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Overview

General

Things to ensure

- Responsive
- Browser compatibility
- Dark mode
- Minor
 - Pointer cursor for anything that is clickable or draggable
 - A reset and submit button for interactive widgets

P5 Library

Pre-existing examples you can possibly use to save time

- Colour options with fills
- 2D shapes; arcs, circle, lines, points, quadrilaterals, triangles, tangents
- 3D shapes; cuboid, sphere, cylinder, cone
- Angles; pi, degrees, radians
- Inputs; buttons; slider, checkbox, radio, select dropdown
- Transforms; rotate, scale, translate
- Array; append, concatenate
- Vectors
- Trigonometry; cos, sin, tan and inverses
- Data representations; pie chart

Structure

Question 2 of 30

Order these numbers in order of greatest to smallest

Note: xyz

Widget or app e.g. ordering cards

Your answer

Text input or checkboxes or custom as described in "input section"

Previous question

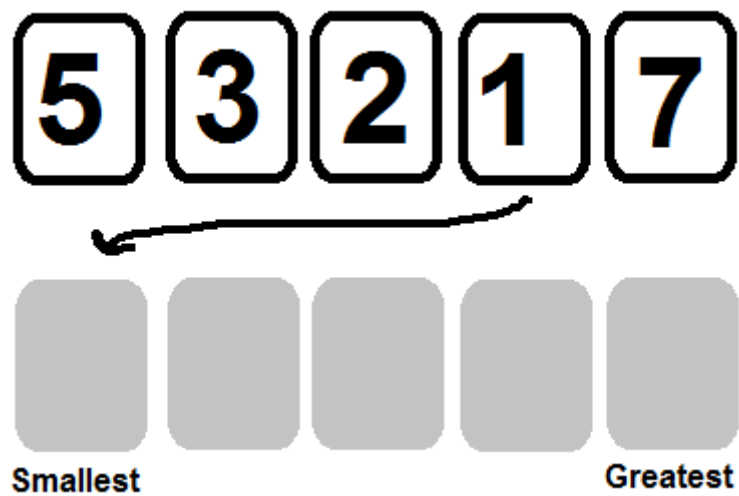
Submit Answer

Sections

- Section 1
 - Text in 3 separate containers for separate styling
 - Math Jax should work for the second and third container
- Section 2
 - Plug and play apps
- Section 3
 - Text or checkboxes or as described in "input section"
- Section 4
 - "Submit answer" -> mark answer and show solution -> change button to "Next question"

Interactive

Ordering cards



Input

- E.g. `array(5, 3, 2, 1, 7)`
 - The array can have up to 5 elements
 - Numbers can be integers, fractions, standard form or decimals

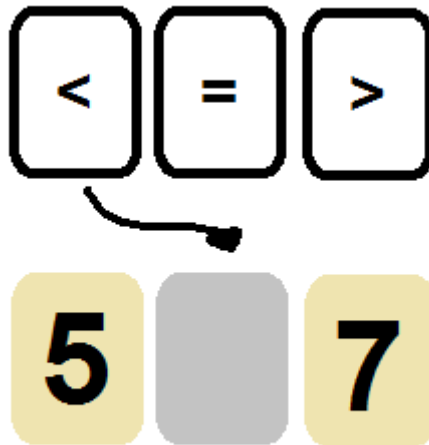
Interactivity

- User can drag and drop the cards onto the grey placeholders

Output

- Array of ordered numbers e.g. `array(1, 2, 3, 5, 7)`

Select one



Input

- Options array e.g. `array(<, =, >)`
- Numbers array e.g. `array(5, 7)`
 - Numbers can be integers, fractions or decimals

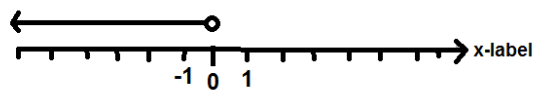
Interactivity

- User can drag and drop the cards onto the grey placeholder

Output

- The value of the card chosen

Inequality Line



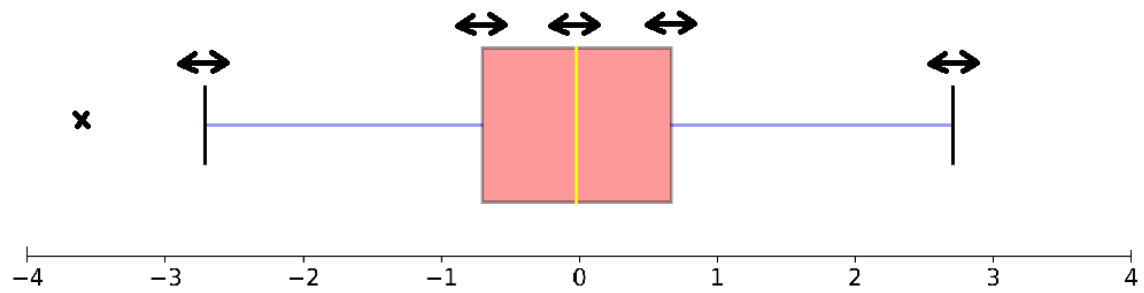
3 options for the ends

- Arrow (goes to the end of the number line)
- Closed circle
- Open circle

Line; Closed or open circle, direction, start and end point

Data

Boxplot



Input

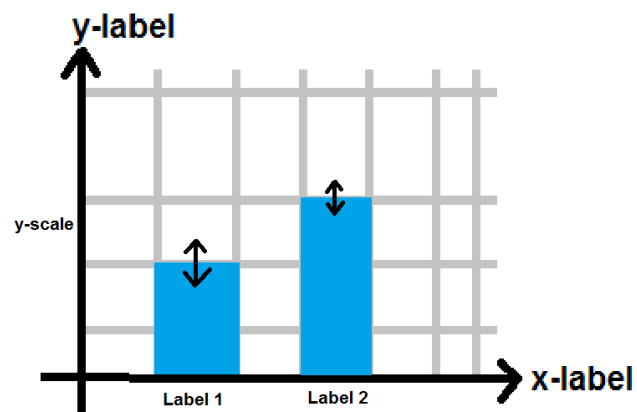
- X-axis; (start, end, increment)
- Values; array(minimum, lower quartile, median, upper quartile, maximum)
- Outliers; array(x-value, x-value)
- Interactive; true or false
 - If interactive, show arrows to allow user to move positions

Output

- Updated values array

Bar Chart

Regular



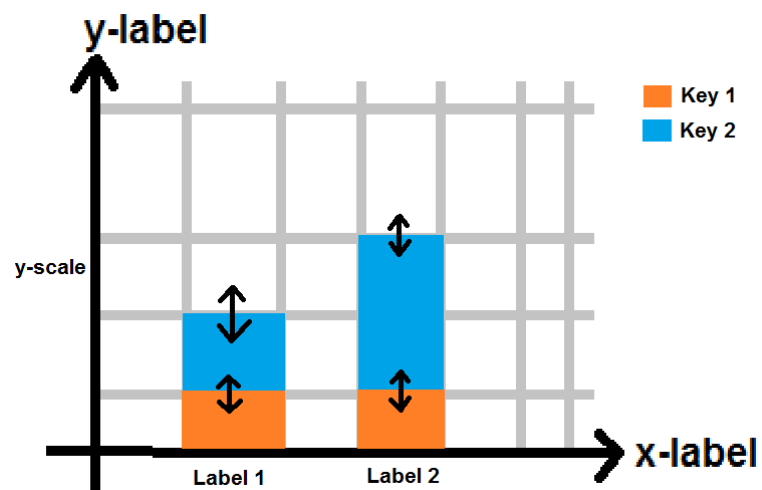
Input

- Bar values; {{label: "Label 1", value: 2}, {label: "Label 2", value: 3}}
- Grid values; y-scale, x-label, y-label
- Interactive; true or false
- Notes:
 - There may be up to 5 bars

Output

- Updated bar values

Composite



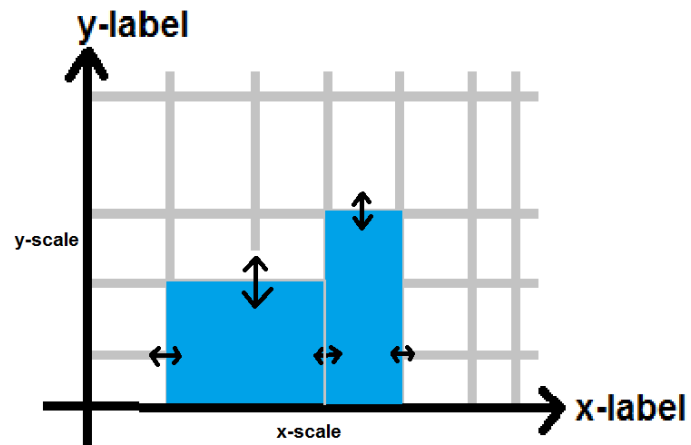
Input

- Bar values; {{label: "Label 1", value_1: 1, value_2: 1}}
- Key values; (key 1, key 2)
- Grid values; y-scale, x-label, y-label
- Interactive; true or false
- Note: there may be up to 5 bars with 3 composites

Output

- Updated bar values

Histogram



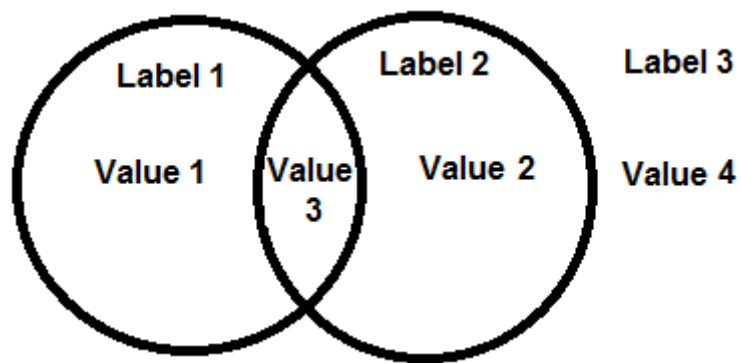
Input

- Bar values; `{{bar_start: 1, bar_end: 3, bar_value: 2}, {bar_start: 3, bar_end: 4, bar_value: 3}}`
- Interactive; true or false
- Note:
 - There may be up to 5 bars

Output

- Updated bar values array

Venn Diagram



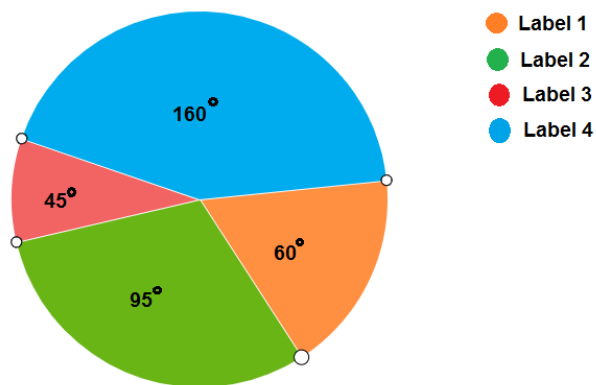
Input

- Labels array; (label 1, label 2)
- Values array; (value 1, value 2, value 3, value 4)
- Interactive; true or false
 - Colour; clicking a region colours the region
- Coloured regions = [true, true, false, false]
 - Determines which regions should start off as coloured
- Note:
 - Values can be integers, fractions, decimals

Output

- If interactive, the regions coloured

Pie Chart



Input

- Segments; {{label: "Label 1", value: 60}, {label: "Label 2", value: 95}}
- Interactive; true or false
 - If true, allow the user to adjust the segment sizes by dragging the circles and displaying real-time degrees. [Example](#)
- Note:
 - There may be up to 5 segments

Output

- Updated segments array

Shapes

Use cases

HTML Images

- Display pentagon, hexagon, octagon, decagon and ask for the shape name
- Display shape and ask for its order of rotational symmetry
- Draw shape (rectangle, parallelogram, trapezium, compound shapes) and ask for the area and perimeter
- Draw circle with radius, circumference, diameter
- Draw circle sector with radius, arc length
- Draw triangle with sides and angles

Editable shape

- Ask user to draw shapes
 - Parallelogram, trapezium, rhombus, kite
 - Isosceles, equilateral, scalene, right-angled, acute-angled, obtuse-angled triangle
- Shaded region of shape; one shape on top of another with different fill colours

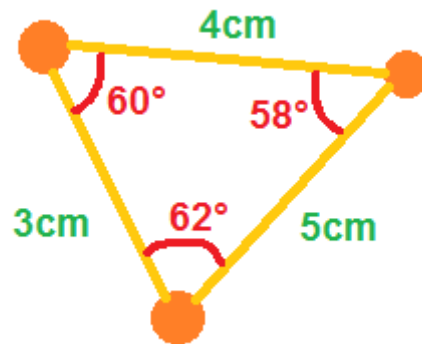
Transformations

- Draw congruent triangles and ask how they are congruent; SSS, SAS, ASA, or RHS
- Enlargements
 - Show a shape and an enlarged shape, ask for the scale factor
 - Show a shape and ask the user to draw an enlarged shape

Angle variation

- Ask user to draw an acute, obtuse, reflex angle

Editable shape



Input

- Grid; true or false
- Grid snapping; true or false
- Shape parameters
 - Corners; 3 or 4 coordinates
 - Fill colour; colour
 - Show angles: true or false
 - Show side length; true or false
 - Interactive; true or false

Features

- Allow the drawing of multiple static shapes
- If an angle is 90 degrees, switch from circle arc to right-angle corner
- Ensure angles add up to 180 degrees (if 3-sided) or 360 degrees (if 4-sided)

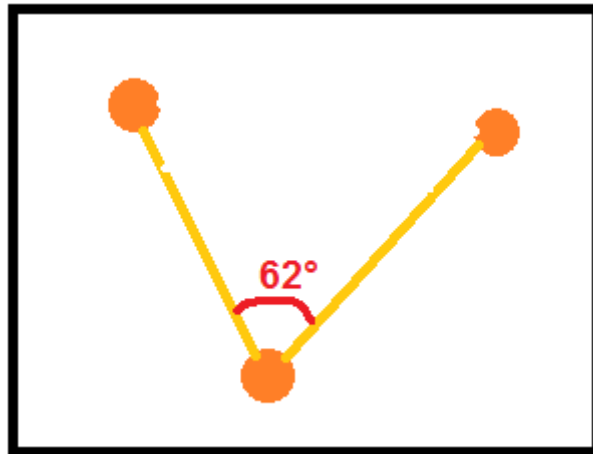
Output

- Corner coordinates, angles and side lengths

Transformations

Will need canvas to be completed

Angle Variation



Input: none

Interactivity

- User can alter angle by moving the three corners

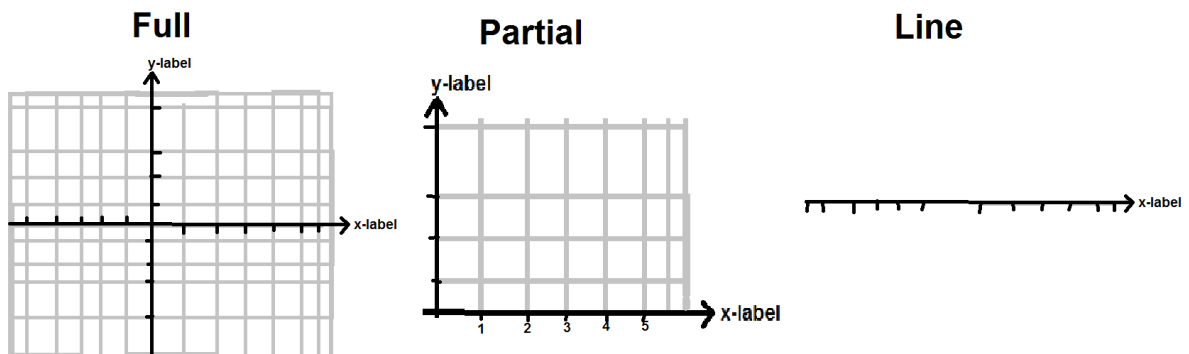
Output

- The angle

Interactive Plot

Canvas

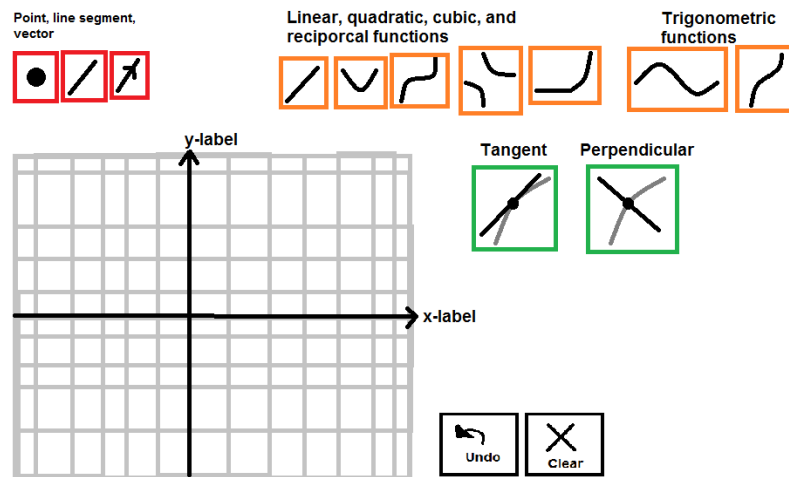
The canvas options for use as the background for the following widgets



Inputs

- Quadrant: full, partial, line
- Axis
 - X-axis; (start, end, increment, show/hide, x-label)
 - Y-axis; (start, end, increment, show/hide, y-label)
- Background: grid, none
- Snapping grid: true or false
- Axis numbering; true or false

Plot



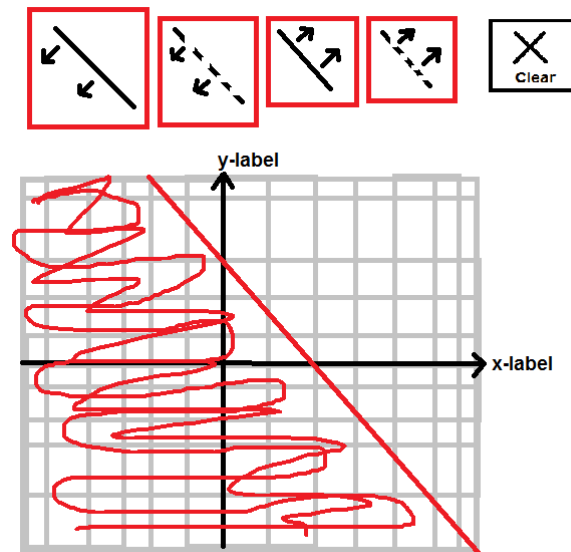
Input

- Canvas options
- Interactive; true or false
 - If true, which tools to show; red, orange and green sets
- On load
 - Static plots from red, orange or green sets
 - Text labels e.g. "P" at coordinate (1,2)

Interactivity

- Red set
 - Point; draw point at cursor position with click
 - Line segment; two points, start at cursor button down, end at cursor button release
 - Vector; same as line segment
- Orange set
 - Linear; 2 movable points
 - Quadratic; 3 movable points
 - Cubic; 4 movable points
 - Trigonometric; move it up/down/left/right and increase/decrease width
- Green set
 - Add a tangent to a curve at a point
 - Adding a perpendicular to a curve at a point

Inequalities



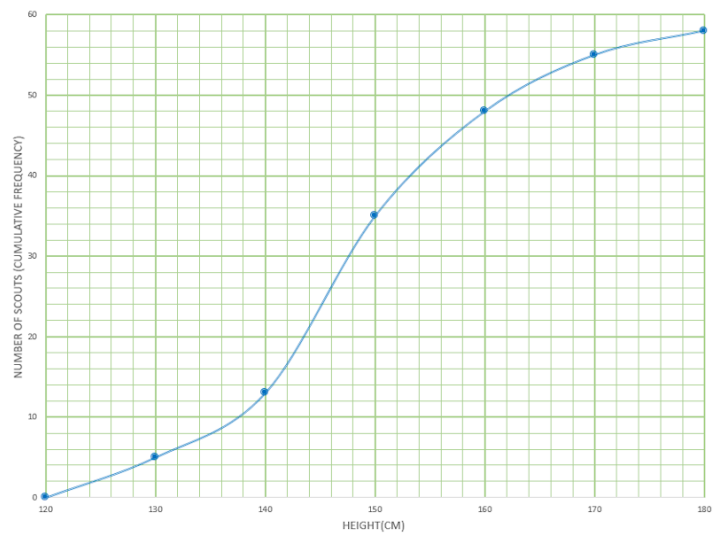
Input

- Canvas options
- Interactive; true or false
 - If true, allow user to manipulate equations
 - If false, remove buttons and draw static elements from red button
- Notes
 - Allow multiple lines
 - Shading should be somewhat transparent

Output

- Dashed or solid line
- Equation of line
- Direction of shading

Cumulative Frequency Diagram



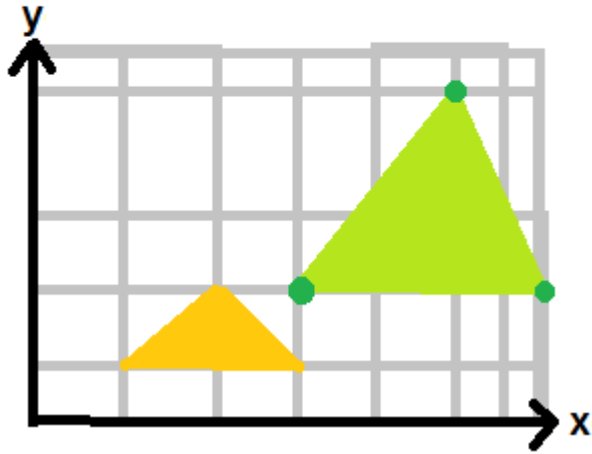
Input

- Canvas options
- Point values; (coordinate, coordinate, ...)
- Interactive; true or false
 - If true, allow user to move points

Output

- Updated point values

Transformations



Input

- Canvas options
- Shape A position values; (coordinate, coordinate, ...)
- Shape B position values; (coordinate, coordinate, ...)
- Interactive; always true

Buttons

- Solid line
- Dashed line
- Note: these are for the student and

Output

- Updated point values for shape B

Notes

- If it can be coded so shape points is flexible that would be great

Teaching Version

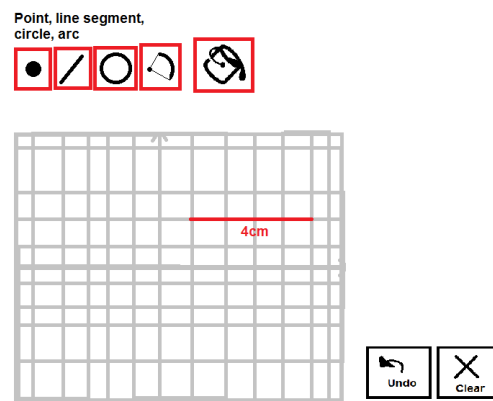
Features

- Labelled points
 - Label
 - Colour
 - Coordinate
 - Position relative to coordinate (e.g. top left)
- Right angles
 - Coordinate
 - Rotation
- Dashed ray lines
 - Arrow; true or false
 - Start and end point
 - Colour
- Solid mirror line
 - Start and end point
 - Colour

Example images

- [Enlargements](#)
- [Translations](#)
- [Reflections](#)
- [Rotations](#)

Construction



Input

- Canvas options
- Paint bucket; true or false
- Static plots
 - Any of the features from the red set

Interactivity

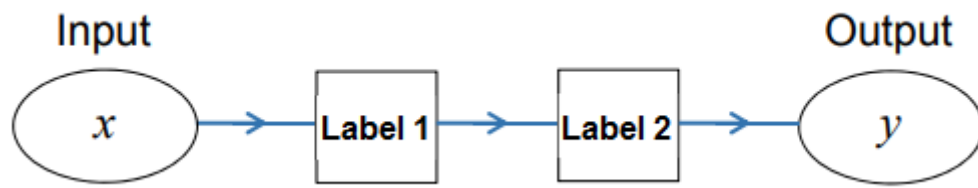
- Click on circle -> ask for radius and center
- Click on circle arc -> ask for degrees and center
- Length of line segments

Output

- Info on drawn elements
 - Coordinates of points
 - Line segment start and end coordinates
 - Circle center coordinate and radius
 - Circle arc center coordinate, radius, arc start and end

Static Sequences

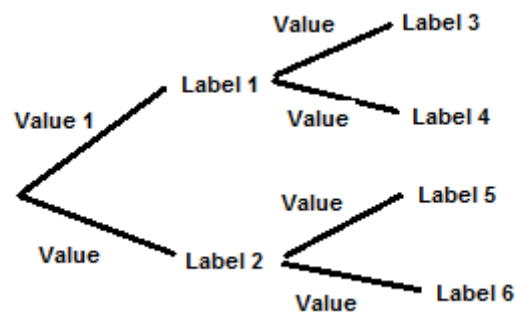
Number Machine



Input

- Labels array e.g. (x5, -8)

Tree Diagram



Input

- Labels array; (label 1, label 2, ...)
- Values array; (value 1, value 2, ...)
- Note: values can be integers, fractions, decimals or input box

Output

- Input values in array (value 3 => 2)

Fillable Table

Header		
Data		Input

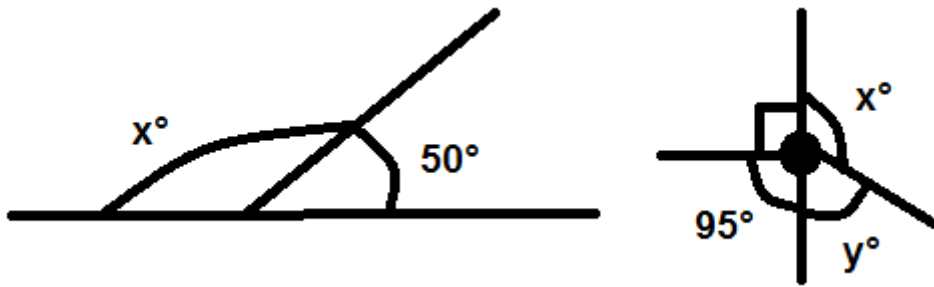
Input

- Table header
- Table rows (data, data, input)

Output

- Input values in array

Angles



Input:

- {type: line, angles: {x, 50}}
- {type: circle, angles: {x, y, 95, 90}}

3D Shapes

Standard

Shapes

- [Set 1](#)
 - Cubes
 - Cuboids
 - Square-based pyramid
 - Triangular-based pyramid
- [Set 2](#)
 - Cylinders
 - Cones
 - Spheres
- Other
 - Prisms
 - Compound 3D shapes

Ability to label

- Faces
- Angles
- Side lengths
- Radius
- Diameter
- Height
- Face height

Examples

- [Pyramid with height labelled](#)
- [Pyramid with face height labelled](#)
- [Cube with side labelled](#)
- [Cube with faces labelled](#)
- [Triangular prism](#)
- [Cylinder with labelled radius](#)
- Sphere with radius labelled
- [Labelled cone](#)

Nets

Plans and Elevation

Show a 3D shape and various plans or elevations

Other

Input section

π \square^\square $\frac{\square}{\square}$ $\square\frac{\square}{\square}$ $(\frac{\square}{\square})$ (\square,\square) $\sqrt{\square}$ \square^\cdot \leq \geq $<$ $>$

Your answer

Label 1

Label 2

Label 3 $\frac{\square}{\square}$

Added standard form to red boxes

Widget parameters

- Input type; equation (black box) or labelled (green box)
- Answer option (applies to green box only)
 - Label text
 - Position; left or right
 - Format; textbox or a red box (e.g. label 3 is fraction)
 - Note; there can be multiple answer inputs

Explanation

- If input is equation then only show the black box with red boxes
- If input is labelled then only show the green box (no red boxes)

Answer options

- **Standard form** 1×10^{-1}
- Pi (π)
- Powers (x^{2n})
- Fractions ($\frac{1}{6}$)
- Mixed number fraction ($7\frac{1}{6}$)
- Column Vector ($\begin{pmatrix} 1 \\ 2 \end{pmatrix}$)
- Coordinate (1,1)
- Square root ($\sqrt{16}$)
- Recurring decimal ($0.\dot{2}1\dot{9}$)
- Inequality symbols (\leq , $<$, \geq , $>$)

The user should be able to combine answer options when the input type is equation

- Power on fraction
- Multiple powers in single line; $2^3 * 5^4$
- Recurring decimals to multiple integers