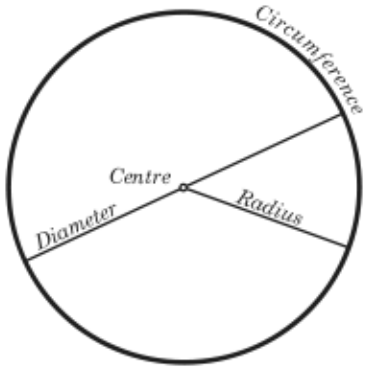
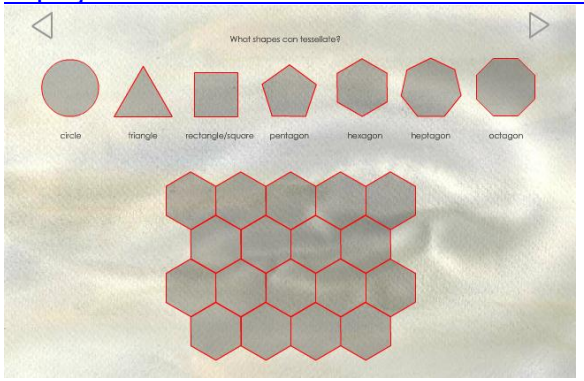
Stae 3 - Two-Dimensional Space 2

Outcome	Language
A student: › describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM › selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations MA3-2WM › manipulates, classifies and draws two-dimensional shapes, including equilateral, isosceles and scalene triangles, and describes their properties MA3-15MG	Students should be able to communicate using the following language: shape, two-dimensional shape (2D shape), circle, **centre**, **radius**, **diameter**, **circumference**, **sector**, **semicircle**, **quadrant**, triangle, equilateral triangle, isosceles triangle, scalene triangle, right-angled triangle, quadrilateral, parallelogram, rectangle, rhombus, square, trapezium, kite, pentagon, hexagon, octagon, regular shape, irregular shape, **diagonal**, vertex (vertices), line (axis) of symmetry, translate, reflect, rotate, clockwise, anti-clockwise.

Teaching and Learning Activities	Notes/ Future Directions/Evaluation	LAC Icon/ Date
Explicit Teaching		
Teacher must show students how to identify and name parts of a circle, including the centre, radius, diameter, circumference, sector, semicircle and quadrant. A **circle** is a closed curve in a plane. All of its points are an equal distance from its centre. That distance is called the **radius** of the circle. A **diameter** is a line segment that has both of its endpoints on the circle and passes through the centre. A **sector** is a portion of the circle that is enclosed by two radiuses and the connecting arc of a circle (a slice of pie). A **semi-circle** is half a circle. A **quadrant** is a quarter of a circle made by two radiuses at a right angle and the connecting arc. The **circumference** is the distance around the edge of the circle.  		Literacy

Circles In small groups, students draw a large circle in the playground using a range of materials from a fixed point e.g. ropes, stakes, chalk, tape measures. Students assess their circle and the strategy they used. They label parts of their circle: centre, radius, diameter, circumference, sector, semi-circle and quadrant. Students then investigate materials in the classroom they can use to draw circles eg a pair of compasses, a protractor, round containers, templates. They then draw and label circles. This activity could be extended to students drawing squares, equilateral triangles, regular hexagons, and regular octagons with in circles.		Literacy
Diagonals Students explore diagonals by joining two geostrips of equal length at their centres. They then join the ends of these to other geostrips to form a two-dimensional shape. Students join three or more geostrips of different lengths at their centres and use other geostrips to join the ends of these to make various convex two-dimensional shapes. Possible questions include: • what is the relationship between the number of sides and the number of diagonals? • which shapes are the strongest? • what happens when the diagonals are removed? • determine whether any of the diagonals of a particular shape are also lines (axes) of symmetry of the shape In groups, students draw their convex two-dimensional shapes complete with diagonals, and record their findings. The students' posters could be displayed. Teacher models so that students identify and name 'diagonals' of convex two-dimensional shapes. Students recognise the endpoints of the diagonals of a shape as the vertices of the shape. Students use measurement to determine which of the special quadrilaterals have diagonals that are equal in length.		Literacy Critical and creative thinking Information and communication technology capability

Translations, reflections and rotations Teacher revises the langauage and how to manipulate shapes. Students investigate combinations of translations, reflections and rotations, with and without the use of digital technologies. Students identify whether a two-dimensional shape has been translated, reflected or rotated, or has undergone a number of transformations, eg 'The parallelogram has been rotated clockwise through 90° once and then reflected once'. Students construct patterns of two-dimensional shapes that involve translations, reflections and rotations using computer software.They predict the next translation, reflection or rotation in a pattern, eg 'The arrow is being rotated 90° anti-clockwise each time'.		Literacy Critical and creative thinking Information and communication technology capability
Drawing and Manipulating Students are given access to a variety of geometric equipment (including rulers, protractors, templates, pairs of compasses, set squares, drawing software) to draw regular and irregular two-dimensional shapes. Possible questions include: ▮ what did you use to construct angles? ▮ how did you ensure angle, side and diagonal properties were correct? ▮ what did you use to construct circles? ▮ what is the difference between a regular and an irregular shape? This activity could be extended to writing a list of properties for the various two-dimensional shapes.		Literacy Critical and creative thinking Information and communication technology capability
http://juliannakunstler.com/art1_tessellations.html#.Ui2ys9I0WuI  Students choose the correct pattern from a number of options when given information about a combination of transformations.		Critical and creative thinking

Computer Design Students explore rotational symmetry and patterns through computer applications. The students are challenged to design a logo that incorporates rotational symmetry. Possible questions include: • how many times can you get your shape to match its original outline in one full turn? • how many axes of symmetry does your logo have? Students discuss their logos.		Critical and creative thinking Information and communication technology capability