

Virtual Manipulatives

Virtual manipulatives can be used to support the effective teaching and learning of mathematical concepts.

The use of manipulatives leads to an improvement in a child's ability to make connections between mathematical concepts, thereby deepening their understanding of a mathematical concept.

When used in a classroom, they can enhance learning by allowing the teacher to demonstrate key concepts to support understanding, creating a bridge between the concrete, the pictorial and the abstract.

In the current situation, where children may not be in a classroom and therefore may not have access to concrete equipment, they offer the opportunity for the children to continue exploring the mathematics for themselves as they would normally do with the practical equipment in class.

The links to the virtual manipulatives below are those that children will be most familiar with in classrooms, such as base ten materials, bead strings, place value counters, arrow cards, geoboards etc.)

All of the websites or apps include simple, clear instructions on their respective page.

Arrow Cards

<https://mathsbot.com/manipulatives/placeValueCards>

Select 'tidy' to start again.

Click + or - to change number on the arrow card.

The screenshot shows the 'Place Value Cards' interface. At the top, there is a purple header bar with the title 'Place Value Cards' and a close button. Below the title, there are controls: a 'Tidy' button, a 'Digits' field showing '5', and '-' and '+' buttons. To the right are 'Zoom out' and 'Zoom in' buttons. The main area contains several arrow-shaped cards. On the left, there is a stack of five cards representing powers of ten: a red card with '1', a yellow card with '10', a green card with '100', a blue card with '1000', and an orange card with '10000'. In the center, there is a horizontal row of five cards representing the number 52473: an orange card with '5', a blue card with '2', a green card with '4', a yellow card with '7', and a red card with '3'. A callout box points to the 'Digits' field with the text 'Select maximum number of digits.' Another callout box points to the stack of power-of-ten cards with the text 'Drag arrow cards onto the screen to select them.' A third callout box points to the 'Tidy' button with the text 'Select 'tidy' to start again.' A fourth callout box points to the '+' and '-' buttons with the text 'Click + or - to change number on the arrow card.'

Base 10

<https://apps.mathlearningcenter.org/number-pieces/>

The screenshot displays the 'Number Pieces' app interface. On the left, a toolbar contains icons for selecting ones, tens, and hundreds blocks, as well as blank numberlines. The main workspace features several yellow base 10 blocks: two vertical rods (tens), two horizontal rods (tens), and a cluster of ten small squares (ones). Below the blocks is a numberline with the digits '1 2 3' in red above it and three yellow blocks placed on the first three tick marks. A bottom toolbar includes icons for undo, redo, copy, paste, search, calculator, text, draw, delete, key, share, and help. Three callout boxes provide instructions: 'Select ones, tens or hundreds.' points to the block selection icons; 'Select blank numberlines.' points to the numberline icon; 'Join or break pieces.' points to the numberline; and 'Annotate your images' points to the drawing and text tools.

Select ones, tens or hundreds.

Select blank numberlines.

Join or break pieces.

Annotate your images

Numberline

<http://www.lancsngfl.ac.uk/curriculum/primarymaths/getfile.php?src=4313/decimal+number+line.com>

The image shows a digital number line interface with two views. The top view shows a number line from 30 to 40 with a yellow arrow pointing to 34. The bottom view shows a number line from 0 to 100 with a zoomed-in section between 30 and 40. A control panel at the bottom includes a left arrow, a scale selector (0, 10, reset), an info icon, and a quit button.

Move the yellow arrow to point to a number.

Click to show or hide the numbers on the numberline

Click under the line to 'zoom in' on the numberline.

Click arrow to change the starting number.

Change the scale of the numberline

Primary National Strategy

Coins

<https://mathsbot.com/manipulatives/coins>

Click on the arrows to copy a selected coin.

Select 'tidy' to start again.

Coins

Copy

Tidy Scatter Delete

Zoom out Zoom in

Currency: Sterling

Drag coins onto the screen to select them.

Geoboard

<https://apps.mathlearningcenter.org/geoboard/>

Drag band onto geoboard.
Move vertices.
Create a new vertex by dragging from the middle of a side.

Select size/type of geoboard.

Select colour of band.

The interface features a central 5x5 grid with a black background. Several shapes are drawn using rubber bands: a yellow right-angled triangle, an orange trapezoid, a purple triangle with a vertex at the center of a side, and a red right-angled triangle. Below the grid is a toolbar with icons for undo, grid selection (a 3x3 grid is highlighted), a circular pattern, a 4x4 grid, a 5x5 grid (labeled '012'), a triangle, a square, a rectangle, a text tool, a pencil, a copy icon, a trash icon, a key icon, and a share icon. A row of eight colored bands (white, yellow, orange, red, purple, blue, green, grey) is positioned above the toolbar, with the purple band selected.

Place Value Counters

<https://mathsbot.com/manipulatives/placeValueCounters>

The screenshot shows the 'Place Value Counters' interface. At the top, a purple header bar contains the title and several controls: a 'Copy' button with four directional arrows, 'Tidy', 'Zoom out', 'Zoom in', 'Snap to grid' (checked), 'Exchange', 'Group', and 'Base: 10'. On the right side of the header, there are dropdown menus for 'Counters: 0.1 to 1000' and 'Show: None'. Below the header is a large white workspace with various colored circular counters: yellow (0.1), red (1), blue (1000), and green (100). The workspace is currently empty of any background patterns. Four callout boxes provide instructions: 'Use arrows to copy counters.' points to the Copy button; 'Click 'tidy' to start again.' points to the Tidy button; 'Choose range of counters.' points to the counter range dropdown; and 'Choose a ten frame, grids or place value grids as background.' points to the Show dropdown.

Use arrows to copy counters.

Click 'tidy' to start again.

Choose range of counters.

Place Value Counters

Counters: 0.1 to 1000

Show: None

Copy

Tidy Zoom out Zoom in Snap to grid

Exchange Group Base: 10

0.1 100

1 1000

10 1000

1000

1000 1000

1000

100

100 100

10

1

1 1

1

0.1

0.1

0.1

Choose a ten frame, grids or place value grids as background.

Ten Frames

<https://apps.mathlearningcenter.org/number-frames/>

The screenshot shows the 'Number Frames' app interface. On the left is a toolbar with various options: a 2x2 grid icon, a single red counter, a stack of 5 red counters, a stack of 10 red counters, a single blue counter, a stack of 5 blue counters, a stack of 10 blue counters, and icons for erasing, undo, redo, and a star. On the right, three ten frames are shown. The first ten frame has 3 red counters in the top row and is annotated with a red '3'. The second ten frame has 7 red counters (5 in the top row, 2 in the bottom row) and is annotated with a red '7'. The third ten frame has 16 red counters (10 in the top row, 6 in the bottom row) and is annotated with a red '16'. A blue toolbar at the bottom contains icons for undo, redo, a highlighted '5', a water drop, a calendar, a math symbol, a text tool 'T', a pencil, a copy icon, a trash can, a key, and a share icon. Five callout boxes with arrows provide instructions: 'Select frame size. Choose between 5, 10, 20, 100 or create your own.' points to the grid icon; 'Select single counters, 5s, or 10s to place in your frame.' points to the counter stacks; 'Choose between red or blue counters.' points to the red and blue counter stacks; 'Start again.' points to the undo icon; and 'Annotate your images with text or freehand.' points to the text and pencil tools.

Bead String

<https://mathsframe.co.uk/en/resources/resource/69/itp-beadstring>

Click on the beads to move them one at a time or in groups.

Click to show/hide the number of beads.

Click to show/hide the number of beads the mouse is hovering over.

Count on or back in ones or tens by clicking the buttons.

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00	-1	-10	i
00	+1	+10	reset

MATHSFRAME.CO.UK