



THIRD SPACE
LEARNING

The Ultimate Guide to Hands On Maths Manipulatives

15 hands on resources every primary
classroom should have—and how to
get them on a budget



Introduction

Hands on resources - the bane of your life or an essential tool for children to get a firmer understanding of Maths? In our opinion, they fall very firmly into the 'essential' camp. We sometimes wonder where we'd be without them. And if you're one of the many schools now following an Asian-style Maths Concrete, Pictorial, Abstract approach, you'll be looking for new ways to explain the first stage.

But with so many resources out there, you need to know which will have the most impact, which are worth the investment, and, perhaps most importantly, how you can make your classroom resources budget stretch even further.

So, here's our rundown of the top 15 resources. And if you want to know our favourite one... we've saved the best till last.

1 Dienes

Summary

Plastic blocks, in ones, rows of ten and larger arrays of 100 and 1000s. These are my number one classroom resource, as they are invaluable for helping children to develop an understanding of place value. They are also great for exploring the concept of regrouping in addition and subtraction and can even be used to model the process for long division.



Suitable for

All age groups, but may want to use different resources (such as place value counters) as learning develops.

Pros

Wide area of application, easy to find, familiar, easy to use and apply.

Cons

The ones can easily go missing, not all sets allow you to separate and join ones together, not always practical to use with whole class groups if looking at very large numbers. Can be cumbersome to use.

Prices

Small sets can be purchased from around £20, class sets for roughly £100.

Where to buy

[TTS Base 10 resources](#)

Budget alternatives

Although not concrete, most whiteboard software has the option for you to manipulate images of hundreds, tens and ones on screen. Or there are plenty of free online resources which do the same:

[ABCYA Base 10 Fun](#) [Learning Box Base 10](#) [Top Marks Dienes and Coins](#)

Also, there are apps available for ipad and Android tablets.

Another option, if you only have a limited number of base ten sets, is to take photos of each type then print, copy and laminate. Not as ideal as the actual blocks but does mean each child in your class can have some to manipulate, and reinforces the size of ones, tens and hundreds.

2 Numicon

Summary

Structured apparatus with different sized and coloured pieces representing each number. One of the most popular resources for developing number sense. Numicon provide a whole approach to teaching Maths but the physical resources can be used within any Maths scheme.



Numicon's imagery uses patterns to represent each numeral. The patterns are structured so number relationships can be seen and experienced. These can also be used to teach about fractions, decimals and percentages.

Suitable for

All age groups - these have many different applications.

Pros

Endless ways for pupils to explore number relationships, very visual, teaching guides and manuals available, software available, Great resources for small group or one-to-one intervention. Numicon is also weighted so you can use it with scales (e.g. you could put a 10 piece in one side, a 4 piece in the other and then ask the children what to put with the 4 to make the scales balance), CPD courses available.

Cons

Can be prohibitively expensive if you want to use in whole class work, the smaller pieces can go missing and replacements are pricey.

Prices

£40 for a box of 80 shapes on their own, complete one to one packs from £120, manuals are an additional cost, small group packs £250- £300.

Where to buy

[Amazon Numicon](#)

Budget alternatives

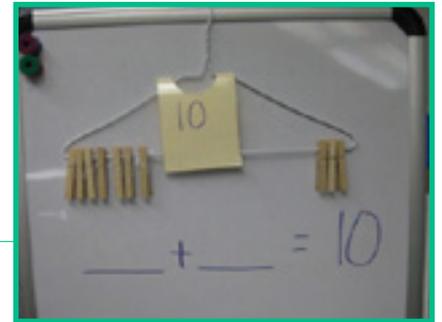
Try this similar [card version of the shapes](#)

Numicon provides pegs to go in the plastic frames which are an additional cost but you could use any small counter or item instead.

3 Clothes Pegs (Number Bonds)

Summary

Wooden or plastic clothes pegs are a good resource for teaching number bonds. You can attach to hangers to look at number bonds, write questions on them and get children to attach answers to them.



Suitable for

EYFS and KS1 to reinforce number bonds; can be used for KS2 when looking at fractions and decimal numbers.

Pros

Cheap, readily available.

Cons

Not as many different applications as some resources.

Prices

Less than £2 for a pack of 20.

Where to buy

Your local shop!

Budget alternatives

Not required.

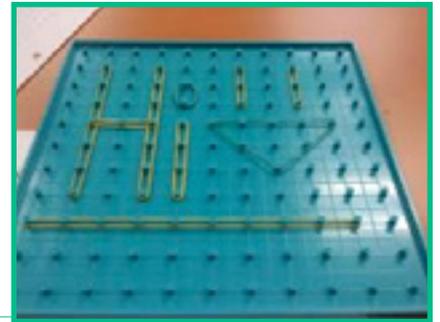
Related links

Great blog post from @magicmuinteoir on [clothes peg Maths](#)

4 Geoboards

Summary

A great way for exploring geometry. Rubber bands are stretched over the pegs to make different shapes, perfect for exploring sides and vertices, investigating area and perimeter, symmetry, angles and much, much more! A variety of different geoboards are available from isometric boards to coordinate boards.



Suitable for

Suitable for KS2 - younger children may not have the dexterity it takes to latch the rubber bands.

Pros

Hands on geometry resource perfect for creating shapes and discussing properties, especially good for children who struggle with drawing accurately.

Cons

Some children will be tempted to flick the rubber bands! Rubber bands may cause injury if not used carefully.

Prices

£9 - £12 for a pack of five geoboards.

Where to buy

[TTS bulk pack of assorted geoboards](#)

Budget alternatives

You could fashion your own out of wood and nails or [try this online version](#). Apps are available for ipads and Android tablets.

Related links

Why not try out some of these [Nrich activities](#)?

5 Place Value Arrow Cards

Summary

Place value cards are another invaluable resource to have in the classroom. Great for reinforcing place value and practising partitioning.

There are a number of different types available but I like these ones with arrow ends as it helps the pupils to line the digits up correctly.



Suitable for

KS1 and KS2.

Pros

Reinforce place value, can be used across different topics, good for partner or group activities, selection of different types available, easy to recreate your own.

Cons

Can be a nightmare to keep each set organised within the classroom leading to, "I don't have a 6 miss" or "but we don't have 300!" Avoid scrabbling around by organising cards onto the back of mini whiteboards or on pieces of card using sticky velcro strips. [Or buy an organised set here](#)

Prices

£12.99 for the plastic durable set shown in the picture above, £4.99 for ones printed on card which you can cut up yourself.

Where to buy

[TTS](#)

Budget alternatives

[Download and print your own versions](#) onto coloured card from TES

Related links

[How to use arrow cards in the classroom](#)

6 Drinking Straws

Summary

Small drinking straws can be bundled together to reinforce place value. These are an inexpensive alternative to base ten and particularly good for EYFS and KS1 as pupils can relate to them, bunching them in groups of ten or separating them.

They can also be used for shape work by getting pupils to explore and build 2d and 3d shapes by attaching them with blu-tac. You could even use them for estimating, by placing a large pile on a table and getting pupils to make sensible estimates.



Suitable for

Suitable for EYFS and KS1.

Pros

Easier to model exchanging/regrouping than base ten. Inexpensive. Can be used for both number and shape work.

Cons

Doesn't show the value of 1, 10 and 100 comparatively as clearly as base ten (it's not immediately clear when you look at a bundle of 10 that there is only 10 there).

Prices

Less than £5.

Where to buy

Supermarkets or online (Buying straws with a 'bend' could aid children when counting the numbers in a bundle, but will not be good for construction!)

Related links

Here's a [selection of TES activities](#) for exploring shapes with straws

Or give this [year 5 activity on perimeter](#) a go

7 Dominoes

Summary

Standard sets of dominoes provide innumerable opportunities for exploring number relationships in the classroom. Great for exploring how numbers can be decomposed in different ways and building knowledge of addition and subtraction facts.



Suitable for

KS1 and KS2.

Pros

Activities can be easily adjusted to differentiate for pupils working at different levels. Easy to print your own set. Great for investigative work with a partner or in small groups. You can also find dominoes with different things on them such as fractions, clocks or shapes.

Cons

Not as useful for teaching place value or counting on or back in different steps as some resources. Pieces could be lost and so won't have a full set.

Prices

Individual sets can be purchased for less than £1.50.

Where to buy

[Amazon dominoes set](#)

Budget alternatives

Print and cut out your own sets of dominoes in paper or card. [Here's a link.](#)

Related links

[Try out this dominoes activity](#) on your interactive whiteboard or on ipads

Nrich has an entire [collection of activities you can do with dominoes](#)

8 Decks of Cards

Summary

A standard deck of cards is a good resource which shows the digits, as well as symbols showing the value of each number. These are good for motivating pupils in lessons, as cards are usually associated with playing games so pupils may not even feel like they are having a Maths lesson!



They can be used in early years to look at the cardinal value of numbers and go right up to higher KS2, where you can use them to explore ratio (what is the ratio of picture cards to the rest of the suit?). Cards are fantastic for investigative work too.

Suitable for

KS1 and KS2.

Pros

Inexpensive, easily adaptable for a wide range of number activities and topic areas.

Cons

Making sure you keep them organised in the classroom!

Prices

£1 for a deck.

Where to buy

[TTS Playing Cards](#)

Budget alternatives

Again, you can always print and cut up your own!

Related links

Some good [Maths starters ideas here](#) (also can be used as main activities!)

9 Dice

Summary

Dice are really good for engaging pupils in fun Maths activities. They are particularly suitable for getting pupils to carry out quick mental Maths tasks. You can also get a range of different sided dice which makes differentiation within the classroom easier.

Try creating your own dice using blank ones - you can write in different operations, use fractions, decimals and percentage - the variations are endless.



Suitable for

All age groups.

Pros

Inexpensive, quick to plan into lessons and use.

Cons

Putting up with the noise of your whole class rolling dice at their tables! Combat this and save your sanity by purchasing foam dice. Not initially so ideal for working with larger numbers, but children can create these by rolling the dice several times.

Prices

You can get a large jar of 200 foam dice for about £20. Or a smaller jar of mixed dice for £10.

Where to buy

[Here's a very wide range of dice to choose from](#)

Budget alternatives

Fashion your own dice from using [DIY air dry clay](#)

The benefit of this means you can also draw anything you want on the faces e.g. if you want to use the dice for a fractions game, just draw fractions on each side with permanent marker when dry.

Related links

[Lots of different dice activities for Maths](#)

[Sowe Valley Primary School's Dice Games](#)

10 Bead Strings

Summary

Most classrooms will have a set of bead strings and they really are an essential item. These normally consist of a short string with beads on, each alternate group of ten coloured differently. These are great for counting on and back in ones or tens but can be used in lots of other ways too.

You can explore number bonds to 10 or 100, you can also use bead strings as a visual way of demonstrating fractions, decimals, percentages and the four operations.



Suitable for

All year groups.

Pros

Great tool for looking at counting on and back, helping pupils understand number lines. Good to provoke exploration and discussion. Very interactive and tactile. Can be used in a variety of ways.

Cons

Some pupils may over-rely on them rather than use them as an exploration tool.

Prices

Around £3-£4 for one string with 100 beads, £100 for a pack of 30.

Where to buy

[Craftpacks Beads](#)

Budget alternatives

Make your own using string and cheap buttons or beads.

Related links

[This article provides](#) 100 different activities you could tryout using bead strings

11 Cuisenaire Rods

Summary

Plastic or wooden rods are coloured coded depending on their size (from 1 unit to 10 units). They have a whole host of applications including number bonds, patterns, fractions, decimals, bar-modelling, scaling, ratios and much, much more.



Suitable for

KS1 and KS2.

Pros

Very versatile, comes in a storage box so easy to tidy away. Fantastic for investigations and algebra too!

Cons

Could lose some of them, especially the smaller parts. Will need enough sets for the whole class so will be costly.

Prices

Costs £26 for a set

Where to buy

[Cuisenaire](#)

Budget alternatives

An interactive online teaching tool from [Nrich](#). Apps available on ipads and Android tablets.

Related links

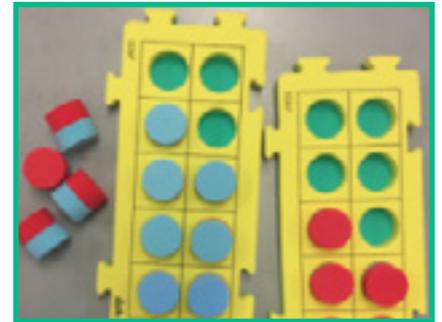
[Try some of these activities](#)

12 Tens Frame

Summary

Have you ever had a student in upper KS2 still count on their fingers when adding 37 and 8? This is because he/she has not grasped the idea that single digits can also be partitioned and used to aid mental addition (or subtraction).

Tens frames help pupils realise that numbers can be manipulated to suit their needs and soon won't be needing to use the concrete materials as they learn number bonds and visualisation. Tens frames can also be used to teach fractions and decimals.



Suitable for

KS1 (and KS2 for those children who struggle with mental addition and subtraction).

Pros

Helps pupils to see why numbers should be partitioned to make ten and reinforces number bonds of numbers up to and including ten.

Cons

Expensive and fiddly.

Prices

Costs around £25 for a pack of 6.

Where to buy

[TTS magnetic foam tens frame](#)

Budget alternatives

[Try Smart Exchange Interactive Ten Frame](#)

[Ten Frame from Illuminations NCTM](#)

Make your own using egg boxes (ensure that there are 10 'cups' by cutting them down to size and then dropping counters, cubes or pasta shells into your tens frames. Also, there are many online versions and games that could be used when teaching the whole class.

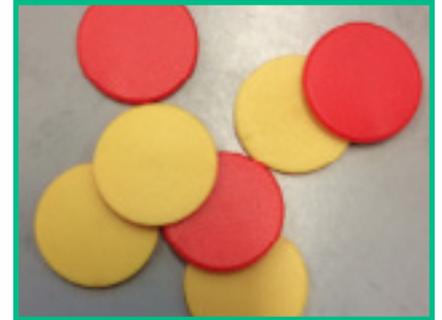
Related links

[Sense of 'ten'](#)

13 Two-coloured Counters

Summary

Counters with a different colour on the flipside are perfect to demonstrate number bonds of all numbers up to ten and even beyond. These counters clearly show how 8, for example, can be made from 1 and 7, or 2 and 6 simply by flipping over the counter - conceptually, nothing is removed as the counters are not replaced with different coloured ones, but just turned over. Also very powerful when teaching the 'difference' between two numbers.



Suitable for

EYFS and KS1.

Pros

Very visual and conceptually easier for children to understand as counters are not removed and replaced at any point.

Cons

Limited applications.

Prices

Costs £8.99 for a 200 pack of counters.

Where to buy

[TTS Two Colour Counters](#)

Budget alternatives

Make your own by sticking two different coloured counters together. Alternatively, stick two coloured card together and cut out your own [or try these](#)

Related links

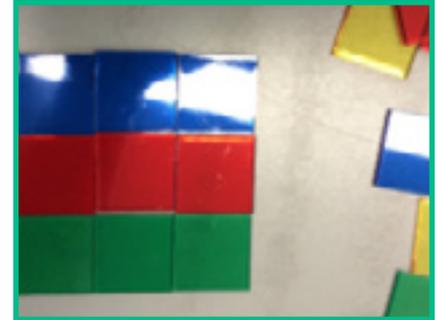
[Try some of these activities](#)

14 Square Counters

Summary

Square shaped counters that can be used for counting, but are also fabulous for demonstrating arrays and linking to times tables. This also directly corresponds to the concept of area of rectangles and square units.

For younger children, the counters could be used for sorting and sequencing, and for older children, they can be used for fraction work.



Suitable for

Suitable for all year groups.

Pros

The concept of square units to represent area is very obvious. Lightweight, colourful and inexpensive. Many applications.

Cons

It's another set of counters to buy!

Prices

Costs £14.39 for a 1000 square counters.

Where to buy

[Reflections on Learning Transparent Square Tiles](#)

Budget alternatives

[Make your own by cutting sheets of foam into squares](#)

Related links

Try some of these activities [Coloured Square Tiles from Mr London's class](#)

[An interactive square tiles game from Study Ladder](#)

15 Place Value Counters

Summary

These I couldn't be without! These counters show place value from 'hundredths' to a 'million' and are invaluable for teaching all four operations – particularly for multiplication and division.

The counters give a concrete representation of the number, especially important when working with larger numbers and decimal numbers. Algorithms like grid method and 'bus-stop' method can also be clearly demonstrated [with these counters](#).



Suitable for

Suitable for KS2 (though you could use HTUs with KS1).

Pros

Fantastic when working with larger numbers and decimal numbers. You can relate the counters to a real-life context to make it more meaningful for children e.g. the counters could represent stickers. Pupils can see why exchange (carrying or decomposition) needs to happen before linking this to the algorithm.

Cons

Can sometimes be cumbersome, especially when exchanging large amounts. Pupils may get distracted by playing 'tiddly winks'! They are expensive but definitely a worthwhile resource.

Prices

Class set costs around £100.

Where to buy

[TTS coloured plastic place value counters](#)

Budget alternatives

Make your own using plain counters and permanent marker [or laminate and cut out here](#) (Use the square counters and print on different coloured card to make life easier!)

Related links

Place value counters (sometimes known as place value disks) can be used to aid understanding of all four operations – there are various websites that demonstrate how to use them effectively and there's even [a Pinterest board!](#)



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For more resources like this sign up at:
www.thirdspacelearning.com/blog

If you think we've missed your favourite classroom manipulative, let us know and we'll add it the guide when we next revise it. Email hello@thirdspacelearning.com

At Third Space Learning, we are Maths specialists who have delivered more than 100,000 online lessons to pupils in England and Wales. Our one-to-one interventions boost pupils' confidence, accelerate their progress and raise their attainment in Maths.

"With Third Space, our pupils improved by 2-3 sub-levels in only one term. One of the major benefits of one-to-one tuition is the individual interaction and feedback each pupil receives from their tutor. This really boosted their confidence and has been reflected in their class work."

Kevin Imbush, Somers Heath Primary School 2014

"Our Third Space pupils were all low ability, but they absolutely smashed their maths SATs!"

Alex Knight, Edwalton Primary School

Get in touch

If you have pupils who struggle in Maths and would benefit from one-to-one Maths tuition that is personalised to their own learning gaps, visit www.thirdspacelearning.com and book a demo. Our schools team would be delighted to talk to you.

Contact us today!

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