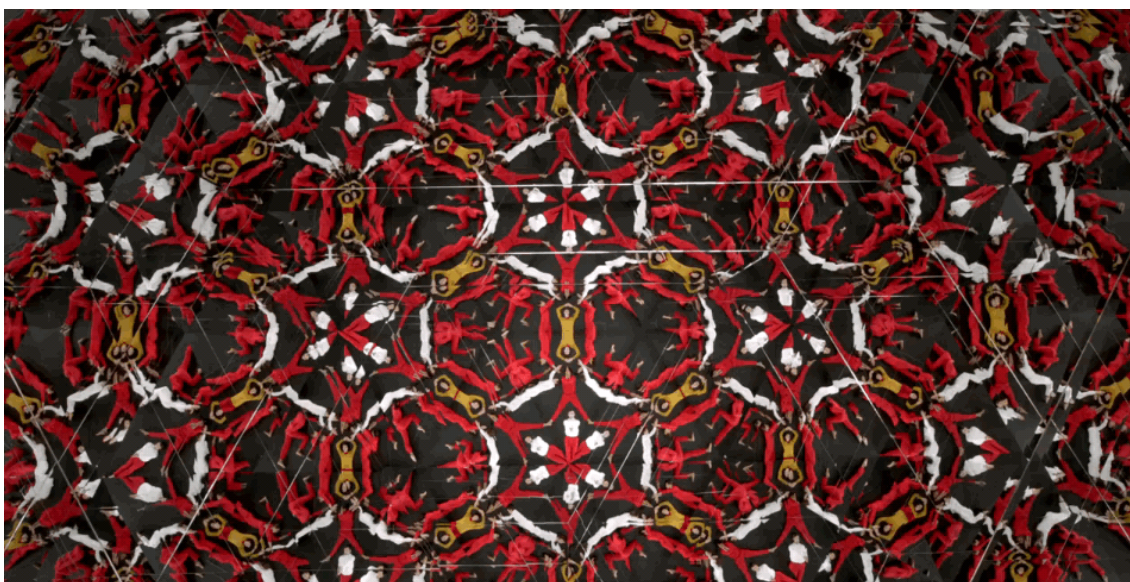
BBC CLASSROOM CLIPS: The Approximate History of Place Values

<http://www.bbc.co.uk/education/clips/zq93cdm>



TEDxSUMMIT THE POWER OF X

<http://vimeo.com/40401367>



N12 USING INDICES - Improving Learning in Mathematics (Standards Box)

<https://spiremaths.co.uk/ilim/>

For Promethean and Smart IWB files: then follow Number tag, N12

Interactive whiteboard research and CPD @ Keele

At the board

KEELE UNIVERSITY

N12 Using Indices

$x^{-\frac{3}{2}}$	x^{-1}	x^4
$\left(\frac{4}{9}\right)^{\frac{1}{2}}$	$\frac{1}{2\sqrt{x}}$	$(-1)^{-2}$

On the desk

Click for more about
At the board, On the desk, In the head

For each learner you will need:

- mini-whiteboard.
- For each small group of learners you will need: Card set A – *Pairs activity* (two pages). Each page should be photocopied onto different coloured card and cut up before the session.
- For each pair of learners you will need: Card set B – *Indices* (two pages).

In the head

Learning objectives

To introduce learners to:

- fractional and negative indices.

To enable learners to:

- evaluate numerical expressions using negative and fractional indices;
- use the rules of indices with integer and fractional powers of variables.

NCETM DEPARTMENT WORKSHOP - INDEX NUMBERS

<https://www.ncetm.org.uk/resources/13249> (if this does not work, paste into your browser)

Overview

Objectives related to this topic are:

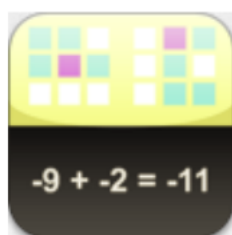
- use index notation for small positive integer powers (Year 8)
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- know that $n^{\frac{1}{2}} = \sqrt{n}$ and $n^{\frac{1}{3}} = \sqrt[3]{n}$ for any positive number n (Year 11)

Our iPad and iPhone resources

Search for Jamtec on the AppStore. We also have other non-mathematics apps. Prices correct at 6 October 2015.



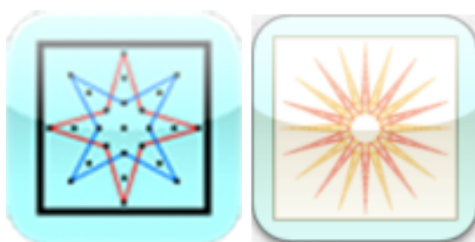
[Age-ulator](#) Free: [Randomised](#) £0.79



[Directed Numbers](#) £0.79: [Equivalents](#) £0.79: [Multiplication Pairs](#) £0.79



[Maths Charts for Jenny Eather](#) Free:
[Maths Charts for Jenny Eather \(Deluxe version\)](#) £3.99



[Grids4Maths](#) £0.79: [GeoDraw](#) £0.79 (iPad only)

Education APPs from Apple

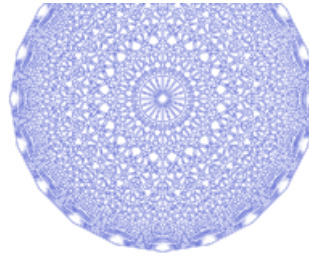
[Half price for volume purchase of some Education APPs](#)



GEO DRAW

Available on iPad iOS 5.0 or later!

(iPad only)



Grids

Circular
Isometric: horizontal
Isometric: vertical
Polar
Square



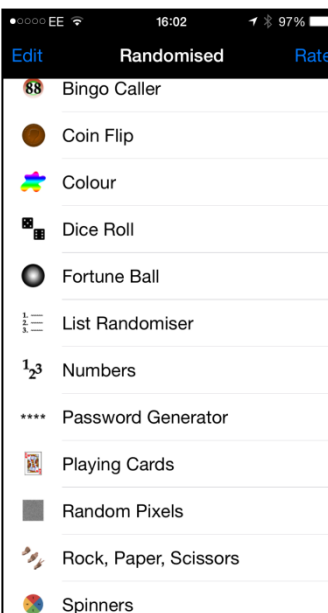
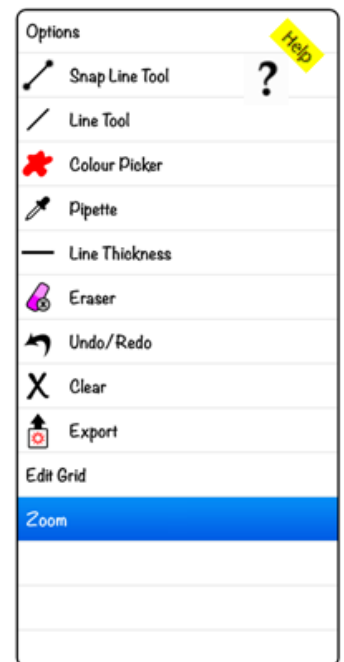
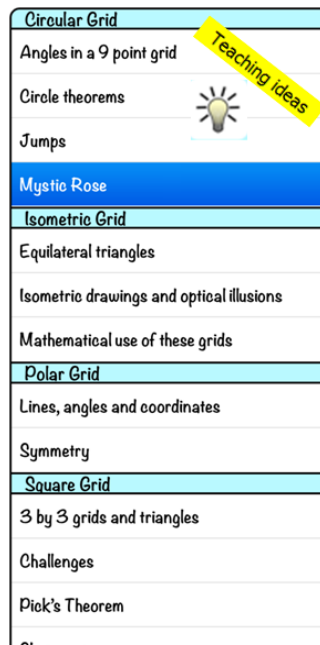
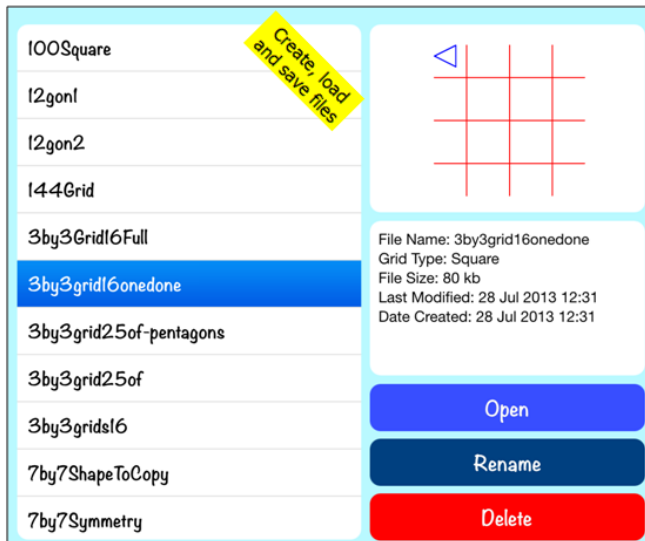
£0.79

Change

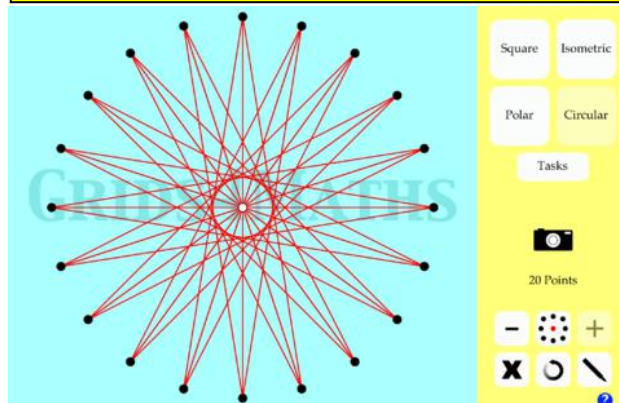
Number of grid points
Grid point size
Line thickness
Line colour

- GeoDraw offers users a choice of 5 grids for use in mathematics and D&T lessons. Send/export images with/without grid using: Bluetooth, Email, Facebook, Twitter and into Pages or Keynote.

Eligible for VPP discount
(see next page).

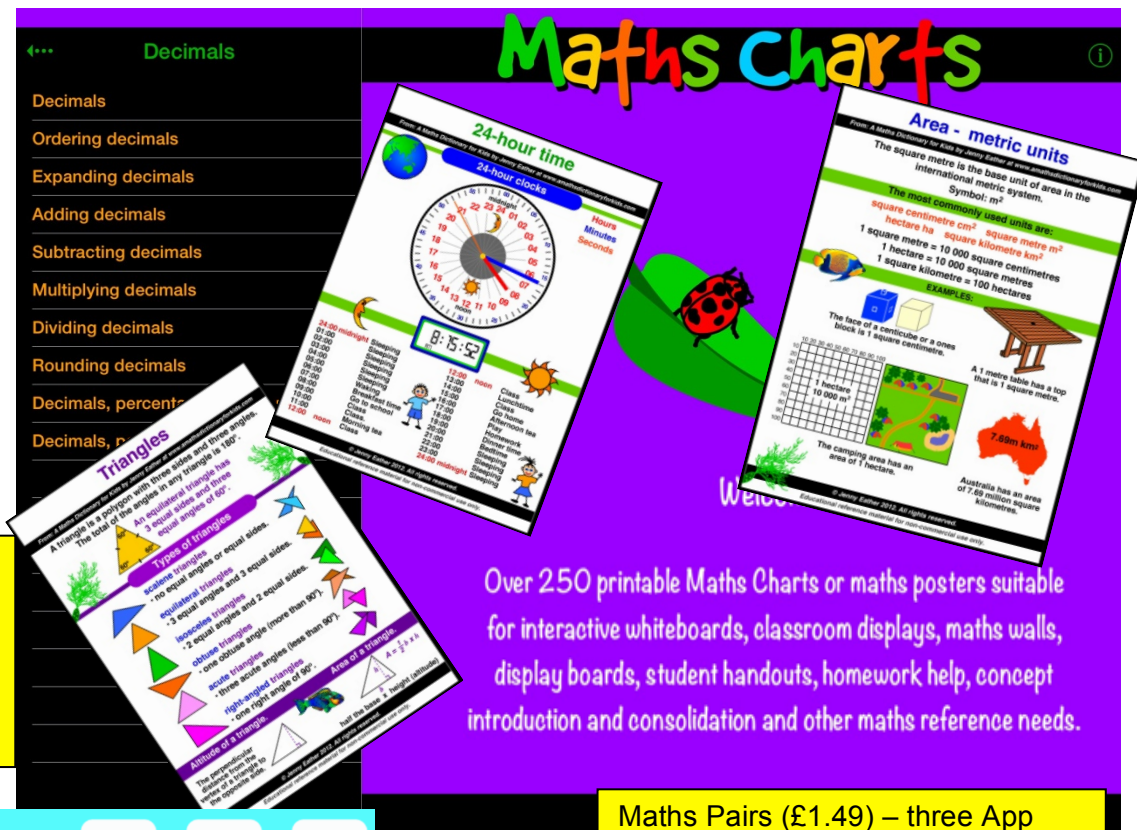


Randomised (79p): for probability lessons.
Age-ulator (free): for large number work and problem solving.
Grids4Maths (79p): much simpler version of GeoDraw for iPhones.



We've teamed up with Jenny Eather to bring her Maths Charts web resources to the iPad/iPhone. Try Maths Charts by Jenny Eather for free, then buy full Deluxe version for £3.99 (half this if you sign up for VPP with Apple and buy 20 or more copies).

Volume Purchase Programme (VPP) lets you buy Apple apps at discount rate of half price for 20 or more of the same app.



Over 250 printable Maths Charts or maths posters suitable for interactive whiteboards, classroom displays, maths walls, display boards, student handouts, homework help, concept introduction and consolidation and other maths reference needs.

$\frac{3}{8}$	$\frac{4}{5}$	$\frac{5}{8}$	$\frac{16}{36}$	$\frac{24}{30}$	$\frac{35}{63}$
$\frac{1}{9}$	$\frac{4}{9}$	$\frac{5}{9}$	$\frac{27}{36}$	$\frac{8}{72}$	$\frac{21}{56}$
$\frac{3}{5}$	$\frac{1}{7}$	$\frac{3}{4}$	$\frac{40}{64}$	$\frac{3}{21}$	$\frac{24}{40}$

Maths Pairs (£1.49) – three App bundle: eligible for VPP discount Directed Number, Equivalents and Multiplication Pairs (or 79p each).

7	x	1	=	Show
7	x	2	=	Show
7	x	3	=	Show
7	x	4	=	Show
7	x	5	=	Show
7	x	6	=	Show
7	x	7	=	Show
7	x	8	=	Show
7	x	9	=	Show
7	x	10	=	Show
7	x	11	=	Show
7	x	12	=	Show

DIRECTED NUMBER

Addition and Subtraction
Multiplication and Division
Mixed Questions
Substitution in Expressions

MULTIPLICATION PAIRS

Equivalent Fractions
Fractions and Decimals
Fractions and Percentages
Percentages and Decimals

All Tables 2 - 12

All Tables 2 - 10

Reverse Tables 2 - 12

Reverse Tables 2 - 10

Learn Tables

$a = -2$	$a = -4$	$-3 - (+2 + 5a)$
$a = +1$	$a = -4$	$+2a - -4$
$-5 - (+2a - -4)$	$+2a - -4$	
$a = -4, b = 0$	$a = +3$	$a = +2$
$-5a + -5b$	$+5 - -5a^2$	$-2a^2 + -4$

$64 \div 8$	$72 \div 12$	$48 \div 8$	9	6	5
$40 \div 8$	$70 \div 7$	$20 \div 4$	10	9	5
$72 \div 8$	$21 \div 3$	$81 \div 9$	8	6	7

Contact and further details:
In school training can be arranged to support implementation. www.jamtecstoke.co.uk
contact@jamtecstoke.co.uk