

Y6 & Y7 Geometry Starters

Number Grid

6	3	3
	2	

Coordinate Plane 1

Grid with x and y axes from -10 to 10. A red rectangle is drawn with vertices at (-2, -2), (2, -2), (2, 2), and (-2, 2).

Word Search

Word search grid with the word "CAT" written vertically.

Triangle Classification

Acute angled	Equilateral
Isosceles	Obtuse angled
Right angled	Scalene

Coordinate Plane 2

Grid with x and y axes from -5 to 5. Points are plotted at (-4, 3), (-2, 1), (-2, 4), and (0, 3).

Coordinate Puzzle

Grid with x and y axes from -5 to 5. A point is plotted at (-4, 3). The coordinates $(-4, 3)$ are written in a box with a checkmark.

Two angles in a triangle are 88° and 67° .
What is the missing angle in degrees?

Geometry Interactive Starters

A Spire Maths Activity

<https://spiremaths.co.uk/ia/>

There are 12 Geometry Interactives: each with three levels. The titles of the interactives are given below. Brief teacher notes are given for each interactive.

Unfortunately flash files will not work on iPads or iPhones.

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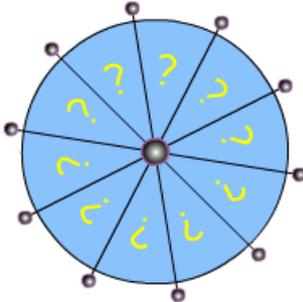
Making dice

OBJECTIVE(S): Use 2-D representations to visualise 3-D shapes and deduce some of their properties.

DESCRIPTION: A 'spin the wheel' starter where you are asked to drag and drop the correct option (face number on a cubical die) into place on the net of a cube. Timer available.

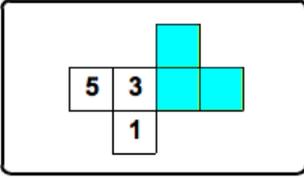
Making dice

Drag and drop the correct yellow number into each empty face of the die so that the opposite faces of the die add up to 7. Then click [Check](#).



[Spin](#)

start → finish



1	2	3
4	5	6

[Check](#)

[Pen on](#)

Level ↑ 1 ↓

[Show timer](#)

[Reset](#)

A wheel, a working space and an array of digits from 1 to 6 are presented on the screen. You are invited to drag and drop numbers from the array in order to make a complete and accurate net. A correct solution (verified by 'Check') moves a pointer along a 10-point scale. Incorrect solutions are not verified and corrections have to be made before the spin button is activated and a new semi-complete net appears. There are 3 levels differentiated by net and arrangement of face numbers.

Despite the apparent 'simplicity' of this task, some pupils will have difficulty in visualising the relative positions of opposite faces of the cube from the net. It is important that pupils are encouraged to discuss their difficulties in this context. Where difficulties are diagnosed it might be useful to have available templates of the nets that can be used with the class to demonstrate and verify results and consider further lessons on the topic at a later stage.

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Areas and perimeters of rectangles

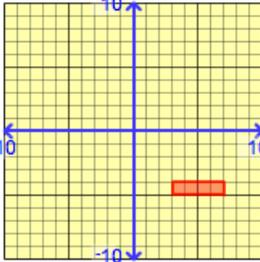
OBJECTIVE(S): Calculate the perimeter and area of rectangles.

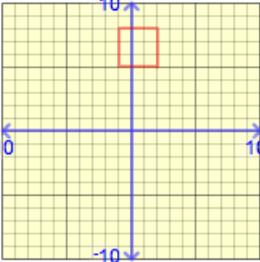
DESCRIPTION: A starter in which pupils have to match their calculations of the area and perimeter of rectangles drawn on a grid with those given in an array.

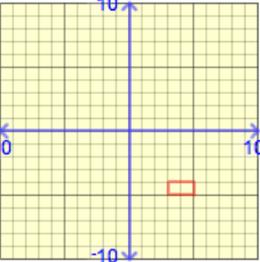
Areas and perimeters of rectangles

Click the correct statements for this rectangle BUT only when the statement is coloured PURPLE.

Pen on







Perimeter = 9	Area = 2	Perimeter = 4	Area = 6	Perimeter = 12	Perimeter = 10
Area = 9		Perimeter = 2	Perimeter = 6	Area = 10	Area = 12

Level ↑ 1 ↓

New
Show timer
Reset

Area correct.

<<
>>

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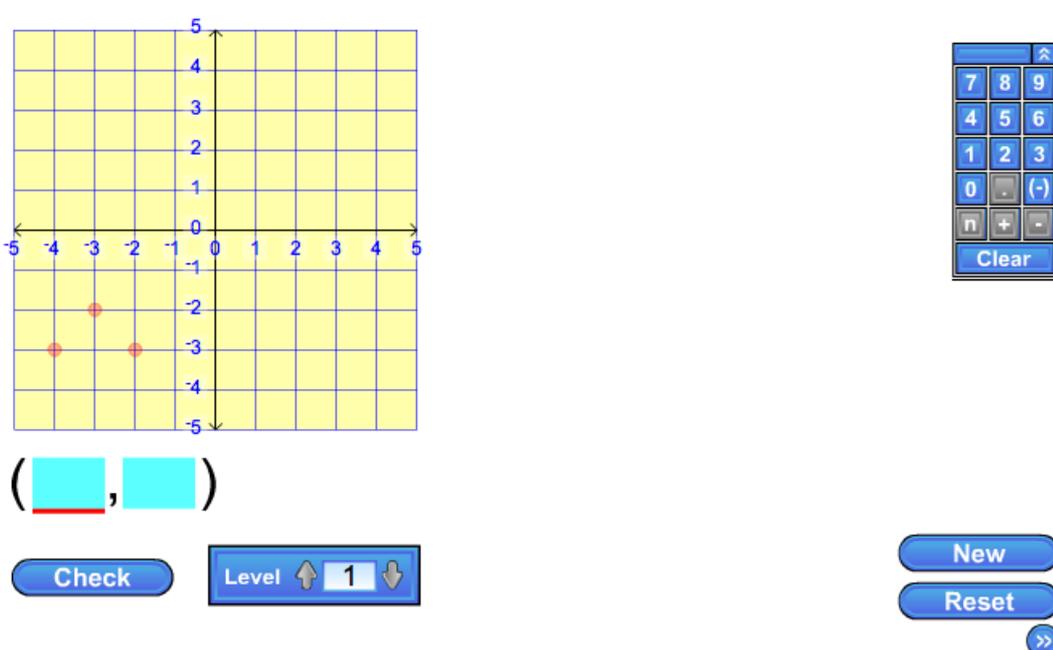
Co-ordinate quadrilaterals

OBJECTIVE(S): Use conventions and notation for 2-D co-ordinates in all four quadrants; find co-ordinates of points determined by geometric information. Begin to identify and use angle, side and symmetry properties of quadrilaterals.

DESCRIPTION: A starter in which pupils are asked to complete named quadrilaterals on a square grid when only three vertices are given. The 3 levels are differentiated by the size and orientation of the quadrilateral concerned.

Co-ordinate quadrilaterals

Three points are shown on the grid. Use the keypad to enter in the empty blue cells the co-ordinates of a fourth point that will make a **rhombus**. Click this point on the grid. Then click **Check**.



A grid (axes from -5 to +5) is presented on which are superimposed three vertices of a quadrilateral. Pupils are invited to complete a particular (given) type of quadrilateral by defining the fourth vertex either by entering co-ordinates into an ordered pair using keypad entry or selecting the point on the grid using the 'mouse'. Answers can be verified using the 'Check' button. Correct responses prompt the message 'Click the point/co-ordinates to match the co-ordinates/point.' When both vertex and co-ordinates have been correctly determined the message 'Correct' appears, the grid is ticked and the quadrilateral is completed in red on the grid.

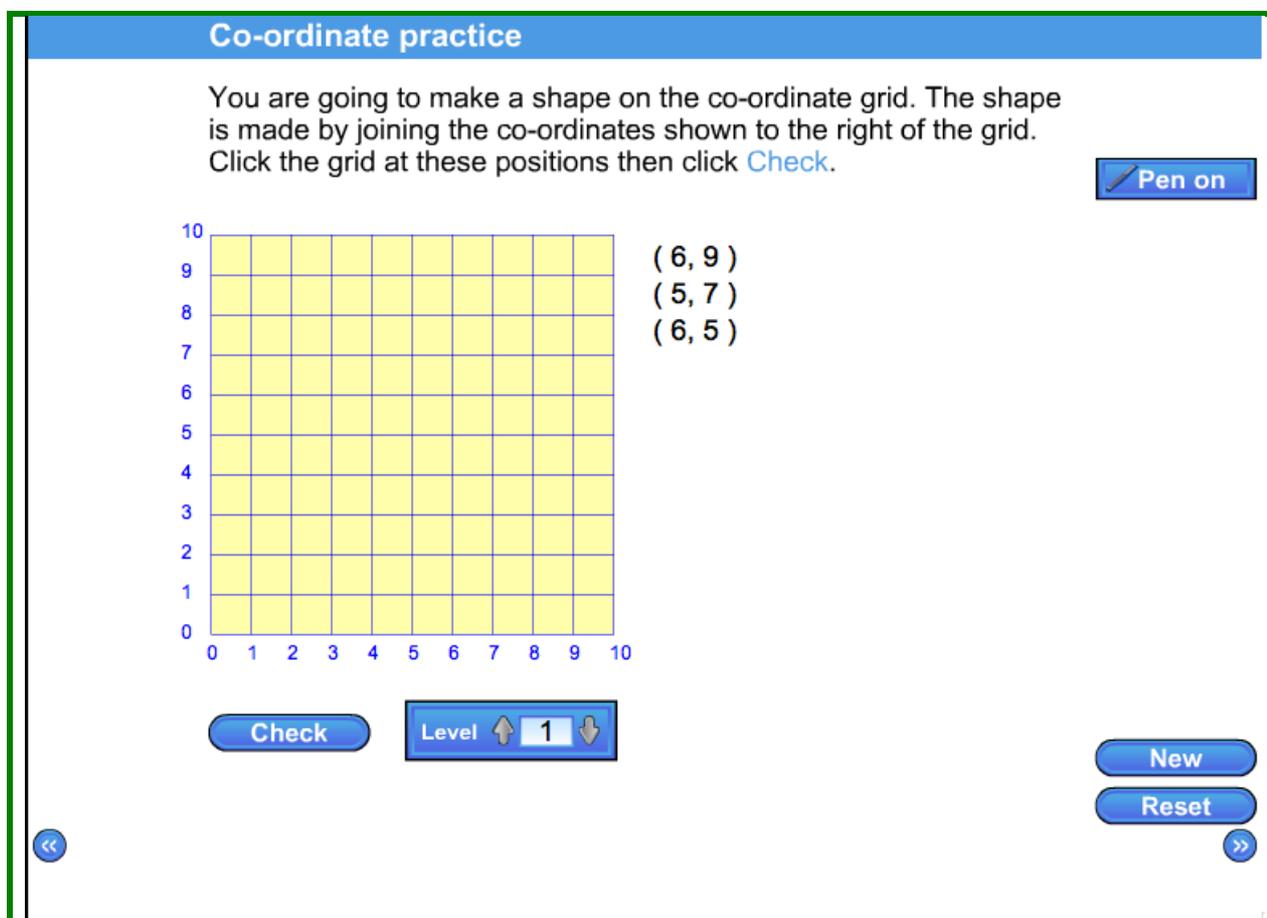
The use of the Pen facility in this starter is helpful to support discussion of errors and misconceptions about names and properties of quadrilaterals. These can be followed up in later lessons.

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Co-ordinate practice

OBJECTIVE(S): Use conventions and notation for 2-D co-ordinates in all four quadrants.
DESCRIPTION: A starter in which pupils are asked to mark the positions of points on a grid, given their co-ordinates.



A co-ordinate grid (10 by 10) is presented on the screen. In addition, three or four co-ordinate pairs are given. Pupils are invited to click the points on the grid suggested by the co-ordinates. Positions of the points can be verified by use of the 'Check' button. If all points are correct, then the message 'Well done. All correct.' is displayed, the grid is ticked and the shape is completed in red. Otherwise the grid is 'crossed' and the message 'Oops. Try again.' is shown.

The 3 levels are differentiated by the grid: Level 1 both axes from 0 to 10, Level 3 both axes from -5 to +5 and Level 2 a mixture of both. In addition at Level 1 in some cases only three co-ordinate pairs are given.

The use of the Pen facility in this starter is helpful to support discussion of errors and misconceptions about the ordering of co-ordinates. These can be followed up in later lessons.

Angles in a triangle

OBJECTIVE(S): Know the sum of angles in a triangle; consolidate mental methods of calculation.

DESCRIPTION: Find the third angle in a triangle given the other two (words only, so also a numeracy problem). A 'stepping stones' starter where pupils have to 'step' a frog across ten stepping stones. They have three lives. Level one has angles which are both multiples of 10, level two angles are multiples of 5 and any number is used at level 3.

Angles in a triangle

Help the frog catch the fly.
Use the keypad to enter the answer to the question in the blue cell then click **Check**.

Two angles in a triangle are 60° and 40° .
What is the missing angle in degrees?

Answer =

Check

Pen on

7	8	9	↕
4	5	6	
1	2	3	
0	-	(-)	
n	+	-	
Clear			



Level **1**

Lives **3**

Reset

Pupils are shown a word question which gives two angles of a triangle and asked to find the third, entering the answer with the keypad. If they get the correct answer a frog moves to the next stepping stone (there are 10 in all). If they get it wrong they lose a life (they have 3 lives). On crossing all stepping stones the frog eats a fly.

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Triangle types

OBJECTIVE(S):

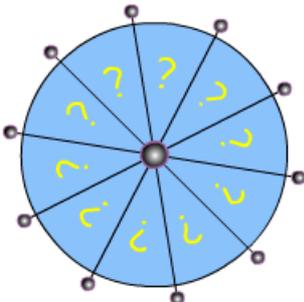
Begin to identify and use angle, side and symmetry properties of triangles.

DESCRIPTION:

A 'spin the wheel' starter where, you are asked to click to highlight two correct descriptors of a given triangle. Timer available. The 3 levels are differentiated by the size of the dot lattice on which the triangles are drawn.

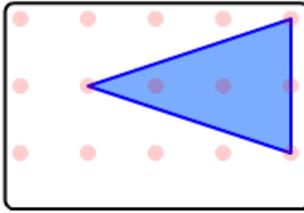
Triangle types

Two of the words in the yellow boxes can be used to describe the triangle in the grid. Click the two words and then click **Check** to see if you are correct.



Spin

start finish

Acute angled	Equilateral
Isosceles	Obtuse angled
Right angled	Scalene

Check

Pen on

Show timer

Reset

<<

Level
↑
1
↓

>>

A wheel, a working space and six different descriptors of triangles are shown on the screen. Clicking the spin button produces a rectangular portion of a square dot lattice in the working space on which a triangle is formed by joining three lattice points. You are invited to click, and highlight, two appropriate descriptors of the triangle. Two correct descriptors (which can be verified by clicking 'Check') moves a pointer along a 10-point scale. 10 successive correct solutions produces a 'Congratulations' message. Incorrect solutions are not verified and corrections have to be made before the spin button is activated and a new triangle appears.

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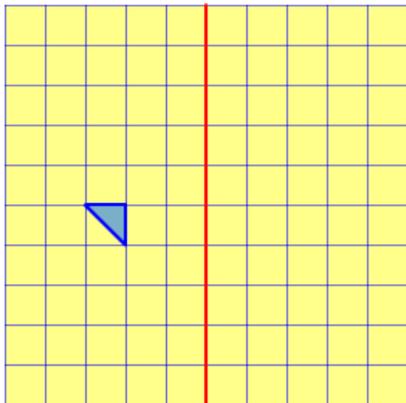
Reflection

OBJECTIVE(S): Understand and use the language and notation associated with reflections; recognise and visualise the transformation and symmetry of a 2-D shape: reflection in given mirror lines.

DESCRIPTION: Pupils have to show the image of a triangle in a given line of reflection on a square grid. The 3 levels are differentiated by the triangle shape, the position of the line of symmetry and the relationship between the triangle and the line.

Reflection

The blue triangle has to be reflected in the red line. Click three points on the grid to place the reflection. Click a point again to de-select it. Click **Check** when you have selected your points.



Pen on

Check **Level** ↑ 1 ↓

New
Reset

⏪ ⏩

Pupils are shown a triangle and a line of reflection on a square grid and have to click on the grid to show the position of the reflection of the triangle. The 3 levels are differentiated by the triangle shape in relation to the line of symmetry, the position of the line of symmetry (horizontal, vertical or along the two diagonals) and whether the triangle touches or crosses the line of reflection.

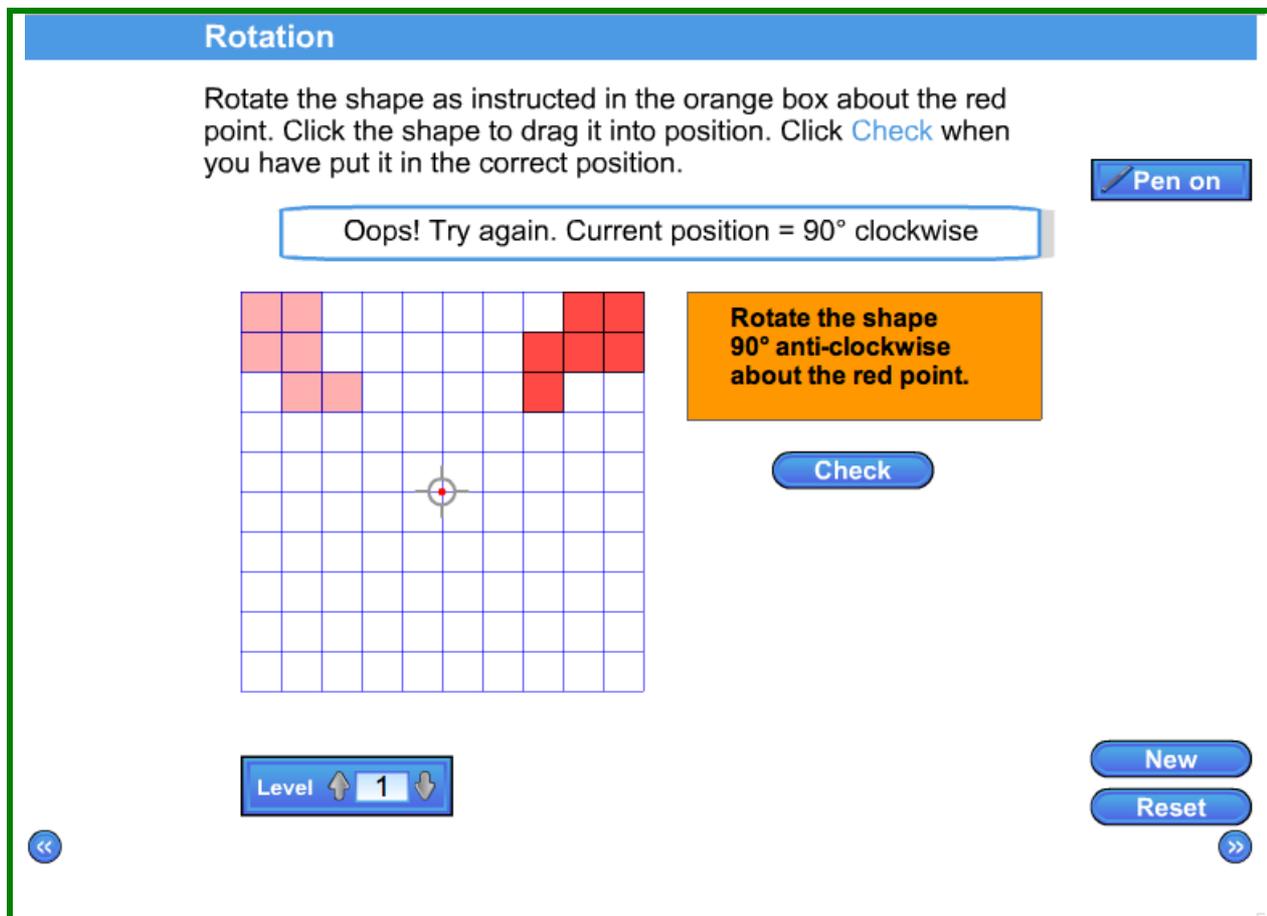
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Rotation

OBJECTIVE(S): Recognise and visualise the transformation and symmetry of a 2- D shape: rotation about a given point.

DESCRIPTION: A starter in which pupils are asked to place a geometric shape on a grid after a particular rotation.



Rotation

Rotate the shape as instructed in the orange box about the red point. Click the shape to drag it into position. Click **Check** when you have put it in the correct position.

Oops! Try again. Current position = 90° clockwise

Pen on

Rotate the shape 90° anti-clockwise about the red point.

Check

Level 1

New

Reset

A 10 by 10 grid containing a marked (red) centre of rotation and geometric shape made from unit squares is displayed on the screen. Pupils are invited to rotate the geometric shape, using drag and drop, through a given angle in a given direction. (These being stated in an orange box to the right of the grid.) Positions can be validated using the 'Check' button. A correct solution prompts the message 'Well done.', otherwise an 'Oops. Try again.' message appears along with the statement of the rotation at the time.

The 3 levels are differentiated by the size and direction of the rotation.

Pupils should be encouraged to discuss the reasoning behind final positions before they are checked.

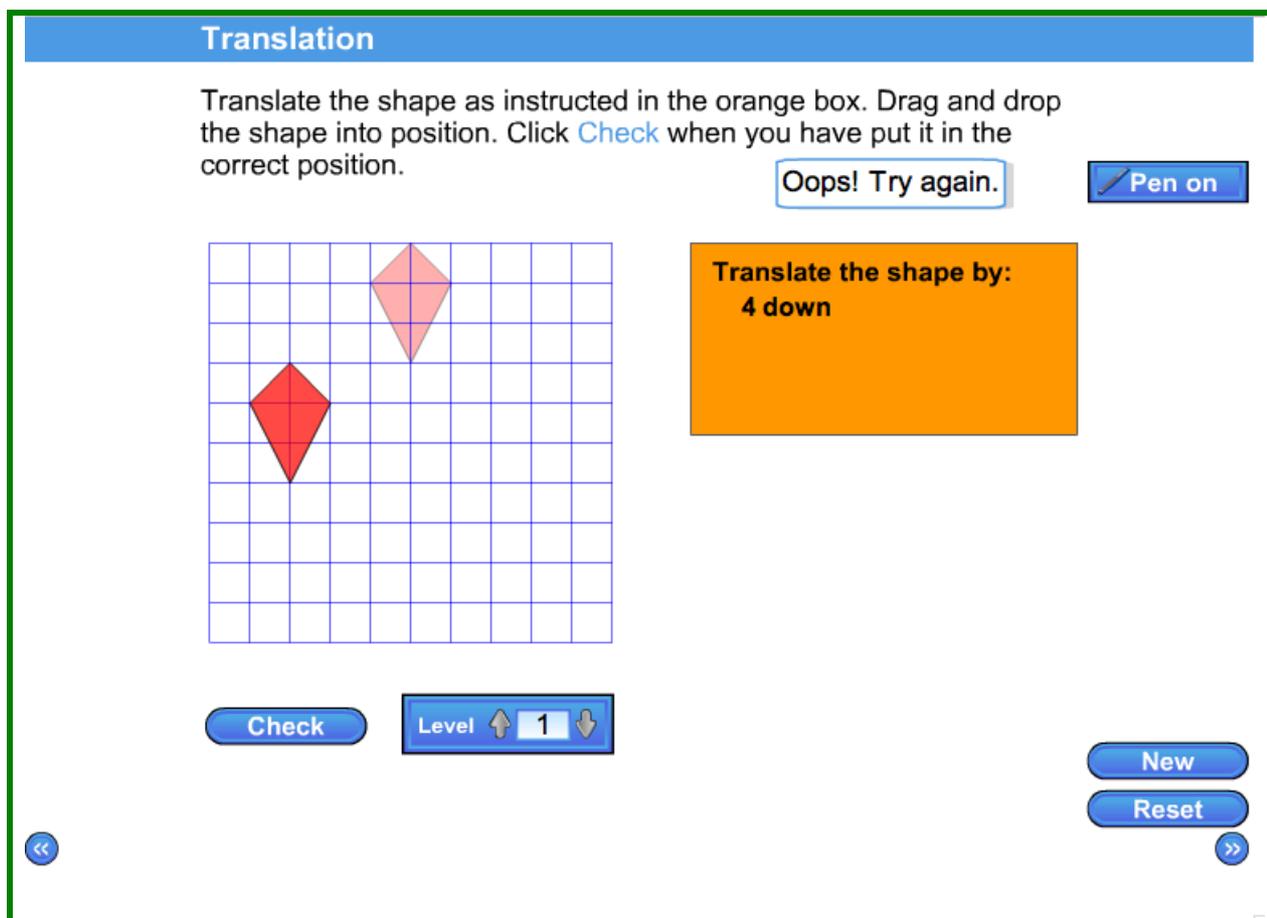
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Translation

OBJECTIVE(S): Recognise and visualise the transformation of a 2-D shape: translation

DESCRIPTION: Pupils have to show the image of a geometric shape after a given translation on a square grid. The 3 levels are differentiated by the geometric shape and the nature of the required translation - one or two dimensional.



A simple, red, geometric shape defined by vertices a 10 x 10 square grid is presented on the screen. Pupils are invited to translate the shape, using 'drag and drop', according to the definition written in an orange box on the screen. The use of the 'Check' button allows pupils to verify their solution. A correct solution produces a 'Well done' message, otherwise 'Oops. Tray again'.

Level 1 challenges all involve one dimensional translations either 'left-right' or 'up-down'.

Levels 2 and 3 involve an increasing proportion of two dimensional translations.

The use of the pen facility can be helpful here in counting squares to move the original shape.

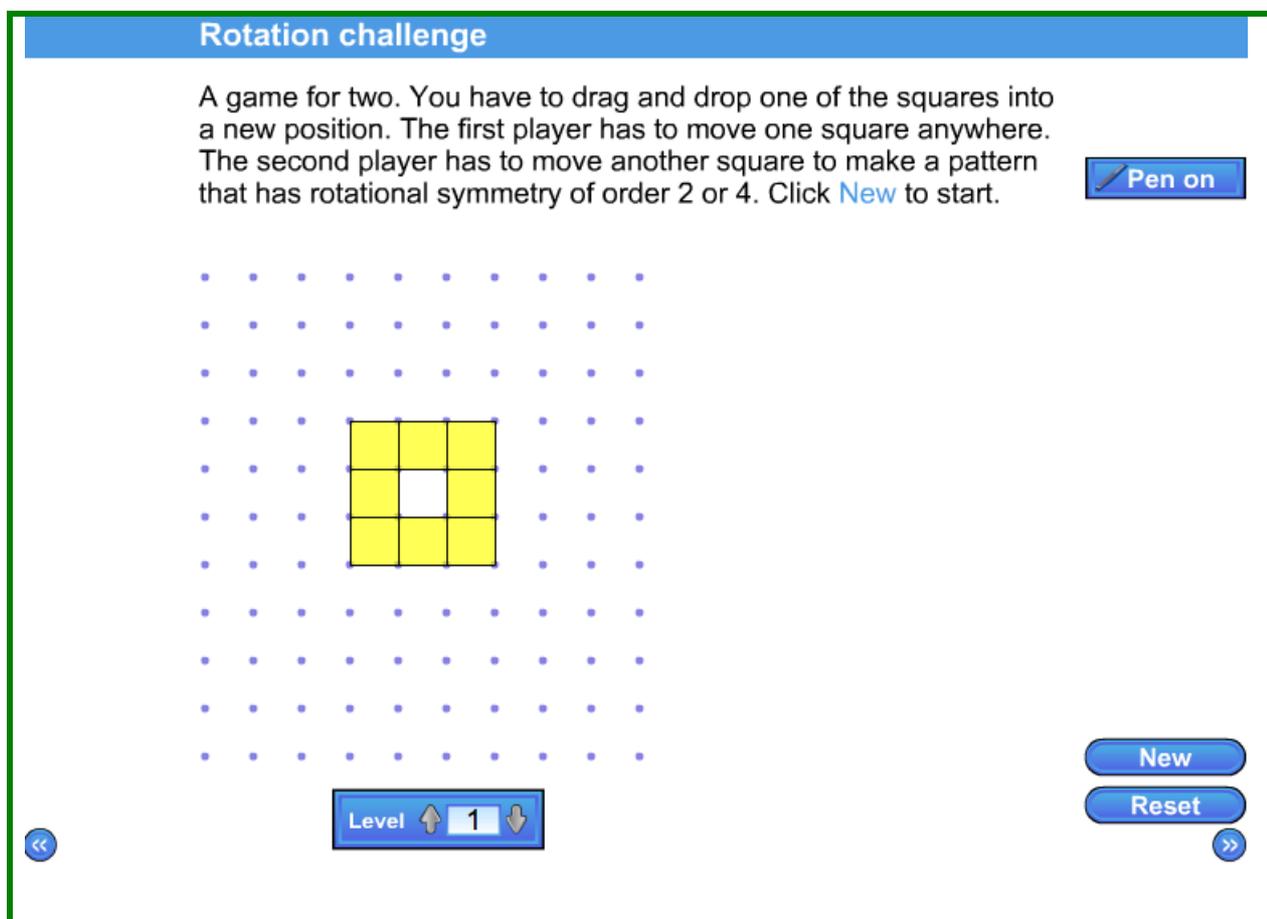
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Rotation challenge

OBJECTIVE(S): Recognise and visualise the transformation and symmetry of a 2- D shape: rotation symmetry.

DESCRIPTION: A game for two pupils requiring one of them to retain rotational symmetry in a pattern of squares on a grid.



Rotation challenge

A game for two. You have to drag and drop one of the squares into a new position. The first player has to move one square anywhere. The second player has to move another square to make a pattern that has rotational symmetry of order 2 or 4. Click [New](#) to start.

Pen on

Level 1

New

Reset

A 10 by 10 dot lattice is presented on the screen. Superimposed on the lattice is an arrangement of up to eight squares forming a pattern with rotational symmetry of either 2 or 4. Pupils are invited, in pairs, to alternately move squares. The first pupil makes a move of a square anywhere on the grid (except on top of another square) and the second pupil moves a square in order to form a new pattern with rotational symmetry of either 2 or 4. Clicking 'New' starts the process. 'Player one/two' messages are shown to indicate who should be playing. Guidance is presented on the screen throughout and 'Correct' or 'Oops' messages are displayed to indicate appropriate or inappropriate moves of the squares (for both pupils). Whilst no timer is available, pupils are asked to move as quickly as possible.

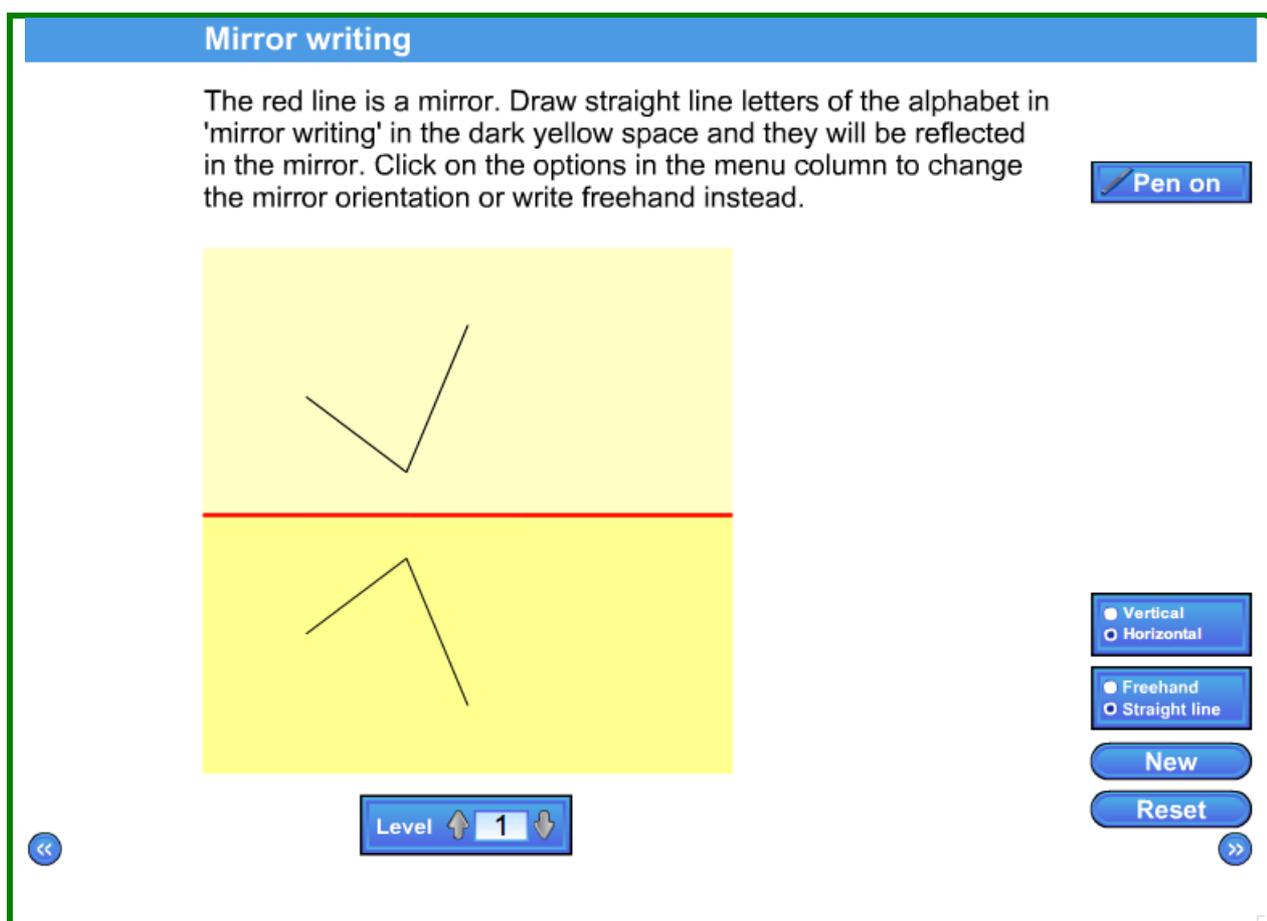
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Mirror writing

OBJECTIVE(S): Recognise and visualise the transformation and symmetry of a 2- D shape: reflection in given mirror lines, and line symmetry

DESCRIPTION: Pupils can explore reflection in mirrors of various orientations using either a 'Freehand' or 'Straight line' drawing tool. The 3 levels are differentiated by the possible orientation of the mirror.



A two-tone yellow working space containing a red mirror is shown on the screen along with palettes offering a choice of mirror orientations and pen types (Freehand or Straight lines). Depending on the pen type chosen, pupils are invited to either investigate the effects of reflection on freehand writing or construct straight line letters of the alphabet. This starter is about exploration rather than trying to achieve a correct solution to a given question. At level 1, the mirror can be horizontal or vertical. At level 2, the mirror can be set along either diagonal. At level 3, the mirror can be moved either clockwise or anti-clockwise in 5-degree steps. The Pen can be used to help explain and focus discussion.

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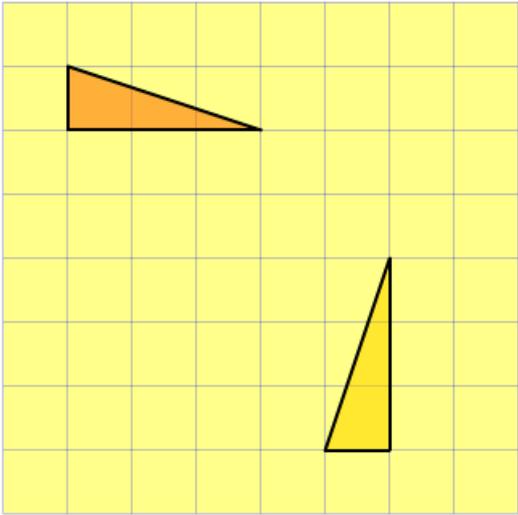
Find the centre

OBJECTIVE(S): Recognise and visualise rotation about a given point.

DESCRIPTION: A trial and improvement starter where pupils are asked to determine the centre of rotation of a transformed triangle on a grid.

Find the centre

The orange triangle has been rotated by -90 degrees about a hidden centre of rotation and finishes in the position of the yellow triangle. Click in the yellow area at the position you think is the centre of rotation.



Pen on

Level \uparrow 1 \downarrow

New

Reset

An 8 by 8 square grid is presented on the screen. Superimposed on the grid are two right angled triangles, one is the image of the other after a rotation about a point on the grid. Pupils are invited to find the centre of rotation. Help is provided by the colour of the dot made on the grid when they click: blue means far away, black that it is close and grey that it is extremely close. The exact centre of rotation is marked with a red dot.

There are 3 levels differentiated by the orientation of the triangles and the nature of the grid. At levels 1 and 2, if a pupil clicks very close to a dot that has already been placed on the boundary between two colour zones, the dot will change colour to indicate whether they have clicked closer to the next colour zone or further from it. At level 2, the lines of the grid are also sometimes removed. At level 3, the lines of the grid are always removed and the centre of rotation can be anywhere on the plane.

Discussion of trial and improvement techniques, supported by some intuitive construction of the centre, should be encouraged.

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