# ATM/MA joint primary group - tools and tasks for home learning (and teaching)

This bank of ideas was generated by members of the ATM/MA joint primary group, during and after an online meeting on 30th January 2021. The names of contributors have been removed.

VIVIEN TOWNSEND JAN 12, 2021 02:18PM

## on-screen (and off-screen) manipulatives

# Ideas on using manipulatives and representations remotely

#### Making virtual numbers and shapes.pptx by Spot On With Numbers

GOOGLE DRIVE



## Manipulatives

#### Manipulatives

Another great website with virtual manipulatives https://www.didax.com/math/virtual-manipulatives.html? Another excellent source of virtual manipulatives online https://wwwk6.thinkcentral.com/content/hsp/math/mathinfocus/common /itools\_int\_9780547673844\_/main.html Virtual Manipulatives (like MathsBot) https://toytheater.com/category/teacher-tools/virtualmanipulatives/ Superb manipulatives to support a range of mathematical topics - https://www.geogebra.org/m/xnrmmkjt Berkeley Everett's WordPress site has grown over the few years it has been around. The visuals explain some of the trickiest parts of mathematics and these are particularly helpful with children who struggle with mathematics or if you simply require another model to strengthen understanding for all children. https://mathvisuals.wordpress.com/ Multiplication Course - Steve Wyborney https://m.youtube.com/playlist?list=PL9womXq-

z7vAHDpuPBnLMu4-g1S5e2V8k

https://stevewyborney.com/2020/08/the-multiplicationcourse-by-steve-wyborney/

#### More sources of online manipulatives:

<u>https://www.mathlearningcenter.org/resources/apps</u> <u>https://www.didax.com/math/virtual-manipulatives.html</u> <u>https://www.mathies.ca/learningTools.php#gsc.tab=0</u> <u>https://mathigon.org/polypad</u> - Shape <u>https://toytheater.com/category/teacher-tools/virtual-</u> <u>manipulatives/</u>

## Useful models and images online

Adjustable 100 squares: https://www.helpingwithmath.com/printables/tables\_charts/1 nbt1-numbers-chart01.htm Adjustable number lines: https://www.helpingwithmath.com/printables/others/Number LineGenerator01.htm 100 Square Jigsaw: https://nrich.maths.org/5572 http://www.pdst.ie/sites/default/files/100%20square%20jigsa w.pdf Images for mathematical discussions: http://ntimages.weebly.com/photos.html Estimation Clip Board is a fantastic range of photos to estimate from. Questions are given. Works brilliantly in EY-Early KS2: http://www.stevewyborney.com/?p=1483 Useful website for subitising and estimation: http://www.estimation180.com/ Printable manipulatives: http://www.mathematicalpractices.com/mple/content/printab le-manipulatives/ Interactive manipulatives: https://www.mathplayground.com/ https://www.explorelearning.com/index.cfm? method=cSearch.actDoSearch&NewSearch=1&uncompiledQuery =mathematics https://www.wootmath.com/interactive/topic/making-senseof-decimals https://mathsbot.com/#Manipulatives Outstanding Visual Mathematics Interactive Tool: https://mathvisuals.wordpress.com/ Maths is Visual - Modelling Videos: http://mathisvisual.com/ Splat: https://www.stevewyborney.com/?p=893 Frayer Model and More to Explore Vocabulary: https://nonexamples.com/compareNCETM Number blocks Materials: https://www.ncetm.org.uk/classroom-resources/eynumberblocks-support-materials/

Useful App to support mathematical concepts: https://www.mathlearningcenter.org/resources/apps NCETM – Teaching Fractions Support: https://www.ncetm.org.uk/teaching-for-mastery/masterymaterials/primary-mastery-professionaldevelopment/fractions/ NCETM Mastery PD Materials: https://www.ncetm.org.uk/teaching-for-mastery/masterymaterials/primary-mastery-professional-development/

## Didax

Free to use browser based manipulatives...I particularly like the way you can fill a 'fast five' in the ten frames

#### Virtual Manipulatives

JavaScript seems to be disabled in your browser. For the best experience on our site, be sure to turn on Javascript in your browser. Free to use browser-based manipulatives Our ad-free Virtual Manipulatives are a great way to



enhance at-home learning. Simply drag the manipulatives into position to see math concepts come alive!

DIDAX

## For IWB and tablet



TEACHERLED

## balance and equivalence

NRICH: EY and primary interactivities exploring balance and equivalence <u>https://nrich.maths.org/14794</u>

## **NRICH general manipulatives:**

Interactive spinners and dice

Geoboards (rectangular and circular)

<u>Interactive balance</u> (drag numbers and/or calculations on to the 'pans')

Dominoes

Cuisenaire

Tessellation

#### Tangram browser

You can find the above general manipulatives and all primary tasks on NRICH which include some kind of onscreen interactive on our <u>Primary Interactive Resources page</u>.

# making connections between virtual and physical manipulatives

A super idea I came across was to use virtual manipulatives alongside photographs of familiar resources to enable the cognitive links to be made

Great idea about photos ! Once the virtual manipulatives have been seen - how realistic is it to re-model these with stuff around the home?

Pipe cleaners and beads from Poundland (other shops available) make a lovely Rekenrek

stones/buttons, straws to represent tens and ones Elastic thread with beads on card works very well for Rekenrek. I've been trying penne on strings looped in tens as home made one and tens. Tried button bead strings too When using food as manipulatives we need to consider the

message this gives to those who are struggling to put food on the table.

I gave up [on virtual money] and use real money in my lesson and encourage parents to use real coins too. It can't be an either/or with manipulative and virtual. The strength is where they interact. But

I photocopied tens frames, Numicon 1-10(coloured), number lines, coloured counters etc. and sent these home to try and encourage children to use in the maths activities.

This is the info I sent to our ITT trainees ahead of their PGCE programme. <u>https://drive.google.com/drive/folders/108c1-7DLSSHetqMJWj2BTlzWTnDcIJUN</u>

The folder includes:

- things to print out or draw (that could be inserted into a plastic wallet as a mini white board

- fractions pieces to print/draw and cut out

- resources to gather - including what the in-school versions look like

## Mathigon

#### Mathigon - Textbook of the Future

Interactive. Personalised. Free. Watch Overview Our unique content format makes learning more interactive than ever before. Students can explore, discover and actively engage in problem



solving and creativity. The content can seamlessly adapt to different students, allowing everyone to achieve mastery. A virtual personal tutor gives real-time hints and encouragement.

MATHIGON

## Interactive geoboard

I've found this resource incredibly useful during remote learning when looking at geometry. The children love it because it links to their experience with geoboards at school. They can take a screenshot to share their work with me at the end of the lesson.

#### Geoboard by The Math Learning Center



Geoboard is a tool for mathematical exploration. Stretch bands around the pegs to form line segments and polygons, and make discoveries about

perimeter, area, angles, congruence, fractions, and more.

MATHLEARNINGCENTER

## Polypad

Includes some elements that work with younger children.

#### Polypad - Virtual Manipulatives -Mathigon

Virtual Manipulatives for Mathematics Classrooms: polygons, number and algebra tiles, fraction bars, tangram, pentominoes, and more.



MATHIGON

## Mathsbot

Many resources but a good few manipulative - need to scroll through all.

some fab tools here - I've used the bar model tool and the counters



Interactive tools and activites to aid the teaching of mathematics. Hundreds of randomly generated questions and answers.

MATHSBOT

## Math Learning Center

There are some fantastic online tools here - there's a clock, a fractions tool, a grid multiplication tool, a 10s frame tool, a rekenrek etc ....

the Dienes ('number pieces') can be exchanged and regrouped very neatly

#### Free Math Apps

Free Math Apps These apps are based on the visual models featured in Bridges in Mathematics. All apps are available in two or more versions: a web app for all modern browsers, and downloadable



versions for specific operating systems and devices (such as Apple iOS for iPad).

THE MATH LEARNING CENTER

**ITPs - Mathsframe ITPs - Tablet Friendly Versions** MATHSFRAME



#### Math Tools

American so not suitable for money as dollars. https://media.pk12ls.com/curriculum/math/Investigations3/To

ols/index.html#



## Brainingcamp

Not free but lots of manipulatives and with the advantage of a pen tool to write on screen. Contact direct and try for a free licence

# · Broin BRAININGCAMP 101 WEBINAR

## **Toy Theater - virtual manipulatives**

#### Teacher Tools " Toy Theater | Learn \* Create \* Play

A collection of interactive manipulatives and assessment tools to illustrate and assess basic math concepts: addition, subtraction, multiplication, division, probability.

TOY THEATER | LEARN \* CREATE \* PLAY



#### ITPs of old

## teacher/learner tools for onscreen lessons

#### Whiteboard.fi

I miss seeing jottings that students make and although I've only dabbled so far, this looks to be a nice way to capture these. (see picture)

ooo I've not tried this - I have asked my trainees to have a miniwhiteboard (or make one with a piece of paper and a plastic wallet) that they can hold up to the screen



## **Atom Learning**

An online homework and remote learning platform where you can construct lessons (video explanations/worked examples/questions).

The lessons and homework tasks can be set per curriculum topic. Questions can be chosen by you OR you can set the AI software to adjust the difficulty of questions based on how many questions they've answered correctly.

It is free for schools. Parents can subscribe for extra support (often for 11+ or other assessments).



ATOMLEARNING

#### Loom

This is a neat free tool for recording some modelling – I've found it useful to use with either the MathsBot or the Math Learning Center tools, moving the manipulatives and providing a narration.

I love Loom – sign up for an Education account if in school to get for free and have a longer time limit for recording (otherwise it's 5 mins for free only).



LOOM

## **Google Jamboard**

Whiteboard to share with learners – you can work on something together so teacher and children interact on the same board. Integrates with google products easily.

I've made a 'why and how to use Jamboard' video for our local ITT community ... enjoy! <u>https://youtu.be/yy7Ji5Dv9JU</u>



## Padlet

This tool can be useful for collating responses from pupils/parents. I created a 'how to' video for our trainee teachers who were interested in trying it out: <u>https://youtu.be/CwAFmYFKiq8</u>



## Hue visualiser

I've found this very useful. Easy to switch between my webcam and visualiser when teaching online.

And here's a great visualiser hack using tins of beans .... https://twitter.com/joedale/status/1241299751590604801

#### HUE

Colorful, affordable technology to inspire creative learning and teaching HUE



## Bank of tools from @MrAWGordon\_

a collection of online tools



# activities and games for away from the screen

#### Famly - blog

Strategies for supporting maths at home (that don't involve screen time). <u>https://famly.co/blog/covid-19/helen-williams-maths-at-home/</u>

## NON-Screen Activities to do at home with everyday resources

#### Kitchen

Party time:

- (Measuring) jugs and containers how many of the same size containers (e.g. cups) will the jug fill? If there are a given number of people how many jugs will be needed? How many drinks from a bottle of squash if they are filled to the same amount (including using a small container to measure).
- If everyone was to have a sandwich how much bread/filling would be needed.
- Ingredients to make cake/cupcakes
- Organising the work schedule to make cakes (or a meal) on a time line.
- Bags of crisps what weight will each person get?

#### Store cupboard:

- Without looking at weights on packets or tins put them in order of size/weight. Check by then looking at the packet weights.
- Best value using shopping lists how many items, how much each item how much for £1.
- Stacking small boxes inside a larger one, best approach. Use of volumes.

#### Other resources:

- Shopping lists, sorting products, adding quickly (estimation/rounding), grouping.
- Chairs which is the most comfortable for different members of the family, measure upper and lower legs to

see if this is relevant, can also do chairs and height of table with different family members.

- Body measurements so doesn't matter if you don't have a ruler or tape. How many steps ... hand spans ... thumb lengths ... finger nails ... arm lengths etc. is ...
- What can you do in one minute such as writing your name, star jumps ... ? Does practice improve your score?
- Dice what scores can you get from 1, 2, 3 ... predict which are the most common then test.
- Dominoes play standard game then try different rules such as the end must always add to ?
- Board games and cards including those like Top Trumps (small ones can learn place value quite quickly when it means they can beat their brother!)
- How far does one rotation of a bicycle pedal take you? Try different gears which takes you the furthest? Measure in handspans or a ruler/tape.
- Robot instructions if more than one person (aka as Logo moves), draw a plan then devise a route. If more than one person they can test your route (remembering to check their stride against yours).

#### Newspapers/magazines/books Football tables:

- Averages in different leagues
- Times of goals scored
- What would happen to who was at the top/bottom of a league if a win was two points and not three as it was years ago.

#### Newspapers/magazines:

- How wide are the columns in cm and average number of words?
- Lengths of words
- Are all the papers the same and who are they aimed at?
- Letter frequency (useful when solving word puzzles)

#### Books:

- Size of print for different ages children/adults
- Number of words on a page
- Lengths of words
- Letter frequency

#### Outside the home:

- On a walk colours of cars/ front doors/peoples jackets and coats. Make a hypothesis then test.
- Types of transport including bicycles and skateboards.
- Draw a map of a walk, how long will it take? Test.
- Count paces as a measure of distance then measure to work out approximate distance travelled.

#### Natural World

- Bird watching, how many visit at different times of the day? Put them into types e.g. large/small, those who come to the ground to feed or stay in the sky, how many can you identify?
- Heights & girths of trees (height can be done without a clinometer)
- Measure something growing at regular intervals
- How many petals on different types of flowers (Fibonacci)

#### **Garden Bird Watch**

We put Garden Bird watch down as an activity too.

#### Big Garden Birdwatch | Join the fun - The RSPB

Thank you for taking part in Big Garden Birdwatch 2021. Remember to submit your results by 19 Feb. We hope you enjoyed taking part in Big Garden



Birdwatch. Whatever you see - even if

nothing at all - it matters as the more people who take part, the better the snapshot we will have of how our garden birds are doing.

THE RSPB

#### ideas for non-screen days

Helen: Non-screen days - board games, treasure hunts with map-making, ATM snacks... origami

## James Brunt style environmental art

see @RFJamesUK



## **Creative Star Learning**

Ideas for messy maths outdoors!!!

#### Maths Outdoors

There's almost 80 blog posts with ideas and suggestions to support you to develop your maths provision outside, be this in the early years or primary school. Most are open-ended and can be easily adjusted to the level at which you work.



CREATIVE STAR LEARNING | I'M A TEACHER, GET ME OUTSIDE HERE!

## Katie Morag-inspired work!

We have done our first non screen day this Friday. We tied it with our literacy- we had children making 'porridgies' from Katie Morag- children weighed out ingredients. We also had children recreate the Isle of Coll using Lego and anything they could find at home- results were brilliant. We had puppet retellings of their own stories from Katie Morag, freeze frame recreations from parts of the story. The work we viewed was lovely. Kids and parents seemed to thoroughly enjoy it. Y1-Y2 age.

#### strategy games

Several useful games are discussed in "strategy games to enhance problem-solving in maths" by Posamentier and Krulik

#### Nim

I use Nim extensively for number awareness...

file NRICH.MATHS.ORG



## padlock challenges

We use padlock challenges from Rachael Horsman and bring in NRICH puzzles too. I use this with my Y3 puzzle club. They solve puzzles and then collaboratively agree on numbers which make up part of the padlock code. Eventually they have 5 digits and see whether the padlock is unlocked. I also have the class puppet at home so Warren the rabbit helps too!

#### Shop

Padlock Challenges is a motivating, innovative and practical way to enable students (Key stage 3 and 4) to engage with algebra and numbers. It is a comprehensive set of worksheets from which teachers can construct their own pupil booklets or classroom posters containing a selected set of challenges. M-A



## ATM's L game

#### L - Game

L - A Mathemagical Adventure was was first published by ATM in 1984 and was at that time a ground-breaking mathematical adventure game. The game began: It is a very hot day. You are sitting on the grass outside a crumbling palace.



ATM

#### ATM maths snacks

a collection of starting points - the videos support pupils and parents to understand how the game can be played - VERY GOOD!

#### Maths Snacks Videos

ATM experts are sharing ideas through Maths Snacks videos, to support children and parents whilst children are away from school for whatever reason or for use in the classroom. The videos are

a mix of tasks, puzzles, challenges and games; selected to support and enrich mathematics taught at school.

ATM

#### collaborative problems

Twinkl murder mysteries. Could give one clue to each group of pupils and feed back to find the culprit of the crime! <u>https://www.twinkl.co.uk/search?term=murder%20mystery</u>

#### **Numeracy Resources CD**

This CD from Bob Ansell is just as relevant today as when he first published it. He updated it in 2018, but it all seems to be online and free now. Amazing resource I have used for 20 years! Lots of games using digit cards and more.

<u>https://www.numeracycd.com/</u>. A pack of cards is a useful resource too, and more have a pack at home. There are sooooo many games to play – look online.

# Michael Minas - videos of him and his son (Nash) playing games at home

this is such an inspiring collection of videos (66 games in total) which use paper/pencil, playing cards, lego, counters, dice... The games include...

- 5 in a row
- lego barrier game
- half, more or less
- poison numbers
- square numbers game
- closest to 10
- multiplication ludo
- the product game
- ten frame filler

#### **Michael Minas**

With so many families grappling with the effects of COVID-19 and trying to provide quality home-schooling for their children, I decided to share some of my favourite maths games. All of the games have



been selected because they are filled with rich learning opportunities, do not require very much in terms of resources and are both fun and easy to play.

## dice and board games...

I have been promoting board games, dice games and domino games, and shut the box has been very popular. Games that can be easily played at home if they have dice or dominoes (or can be picked up quite cheap in a supermarket)

#### Games for at home and with teachers

These are some games that I used at home last summer with my son before he started Reception around subitising:

• <u>https://drive.google.com/drive/folders/1rudpl3D4s3y-</u> NXcn8ZhseAjvAxNwnrSz?usp=sharing

I've used these games in PD sessions with teachers:

- <u>https://drive.google.com/file/d/1aJjiA2w6JYBY19GDTEV</u> <u>aWZpmfCrxpaXG/view?usp=sharing</u>
- <u>https://drive.google.com/file/d/10wmKRDZs9us3SJHu</u> <u>M\_EagPO3fVSLLKy7/view?usp=sharing</u>

Nothing revolutionary, but may be of some use!

## Herts for Learning - blog

this blog promotes games and activities for developing mathematical thinking at home - and links to lots of useful ideas!

## Unexpected activities that could help children get better at maths

A recent(ish) Twitter conversation with Dr Helen J Williams (@helenjwc) about her wishes for a jigsaw club to exist in



schools and our subsequent reasons why this would be a good idea, inspired this blog. No curriculum can fully capture the range of human activity that supports the learning of a discipline (or at least not one that can be easily digestible by busy teachers).

HERTS FOR LEARNING

# Some reading and suggestions for games etc...

My blog contains some entries describing games I have written for early years' families: <u>https://info125328.wixsite.com/website</u>

And James' Russo (@surfmaths) has had some great stuff going on with his son - short videos and here is an article: <u>https://primarylearning.com.au/2020/08/16/whats-your-favourite-maths-game/</u> And look at this blog: <u>https://www.michaelaepstein.com.au/post/mathematical-thinking-with-games</u>

#### **Babcock home learning resources**

I love these tasks which use resources children are likely to have at home. For Y1/2, Y3/4 and Y5/6.

#### Mathematics Learning Resources COVID-19



We are offering support to all adults working with children over the coming weeks and months, with the aim that we

engage children in positive mathematical experiences where they are encouraged to think, notice and wonder. This is an opportunity for learners to experience the beauty and creativity of mathematics.

BABCOCKLDP

## dice games!

a selection of games for KS1 and KS2

#### **Playing with Dice**

MATHS

New term, new classes? Playing with dice can tell you a lot about how your new pupils think.



#### 10 ways with ....

This is a collection of tasks that I put together for subject leaders a few years ago ... 10 activities with each of:

3D shapes, 100 square, calculator, chalk, compare bears,

cuisenaire, dice, digit cards, dominoes, multilink, playing cards, polydron

10 ways with COLLECTION.zip
by Vivien Townsend
GOOGLE DRIVE

## **Science Museum Group**

At the Science Museum, we've developed some hands-on activities related to maths.

#### Maths resources for home learning

- Science Museum Group Learning Teachers can use our Maths resources in the classroom, while families can use them to support home learning and help build confidence in maths at home. Get



your class interacting with maths! These activities have easy to follow, step-by-step instructions using simple materials.

LEARNING

## **STEM learning**

primary maths activities for home learning

## Primary resources for home learning

Starters for STEM are ten activities that parents can use at home to help children develop their science, technology, engineering and maths skills. These activities are easy-to-resource and



provide children with the stimulus to talk about the world around them.

STEM

## NRICH maths at home

grouped by age

#### Maths at Home

Whether you are visiting NRICH for the first time or you are one of our regular users, this page outlines how the NRICH team are working to support rich mathematical learning opportunities for everyone during this period of disruption. NRICH welcomes millions of users every year to share our free, online mathematical activities for learners ared

mathematical activities for learners aged 3-19.

MATHS

## support for parents

## Maths at Home (CCC)

Guide for parents and carers supporting children with maths at home. Contains information, games, activities etc. for families to try offline. Please note this is due to be updated in the summer with a list of board games.



maths-at-home-parents-v4.pdf PDF document WWW.CAMBSLEARNTOGETHER.CO.UK

## **Rebecca the Maths Lady**



a bank of useful videos to support parents

#### RebeccaTheMathsLady

Free training and support for all the adults who work with children on primary mathematics. For more for information about these free videos, the accompanying free worksheets or for 'in-



school (currently provided by zoom)' professional development workshops that will inspire and up skill teachers, visit

https://authenticmaths.co.uk/rebeccathemathslady To donate to help with the costs of this project please go to:

https://www.justgiving.com/crowdfunding/expert-maths-teaching Some of the products featured were sent to Rebecca as free samples but she accepts no payment from any company.

YOUTUBE

#### videoing a game as a demo

I recorded me playing a couple of practical games under the visualiser for a PD session with TAs. For these, I recorded the games with no sound and part of the PD was adding the language etc. Maybe for parents, I might include the narration and model the language and questioning so parents and children have a model to copy.

Exchange game: https://youtu.be/HcfQ5gqWeRs 10 nice things: https://youtu.be/vEmbXGv107E

Watching a game being played without a narrative and working out the rules is nice too. There's a clip on NRICH that Liz and Lynne recorded. Strike it out?

At NRICH we've recorded a video for parents in our Solving Together collection modelling a similar game which we call 'Got It' - the settings on the game allow the player to play an opponent or the computer, and the numbers can be changed too .https://nrich.maths.org/14442

#### Herts for Learning games

Herts for learning have some lovely games modelled on their Youtube channel

Herts for Learning: **ESSENTIAL**maths Share your videos with friends, family, and the world YOUTUBE



## STEM learning

advice and support for parents

#### Home learning support for families

Starters for STEM Starters for STEM consists of lots of easy to run activities suitable for children from 4-11. Designed for parents to use at home they help children develop their science, technology, engineering and maths skills.

STEM

#### Measuring at home

#### Measuring using everyday itemsearly level

I have experimented with everyday items as units of measure to investigate and compare sizes and amounts in my environment, sharing my findings with



others. (MNU 0-11a) Numeracy and mathematical thinking involves many different skills such as understanding numbers, counting, problem solving, measuring, sorting and patterning.

GOV

#### Measuring at home

#### Measurement in Year 1 (age 5-6) | **Oxford Owl**

When you are talking about time with your child, try to use language like before, after, next, first, today, yesterday, tomorrow, morning, afternoon, and



evening. If you frequently use this precise vocabulary, your child will pick it up in no time. Ask your child to sequence all your family events in a typical day or week in a planner.

OXFORD OWL FOR HOME

#### Measuring at home...

#### Math Talk: Measurement at Home

by Michelle Hurst and Susan Levine, University of Chicago Jasmine, DeShawn, and Andrea are playing with blocks and build two towers: a red tower made of three small blocks and a blue



tower made of three big blocks. Jasmine says the blue tower is bigger because it's taller, but Andrea points out that they're both made with three blocks.

STANFORD



Secondary