Primary *National Strategy*

Guide to the

Interactive teaching programs

Area

This ITP allows you to colour in cells on a grid, a full cell or half a cell, or to place a circular counter into a cell. There are three choices of grid size: 5 by 5, 10 by 10 or 20 by 20. The grid can be hidden or replaced by a pin board around the points of which rubber bands can be stretched.

The making of different shapes and patterns can support the teaching of number, shape and space and problem solving, for example, to identify the positions of counters in a given sequence or to find the number of nets of an open cube. The flexibility offered by the ITP allows it to be used to support a variety of teaching and learning contexts in mathematics.
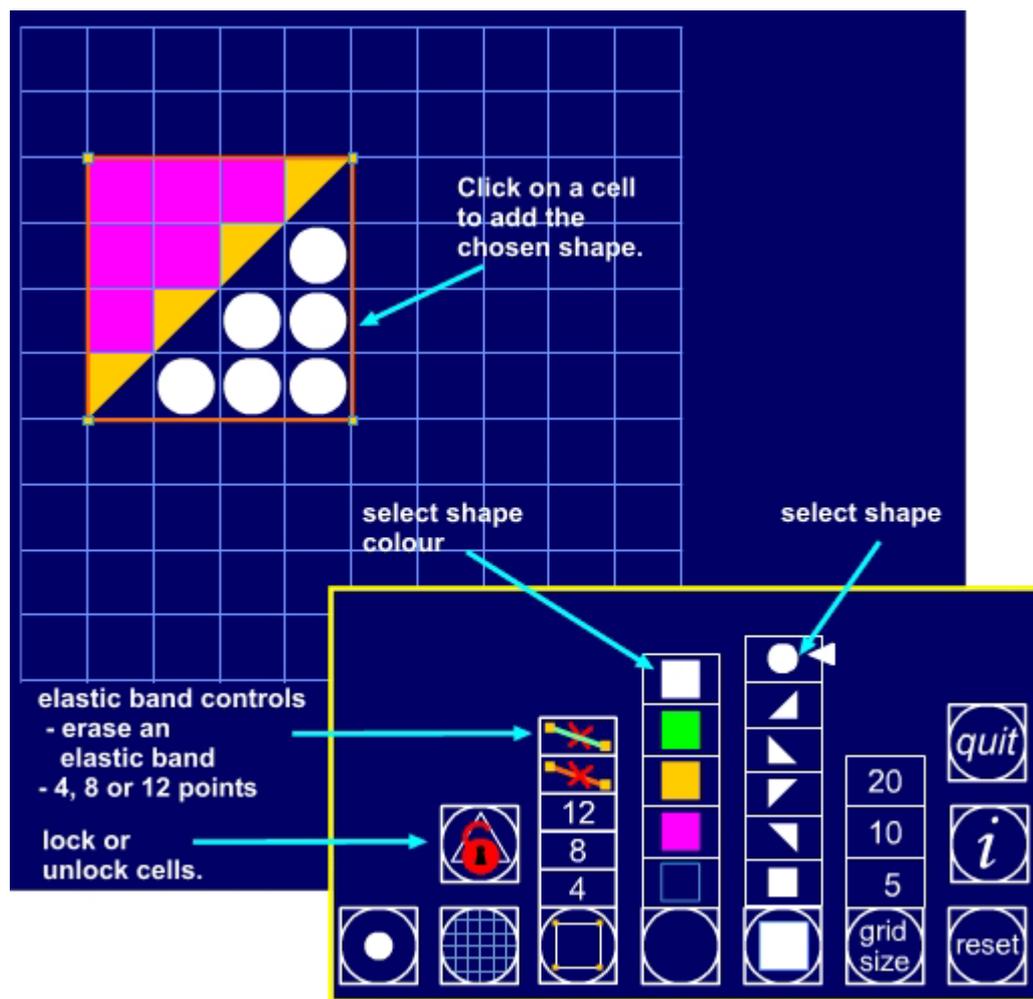
Up to two 'elastic bands' can be stretched to enclose areas.

You can chose elastic bands with 4, 8 or 12 points.

Place a marker dot on the grid. Press and drag it to any point.

Use the marker as a reference when discussing rotation around a point.

The lock button locks all the cells so that they cannot be coloured.

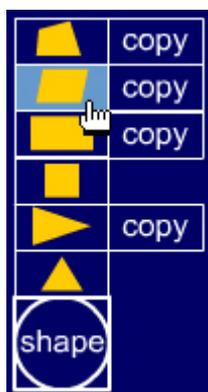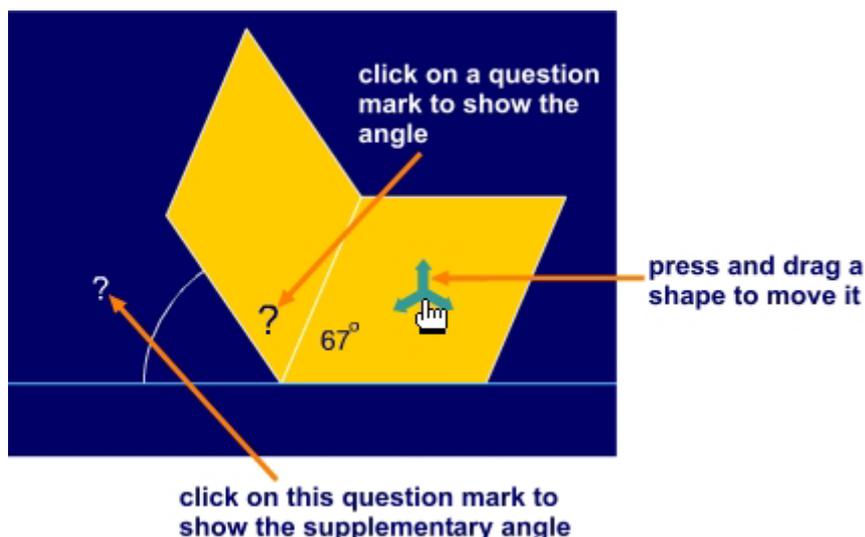This prevents cells being changed when you want to touch them to make a teaching point.

Set the grid size to 5x5, 10x10 or 20x20

3

Calculating angles

This ITP allows you to place shapes around a point and investigate their angles. You can opt to display the shapes in one, two or four quadrants. The first shape is placed on the screen in the first quadrant with one of its sides horizontal.

Additional shapes are rotated around the central point to fit against the previous shape. In some shapes side lengths and angles are generated randomly. Shapes generated can be dragged to new positions and overlaid to form new intersecting shapes and angles.

click on a question mark to show the angle

press and drag a shape to move it

click on this question mark to show the supplementary angle

Select the type of shape to place on the screen.

If you click 'copy' you create a shape with the same base angle as the previous shape.

Select the colour of the next shape.

Opt to show one, two or four quadrants.

Two quadrants (180°) are shown in the example above.

Show or hide the protractor. You can drag the protractor around the screen and rotate it using the rotate handle on its right-hand side.

Coordinates

This ITP allows you to use a marker to identify the coordinates of points on different grids. You can mark points and draw lines and shapes. You have a choice of 1, 2 or 4 quadrants to work in to introduce both positive and negative coordinates.

You can explore the use of the different quadrants by hiding and revealing the grid to support children's understanding of the coordinate system.

The ITP can also be used to explore the properties of 2-D shapes and to predict translations, rotations and reflections of various shapes in the different quadrants. Interactive whiteboard tools can be used to draw mirror lines or points of rotation.

coordinate marker. Touch and drag to move.
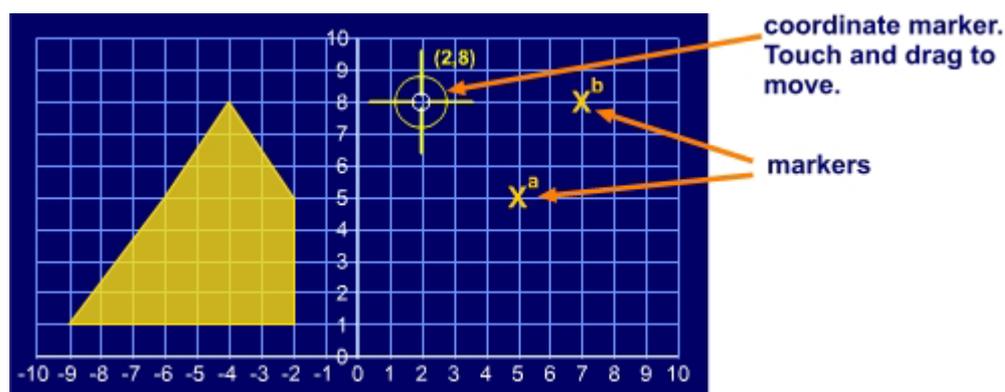
markers

Show the coordinate marker.	You can move the marker by touching and dragging it or by using the pointers on the control button.
Show or hide the coordinates of the coordinate marker.	
Open the grid selection options.	Select the type of grid to show.
	Hide or show the grid.
Open the drawing options.	Erase the current shape or lines.
	Select the draw a shape option.
Use the pointers to move the shape.	Select the draw a line option.

 Open the marker options.
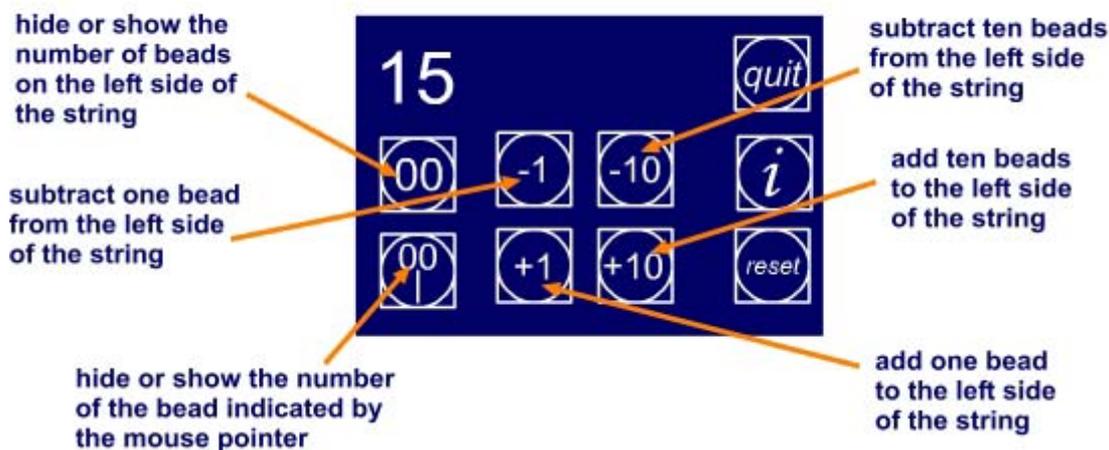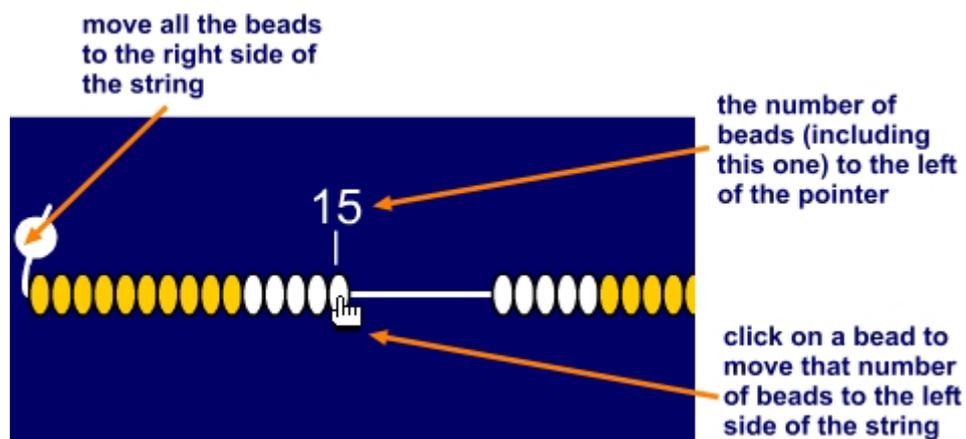
 Select a marker.

Hide or show the markers.

Move the selected marker.

Add a new marker at the coordinate marker's position.

Counting on and back in ones and tens

This ITP simulates a 100-bead string. You can move all the beads to the right of the string and move individual or groups of beads to the left side of the string by clicking on selected beads.

The controls also allow you to move 1 or 10 beads to the left or right of the string to show addition and subtraction. This ITP can be used to model different counting and calculation strategies.

move all the beads to the right side of the string

the number of beads (including this one) to the left of the pointer

15

click on a bead to move that number of beads to the left side of the string

hide or show the number of beads on the left side of the string

subtract ten beads from the left side of the string

subtract one bead from the left side of the string

add ten beads to the left side of the string

15

hide or show the number of the bead indicated by the mouse pointer

add one bead to the left side of the string

Data handling

This ITP allows you to enter data into a table and then create a vertical bar chart, a horizontal bar chart or a pie chart. You can select from existing data sets, which you can amend to show the impact and change on the charts, or enter data the children collect.

Parts of the table can be hidden so that you can ask questions about the data, for example, hiding the data values so pupils are to read the values from the graph. The height of the bars in the bar chart can be increased or decreased using the pointers at the base of each bar. This will also change the values in the table and where appropriate adjust the scale.


8
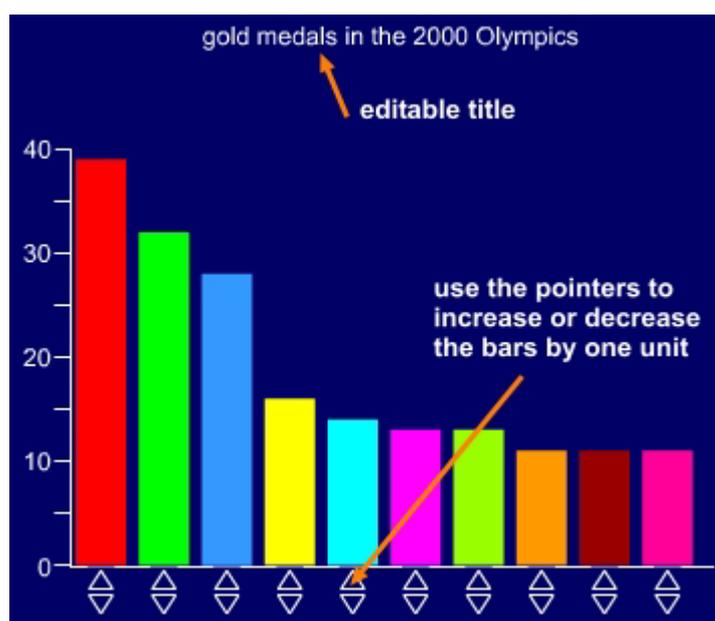
Decimal number line

This ITP allows you to select an interval from a given number line and show that interval as a second number line divided into ten equal parts but on a bigger scale. This can then be repeated to create a third number line that represents an interval on the second number line. Initially the ITP shows a number line spanning 0 to 100. This can be adjusted to show intervals of different lengths with different starting numbers.

Clicking on the hidden buttons below the number line creates an interval displayed as a hidden number line. Clicking on the circular 'hide/show' button will reveal the ten equal divisions between the two selected numbers of the interval. The square 'show numbers' button will reveal or hide the numbers above the divisions in the interval. The ITP can be used to refine children's understanding of the decimal number system and to practise and develop their estimation skills. A marker can be placed at different points on a number line.
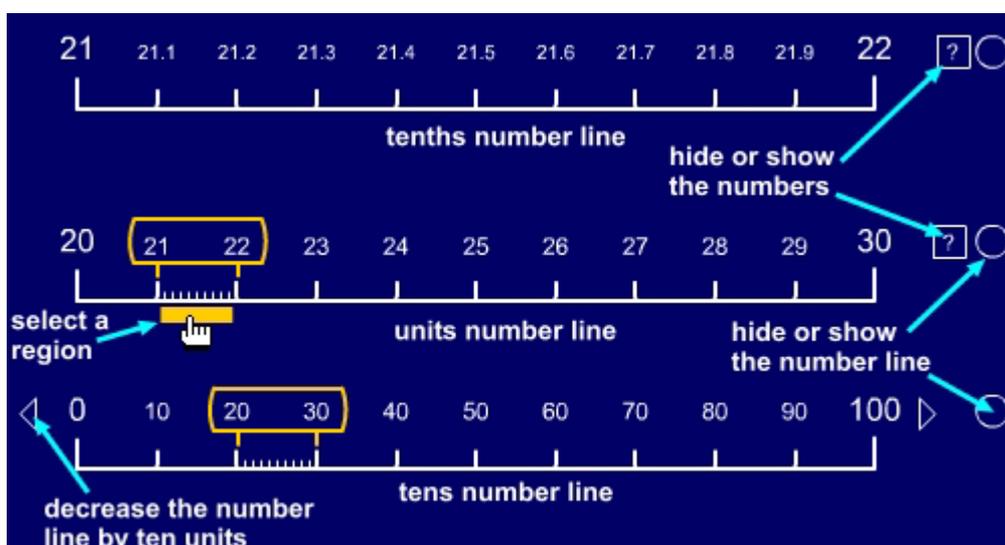
Click on this button to select the size of the interval between each pair of markers on the first number line. The choices are 10, 100 or 1.

This is set to 10 when the program starts, giving a number line of 0 to 100 as shown above.

Click on the pointers to increase and decrease the starting number on the first number line. This will be a multiple of the interval already set i.e. the number shown on the interval button. For the example displayed above, clicking on the upwards pointer once will increase the starting number to 10 giving a number line of 10 to 110.

Click and hold to slide the marker along the number line. Use the markers to predict the position of numbers on the number line.

9

Difference

This ITP allows you to compare two rows of beads and to analyse the calculations they can represent. It can be used to promote the language of addition and subtraction, particularly the interpretation of difference. The ITP operates as a series of animations which show how the rows of beads can be represented by two number lines and then as a single number line with the difference indicated by a 'jump'. The animation runs in a sequence as shown below.

Select the number of yellow and white beads to view (the maximum is 30) and click on the numbers to make the beads appear on screen. You can move each row of beads up and down the screen at any point.

Click the play button to start each stage of the animation. The sequence is:

1. The top yellow bead line moves down until it is in line with the white bead line. The shorter line will be on top so that you can compare both bead lines.

2. A number line representing the yellow bead line appears.

3. A number line representing the white bead line appears.

4. The number lines merge and the difference is shown as a 'jump'.

move the beads up or down the screen to compare their lengths

difference is shown as a 'jump' on the number line
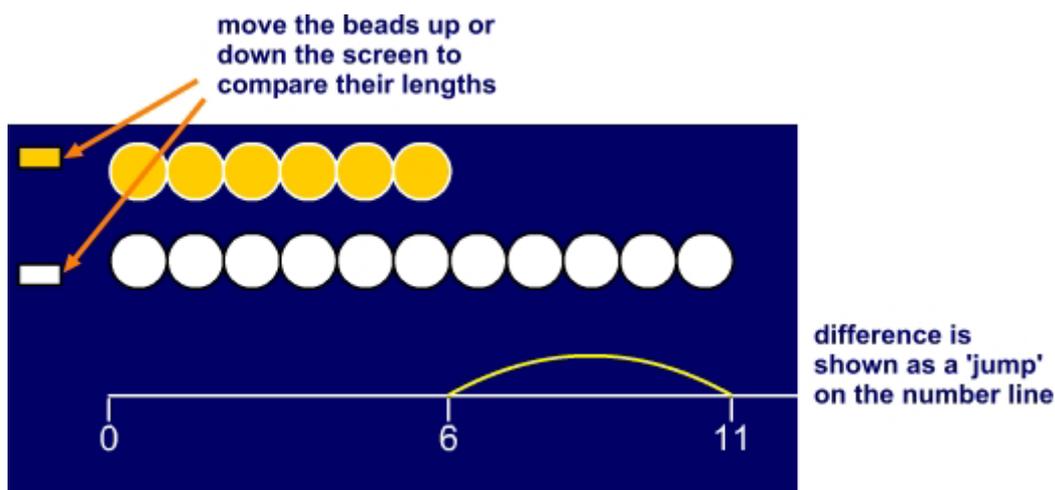
show or hide the calculation in different forms

play the next part of the animation

set the number of yellow and white beads using the pointers

click on the number to make the beads appear on the screen

Division grid

This ITP allows you to model long division in a grid of thousands, hundreds, tens and units or hundreds, tens and units. You create a dividend and divisor by clicking on the hidden pointers above and below the digits in the calculation at the bottom of the screen.

In the example below the dividend is 8522 and the divisor is 19.

The dividend is partitioned into thousands, hundreds, tens and units in the grid and the divisor appears on the left-hand side below the multiplication sign.

Click to toggle between displaying thousands, hundreds, tens and units and hundreds, tens and units	Click on the hidden pointers to increase or decrease the number of decimal places shown in the remainder (up to 4).

Click to show or hide the grid lines

Step 1 How many thousands of 19 are less than 8000?

Click on the hidden pointer above the left-hand digit above the 8000 to display what is shown here.

This demonstrates that one thousand nineteens is 19000 (in pale blue) but this is 11000 more than 8000 so there are no thousands of 19 which are less than 8000.

Click on the hidden pointer below the 1000 as shown to display what is shown in the first screen-shot above.

Step 2 How many hundreds of 19 are less than 8500?

To 'carry' the 8000 to the hundreds column, click on the hidden arrow which is next to the 8000. You can carry it back as shown here, to remind pupils where it came from.

Click on the hidden pointer above the left-hand digit above the 8500 to display what is shown here.

This demonstrates that four hundred nineteens is 7600 which is 900 less than 8500 (so not enough for another hundred nineteens).

Step 3 How many tens of 19 are less than 920?

Click on the hidden arrow next to the 900 to 'carry' it to the tens column.

Click on the hidden pointer above the left-hand digit above the 920 to display what is shown here.

This demonstrates that forty nineteens is 760 which is 160 less than 920 (so not enough for another ten nineteens).

Step 4 How many 19s are less than 162?

Click on the hidden arrow next to the 160 to 'carry' it to the units column.

Click on the hidden pointer above the left-hand digit above the 162 to display what is shown here.

This demonstrates that eight nineteens is 152 which is 10 less than 162 (so not enough for another nineteen).

Click on the hidden arrow to 'carry' the remainder.

The remainder is shown on the right.

Click on it to display as a fraction or a decimal.

x	0000	400	40	8	
19	0	7600	760	152	r 10

Fixing points

This ITP allows you to create a number of connected vertices on a grid. The grid size can be changed, and the grids hidden and revealed. As each vertex is created it is labelled and joined to the previous one. To close a shape select a vertex at any point and drag it onto the required point to create a closed shape. Once a shape has been created, its vertices can be dragged to new positions to create new shapes. Lengths of sides can be measured using a ruler.

The angles created at vertices can be measured using the protractor and their values can be displayed or hidden. For reflex interior angles the value of the exterior angle is shown. You can use the ITP to demonstrate and explore properties of shapes, such as the internal angles of different pentagons and the properties of opposite sides of various parallelograms in different orientations.
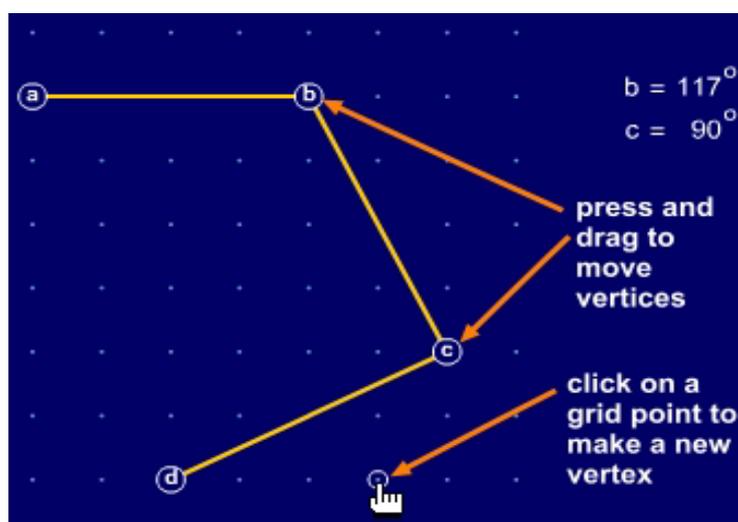
|	
Select a grid size from 3x3, 4x4, 5x5 and 10x10. The grid is initially set to 4x4.	Hide or show the grid points.
Set the 'snap to grid' feature, a vertex will snap to the nearest point when released.	Show or hide the angles display. Click on the ? symbol adjacent to an angle label to show the angle's value.
Show or hide the protractor, which can be moved over the angles in the shapes on the screen.	Show or hide the ruler, which can be moved over the sides of the shapes on the screen.
Lock vertices so that they cannot be moved.	Show or hide the grid lines.

Fractions

This ITP allows you to divide a green strip into a number of equal parts and colour the individual parts in yellow. You can label the strip to show what proportion the coloured yellow parts are of the whole strip. This can be shown as a vulgar fraction, decimal (to 3 decimal places) or percentage. The ratio of yellow to green can also be displayed. You can create more then one strip and drag these up and down the screen to compare strips.

The ITP can be used to explore equivalence between fractions, decimals and percentages and the different representations of the same relative quantities. The equal parts on the strips can also be used to demonstrate how to calculate fractions and percentages of given amounts and to represent a horizontal bar chart. The ITP can be used to set up and solve ratio and proportion problems.
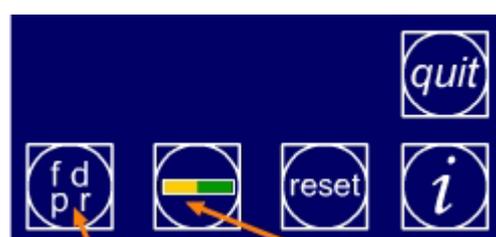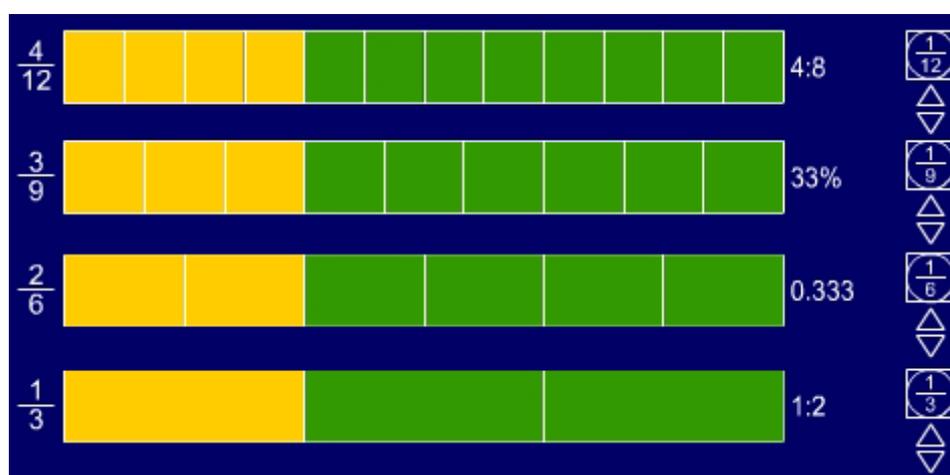
show or hide the fraction, decimal, percentage, ratio buttons

open a new fraction strip (up to 5)
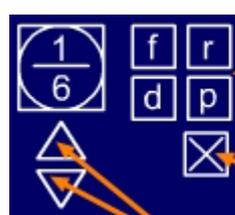
use the pointers to increase or decrease the demominator

show the yellow section's fraction, decimal or percentage of the whole strip - or the ratio of yellow to green

remove this fraction strip

Grouping

This ITP allows you to display up to 30 counters or shapes on the screen. You then select a number to be the divisor in a division calculation. A number line displays the number to be divided. As individual counters or shapes are clicked and dragged to form a group the size of the divisor, they change colour. Once a group equal to the divisor is selected, it 'jumps' to the number line. In this example 22 counters were chosen and the divisor set to 5.

In the example shown below, 3 sets of 5 shapes have been selected and moved to the number line, which shows each group as a jump. Four more counters have been dragged together and the fifth is about to be selected. The answer to the division calculation is shown at the bottom of the screen.

The ITP can be used to model division as grouping and to link this process to jumps on a number line. It can also introduce children to how remainders are recorded in the answer and to apply their knowledge, setting them similar problems that can be solved using the image displayed.
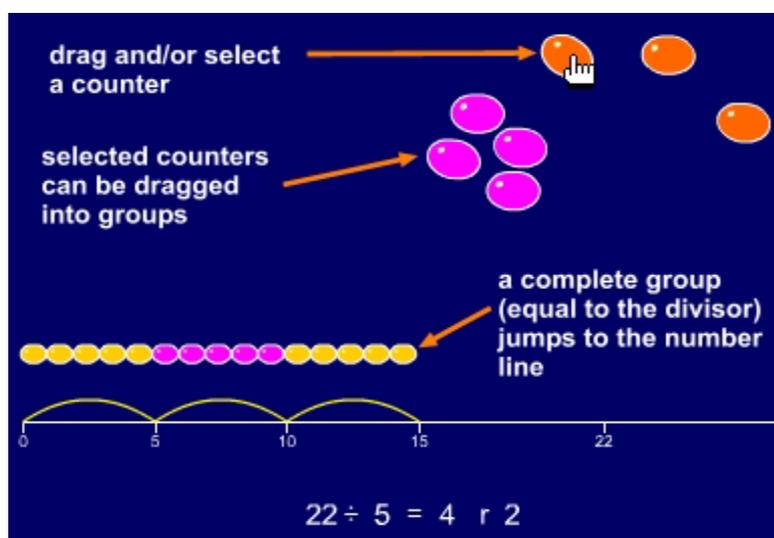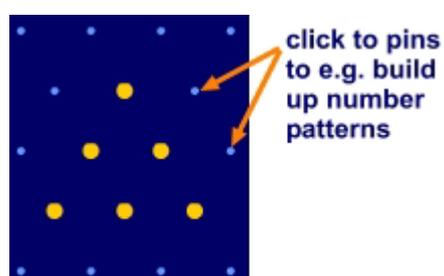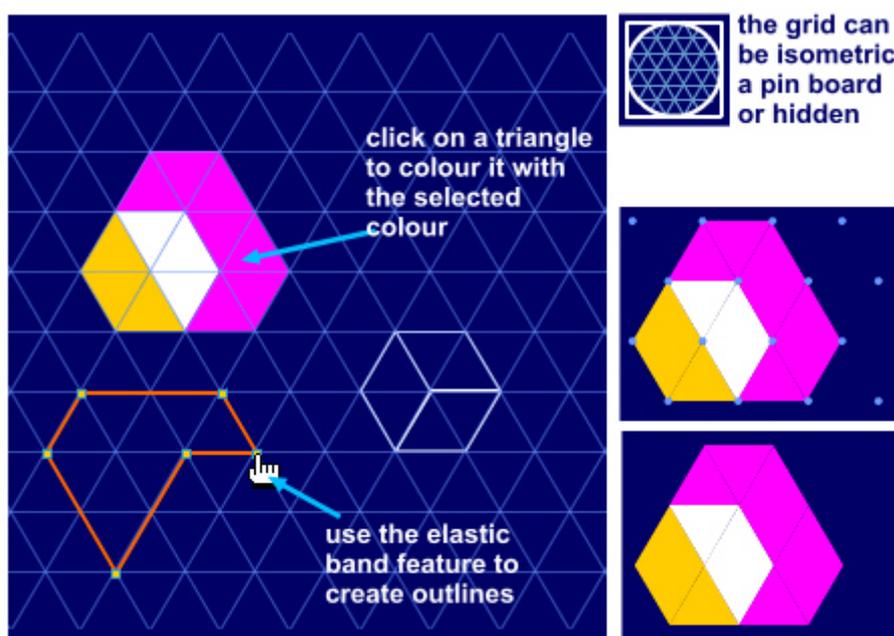
Isometric grid

This ITP allows you colour the equilateral triangles set out on an isometric grid. The grid can be hidden or become an isometric pin board. An 'elastic band' can be stretched around the pins to create outlines. One of three different rhombuses can be selected and dragged to different positions on the grid. These three rhombuses can be locked together to form the isometric view of a cube. Skeleton outlines of rows and columns of cubes can be formed this way and by colouring in two adjacent triangles, coloured faces can be created.

The ITP can be used to explore properties of shapes and space. The making of different shapes and patterns can support the teaching of number and problem solving, for example, to explore the interior and exterior angle and symmetry of polygons made up of equilateral triangles and to identify the patterns in triangle numbers.

The flexibility offered by the ITP allows it to be used to support a variety of teaching and learning contexts in mathematics. It can be used in conjunction with the Area ITP to look at the nets of 3-D shapes represented on the isometric grid.

the grid can be isometric, a pin board or hidden

click on a triangle to colour it with the selected colour

use the elastic band feature to create outlines

click to pins to e.g. build up number patterns

Click on the select rhombus to open the rhombus controls.

Each button places a rhombus in a different orientation on the grid. They can be dragged to any position on the grid.

The 'clear' button removes all rhombus outlines.

Drag unwanted rhombus outlines to the bin.
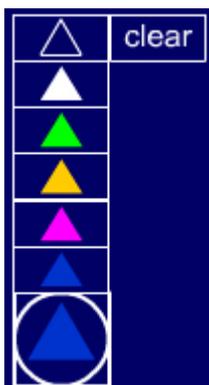
Click on the select colour button to open the colour controls.

The 'clear' button removes any white outlines (created when the top button is selected).

Select the blue triangle to erase any coloured triangles.

Lock the grid so that no changes are made when you wish to point to elements.
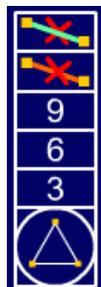
Click on the elastic band controls to open the elastic band options. You can select one or two an elastic bands with 3, 6 or 9 points.

The top two buttons erase the elastic band of the corresponding colour.

17

Line graph

This ITP allows you to enter data into a table and then create a line graph to represent the data. You can select from existing data sets, which you can amend to show the impact and changes to the graph. The data table can be hidden so that you can ask questions about the graph, for example, what a horizontal section on the graph means. As data is changed the line graph is updated.

Points on the graph can be dragged up or down to create new graphs and see the data change in the data table. The maximum value on the vertical axis can be changed and the effect of changing this scale can be demonstrated.
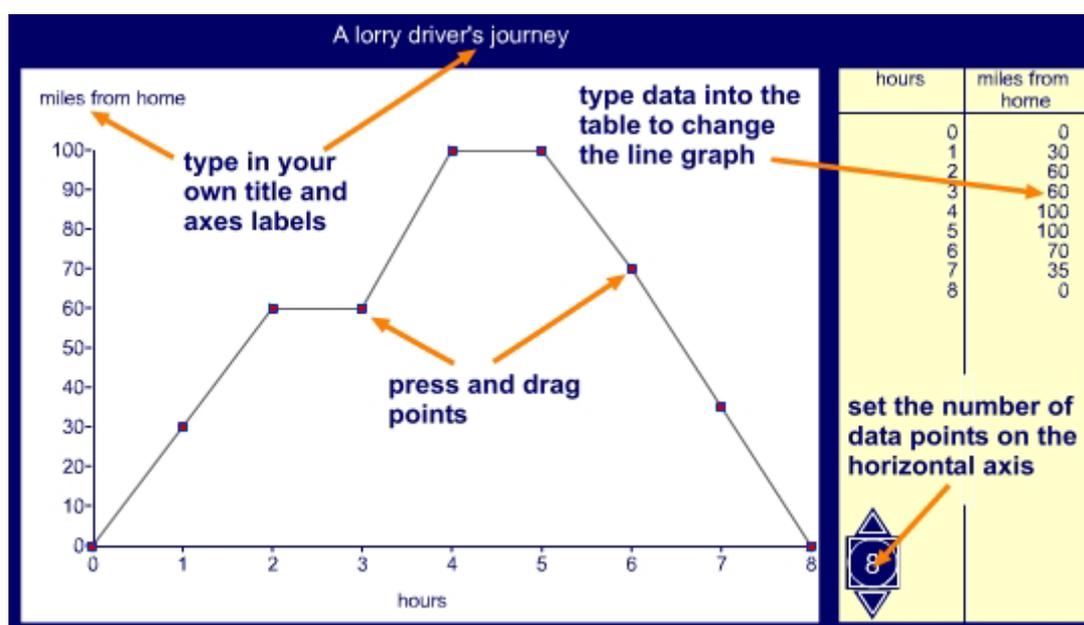
The ITP can be used to introduce children to line graphs, to enable them to draw their own and to explore the properties and the 'story' told by these graphs.

Click the 'data' button to open the list of available data.

Click on a data set to create a graph from the data.

Click on the pointers to increase or decrease the maximum value on the vertical axis.

Click on the number to recalculate the graph with the new values.

Click here to hide or show the data table.

Click here to reset the graph – it will automatically re-calculate the maximum value on the vertical axis.

Measuring cylinder

This ITP allows you to control two taps that pour a liquid in and out of a measuring cylinder. You can set the scale on the cylinder to a maximum of 50, 100, 200, 500 or 1000 units and the scale interval to 1, 2, 5 or 10 units. You can simply turn the taps on and off and ask questions that involve prediction, addition and subtraction. Using the inlet and outlet controls to set the amount of liquid to pour in and out of the cylinder offers the opportunity for the introduction of multiplication (repeated addition) and division (repeated subtraction) too. A marker can be set to indicate an early quantity.

The ITP can be used to explore and consolidate the interpretation and reading of scales, mental calculation strategies and methods of recording. Using different scales can support children's estimation skills and provides a context for problem solving involving capacity and volume.
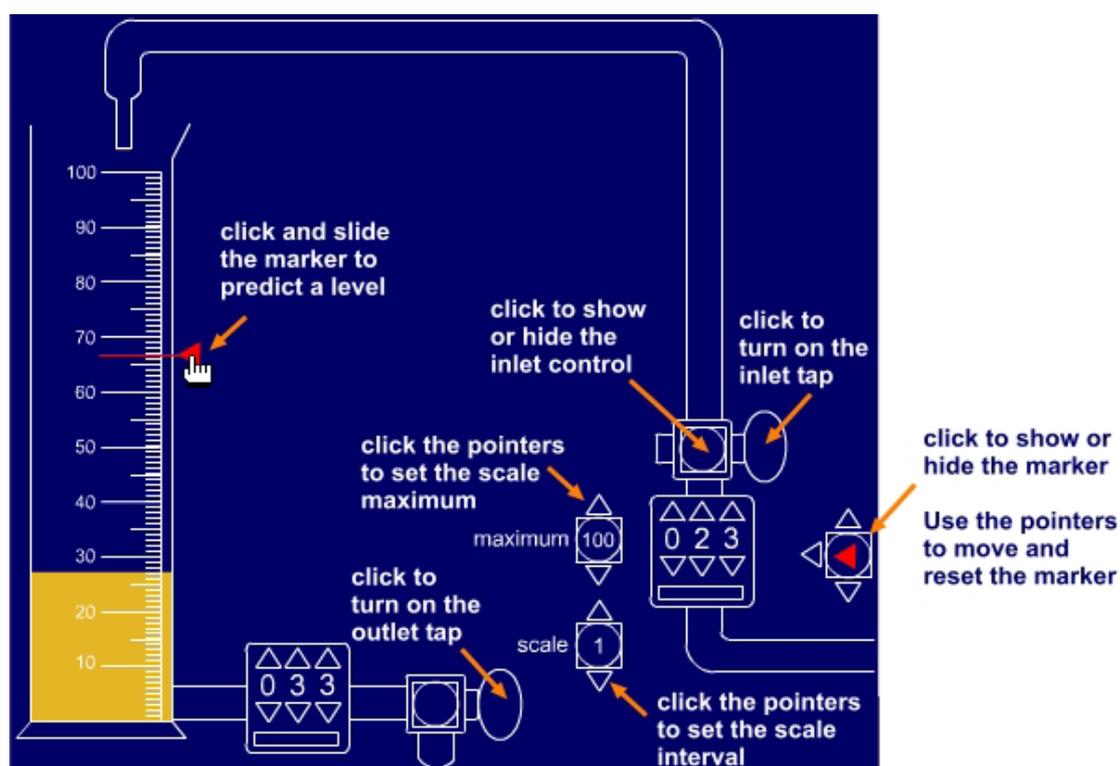
|	
Hide or show the numbers on the scale.	Show or hide the outlet pipe and controls.
Show or hide the reading of the amount of liquid in the measuring cylinder.	Inlet and outlet controls can be set using the pointers. This is set to let 33 units of liquid flow out of the measuring cylinder once the tap is turned.

19

Measuring scales

This ITP allows you to add different masses to or from a scale pan. You can add masses of 1, 2, 5, 10, 50, 100 and 500 units. The pointer or hand shows the total mass. This can be hidden to promote children's prediction skills. The maximum value of the circular scale can be changed together with the size of the interval. A digital readout can also be hidden or displayed. A red marker can be used to keep a track of previous values and to set target quantities.

The ITP can be used to support children's calculation strategies. Using different scales can support their estimation skills in reading circular scales and solve problems set in the context of mass.
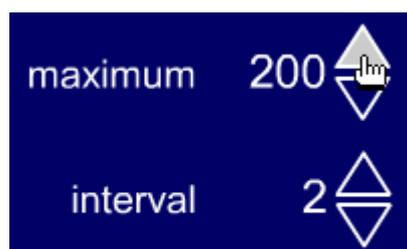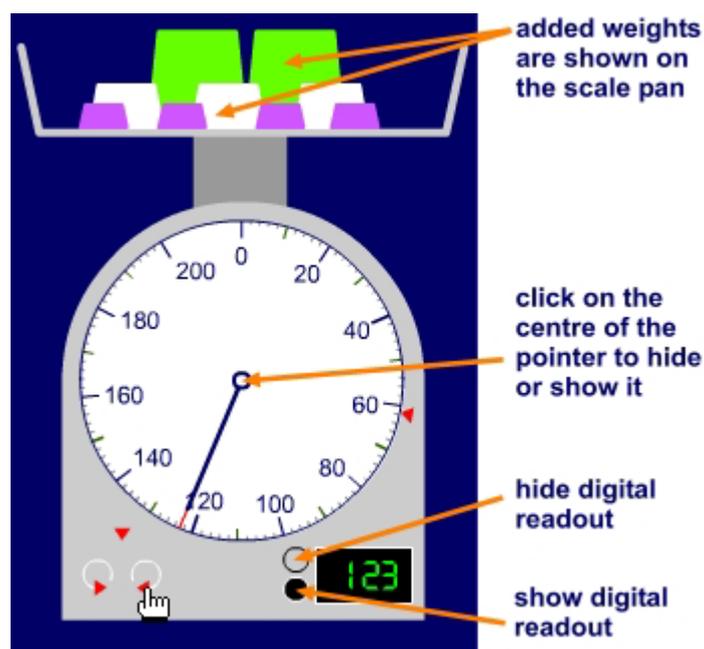
The display can be set to a maximum of 10, 100, 200, 500 or 1000 units.

The scale interval can be set to different values depending on the current maximum value.
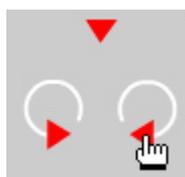
Reset the red marker to the top of the scale.

Move the red marker around the edge of the scale (to predict where the pointer will stop).

Add or remove a mass from the scale pan.

Hide or show the scale pan.

Hide or show the scale pointer.

20

Moving digits

This ITP allows you to demonstrate the effect of multiplying and dividing by 10 and 100. By dragging cards from the set of digit cards, different decimal numbers can be displayed. These decimal numbers can be placed in either of the two middle rows. The cards in the first row move when the multiply or divide buttons are selected. The cards will not move if the result is greater than 99 999 or less than 0.01. The cards in the second row do not move in order to highlight the shift in the digits when multiplying or dividing.

The ITP can be used to explore, and to encourage children to predict the effect of multiplying and dividing by 10 and 100. The ITP can also be used to demonstrate the effect of repeated multiplication and division by 10.

	Multiply the top row by 10. All the cards move one place to the left.		Multiply the top row by 100. All the cards move two places to the left.
Divide the top row by 10. All the cards move one place to the right.		Divide the top row by 100. All the cards move two places to the right.
Change or hide the labels above the columns.		Show or hide lines between the columns.

Multiplication facts

This ITP allows you to represent multiplication as repeated addition using a grid of blocks or counters. The grid can also be hidden. You first select the number of rows and columns in the grid. As the children count in steps equivalent to the number of blocks or counters in a column, you can identify each additional column using the pointers. As you do so, these are represented as steps, equivalent to the size of the column, along a number line. A similar representation appears on the screen when moving along the rows. One or both number lines can also be hidden. Each number line has an associated calculation, revealed by clicking on the equals sign. Clicking on ? gives the answer to the calculation.

In the example below with 5 rows and 9 columns, when you select to count along the columns the given calculation is:

$5 \times 9 = 45$ [the 5 is multiplied by 9].

Selecting to count along rows gives:

$9 \times 5 = 45$ [the 9 is multiplied by 5].

The ITP can be used to develop children's understanding of multiplication and to develop links between the different representations and notation. The dynamic images should help children to understand why 5 x 9 means that the 5 is multiplied by the 9, and to recognise that multiplication is a commutative operation.

Multiplication grid

This ITP allows you to set up a multiplication grid to demonstrate the grid method of multiplication for whole and decimal numbers. The grid size can be changed to accommodate different calculations. The calculation is defined at the bottom of the screen by changing the digits using the hidden pointers. Decimal points can be inserted by clicking between two adjacent digits. The numbers are partitioned and the respective components in the calculation revealed and hidden by clicking on the ? in the cell. These values appear in the addition calculation and the answer confirmed clicking on the equals sign below the plus sign. The numbers around the grid, and in the calculation, can be hidden and revealed. To do this, hover over and clicking on the rectangular strips, at the right hand side of, or below, each number.

The ITP can be used to develop children's understanding of the grid method of multiplication for whole and decimal numbers, and their ability to apply their knowledge of number facts and to deduce and reason, when finding missing component numbers.

Select a tens x hundreds grid

Select a tens x tens grid

Select a units x hundreds grid

Select a units x tens grid

Number dials

This ITP generates a number dial. The empty boxes around the outside of the dial contain multiples, the number in the centre multiplied by the corresponding multipliers around the inside edge of the dial. To reveal and hide the number at the centre, click on it or the box with the two pointers. To reveal and hide each multiple, click on the box. To reveal and hide all multiples, click on the box with ?. To reveal and hide all multipliers, click on the box with the dial. You can change the centre number to a single digit in the range 2 to 9, a multiple of 10 from 10 to 90, and to a decimal 0.1to 0.9. The single dice button generates a random centre number; all numbers bar the multipliers are hidden. The double dice button also reorders the multipliers around the inside edge of the dial and all the numbers are hidden. The ITP can be used to practise multiplying by one- and two-digit numbers and decimals. Hiding different sets of numbers on the dial promotes reasoning and explanation.

The ITP can also be used to practise the recall of division facts and use of these number facts to generate other facts. Setting the numbers on the dial in a context also provides opportunity for problem solving.

click here to hide
or show multiples
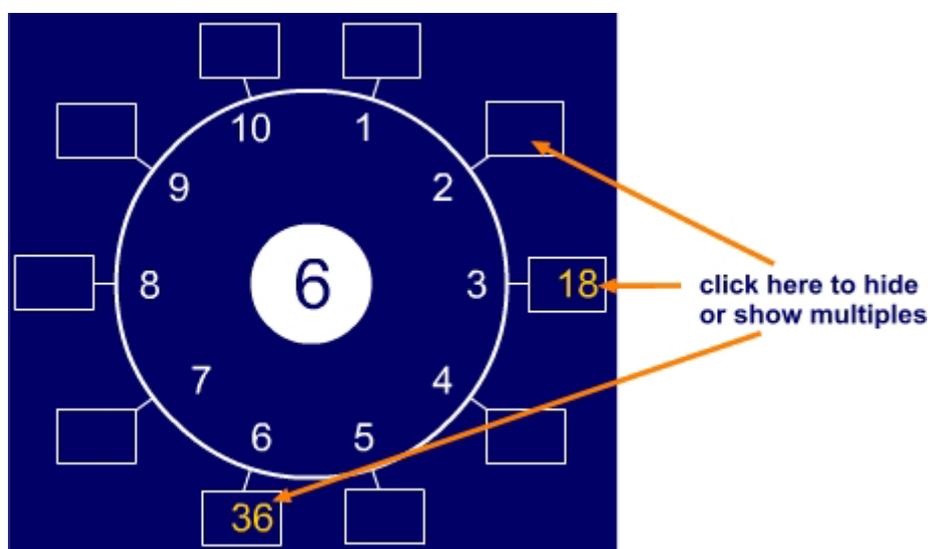
Click on the up and down pointers to increase or decrease the number in the centre of the dial.		Click here to select the range of the numbers in the centre of the dial.

Click on the number to hide or show the number in the centre of the dial.		Choose either:
		    2 – 9
		    10 – 90
		    0.1 – 0.9

Click here to hide or show the multiples around the outside edge of the dial.		Click here to hide the numbers around the inside edge of the dial.
Click here to generate a random number within the chosen range in the centre of the dial - and hide it.		Click here to generate a random number within the chosen range in the centre of the dial, and to mix up the order of the numbers around the inside edge of the dial - and hide all the numbers.

Number Facts

This ITP displays up to 20 coloured counters and the corresponding addition sentence. The number of counters you select, appear on the screen in purple. Click on any counter to change its colour, the number sentence also changes. To hide and reveal the number sentence, click on the box with the question marks. You can replace a number in the number sentence with a question mark by clicking on the number, and drag counters around the screen to form groups. Addition can be changed to subtraction by clicking on the addition sign in the box. Counters can be dragged into the displayed box, which you can make opaque to hide the counters.

The ITP can be used to model addition by combining and counting, and subtraction by partitioning and taking away. The hide and reveal options allow you to pose questions with unknown numbers in different positions in the number sentence. Partitioning counters in different ways helps children to identify all sums and differences of numbers to 20.

Addition

Use the pointers to increase or decrease the initial number of counters.

Click on the number to place that many counters on the screen.

Click to hide or show the calculation.

Click on the plus sign to toggle between addition and subtraction.

In subtract mode the top button makes the 'bin' opaque and the lower button makes it semi-transparent.

Subtraction

Model subtraction by dragging counters into the 'bin'.

The bin can be opaque or transparent.

drag counters to the 'bin' to change the calculation

Number Grid

This ITP generates a 100 square. Choose a colour or the grey mask. You can then click on individual cells to hide or highlight them in different colours, and by clicking on the box at the left-hand foot of the grid and using the pointers you can hide or highlight rows and columns. The prime numbers and multiples can also be highlighted.

You can change the number of columns from 3 up to 13, the starting number, and its position – either top left corner or bottom left corner of the grid. Choose the mask option to create a temple that can be moved around the grid to hide or highlight particular groups of cells. The template can be rotated using the single arrow button.

The ITP can be used to explore different multiples, number sequences and patterns on grids of different sizes. The superimposed masked template can provide practice at adding groups of numbers and enable children to hypotheses about the sums and difference of the numbers.

The ITP can develop children's ability to predict and generalise. Changing the number of columns provides a new grid to test general statements about the relationships between numbers and to look for counter examples.

Start number position – toggle between top left and bottom left corner.

Highlight all the prime numbers.

Use the pointers to set the number.

Click on the number to highlight its multiples in the grid.

Use the pointers to set the start number.

Use the pointers to change the number of columns in the grid.

You can select from 3 to 13 columns.

Set the highlight colour.

Open or close the masked template controls

Click on the mask button to make the masked template appear on the grid.

Use the pointers to move the masked template around the grid.
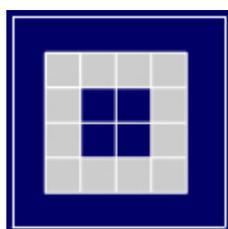
Click on individual squares to create the masked template.

Click on the outer area to invert the mask, so that only the masked squares are uncovered.

Rotate the masked template by 90° each time. With the start number in the top left hand corner the template rotates clockwise.

Number line

This ITP generates a number line. Two markers with numbered boxes can be moved along the number line. Depending on the order of the two markers you can show the sum and difference between the two numbers and the calculation represented. You can hide and reveal the numbers in the boxes, which will also hide and reveal the respective numbers in the calculation. The maximum and minimum values on the number lines can be altered and the numbered intervals can be hidden and revealed.

The ITP can be used to model calculation strategies for addition and subtraction and to develop children's understanding of the sums and differences between positive and negative numbers. Selecting different scales on the number line and hiding and revealing the numbered intervals can support children's estimation skills and ability to read horizontal scales.
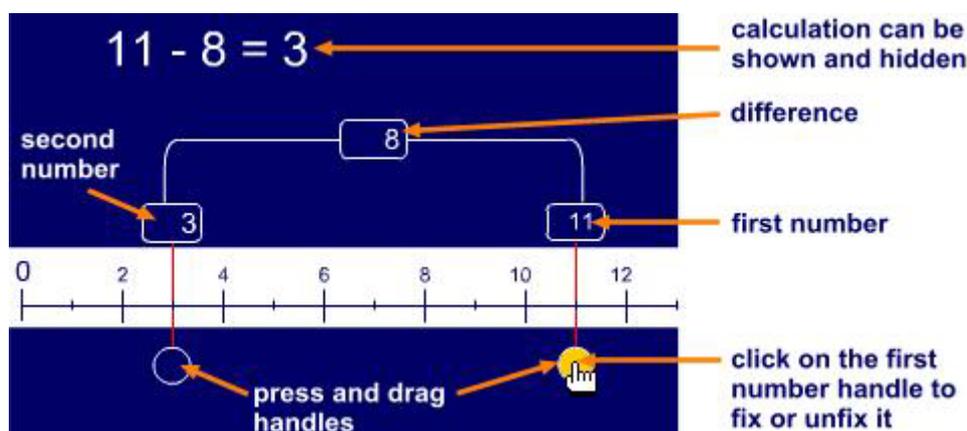
Show or hide the corresponding number on the number line and in the calculation.

Fix or unfix the first number. When it is fixed it stays in the same place. When unfixed, as the second number is moved, it moves to the position of the second marker.

Show or hide the number in the spanning box and the corresponding number in the calculation.

Show or hide the difference span.

Show or hide the corresponding number on the number line and in the calculation.

Hide or show the numbered intervals on the number line.

Use the pointers to increase or decrease the maximum and minimum numbers.

Maximum range is 0 to 500
Minimum range is –50 to 50 (negative numbers are only available when the maximum number is 50 or less).

Show or hide the calculation.

Click on the 'max' or 'min' button to hide or show the maximum or minimum numbers on the number line.

Number Spinners

This ITP generates random numbers using 'spinners' with 3, 4, 5 or 6 sides. Using the pointers on the numbered button, you can create one, two or three spinners at a time. The pointers on the shape button allow you to select the number of sides. Once this has been determined, click on the shape in the button to display the spinners. By clicking on the centre point of a spinner the spinner will spin to generate a random number identified by the arrow.

The numbers on the spinners can be changed. They toggle when you click on them. The ITP can be used to generate data quickly and help children to understand the behaviour of random numbers. Using two spinners you can look at the distribution of the sums and differences between the numbers generated and introduce situations where children are asked to predict outcomes, which they can then test with the data generated by the ITP.
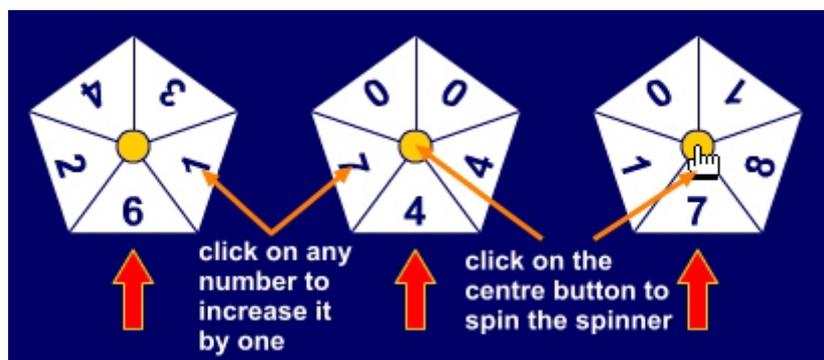
Click on the pointers to increase or decrease the number of sides on the spinners. There are 3 to 6 sided spinners available.

Click on the shape to create the spinners.

Click on the pointers to increase or decrease the number of spinners. There are 1 to 3 spinners available.

Click on the number to create the spinners.

Ordering numbers

This ITP shows how a number line can be developed from a row of 10, 20 or 100 counters. It behaves like a short film. The film is in four stages. You can pause at the end of each stage. The ITP can be used to help children to understand how a number line relates to discrete object placed in a row and to support their counting and recording skills. Using the different sequences the number line image can be developed to increase the interval between numbers and to support addition and subtraction activities moving from the counters to the number line.

The ITP can be used to develop children's estimation skills and their strategies for checking calculations by referring to the 5s and 10s landmark numbers.

The example shown here is for a 0 to 20 number line.

1. The counters slide across from the right, slowly enough to be counted.
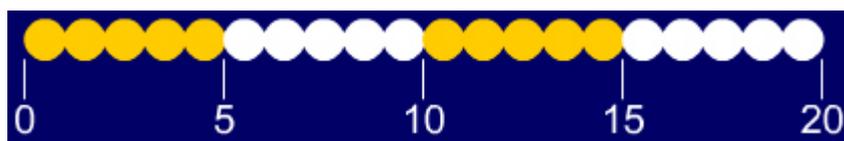
2. Marker lines appear at 5 counter intervals and the corresponding numbers appear below them.
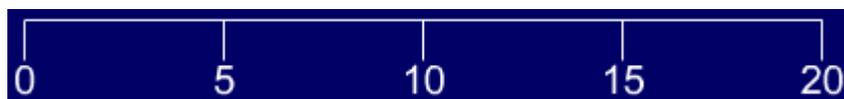
3. A number line emerges from the line of counters and moves below it.

4. Another number line, with 0, 10 and 20 markers, emerges and moves below.

Click on the counters button to select 10, 20 or 100 counters and corresponding number lines.

Click to pause the animation at the beginning of the next stage.

Click to continue the animation.

Click to play the current number line animation from the beginning.

Place value

This ITP displays on-screen place value cards to construct and partition three-digit whole numbers. Once the cards are created they can be deleted clicking on the cross in the top left hand corner. By clicking on the number, a card can be dragged around the screen and repositioned. You can have one or two sets of cards on the screen at a time. The value of each place value card is determined using the respective button at the bottom of the screen.
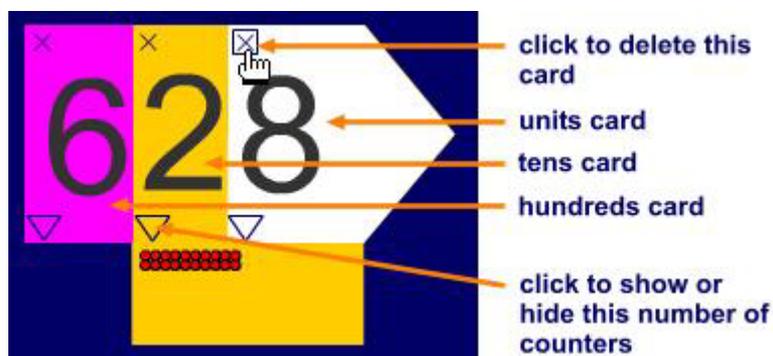
Each number on a card can be represented by groups of counters, clicking on the pointer on the card to reveal and hide the counters.

The ITP can be used to demonstrate the construction and partitioning of numbers to secure children's understanding of place value. Displaying two sets of cards you can compare their values and pose questions about their sum and difference. Partitioning the numbers and rearranging them can be use to help children understand how pencil and paper methods of calculation are recorded.

Use the up and down pointers to set the values for hundreds, tens and units.

Click on the number button to create a card with that value.

click to delete this card

units card

tens card

hundreds card

click to show or hide this number of counters

Polygon

This ITP displays regular polygons with 3 to 10 sides. A background grid can be revealed and hidden and the displayed polygon can be enlarged using the pointers on the polygon button. The polygon can be translated and rotated. A vertex on the polygon can be dragged to another position to change its shape and properties. Double clicking on a vertex allows you to add remove the vertex or to add an extra vertex at the mid point of an adjacent side. You can use the ruler or protractor to measure dragging it and using the circular button to rotate it to the required position.

The ITP can be used to explore the properties of regular and irregular polygons. Children's understanding of the angular properties of polygons can be developed. Children's hypotheses about properties of sides and internal and external angles can be verified by measurement. Using the grid, children can explore the areas of polygons; identify which polygon's vertices fit onto the grid points and look at how they calculate the areas of rectilinear shapes.

Click and drag to change the shape.

Double-click for add/subtract a point controls:

+ add a point between this point and the next clockwise point.

- delete this point

Show or hide protractor and ruler.

Show or hide the grid.

Show the rotate-shape controls.

Use the up/down pointers to increase or decrease the shape's size.

Use the up/down pointers to set the number of sides. Click on the number to draw the shape.

Rotate shape controls

Click on the arrows to rotate the shape.

Click on the large circle to set the turn to 5° per click.

Click on the small circle to set the turn to 0.5° per click.

Remainders after division

This ITP sets up an empty grid into which you can place counters. Counters can be added singly, working from the first empty top left-hand corner cell, or in bulk clicking on a cell in the final row. As each column is completed it is numbered. The division calculation representing the number of highlighted counters divided by the number of rows can be revealed and hidden using the equals sign button. The answer appears when the equals sign in the calculation is clicked. Any remainder can also be shown as a fraction. In the example, below, there are 17 counters in a grid with 5 rows. Three columns are completed and there are 2 counters in the incomplete column. The displayed result will be:

$$17 \div 5 = 3r2 \qquad \text{or} \qquad 17 \div 5 = 3^2/_5$$

Removing or highlighting extra counters will change the calculation displayed.

The ITP can be used to demonstrate division as grouping, and to develop children's understanding of remainders and the notation for division. Keeping the number of counters fixed but changing the number of rows demonstrates the effect of changing the divisor in the calculation. Children can explore the effect different divisors has on the remainder and they can look for division calculations whose remainders satisfy particular properties.
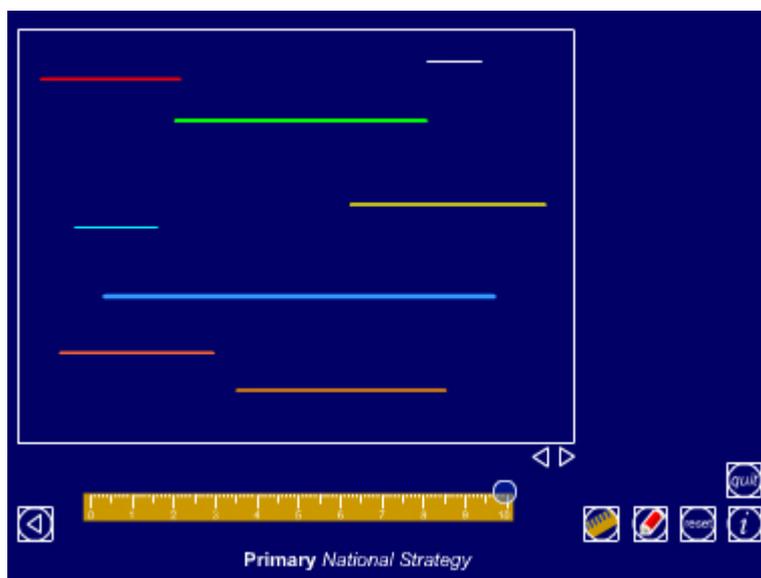
Ruler

This ITP displays an on-screen ruler you can use to measure lines and the sides of shapes. There is a choice of rulers and five screens to use to demonstrate measuring length. You can draw your own lines and shapes or select those that are available on the ITP. The ITP can be used to demonstrate how to use measure using different rulers. The ITP can be used to compare lengths and the perimeters of shapes and to support children's understanding of scale. You can develop their ability to estimate length against a given scale and use the ruler to check the accuracy and demonstrate what to the nearest half and whole unit means.

Click on the right pointer to reveal different pages.

There are five screens in total;
- An empty screen to draw.
- Horizontal lines,
- Sloping lines.
- Rectangles with horizontal base.
- Rectangles with sloping base.

Click on the button to change the ruler from plastic to wood and to hide and reveal the numbers on the ruler.

Press and drag the ruler to move it to a different position. Use the button on the end of the ruler to change its angle.

Click on the pencil button to reveal the drawing tools. A pencil will appear on the screen.

Drag and drop the pencil to start a line; drag and drop again and a line will appear between the two points.

Drag and drop to create the outline of a shape. When the shape is closed it will be filled.

Delete all lines or shapes.

Symmetry

This ITP displays a grid, which has a 'mirror' in the middle. The mirror can be set to a horizontal, vertical or diagonal orientation and then adjusted by dragging it around a central point. Squares on the grid can be highlighted in yellow and the shape created can be moved to a new position on the grid. The reflection of these highlighted squares can be shown in blue, or hidden, with the mirror fixed or while the mirror is being rotated.

The ITP can be used to develop children's understanding of symmetry, to observe the effect of reflecting shapes in mirror lines, and to explore the properties of reflected shapes. You can use the ITP to help children to predict the position of shape that is to be reflected and to look at what happens to an image as the original shape is altered or its position is changed.

press and drag to rotate the mirror

reflection

mirror

click on any square to highlight or clear it
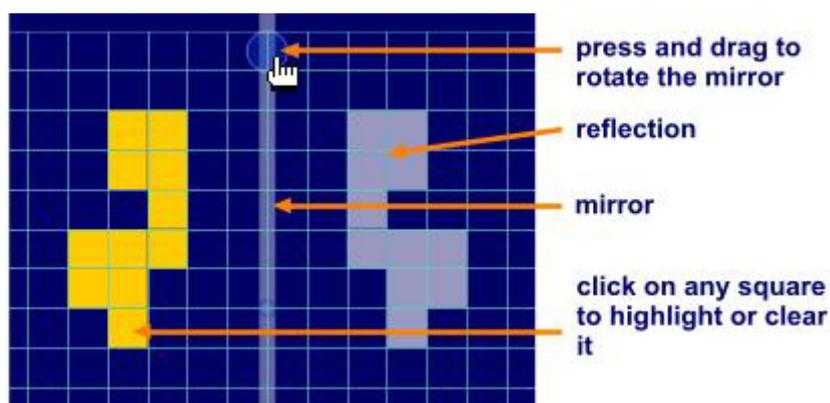
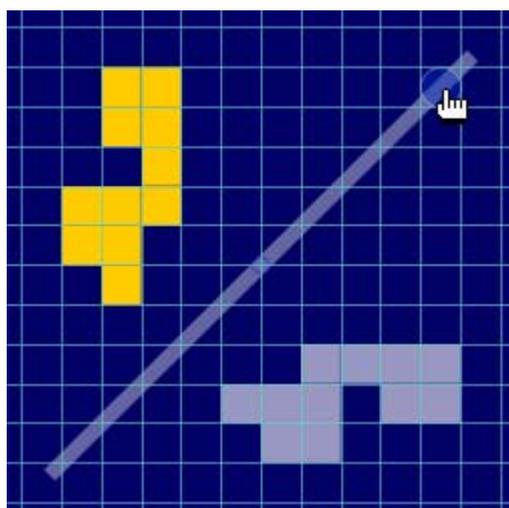Show or hide the reflection of the highlighted squares.

Use the pointers to move the highlighted squares (and their reflections).

Set the angle of the mirror to one of four pre-set angles.

You can also move the mirror to any angle by pressing and dragging on the hidden button, which is near the top of the mirror.

35

Tell the time

This ITP displays on-screen analogue and digital clocks separately or together. The clocks can be moved around the screen and their sizes altered. Times can be adjusted in different intervals of time. The 'set' option on the digital clock is used to set the time shown on the clocks. Once you have selected your options click on 'set' again to restart the clocks. The clocks can run in real time or from a set time and over any interval. The clock can be stopped and started. The ITP can be used to support the teaching of the telling of time, to identify time before and after given intervals and to undertake calculations that involve time.
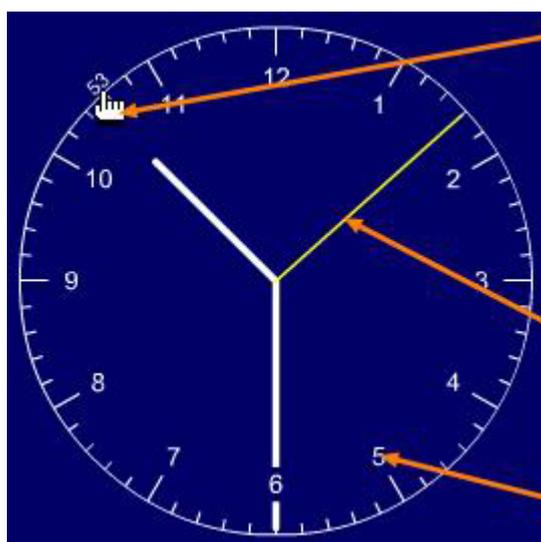
click on a minute marker to move the minute hand to here

press and drag anywhere on the clock face to move it around the screen

the second hand is shown when seconds are selected on the digital clock 'set' control

click on an hour number to move the hour hand to here

Use the pointers to make the clocks larger or smaller.

Click on the button to show or hide each clock.

Click on the button to stop or start the clock.

When started, the clock operates in real time.

Click on the plus and minus buttons to change the time shown on the clock by the amount shown in the centre button.

Click on the centre button to change its value. The options are 1hr, ½hr, ¼hr, 10min, 5 min and 1min

use the pointers to set the hours, minutes and seconds manually

show or hide seconds (and the second hand on the clock face)

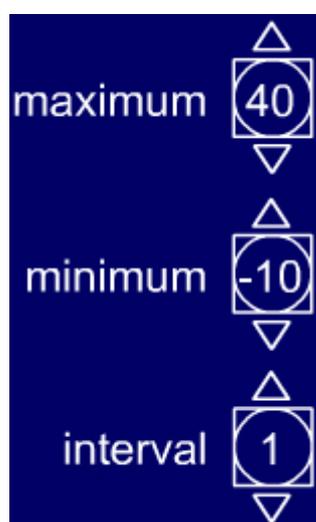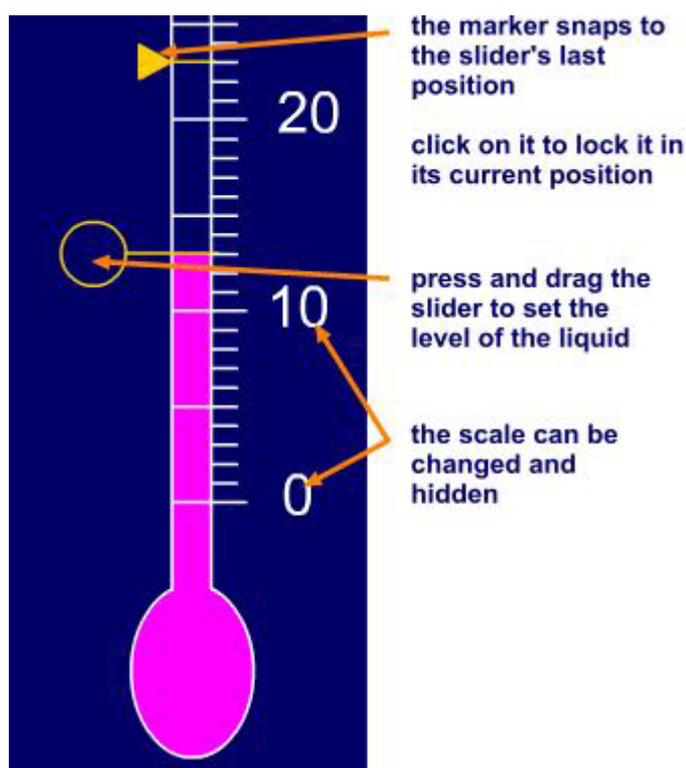set to 12 or 24 hour clock display

set to the current (computer) time

set to midnight

press and drag anywhere on the digital clock to move it around the screen

36

Thermometer

This ITP displays a thermometer. The scale, range and the interval markers can be changed and a slider control can be dragged up and down the length of the thermometer to set the height of the column. A second marker indicates the last reading so that comparisons can be made. This marker can be fixed in position if required. The positive or absolute difference between two values can be displayed, and the change in the temperature as the marker is moved. The ITP can be used to develop children's understanding of vertical scales and negative numbers in the context of temperature. The slider controls can be used to introduce and model strategies for addition and subtraction that involve positive and negative numbers. The language of number can be developed, giving meaning to calculations such as subtract negative 3 from negative 7.

the marker snaps to the slider's last position

click on it to lock it in its current position

press and drag the slider to set the level of the liquid

the scale can be changed and hidden

Use the pointers to adjust the way the scale is displayed.

Maximum from –20 to 50

Minimum from –30 to 40

The interval markers on the scale can be displayed at every 1, 2, 5, or 10.

Fix or unfix the position of the marker.

Hide or show the value indicated by the slider.

Show or hide the absolute difference in value between the slider and the marker (always a positive value).
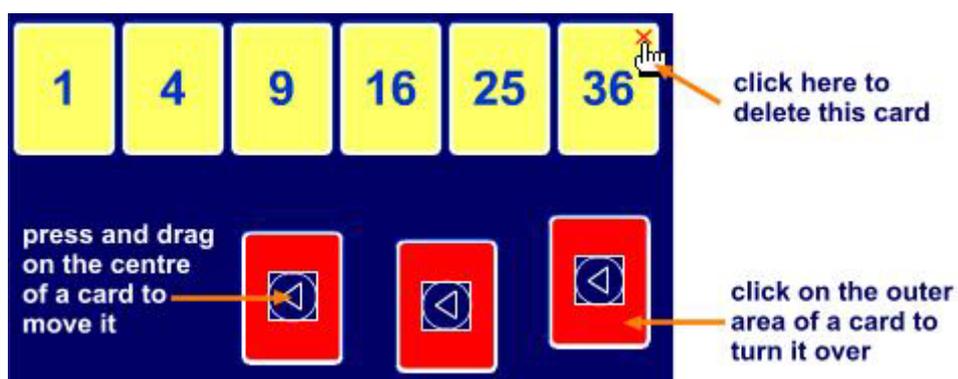
Show or hide the change in value between the slider and the marker (can be a negative value).

Twenty cards

This ITP create stacks of numbered cards and individual cards. Cards appear face down. They can be moved around the screen with or without the help of a hidden grid, 'turned over' to display the card's number and deleted. Cards can be sequenced or generated as a random set, to include whole numbers, decimals or fractions.

The ITP can be used to display sets of different numbers that children can compare and order. The stacks created can support work on identifying, describing, extending and generating sequences. Different stacks can be used to display and reorganise particular numbers from which children can hypothesise and go on to explore properties and patterns in numbers.

click here to delete this card

press and drag on the centre of a card to move it

click on the outer area of a card to turn it over

Create 20 cards numbered 1 to 20

Toggle between:
On: cards snap to an invisible grid
Off: cards can be placed anywhere

Create a single card.

Use the up and down pointers to set the number on the card.
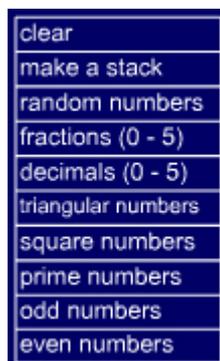
Click on the number to create the card.

Deal the cards in one or two rows in numerical order.

Shuffle a stack of cards – i.e. put the numbers out of order

Open the create a stack options shown here

clear
make a stack
random numbers
fractions (0 - 5)
decimals (0 - 5)
triangular numbers
square numbers
prime numbers
odd numbers
even numbers

When you opt to make a stack or make random numbers a control panel, like this one, opens.

Set the parameters using the pointers to change the numbers and click on 'go' to make the stack.

Make a stack go
How many cards ◁ 10 ▷
First card number ◁ 1 ▷
Step number ◁ 1 ▷
Step increment ◁ 0 ▷