NSW Curriculum references

The following outcomes and relevant content are drawn from the BOSTES site:
http://syllabus.bostes.nsw.edu.au/mathematics/

1. Length concepts: **Used in all activities**

MATHEMATICS K–10 - STAGE 3 - MEASUREMENT AND GEOMETRY **LENGTH**

2. Area concepts: Activity A: Mapping a Garden or Perimeter of a Building

MATHEMATICS K–10 - STAGE 5.1 - MEASUREMENT AND GEOMETRY **AREA AND SURFACE AREA**

3. Volume concepts: **Activity D: Marking out the corners of a shed**

MATHEMATICS K–10 - STAGE 5.2 - MEASUREMENT AND GEOMETRY **VOLUME**

4. Bearings concepts: **Activity A: Mapping a Garden or Perimeter of a Building**

Activity B: MiniCAD

Activity E: Marking a Path through a Minefield

MATHEMATICS K–10 - STAGE 5.2 - MEASUREMENT AND GEOMETRY **RIGHT-ANGLED TRIANGLES (TRIGONOMETRY)**

5. Pythagoras theorem concepts: Activity D: Marking out the corners of a shed

MATHEMATICS K–10 - STAGE 4 - MEASUREMENT AND GEOMETRY **RIGHT-ANGLED TRIANGLES (PYTHAGORAS)**

6. Similar triangle concepts: Activity C: Measuring Heights using Shadows

MATHEMATICS K–10 - STAGE 5.1 - MEASUREMENT AND GEOMETRY **PROPERTIES OF GEOMETRICAL FIGURES**

1. Length concepts: used in all activities

MATHEMATICS K–10 - STAGE 3 - MEASUREMENT AND GEOMETRY LENGTH

OUTCOMES

A student:

- MA3-1WM

describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions

- MA3-3WM

gives a valid reason for supporting one possible solution over another

- MA3-9MG

selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length

- MA3-2WM

selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations

CONTENT

- Students:
- Choose appropriate units of measurement for length (ACMMG108)
- select and use the appropriate unit and measuring device to measure lengths and distances
- describe how a length or distance was estimated and measured (Communicating, Problem Solving)
- question and explain why two students may obtain different measures for the same length, distance or perimeter(Communicating, Reasoning)
- estimate lengths and distances using an appropriate unit and check by measuring
- record lengths and distances using combinations of millimetres, centimetres, metres and kilometres, eg 1 km 200 m
- Calculate the perimeters of rectangles using familiar metric units (ACMMG109)
- use the term 'dimensions' to describe the 'lengths' and 'widths' of rectangles
- measure and calculate the perimeter of a large rectangular section of the school, eg a playground, netball courts
- calculate perimeters of common two-dimensional shapes, including squares, rectangles, triangles and regular polygons with more than four sides (ie regular polygons other than equilateral triangles and squares)
- recognise that rectangles with the same perimeter may have different dimensions (Reasoning)
- explain that the perimeters of two-dimensional shapes can be found by finding the sum of the side lengths (Communicating)
- explain the relationship between the lengths of the sides and the perimeters for regular polygons (including equilateral triangles and squares) (Communicating, Reasoning)

- record calculations used to find the perimeters of two-dimensional shapes
- Connect decimal representations to the metric system (ACMMG135)
- recognise the equivalence of whole-number and decimal representations of measurements of length, eg 165 cm is the same as 1.65 m
- interpret decimal notation for lengths and distances, eg 13.5 cm is 13 centimetres and 5 millimetres
- record lengths and distances using decimal notation to three decimal places, eg 2.753 km
- Convert between common metric units of length (ACMMG136)
- convert between metres and kilometres
- convert between millimetres, centimetres and metres to compare lengths and distances
- explain and use the relationship between the size of a unit and the number of units needed to assist in determining whether multiplication or division is required when converting between units, eg 'More metres than kilometres will be needed to measure the same distance, and so to convert from kilometres to metres, I need to multiply' (Communicating, Reasoning) 
- Solve problems involving the comparison of lengths using appropriate units (ACMMG137)
- investigate and compare perimeters of rectangles with the same area 
- determine the number of different rectangles that can be formed using whole-number dimensions for a given area (Problem Solving, Reasoning) 
- solve a variety of problems involving length and perimeter, including problems involving different units of length, eg 'Find the total length of three items measuring 5 mm, 20 cm and 1.2 m' 

2. Area concepts: Activity A: Mapping a Garden or Perimeter of a Building

MATHEMATICS K–10 - STAGE 5.1 - MEASUREMENT AND GEOMETRY AREA AND SURFACE AREA

OUTCOMES

A student:

- MA5.1-1WM

uses appropriate terminology, diagrams and symbols in mathematical contexts

- MA5.1-2WM

selects and uses appropriate strategies to solve problems

- MA5.1-8MG

calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms

CONTENT

- Students:
- Calculate the areas of composite shapes (ACMMG216)
- calculate the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectors
- identify different possible dissections for a given composite figure and select an appropriate dissection to facilitate calculation of the area (Problem Solving)
- solve a variety of practical problems involving the areas of quadrilaterals and composite shapes
- apply properties of geometrical shapes to assist in finding areas, eg symmetry (Problem Solving, Reasoning)

3. Volume concepts: Activity D: Marking out the corners of a shed

MATHEMATICS K–10 - STAGE 5.2 - MEASUREMENT AND GEOMETRY **VOLUME**

OUTCOMES

A student:

- MA5.2-1WM

selects appropriate notations and conventions to communicate mathematical ideas and solutions

- MA5.2-2WM

interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems

- MA5.2-12MG

applies formulas to calculate the volumes of composite solids composed of right prisms and cylinders

CONTENT

- Students:
- Solve problems involving the volumes of right prisms (ACMMG218)
- find the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals
- solve a variety of practical problems related to the volumes and capacities of composite right prisms
- compare the surface areas of prisms with the same volume (Problem Solving, Reasoning)
- find the volumes and capacities of various everyday containers, such as water tanks or cartons used by removalists (Problem Solving)
- Solve problems involving volume for a range of prisms, cylinders and composite solids (ACMMG242)
- find the volumes of solids that have uniform cross-sections that are sectors, including semicircles and quadrants
- find the volumes of composite solids involving prisms and cylinders, eg a cylinder on top of a rectangular prism
- dissect composite solids into two or more simpler solids to find their volumes (Reasoning)
- solve a variety of practical problems related to the volumes and capacities of prisms, cylinders and related composite solids

4. Bearings concepts: Activity A: Mapping a Garden or Perimeter of a Building
Activity B: MiniCAD
Activity E: Marking a Path through a Minefield

MATHEMATICS K–10 - STAGE 5.2 - MEASUREMENT AND GEOMETRY RIGHT-ANGLED TRIANGLES (TRIGONOMETRY)

OUTCOMES

A student:

- MA5.2-1WM

selects appropriate notations and conventions to communicate mathematical ideas and solutions

- MA5.2-2WM

interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems

- MA5.2-13MG

applies trigonometry to solve problems, including problems involving bearings

CONTENT

- Students:
- interpret three-figure bearings (eg 035°, 225°) and compass bearings (eg SSW)
- interpret directions given as bearings and represent them in diagrammatic form (Communicating, Reasoning)
- solve a variety of practical problems involving bearings, including problems for which a diagram is not provided
- draw diagrams to assist in solving practical problems involving bearings (Communicating, Problem Solving)
- check the reasonableness of solutions to problems involving bearings (Problem Solving)

5. Pythagoras theorem concepts: Activity D: Marking out the corners of a shed

MATHEMATICS K–10 - STAGE 4 - MEASUREMENT AND GEOMETRY **RIGHT-ANGLED TRIANGLES (PYTHAGORAS)**

OUTCOMES

A student:

- MA4-1WM

communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols

- MA4-2WM

applies appropriate mathematical techniques to solve problems

- MA4-16MG

applies Pythagoras' theorem to calculate side lengths in right-angled triangles, and solves related problems

CONTENT

- Students:
- Investigate Pythagoras' theorem and its application to solving simple problems involving right-angled triangles (ACMMG222)
- identify the hypotenuse as the longest side in any right-angled triangle and also as the side opposite the right angle
- establish the relationship between the lengths of the sides of a right-angled triangle in practical ways, including with the use of digital technologies
- describe the relationship between the sides of a right-angled triangle (Communicating)
- use Pythagoras' theorem to find the length of an unknown side in a right-angled triangle
- write answers to a specified or sensible level of accuracy, using an 'approximately equals' sign, ie ≒ or ≈
- solve a variety of practical problems involving Pythagoras' theorem, approximating the answer as a decimal
- apply Pythagoras' theorem to solve problems involving the perimeters and areas of plane shapes (Problem Solving)
- identify a Pythagorean triad as a set of three numbers such that the sum of the squares of the first two equals the square of the third
- use the converse of Pythagoras' theorem to establish whether a triangle has a right angle

6. Similar triangle concepts: Activity C: Measuring Heights using Shadows

MATHEMATICS K–10 - STAGE 5.1 - MEASUREMENT AND GEOMETRY **PROPERTIES OF GEOMETRICAL FIGURES**

OUTCOMES

A student:

- MA5.1-1WM

uses appropriate terminology, diagrams and symbols in mathematical contexts

- MA5.1-2WM

selects and uses appropriate strategies to solve problems

- MA5.1-3WM

provides reasoning to support conclusions that are appropriate to the context

- MA5.1-11MG

describes and applies the properties of similar figures and scale drawings

CONTENT

- Students:
- Use the enlargement transformation to explain similarity (ACMMG220)
- describe two figures as similar if an enlargement of one is congruent to the other
- recognise that if two figures are similar, they have the same shape but are not necessarily the same size (Reasoning)
- match the sides and angles of similar figures
- name the vertices in matching order when using the symbol ||| in a similarity statement
- use the enlargement transformation and measurement to determine that the size of matching angles and the ratio of matching sides are preserved in similar figures
- Solve problems using ratio and scale factors in similar figures (ACMMG221)
- choose an appropriate scale in order to enlarge or reduce a diagram
- enlarge diagrams such as cartoons and pictures (Reasoning)
- construct scale drawings
- investigate different methods for producing scale drawings, including the use of digital technologies (Communicating, Problem Solving)
- interpret and use scales in photographs, plans and drawings found in the media and in other key learning areas
- determine the scale factor for pairs of similar polygons and circles
- apply the scale factor to find unknown sides in similar triangles
- calculate unknown sides in a pair of similar triangles using a proportion statement
- apply the scale factor to find unknown lengths in similar figures in a variety of practical situations
- apply the scale factor to find lengths in the environment where it is impractical to measure directly, eg heights of trees, buildings (Problem Solving)