| **SCOPE AND SEQUENCE** | | | Mathematics — Years 1 to 9 | | | | **SPACE** | | **DRAFT** | | | |
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| **Scope and sequence** identifies what should be taught and what is important for students to have opportunities to learn. It describes the *knowledge* that students need for ongoing learning in Mathematics.  This knowledge is presented as *Concepts and facts* and *Procedur*es.  The scope and sequence:   * is provided for each year of schooling * should be used together with the *Essential Learnings* * provides additional detail in each Organiser * informs the focus of Mathematics in assessment * is a key document for school curriculum planning. | | | | | | | | | | | | |
| **Prep** | **Year 1** | **Year 2** | | **Year 3** | **Year 4** | **Year 5** | | **Year 6** | | **Year 7** | **Year 8** | **Year 9** |
| ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | | ***Concepts and facts*** | | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** |
| * Straight and curved lines in shapes and objects, e.g. curved line on a ball and circle and straight sides on a die and a square | * 2D shapes: circle, triangle, rectangle (including squares) * 3D objects: cube, rectangular prism, sphere, cone, pyramid, cylinder * Simple properties of 2D shapes   + straight and curved lines and surfaces   + number of sides   + number of corners * Simple properties of 3D objects, e.g. shapes of faces | * Families of shapes * Geometric properties of shapes   + angles in turns   + nets of a cube   + depth in 3D objects * Symmetry: a line or plane dividing images into two congruent shapes   + folded and cut pictures   + flips, slides, turns | | * 2D shapes names: square, rectangle, triangle, and circle * 3D objects: prism, pyramid, cone, cylinder and sphere * Geometric properties   + angle, line of symmetry | * Quadrilaterals:   + parallelograms   + rectangles   + trapeziums   + rhombuses (including diamonds) * Nets of prisms, pyramids, cylinders, cones * Geometric properties of shapes:   + lines (horizontal, vertical, oblique, parallel and non‑parallel)   + equal sides, faces   + angles (straight 180º,  right 90º) * Symmetrical, asymmetrical shapes * Tessellating properties of triangles and quadrilaterals * Enlargements and reductions | * Polygons: a plane figure with three or more sides, non‑polygons * Triangles:   + right-angled   + isosceles   + scalene   + equilateral * Geometric properties of shapes:   + vertex, edge, base   + parallel sides, faces, lines   + perpendicular sides and lines   + angles (acute, obtuse, straight, reflex) * Prediction of shapes from nets using visualisations * Symmetry * Tessellations involving transformations | | * Regular and irregular polygons:   + triangles   + quadrilaterals   + pentagons   + hexagons   + octagons   + dodecagons * Specialised names of prisms and pyramids   + by their base shape,  e.g. square-based pyramids, hexagonal prism   + tetrahedrons * Sphere, hemisphere * Geometric properties:   + equal base angles, diagonals of a polygon * Symmetry:   + lines   + planes   + points   + rotational and angle of rotation | | * 2D shapes: circles (including concentric, non-polygons,  e.g. ellipse) * 3D objects: plans, nets, isometric view * Part of 2D shapes,  e.g. semicircle, quadrant * Composite shapes, e.g. 4-, 5-, and 6-pointed stars are made of a number of distinct shapes * Geometric properties:   + sum of internal angles   + circles (radius, diameter, centre, circumference, chord, tangent) * Symmetry:   + lines of   + points of   + planes of   + rotational (including angle of rotation) * Congruent shapes have the same shape and size * Transformations: reflection, rotation and translation * Points * Lines | * Cross-sections of prisms and pyramids parallel or perpendicular to base * Shapes produced by repeating regular geometric shapes (Platonic solids), e.g. cube, tetrahedron, octahedron, dodecahedron, icosahedron * Shapes embedded within other shapes * Parts of 3D objects,  e.g. truncated cone * Composite 3D shapes,  e.g. octahedron (two square-based pyramids) * Line segment and midpoint * Angles:   + formed by intersecting lines, e.g. opposite, supplementary, complementary angles   + external angles: properties of external angles of (triangles, polygons) * Congruence * Similarity * Perspective drawings | * Complex geometric shapes:   + curved surfaces   + compound shapes as objects combined to make a single object, e.g. embedded shapes * Cross sections of shapes:   + partitions of circles,  e.g. sectors, segments, annulus * Specifications:   + boundary, angle and scale * Sequences of transformations * Proofs:   + angle properties associated with parallel, perpendicular and transverse lines and polygons, e.g. when two straight lines intersect, opposite angles are equal   + sum of interior angles |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | | ***Procedures*** | ***Procedures*** | ***Procedures*** |
| * Classification by:   + shape name, e.g. circle   + single attribute, e.g. things that roll | * Classification of shapes using one or two defining features * Comparison of shapes:   + defining features   + common features   + different features | * Classification using geometric names and defining properties * Comparison of:   + different nets of a cube   + of 2D shapes and 3D objects, connections and differences   + folded or cut images * Partition of 2D shapes, e.g. triangles within a square, rectangle | | * Classification using geometric names and defining properties * Comparison of:   + shapes for one line of symmetry   + angles, e.g. bigger than, smaller than | * Classification using geometric names and defining properties * Relationship between symmetry and flip * Preservation of symmetry in flips, slides, and turns of objects | * Classification using geometric properties * Shapes within shapes * Angles within angles | | * Estimation of angles | | * Classification using geometric conventions, e.g. length, angle size, relationships between faces * Comparison of shapes by superimposing them through a sequence of transformations * Connections between transformations, tessellations of suitable shapes in the plane and points, lines and planes of symmetry | * Constructions using geometric tools for perpendicular lines,  90º angles, 60º angles, and to bisect an angle * Composite constructions based on known properties,  e.g. construct a rhombus given lengths of two diagonals * Link symmetry, congruence, similarity of shapes with transformations, tessellations in the planes and on surfaces and informal proofs | * Construction and manipulation of complex geometric shapes, e.g. soccer ball from net of stitching pattern involving tessellations of hexagons and pentagons * Construction from isometric drawings * Comparison of geometric properties of families of shapes for congruence or similarity |
| * Concrete materials:   + computers   + manipulative materials (familiar shapes and objects) * Verbal:   + everyday language: straight sides, curved lines, straight lines * Written:   + straight and curved lines within drawings | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + everyday examples of 3D objects, e.g. ice-cream cones, balls, die,   + everyday examples of 2D shapes, e.g. a window in a drawing of a house   + 3D object constructions   + puzzles * Verbal:   + descriptions of shapes   + mathematical language: names of 2D shapes * Written:   + sketches of 2D shapes and 3D objects from different viewpoints   + 3D objects have different orientations | * Concrete materials:   + computers and other electronic devices   + manipulative materials (3D objects)   + mirrors   + ruler for drawing straight lines * Verbal:   + defining features of families of 2D shapes and 3D objects   + 3D objects: shape and number of faces, function   + 2D shapes: number of sides, number of corners   + common characteristics of 2D shapes, e.g. length, width   + common characteristics of 3D objects, e.g. length, width, depth, height * Written:   + drawings and electronic representations of shapes in different orientations and turns | | * Concrete materials:   + computers and other electronic devices   + manipulative materials (puzzles)   + mirrors   + construction of 2D shapes and 3D objects   + repeating patterns * Verbal:   + mathematical language: angle, line of symmetry   + 2D shapes: number of sides, number of angles * Written:   + drawings and electronic representations of 2D and 3D objects | * Concrete materials:   + computers and other electronic devices   + manipulative materials (models of 3D objects)   + mirrors * Verbal:   + descriptions of features using appropriate spatial language and families of shapes * Written:   + conventions for labelling shapes and lines   + arrows to identify parallel lines   + dotted lines to represent hidden lines in 3D objects | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + nets of 3D objects * Verbal:   + descriptions of features and broad family groups * Written:   + symbols for angles   + different viewpoints and orientations   + conventions for labelling shapes and angles   + letters for naming 2D shapes (ABC … )   + marks to identify equal sides of shapes, equal angles, and right angles,   + patterns   + designs   + tessellations | | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + pair of compasses and straightedge protractor * Verbal:   + mathematical language: congruence * Written:   + symbolic: congruent ()   + simple compass constructions, e.g. isosceles triangle   + conventions for labelling shapes and angles   + congruent markings on segments and angles | | * Concrete materials:   + computers and other electronic devices   + manipulative materials,  e.g. multi-link cubes   + mirrors   + geometric drawing tools   + geometry software * Verbal:   + descriptions of symmetry and transformations in patterns   + mathematical language: congruent, non-congruent shapes, properties of shapes * Written:   + accurate drawings and using geometric conventions, tools and technologies   + mosaic patterns from plans drawn to scale   + plans, nets, isometric diagrams and grid drawings   + drawings of 3D objects and composite shapes from different viewpoints and orientations | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + mirrors   + geometric drawing tools   + cross-sections * Verbal:   + sum of internal angles   + informal proofs * Written:   + sketches, drawings or electronic images of cross sections   + compass construction to bisect a line segment | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + geometric drawing tools   + plans   + nets * Verbal:   + descriptions of complex geometric shapes using geometric conventions and properties, e.g. diagonals of a rhombus bisect each other at right angles   + deductions supported by proofs, e.g. proof that lines are parallel * Written:   + sketches, accurate drawings or electronic images of complex geometric shapes from specifications and with geometric conventions, e.g. symbols to indicate parallel lines, perpendicular lines and congruent lines |
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| * Visual:   + photographs and drawings of familiar shapes and objects   + “mind pictures” of different shapes * Positions and their opposites in immediate environment * Directions to locate positions or objects | * Visual:   + shapes within shapes   + folding   + cutting   + joining halves   + shapes within pictures   + illustrations   + “mind pictures”’ of different shapes * Turns change direction * Non-verbal information, e.g. gestures and simple treasure maps from familiar board or electronic games | * Visual:   + paper-folding   + different orientations and viewpoints   + ‘mind pictures’ of different viewpoints of shapes, and movement of shapes * Left and right turns change direction * Estimates of informal measurements in movements:   + steps   + grid spaces | | * Visual:   + partial 2D shapes and 3D objects and different orientations   + angles in familiar objects   + “mind pictures” of different viewpoints of shapes, and movement of shapes * Relative size within maps * Turns: quarter, half, three‑quarter and full, more than or less than a quarter turn, clockwise, anticlockwise * Estimates of informal measurements in movements:   + paces   + grid spaces | * Visual:   + enlargements and reductions of shapes   + transformations of 2D shapes   + paper-folding techniques for symmetry   + “mind pictures” of different viewpoints of shapes, and movement of shapes Directional north (⭡N) * Mapping conventions:   + symbols   + legends   + alphanumeric grids | * Visual:   + “mind pictures” of the construction sequence of 3D objects from nets * Four major compass points * Mapping conventions:   + symbols   + compass points labels and directional arrow for north   + scale, e.g. 1 cm represents 10 m   + legends   + alphanumeric grids | | * Visual:   + tessellations using iterative single transformations   + isometric view * Distance between locations * Angle as a change in direction * Mapping conventions:   + grid references: poles, key lines of reference on globe and flat map of earth, e.g. equator, prime meridian, international date line   + coordinates   + compass points: north (N), south (S), east (E), west (W), north- east (NE), south‑east (SE), north-west (NW), south-west (SW)   + scale * Basic orienteering conventions | | * Visual:   + lines of symmetry, e.g. the plane containing the equator on a globe   + origami design, paper-folding * Mapping conventions:   + coordinates   + compass points   + scale * Eight compass points: N, S, E, W, NE, SE, NW, SW | * Visual:   + 3D objects from different viewpoints (nets, isometric , location of viewer, e.g. top, side, front)   + perspective: one-point, two‑points * Distance between grid references * Mapping conventions   + ratio scale on maps (1:250) * grid references   + latitude   + longitude | * Visual:   + isometric and perspective drawings * Bearings in whole degrees * Mapping conventions:   + scale   + coordinates   + bearings   + angles   + keys   + annotations |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | | ***Procedures*** | ***Procedures*** | ***Procedures*** |
| * Position of self in relation to other objects, e.g. on the chair, under the roof, behind Lachlan and in front of the teacher | * “Mind pictures” to assist plans for movement | * Position relative to known landmarks * “Mind pictures” to assist plans for movement | | * Comparison of sketched maps and commercial maps of the same environment | * Connection between the amount of turn and change in direction from north, e.g. half a turn from facing north is facing south | * Connection between four compass points and the amount of turn or angle * Estimation of distances in relation to scale | | * Connection between eight compass points and the amount of turn or angle * Estimation of distances | | * Connection between eight compass points and the amount of turn * Estimation of distances | * Interpretations of maps using scale, coordinates, features distance and orientations * Comparison of alternative pathways between locations * Estimation of distances | * Relationship between flat maps and globe * Measurement of bearings measured clockwise from north * Estimation of bearings in degrees * Calculations of distances using scale |
| * Concrete materials:   + computers   + manipulative materials   + familiar environments * Verbal:   + directions using position language   + everyday language: here, there, on, off, forward, backward, on, under, in front of, behind, inside, outside, in, out * Written:   + simple line drawings representing a map * Visual:   + photographic of familiar environments | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + community environments * Verbal:   + feedback on and improvement of directions   + everyday language:   - over, under  - up, down  - left, right  - forwards, backwards  - sideways  - on below  - between  - beside  - near  - before, after  - full, half and quarter turns   * Written:   + signs and symbols   + simple line drawings representing a map * Visual:   + electronic maps and plans | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + grids * Verbal:   + explanations of the construction and interpretation of directions   + everyday language: left/right of, long way from, close to * Written:   + simple sketches of maps and plans on grids * Visual:   + electronic maps including grids and plans | | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + maps of familiar environments   + grids * Verbal:   + informal distances in directions   + descriptive directions   + factors assisting precision and interpretation of directions * Written:   + sketches of simple maps and plans on grids * Visual:   + electronic maps including grids and plans | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + treasure map   + room plan * Verbal:   + turns in directions * Written:   + drawings and electronic of maps from different viewpoints, e.g. from above as in “bird’s-eye-view” with mapping conventions * Visual:   + electronic maps and plans | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + maps and plans of schools and local area for interpretation * Verbal:   + spatial language to specify directions * Written:   + manual or electronic maps and plans with conventions and straightforward scale,  e.g. legend and symbols for direction * Visual:   + electronic maps and plans | | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + commercial maps and plans   + globe * Verbal:   + directions to specific locations   + calculation of distance between grid reference points * Written:   + manual or electronic maps and plans with conventions * Visual:   + simple orienteering maps and directions | | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + commercial maps and globe   + shopping centre plans * Verbal:   + directions for specific locations and movement from one location to another using flat maps and the globe * Written:   + calculation of distance between locations   + manual or electronic maps and plans with conventions and scale * Visual:   + other people’s maps and plans | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + flat maps, topographical maps and globes * Verbal:   + precise directions for specific locations and movement from one location to another   + critical analysis of alternative pathways and distances between locations * Written:   + calculation of enlargement, reductions using scale   + manual or electronic maps and plans with conventions and scale, e.g. floor plans with scale   + calculations of distances between locations * Visual:   + commercial floor plans | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + flat maps including world, atlas, street directory and orthophoto   + amusement park maps and location guides * Verbal:   + specify locations and descriptions of spatial relationships * Written:   + manual/electronic maps and plans with conventions to represent location   + distance and orientation on grids   + plans and elevations with scale * Visual:   + orienteering maps and directions |