Length 1

Stage 3 Outcome

A student:
› describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM
› gives a valid reason for supporting one possible solution over another MA3-3WM
› selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length MA3-9MG

Language: Students should be able to communicate using the following language: length, distance, **kilometre**, metre, centimetre, millimetre, measure, **measuring device**, ruler, tape measure, trundle wheel, estimate, perimeter, **dimensions**, width.
When recording measurements, a space should be left between the number and the abbreviated unit, eg 3 cm, not 3cm.

Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date/ LAC Icons
Ignition Activity **Coming to School** The teacher poses the question: 'What distance do you travel to school?' Students suggest ways to determine the distance, such as checking the odometer on the car or bus, borrowing a trundle wheel and measuring the walk to school, estimating the distance using a street directory. Students record their answers using a combination of kilometres and metres, and express the distance in kilometres to three decimal places eg 1.375 km.		Literacy Critical and creative thinking
Explicit Mathematical Teaching Teachers will need to refresh the correct terminology and the processes for findling the length of onjects. A KWL chart would be a useful way to start this topic. Teachers must take into account prior knowledge and ensure students have at least a basic understanding of how to measure. Students should recognise the need for a formal unit longer than the metre for measuring distance. There are 1000 metres in one kilometre, ie 1000 metres = 1 kilometre Students calculate the perimeters of rectangles using familiar metric units, use the term 'dimensions' to describe the 'lengths' and 'widths' of rectangles		

When students are able to measure efficiently and effectively using formal units, they should be encouraged to apply their knowledge and skills in a variety of contexts. Following this, they should be encouraged to generalise their method for calculating the perimeters of squares, rectangles and triangles.

Ignition Activity

Coming to School
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Literacy
Critical and creative thinking

Whole Class Teaching Activities- some suggestions

Less Than, More Than, About the Same
Students estimate whether places known to them are less than, more than, or about one kilometre, from the front gate of the school. These can be checked by measuring. Students record the results in a table.

Place	Less than 1 km	About 1 km	More than 1 km
Library			
Post Office			

Critical and creative thinking

Trundle wheels
Small groups of students investigate the length measured by one rotation of the trundle wheel. Students can either: (1) draw a chalk line along the ground as the wheel rotates once, (2) draw a line one metre long, or place the 1 metre ruler on the ground and rotate the wheel along the line, (3) cut a piece of string 1 metre long and place it around the wheel or (4) place a tape measure around the wheel.
Students record the procedure used to measure the length and report on the accuracy of their group's trundle wheel. Students measure and record the perimeter of playground markings or pathways. Groups compare their measurements and report on any differences.

Literacy
Critical and creative thinking

Shapes to order
Students draw and label rectangles and squares which have specified perimeters, e.g. 20 cm, 36 cm, 1 m 20 cm, 3.6 m.
Students work in groups to record as many different rectangles as possible in a set time.
Note: 1 cm grid paper may assist students who have difficulty in drawing lines.

Literacy

String Shapes Students use a piece of string 1 metre long to experiment with making triangles, rectangles and square. Students measure the lengths of the sides of the shapes in centimetres and millimetres. Students record and label the shapes as square, rectangle and the triangles as right-angled, isosceles, equilateral or scalene. Students check the measurements on the drawn shapes to ensure that each shape has a perimeter of 1 metre.		
How far is a kilometre? Students discuss how kilometres are used as a unit to measure distance, and the relationship between metres and kilometres. Students discuss how to measure 1 kilometre in the school grounds, possibly by measuring 100 metres and multiplying by 10. Students estimate, then measure to see how long it takes them to walk 1 kilometre, e.g. by walking 100 metres 10 times.		Literacy
Metre, Centimetre and Millimetre Race Students are told they are going to race across the playground in small groups. Students are given three different coloured dice, one for metres, one for centimetres and one for millimetres. They are asked to choose the equipment they would need to measure the playground eg a metre ruler and a centimetre/millimetre ruler. The groups start at one side of the playground. Each student takes a turn at rolling the three dice. They measure the distance shown on the three dice (eg 3 m, 5 cm and 4 mm), add to the group's line on the ground, and record the total distance each time eg 3.54 m or 354 cm. The winner is the first group to reach the other side of the playground. Students compare and discuss the results. Results could be checked on the calculator. Possible questions include: ▮ what strategies did you use to record your distances? ▮ were there any differences in distances between the groups? Why? ▮ would you do it differently next time? *Variation:* Students measure a smaller/larger distance and vary the equipment used.		Literacy Critical and creative thinking
Appropriate Measure The teacher poses the problem: 'Alex needs to measure the length of the school hall. What measuring device and unit of measurement do you suggest would be best for him to use?' Explain why.		Literacy Critical and creative thinking
Perimeter Discuss what perimeter is - construct a definition - and what it's used for. Find the perimeter of a large area e.g. school playground and calculate and compare perimeters of squares, rectangles and triangles.		Literacy

Introduction To Perimeter Pairs of students find the perimeter of a rectangle or square by measuring, recording and then adding each side. Examples may include rectangular cards or drawings with sides which measure a whole number of centimetres. Students discuss the possible methods of finding the perimeter of a rectangle, and report on whether it is necessary to measure all four sides of a rectangle or square. Measure and record the perimeter of a desk or two desks joined together, by measuring one edge at a time. Record the perimeter in metres and centimetres. Check by using a long tape measure or piece of string. Students need multiple opportunities to; • use the term 'dimensions' to describe the 'lengths' and 'widths' of rectangles • 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 • explain that the perimeters of two-dimensional shapes can be found by finding the sum of the side lengths • explain the relationship between the lengths of the sides and the perimeters for regular polygons (including equilateral triangles and squares) record calculations used to find the perimeters of two-dimensional shapes		Literacy Critical and creative thinking
Shapes To Order Students draw and label rectangles and squares which have specified perimeters, e.g. 20 cm, 36 cm, 1 m 20 cm, 3.6 m. Students work in groups to record as many different rectangles as possible in a set time. *Note:* 1 cm grid paper may assist students who have difficulty in drawing lines.		Literacy

<u>Guided/Independent Activities-</u>some suggestions **Fun Run** In pairs, students plan the course of a fun run of 1 km within the school grounds. Students check the measurements in the school grounds using tapes, trundle wheels etc. Students are provided with a map of the school and discuss the scale they will use to draw a diagram of their course. They then draw and label their diagram. Possible questions include: ▮ how many metres long is your fun run course? How do you know? ▮ how did you measure the distance? ▮ how could the distance be halved for younger runners? ▮ how could you measure this distance? ▮ how could the distance be doubled without retracing steps? Students place markers at intervals along the course to mark the distances and direction. They calculate and record the distances between the markers in metres (eg 80 m) and convert them to kilometres. They add the distances using a calculator to determine the length of the course.		Literacy Critical and creative thinking
Measuring Perimeter Students select the appropriate measuring device and unit of measurement to measure the perimeter of their desktops, the perimeter of the classroom floor and the perimeter of the school. Students compare their measurements and discuss. Students find the perimeter of a face of a small object eg an eraser. Students write their own list of objects for which perimeters could be measured. Possible questions include: ▮ How could we categorise the list? In small groups, students categorise items into groups under the headings suggested.		Literacy Critical and creative thinking
Calculating Perimeter Students are given a sheet of paper on which a square, a rectangle, an equilateral triangle and an isosceles triangle have been drawn. Students calculate the perimeter of each shape. Students record and compare their findings. Possible questions include: ▮ how will you calculate the perimeter of each shape? ▮ did you discover an easy way to calculate the perimeter of squares , rectangles and triangles		Literacy Critical and creative thinking

Fixed Perimeter Students construct a rectangle, a square and a triangle, with a given perimeter eg 30 cm. Students label the shapes and explain why they have the same perimeter. Students discuss whether the areas of shapes with the same perimeter have the same area.		Literacy
Room For Elbows Students design a dinner table which will seat four students along each side, with enough space to eat comfortably. Students draw a diagram of the table with listed reasons for the dimensions.		Critical and creative thinking
Cut In Half Students choose a large, rectangular picture from a magazine. Students measure and record the perimeter. The picture is cut in half and the perimeter measured and recorded again. Students cut the picture in half again and measure the perimeter. Students record results with labelled diagrams and comment on how the measurements are changing. Students present to the class the results in a table and graph.		Literacy
Mystery Flight Students use the scale on a map of NSW (Google Maps). Students plan a mystery flight of 1000 kilometres (for example), which commences from the nearest airport and includes up to four take-offs and landings. Students present this to the class.		Literacy Critical and creative thinking Information and communication technology capability
Design A Cross Country Track Students work in pairs or small groups to design a 3 kilometre cross country course for their school. Students draw the course to scale and label their plan with the scale used and the length of each part of the course.		Literacy Critical and creative thinking

Plan a Trip Students use a website to complete an itinerary for a trip. On the site www.Travelmate.com.au students can click on *Smart Trip* and enter trip details, e.g. from Sydney to Bathurst for a detailed itinerary. From the driving directions, students will need to convert units to calculate time and distance. Students could complete a timeline of their trip using 24 hour time. Students can use www.qantas.com.au to plan a holiday with a flight.		Literacy Critical and creative thinking Information and communication technology
How Long? Students work in small groups to answer: How long is the wool in a ball of wool? Students may need to discuss a range of strategies before commencing to measure. Students express the measurement in kilometres, and in metres.		Literacy Critical and creative thinking
Maths for Sustainability Website **http://maths4sustainability.wordpress.com/2011/08/02/holding-hands-around-the-world/** Use sustainability website to interpret and explore the use of length in real life situations.		Sustainability Critical and creative thinking Information and communication technology capability