SYLLABUS RELATIONSHIPS
Stage 4 - Space & Geometry

Workbook activities relate to outcomes of the NSW Syllabus as follows:

OUTCOME	Workbook Activities
SGS4.1 - Properties of solids **Knowledge and skills. Students learn about:**	
• describing solids in terms of their geometric properties *number of faces* *shape of faces* *number and type of congruent faces* *number of vertices* *number of edges* *convex or non-convex*	13 - 1,5 14 - 1,2,3,4,5 15 - 1,2,5,7 16 - 1,2,4,6,7
• identifying any pairs of parallel flat faces of a solid	13 - 2,3
• determining if two straight edges of a solid are intersecting, parallel or skew	13 - 2,3
• determining if a solid has a uniform cross-section	15 - 3 16 - 2,6
• classifying solids on the basis of their properties *A polyhedron is a solid whose faces are all flat.* *A prism has a uniform polygonal cross-section.* *A cylinder has a uniform circular cross-section.* *A pyramid has a polygonal base and one further vertex (the apex).* *A cone has a circular base and an apex.* *All points on the surface of a sphere are a fixed distance from its centre.*	13 - 5 14 - 8 15 - 1,2,3,7 16 - 1,6,7
• identifying right prisms and cylinders and oblique prisms and cylinders	15 - 2,7
• identifying right pyramids and cones and oblique pyramids and cones	16 - 1,2,5,6
• sketching on isometric grid paper shapes built with cubes	13 - 10,12
• representing three-dimensional objects in two dimensions from different views	13 - 11,12 16 - 1
• confirming, for various convex polyhedra, Euler's formula $F + V = E + 2$ *relating the number of faces (F), the number of vertices (V) and the number of edges (E)*	14 - 5 15 - 5 16 - 4
• exploring the history of Platonic solids and how to make them	14 - 1,2,3,4,7
• making models of polyhedra	14 - 1,2,6
SGS4.1 - Properties of solids **Working Mathematically. Students learn to:**	
• interpret and make models from isometric drawings *(Communicating)*	13 - 12,13
• recognise solids with uniform and non-uniform cross-sections *(Communicating)*	15 - 3 16 - 2,6
• analyse three-dimensional structures in the environment to explain why they may be particular shapes eg buildings, packaging *(Reasoning)*	14 - 8,9,10 15 - 5,6 16 - 3 (also 2 - 4) 16 - 8
• visualise and name a common solid given its net *(Communicating)*	14 - 2 15 - 4
• recognise whether a diagram is a net of a solid *(Communicating)*	13 - 7,8,9 15 - 7 16 - 5
• identify parallel, perpendicular and skew lines in the environment *(Communicating, Reflecting)*	13 - 4,6

OUTCOME	Workbook Activities
SGS4.2 - Angle relationships **Knowledge and skills. Students learn about:**	
• labelling and naming points, lines and intervals using capital letters	1 - 1
• labelling the vertex and arms of an angle with capital letters	1 - 1
• labelling and naming angles using ∠A and ∠XYZ notation	1 - 1
• using the common conventions to indicate right angles and equal angles on diagrams	1 - 6,7 2 - 2
• identifying and naming adjacent angles (two angles with a common vertex and a common arm), vertically opposite angles, straight angles and angles of complete revolution, embedded in a diagram	1 - 1,2,3,5 9 - 1,2
• using the words 'complementary' and 'supplementary' for angles adding to 90º and 180º respectively, and the terms 'complement' and 'supplement'	1 - 6 9 - 1,2
• establishing and using the equality of vertically opposite angles	1 - 7,8 9 - 2
• identifying and naming a pair of parallel lines and a transversal	1 - 9 9 - 2
• using common symbols for 'is parallel to' (∥) and 'is perpendicular to' (⊥)	1 - 9
• using the common conventions to indicate parallel lines on diagrams	1 - 9
• identifying, naming and measuring the alternate angle pairs, the corresponding angle pairs and the co-interior angle pairs for two lines cut by a transversal	1 - 10, 11 9 - 2
• recognising the equal and supplementary angles formed when a pair of parallel lines are cut by a transversal	1 - 11 9 - 2
• using angle properties to identify parallel lines	1 - 11 6 - 4 9 - 2
• using angle relationships to find unknown angles in diagrams	1 - 13
SGS4.2 - Angle relationships **Working Mathematically. Students learn to**:	
• recognise and explain why adjacent angles adding to 90º form a right angle *(Reasoning)*	1 - 2,3,5
• recognise and explain why adjacent angles adding to 180º form a straight angle *(Reasoning)*	1 - 2,3,5
• recognise and explain why adjacent angles adding to 360º form a complete revolution *(Reasoning)*	1 - 2,3,5 6 - 5
• find the unknown angle in a diagram using angle results, giving reasons *(Applying Strategies, Reasoning)*	1 - 12 4 - 1
• apply angle results to construct a pair of parallel lines using a ruler and a protractor, a ruler and a set square, or a ruler and a pair of compasses *(Applying Strategies)*	1 - 11 8 - 7
• apply angle and parallel line results to determine properties of two-dimensional shapes such as the square, rectangle, parallelogram, rhombus and trapezium *(Applying Strategies, Reasoning, Reflecting)*	2 - 2,3 8 - 2,4,5 9 - 3,4,5
• identify parallel and perpendicular lines in the environment *(Reasoning, Reflecting)*	13 - 4,6
• construct a pair of perpendicular lines using a ruler and a protractor, a ruler and a set square, or a ruler and a pair of compasses *(Applying Strategies)*	8 - 1 10 - 4
• use dynamic geometry software to investigate angle relationships *(Applying Strategies, Reasoning)*	9 - 1,2

OUTCOME	Workbook Activities
SGS4.3 - Properties of Geometrical Figures **Knowledge and skills. Students learn about:**	
• labelling and naming triangles (eg ABC) and quadrilaterals (eg ABCD) in text and on diagrams	2 - 1 8 - 9 10 - 2,3,4,5
• using the common conventions to mark equal intervals on diagrams	4 - 1 11 - 3
• recognising and classifying types of triangles on the basis of their properties (acute-angled triangles, right-angled triangles, obtuse-angled triangles, scalene triangles, isosceles triangles and equilateral triangles)	2 - 5,6 9 - 3
• constructing various types of triangles using geometrical instruments, given different information eg the lengths of all sides, two sides and the included angle, and two angles and one side	1 - 4 2 - 7
• justifying informally by paper folding or cutting, and testing by measuring, that the interior angle sum of a triangle is 180^{o}, and that any exterior angle equals the sum of the two interior opposite angles	2 - 1,3 6 - 3
• using a parallel line construction, to prove that the interior angle sum of a triangle is 180^{o}	2 - 2
• proving, using a parallel line construction, that any exterior angle of a triangle is equal to the sum of the two interior opposite angles	2 - 3 9 - 3
• distinguishing between convex and non-convex quadrilaterals (the diagonals of a convex quadrilateral lie inside the figure)	4 - 3
• establishing that the angle sum of a quadrilateral is 360^{o}	4 - 4 6 - 4
• constructing various types of quadrilaterals	8 - 9
• investigating the properties of special quadrilaterals (trapeziums, kites, parallelograms, rectangles, squares and rhombuses) by using symmetry, paper folding, measurement and/or applying geometrical reasoning Properties to be considered include : *opposite sides parallel* *opposite sides equal* *adjacent sides perpendicular* *opposite angles equal* *diagonals equal in length* *diagonals bisect each other* *diagonals bisect each other at right angles* *diagonals bisect the angles of the quadrilateral*	8 - 10,11 9 - 5
• investigating the line symmetries and the order of rotational symmetry of the special quadrilaterals	8 - 12 9 - 5
• classifying special quadrilaterals on the basis of their properties	8 - 3,4,5,6 9 - 5
• identifying and naming parts of the circle and related lines, including arc, tangent and chord	3 - 1,2
• investigating the line symmetries and the rotational symmetry of circles and of diagrams involving circles, such as a sector and a circle with a chord or tangent	3 - 5 7 - 1,7,8,9,10

OUTCOME	Workbook Activities
SGS4.3 - Properties of Geometrical Figures **Working Mathematically. Students learn to:**	
• sketch and label triangles and quadrilaterals from a given verbal description *(Communicating)*	2 - 3 8 - 9
• describe a sketch in sufficient detail for it to be drawn *(Communicating)*	4 - 5
• recognise that a given triangle may belong to more than one class *(Reasoning)*	2 - 5,6
• recognise that the longest side of a triangle is always opposite the largest angle *(Applying Strategies, Reasoning)*	2 - 1 9 - 3
• recognise and explain why two sides of a triangle must together be longer than the third side *(Applying Strategies, Reasoning)*	2 - 6
• recognise special types of triangles and quadrilaterals embedded in composite figures or drawn in various orientations *(Communicating)*	11 - 2
• determine if particular triangles and quadrilaterals have line and/or rotational symmetry *(Applying Strategies)*	7 - 2,3,4,5,6,7 8 -12 9 - 5
• apply geometrical facts, properties and relationships to solve numerical problems such as finding unknown sides and angles in diagrams *(Applying Strategies)*	1 - 13 4 - 6 8 - 13 9 - 4
• justify their solutions to problems by giving reasons using their own words *(Reasoning)*	2 - 2,3,6 4 - 6 8 - 4,5,13 9 - 3,4
• bisect an angle by applying geometrical properties eg constructing a rhombus *(Applying Strategies)*	10 - 5,6
• bisect an interval by applying geometrical properties eg constructing a rhombus *(Applying Strategies)*	10 - 1,2,3
• draw a perpendicular to a line from a point on the line by applying geometrical properties eg constructing an isosceles triangle *(Applying Strategies)*	10 - 4
• draw a perpendicular to a line from a point off the line by applying geometrical properties eg constructing a rhombus *(Applying Strategies)*	10 - 4
• use ruler and compasses to construct angles of 60º and 120º by applying geometrical properties eg constructing an equilateral triangle *(Applying Strategies)*	10 - 6
• explain that a circle consists of all points that are a given distance from the centre and how this relates to the use of a pair of compasses *(Communicating, Reasoning)*	8 - 8 10 - 1
• use dynamic geometry software to investigate the properties of geometrical figures *(Applying Strategies, Reasoning)*	9 - 3,4,5

OUTCOME	Workbook Activities
SGS4.4 - Congruence and Similarity **Knowledge and skills. Students learn about:**	
• identifying congruent figures by superimposing them through a combination of rotations, reflections and translations	5 - 1,2,3,4,5,6,7,8 13 - 8
• matching sides and angles of two congruent polygons	11 - 3
• naming the vertices in matching order when using the symbol ≡ in a congruence statement	11 - 3
• drawing congruent figures using geometrical instruments	3 - 3,4 11 - 4
• determining the condition for two circles to be congruent (equal radii)	3 - 3
• using the term 'similar' for any two figures that have the same shape but not necessarily the same size	11 - 7,8,9,10,11,12 12 - 5
• matching the sides and angles of similar figures	11 - 9,12
• naming the vertices in matching order when using the symbol lll in a similarity statement	11 - 9,12
• determining that shape, angle size and the ratio of matching sides are preserved in similar figures	11 - 9,10 12 - 2,5,8,10
• determining the scale factor for a pair of similar polygons	12 - 1,2,3,10
• determining the scale factor for a pair of circles	12 - 5
• calculating dimensions of similar figures using the enlargement or reduction factor	12 - 2,10
• choosing an appropriate scale in order to enlarge or reduce a diagram	12 - 5
• constructing scale drawings	12 - 9
• drawing similar figures using geometrical instruments	11 - 5 12 - 10
SGS4.4 - Congruence and Similarity **Working Mathematically. Students learn to:**	
• recognise congruent figures in tessellations, art and design work *(Reflecting)*	6 - 1,2,3,4,6
• interpret and use scales in photographs, plans and drawings found in the media and/or other learning areas *(Applying Strategies, Communicating)*	12 - 7,8,9
• enlarge diagrams such as cartoons and pictures *(Applying Strategies)*	3 - 3 12 - 2,5
• apply similarity to finding lengths in the environment where it is impractical to measure directly eg heights of trees, buildings *(Applying Strategies, Reasoning)*	12 - 4,10
• apply geometrical facts, properties and relationships to solve problems such as finding unknown sides and angles in diagrams *(Applying Strategies, Reasoning)*	12 - 10
• justify their solutions to problems by giving reasons using their own words *(Reasoning, Communicating)*	12 - 4
• recognise that area, length of matching sides and angle sizes are preserved in congruent figures *(Reasoning)*	11 - 2,3,5
• recognise that shape, angle size and the ratio of matching sides are preserved in similar figures *(Reasoning)*	11 - 6,7,9,10
• recognise that similar and congruent figures are used in specific designs, architecture and art work eg works by Escher, Vasarely and Mondrian; or landscaping in European formal gardens *(Reflecting)*	11 -1,2,11
• find examples of similar and congruent figures embedded in designs from many cultures and historical periods *(Reflecting)*	3 - 3,4 4 - 2 7 - 11 11 - 1,11
• use dynamic geometry software to investigate the properties of geometrical figures *(Applying Strategies, Reasoning)*	12 - 6