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|  | **Campbell House School Teaching and Learning Program** |
| **Title/Type of Unit: Mathematics – Using Units of Measurement****Duration: 10 Weeks** |
| **Syllabus Outcomes****Stage**  | *A student:*Students:MA5.1-1WM: uses appropriate terminology, diagrams and symbols in mathematical contextsMA5.1-2WM: selects and uses appropriate strategies to solve problemsMA5.1-8MG: calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms |
| **Connectedness****Why does this learning matter?** | **Students learn to:**Calculate areas of composite shapesCalculate the surface area and [volume](http://www.australiancurriculum.edu.au/glossary/popup?a=M&t=Volume) of cylinders and solve related problemsSolve problems involving the surface area and [volume](http://www.australiancurriculum.edu.au/glossary/popup?a=M&t=Volume) of right prismsInvestigate very small and very large time scales and intervalsSolve problems involving surface area and [volume](http://www.australiancurriculum.edu.au/glossary/popup?a=M&t=Volume) for a range of prisms, cylinders and composite solids Calculate the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectorsSolve a variety of practical problems involving the areas of quadrilaterals and composite shapesSelect and use the appropriate formula to find the area of any of the special quadrilateralsSolve a variety of practical problems relating to the areas of triangles and quadrilaterals | **Students learn about:*****Perimeter:***Perimeter being the outside numerical value of a shape. ***Area:***Area of rectangle=lb where l is the length and b is the breadth (or width) of the rectangleArea of square=s2 where s is the side length of the squareArea of parallelogram=*bh* where b is the length of the base and h is the perpendicular heightArea of triangle=12*bh* where b is the length of the base and h is the perpendicular height.Area of rhombus/kite=12xy where x and y are the lengths of the diagonals- develop and use the formula to find the areas of trapeziums: Area of trapezium=12*h*(*a*+*b*) where h is the perpendicular height and a and b are the lengths of the parallel sidesArea of circle=πr2 where r is the length of the radiuspartitioning composite shapes into rectangles and triangles as a strategy for solving problems involving area.Surface area:nets of cylinders as a formula for surface area ***Volume:***  connecting the volume and capacity of a cylinder to solve authentic problems ***Scientific notation and measurement:***scientific notation in representing very large and very small numbersconvert between metric units of area using 1 cm2 = 100 mm2, 1 m2 = 1 000 000 mm2, 1 ha = 10 000 m2, 1 km2 = 1 000 000 m2 = 100 ha |
| **Background and Key Ideas** | The program focuses on measurement and using numbers of any magnitude. Students engage with shapes and spaces and use methods to measure length, capacity, distance, time or parameters of an object or shape. The unit is also intended to extend and strengthen preliminary numeracy skills and understandings. It puts an understanding of why numbers have value and helps them think about how to combine quantities and eventually how this process connects with written procedure. The programs content focuses on equipping students with skills to think logically and gain practice in area, perimeter, measurement conversions and fluency in movement between number types to consolidate strong groundwork for the next topic financial maths, where conversions and fluency in decimals, fractions and whole numbers is vital. Students are practicing applying their mathematical knowledge to solve problems. Students use background knowledge of whole numbers, rounding and the four mathematical operations.  |
| **Literacy Continuum** | Reading Texts | Comprehension | Vocabulary Knowledge | Aspects of Writing | Aspects of Speaking | Phonics | Phonemic Awareness | Concepts About Print |
| **Student:** …**Literacy Aspect:** Vocabulary Knowledge**Element:** cluster 7 and cluster 10 **Teaching activities linked to program to increase learning:**Knows the meaning of commonly used words in increasingly challenging texts and can demonstrate this knowledge when reading, writing and speaking. Students will use common words such as sum, subtract, add, addition, multiply, relationship between, greater than, smaller than. Students are to apply these terms in varying complex contexts. Demonstrates understanding that words can have different meanings in different contexts. Demonstrates expanded content vocabulary by drawing on a combination of known and new topic knowledge. Students will extend their understanding of words such as integer, index, notation within the new topic knowledge |
| **Numeracy Continuum** | Counting Sequences | Counting as Problem Solving | Pattern and Number Structure | Place Value | Multiplication and Division | Fraction Units | Length, Area and Volume |
| **Student: …****Numeracy Aspect:** measurement **Element**: 5 (indirect comparison) and 6 (iterates the unit) **Teaching activities linked to program to increase learning:**Indirect comparison – states the qualitative relationship between the size and number of units (i.e with bigger units you need fewer of them) and chooses and uses a selection of the same size and type of units to measure by indirect comparison. Iterates the unit – uses a single unit repeatedly to measure or construct length identifying qualitative relationship between length and number of units. In converting numbers between unit values and determining the unit value of each question students are practicing this numeracy skill. Students are required to use an estimation to decipher which measurement value is to be used to measure real life scenarios and objects. Students use their iterate and indirect comparison techniques within this requirement.  |
| **Quality Teaching** |
| **Intellectual Quality** | **Quality Learning Environment** | **Significance** |
| * IQ1 Deep Knowledge
* IQ2 Deep Understanding
* IQ3 Problematic Knowledge
* IQ4 Higher-order Thinking
* IQ5 Metalanguage
* IQ6 Substantive Communication
 | * QLE1 Explicit Quality Criteria
* QE2 Engagement
* QE3 High Expectations
* QE4 Social Support
* QE5 Students’ Self-regulation
* QE6 Student Direction
 | * S1 Background Knowledge
* S2 Cultural Knowledge
* S3 Knowledge Integration
* S4 Inclusively
* S5 Connectedness
* S6 Narrative
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| **Teaching and Learning Lesson Overview** |
| **The Elements of Learning & Achievement**F:\Mock ups\Square elements\Numeracy.jpgE:\Final V1\Final sq NO border\Sq Technology no bdr.jpg | **Week one and two:** **Introduction to perimeter and area of rectangles and squares.*****Content:*** Opposing sides of rectangles are equal in number, but right angled sides of rectangles are not equal. Area as measuring space inside the object or shape. Area is times. The formula for Area of a rectangle is lxb. Area of a square is L2 Perimeter as measuring the length around the shape or object. Perimeter is the addition of all the sides of the shape and space. Perimeter is Plus. Teach students the visual cue of marking same values in perimeter on shapes. ***Student activities:*** * New Century **Maths 9**. Chapter **10.03**
* Area and perimeter worksheets.
* Measuring perimeter using a trundle wheel and masking taped shapes on the floor of the classroom.
* Area and perimeter dot-to-dot sheets.
* Notebook (direct teaching explanation and exercises for students).

***Numeracy tasks:*** 2 times tables* Two times tables ball game outside
* Double or nothing card game
* Two for the price of one memory game

**Week Three:** **Perimeter and area of triangles and polygons.*****Content:*** *Traingle:*There are 5 types of triangles. Right angle, obtuse, equilateral, acute and isosceles triangle. Perimeter of a triangle is a + b+ c = Perimeter.To find the area of a triangle, multiply the base by the height, and then divide by 2. Or the area of a triangle equals ½ B xH*Polygon:*A polygon is a plane figure with at least three straight sides and angles, and typically five or more.The area of a polygon is the number of square units inside that polygon.Perimeter of a polygon is a + b+ c = Perimeter.Area of a polygon is b x h if b is the length of the base and H is the height. ***Student activities:*** * Area of a triangle worksheet
* Maths new century 8 Chapter 8 exercise 8.02
* Areas of polygon worksheets
* Mixed areas worksheet
* Create your own shape game and round robin.

***Numeracy tasks:*** 3 times tables* 3 x table ball game. Students must ask a 3x tables question when they throw the ball to another student. Students must answer the times tables question before catching the ball.
* 3 x tables memory game.
* 3 x table board game.

**Week Four:** **Perimeter and area of composite shapes.*****Content:*** Composite Shapes are A figure (or shape) that can be divided into more than one of the basic figures is said to be a composite figure (or shape).Solve a variety of practical problems involving the areas of quadrilaterals and composite shapesTo find the area of composite shapes students must break the shapes into smaller block units. The area of both shapes is then found and the results are added together. ***Student activities:**** Practice breaking down shapes into smaller block units worksheet
* New Century Maths 9 Chapter 10.04
* New century Maths 8 chapter 8.02 (task 3 and 4)
* Composite shapes worksheet
* Find the shapes buzzer game on notebook.

***Numeracy activities:*** *4 times tables** 4 up game
* 4 tables lolly game (setting four tables in the classroom as stations and dividing lollies.)
* 4 times fire game with hidden message to decode.

Assessment for learning: Purpose of the assessment is to use information about students knowledge, understanding and skills to inform teaching in future lessons. Outcomes assessed: MA5.1-2WM: selects and uses appropriate strategies to solve problemsMA5.1-8MG: calculates the areas of composite shapesAssessment is two page task that tests students working out and problem solving techniques. Students are using problem recognition and problem solving skills in determining which way to segment a composite shape. The assessment will last for 40 minutes. Students will be assessed on their problem solving skills in relation to two and one digit area and perimeter problems. **Week Five and Six:** **Numbers of any magnitude*****Content:*** Use the language of estimation appropriately, including ‘rounding’, ‘approximate’ and ‘level of accuracy’Identify significant figuresRound numbers to a specified number of significant figuresInterpret the meaning of common prefixes such as ‘milli’, ‘centi’ and ‘kilo’Teach metric unit conversions.Interpret the meaning of prefixes for very small and very large units of measurement, such as ‘nano’, ‘micro’, ‘mega’, ‘giga’ and ‘tera’Describe the limits of accuracy of measuring instruments (+0.5 unit of measurement)Explain why units are never exactExplain Mass, explain length, time and explain capacity and differences and which is used for measuring in real life situations.EXPICITLY AND DIRECTLY teach the conversion circles for numbers of magnitude. ***Student activities:*** * Measurement match notebook game. Students are to match the correct form of measurement in each scenario. For examples students match length with the image of the football oval, a measuring cup with capacity, a scale with mass or a swimming pool with capacity.
* New Century Maths 9 Chapter 10.01
* New Century Maths 9 Chapter 10.02
* The metric system activity chapter 8 new century maths 8 on exercise 8.01
* Conversion in real life worksheet
* Analogue time charts and worksheet
* Analogue test a friend game.

***Numeracy activities:*** *five and six times tables** 5 times block game
* six times squares game
* Decode the time activity
* 6 times bingo game.

**Week seven:** **Area of a circle and an annulus*****Content:***An annulus is a ring-shaped object, structure, or regionHow to Calculate the area of an annulusHow to Calculate the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semi-circles and sectors.The formula for finding the area of an annulus is A=π(R2 - r2)The formula to calculate the area of a circle is A =π r2Student activities:* Find the area of a circle worksheet
* Find the area of an annulus worksheet
* New Century Maths 9 Chapter 10.05

Numeracy activities: seven times tables.* <http://www.mad4maths.com/7_x_multiplication_table_math_game/>
* 7 times tables match game
* 7 times table’s builder.

Assessment for and as learning task:Students complete the numbers of any magnitude assessment sheet. Students evaluate their understanding of each question once completed to build in a self-reflective assessment as learning and student reflection to consolidate their working towards goals for the end of the unit. Students are converting between units of measurement and answering analogue time questions. **Week Eight:** **Surface area of prisms****Content:**surface area: the surface area is the sum of all the areas of all the shapes that cover the surface of the object.Surface Area of a Cube = 6 a 2Surface Area of a Rectangular Prism = 2ab + 2bc + 2acSurface area of any prism: (b is the shape of the ends) Surface Area = Lateral area + Area of two ends (Lateral area) = (perimeter of shape b) \* L Surface Area = (perimeter of shape b) \* L+ 2\*(Area of shape b) Solve problems involving the surface area of right prisms Identify the edge lengths and the areas making up the ‘surface area’ of rectangular and triangular prismsVisualise and name a right prism, given it’s netVisualise and sketch the nets of right prismsFind the surface areas of rectangular and triangular prisms, given their netCalculate the surface areas of rectangular and triangular prismsSolve a variety of practical problems involving the surface areas of rectangular and triangular prisms.***Student activity:*** * Introductory to the concept of surface area lesson. Students measure and provide the area of shapes they stick them together to make a prism. Building students understanding of what surface area is. Lesson includes code cracker game that practices numeracy skills.
* New Century Maths 9 Chapter 10.06
* Net of a prism build shapes activity
* New century maths 10 chapter 3.02
* Surface area of prisms worksheets

***Numeracy activity:*** *eight times tables** Eight times bingo
* Eight times tables card game
* Eight times tables bowls game

**Week Nine:** **Surface area of Spheres and Cylinders****Content:**Surface Area of a Sphere = 4 *pi* r 2Surface Area of a Cylinder = 2 *pi* r 2 + 2 *pi* r hThe surface area is the areas of all the parts needed to cover the can. That's the top, the bottom, and the paper label that wraps around the middle. You can find the area of the top (or the bottom). That's the formula for area of a circle (*pi* r2). Since there is both a top and a bottom, that gets multiplied by two. The side is like the label of the can. If you peel it off and lay it flat it will be a rectangle. The area of a rectangle is the product of the two sides. One side is the height of the can, the other side is the perimeter of the circle, since the label wraps once around the can. So the area of the rectangle is (2 *pi* r)\* h. Add those two parts together and you have the formula for the surface area of a cylinder. Surface Area = 2(*pi* r 2) + (2 *pi* r)\* h ***Student activities:*** * New century maths 10 chapter 3.03
* Surface area of cylinders worksheet
* Surface area of spheres worksheet
* Surface area of real objects activity

***Numeracy Activities:*** 9 times tables* 9 times tables hand trick (explicitly taught)
* 9 times tables card game
* 9 times tables mystery (solve the puzzle to reveal where a prize is hidden.)

**Week Ten:** **Surface area and volume of composite shapes****Content:**Surface Area of a Sphere = 4 *pi* r 2Surface Area of a Cylinder = 2 *pi* r 2 + 2 *pi* r hSurface Area of a Cube = 6 a 2Surface Area of a Rectangular Prism = 2ab + 2bc + 2acComposite Shapes are A figure (or shape) that can be divided into more than one of the basic figures is said to be a composite figure (or shape).Solve a variety of practical problems involving the areas of quadrilaterals and composite shapesTo find the area of composite shapes students must break the shapes into smaller block units. The area of both shapes is then found and the results are added together. *Volume:* The amount of 3-dimensional space an object occupies. Capacity.For this example the volume is 4×5×10 = 200 units3Units of volume include:*Metric:* cubic centimeters (cm3), cubic meters (m3), liters***Student activities:*** * New century maths 10 chapter 3.04
* Surface area of composite shapes.
* Volume worksheets
* New century maths 10 chapter 3.05

***Numeracy Activities:*** 10 times tables and 11 times tables.* Ten times tables bingo
* Ten times table board game

**Assessment of learning task.**Students are given three envelopes. Students must measure each flat area shape individually and record the perimeter and area of each shape on their test paper. Students then tape together the pieces to make prisms. Students are to find the surface area of the shape using the formula sheet given. Students will insert their measured numbers into the formula. Students will then use the formula sheet to assist in finding the volume of the shape. Students will do this to the three shapes. The final activity requires students to concert the measurements into new measurements as outlined on the test paper. **Outcomes:**MA5.1-1WM: uses appropriate terminology, diagrams and symbols in mathematical contextsMA5.1-2WM: selects and uses appropriate strategies to solve problemsMA5.1-8MG: calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms | **The Australian General Capabilities**Aboriginal and Torres Strait Islander histories and cultures boriginal and Torres Strait Islander histories and culturesAsia and Australia's engagement with Asia sia and Australia's engagement with AsiaSustainability ustainabilityCritical and creative thinking ritical and creative thinkingEthical understanding thical understandingInformation and communication technology capability nformation and communication technology capabilityIntercultural understanding ntercultural understandingLiteracy iteracyNumeracy umeracyPersonal and social capability ersonal and socail capabilityCivics and citizenship ivics and citizenshipDifference and diversity ifference and diversityWork and enterprise ork and enterprise |
| **Special Needs Adjustments** | **School to Work** |
| * One-on-one support where required
* Short lessons
* Engaging topics
* Behaviour management strategies

For individualised adjustments, please see personalised learning plans. | * Improved communication skills
* Building strength in mental calculations
* Developing understanding in converting between mathematical units
* Language development
* Collaborative learning
* Self-manage

Building skills for further development in financial mathematics. |
| **Assessments. Type. Weight. Due Date** |
| **Assessment 1:** area and perimeter and composite shapes**Due date:** Week 4**Type:** Assessment for learning task. **Assessing:** skills in problem solving and knowledge and recall**Weight:** 30%5% accurate methods to find area5% accurate method to find perimeter10% accurate method to separate shapes within a composite shape10% accuracy in selecting area and perimeter equations for the appropriate questions. **Assessment 2:** Numbers of any magnitude **Due date:** Week 7**Type:** Assessment for and as learning task. **Assessing:** Evaluation skills and skills in critical thinking.**Weight:** 20%10% Evaluation and self reflection thought out and considered. 10% Can accurately use conversion model to convert between units.**Assessment 3:** area, perimeter, surface area, and volume and converting units of measurement.**Due date:** Week 10**Type:** Assessment of learning task. **Assessing:** skills in problem solving and understanding.**Weight:** 50% total5% accurate method and result in measuring area5% accurate method and result in measuring Perimeter10% piecing together the prism with understanding of opposite sides having the same value10% accurate method and result in finding Surface area10% accurate method and result in finding Volume10% accurate method and result in converting units of measurement |
| **Resource List** |
| All resources are in corresponding lesson and week folders in file |

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| **Teacher Evaluation****Comments / Variations** |
| Guiding QuestionsWhat worked well?What needed to be changed?What do I think the students gained from this lesson?How well did this unit match the Elements of Learning and Achievement?What did I learn?How will I use this experience to extend my practice in the future?  |
| **Date Commenced**:  | **Date Finished**:  |
| **Teachers Signature**: | **Assistant Principals Signature**: |