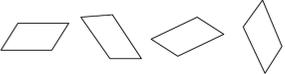
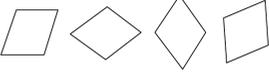


Scope and sequence summary	Duration: 2 weeks
Substrand: S2 MG Two-Dimensional Space 1	Detail: 8 activities

Outcomes	Key considerations	Overview
<p>› uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM</p> <p>› checks the accuracy of a statement and explains the reasoning used MA2-3WM</p> <p>› manipulates, identifies and sketches two-dimensional shapes, including special quadrilaterals, and describes their features MA2-15MG</p>	<p><i>Key ideas</i></p> <ul style="list-style-type: none"> Identify and name the special quadrilaterals presented in different orientations Describe and compare features of shapes, including the special quadrilaterals <p><i>Language</i></p> <p>Students should be able to communicate using the following language: shape, two-dimensional shape (2D shape), circle, triangle, quadrilateral, parallelogram, rectangle, rhombus, square, trapezium, kite, pentagon, hexagon, octagon, orientation, features, properties, side, parallel, pair of parallel sides, opposite, length, vertex (vertices), angle, right angle.</p> <p>The term ‘diamond’ is often used in everyday contexts when describing quadrilaterals with four equal sides. However, ‘diamond’ is not the correct geometrical term to name such quadrilaterals; the correct term is ‘rhombus’.</p> <p><i>Background information</i></p> <p>The special quadrilaterals are the parallelogram, rectangle, rhombus, square, trapezium and kite.</p> <p>It is important for students to have experiences with a variety of shapes in order to develop flexible mental images. Students need to be able to recognise shapes presented in different orientations.</p>	<p><i>This unit of work encompasses:</i></p> <ul style="list-style-type: none"> some of the content of S2 Two-Dimensional Space <p><i>Assumed knowledge from the same stage</i></p> <ul style="list-style-type: none"> S2 Length 1 (measuring to the nearest millimetre) S2 Angles 1 (concept of an angle and identification of right angles) <p><i>Links to learning across the curriculum</i></p> <p>Students will have opportunities to practise their literacy skills while describing features and properties of special quadrilaterals. They will use critical and creative thinking in identifying, matching and sorting special quadrilaterals and in determining their features.</p>

Content	Teaching, learning and assessment	Resources
<p>Compare and describe features of two-dimensional shapes, including the special quadrilaterals</p> <ul style="list-style-type: none"> manipulate, compare and describe features of two-dimensional shapes, including the special quadrilaterals: parallelograms, rectangles, rhombuses, squares, trapeziums and kites  determine the number of pairs of parallel sides, if any, of each of the special quadrilaterals (Reasoning) use measurement to establish and describe side properties of the special quadrilaterals, eg the opposite sides of a parallelogram are the same length identify and name the special quadrilaterals presented in different orientations, eg <div style="text-align: center;">  <p>parallelograms</p>  <p>rhombuses</p> </div> <ul style="list-style-type: none"> explain why a particular quadrilateral has a given name, eg 'It is a parallelogram because it has four sides and the opposite sides are parallel' (Communicating, Reasoning)  name a shape, given a written or verbal description of its features (Reasoning)  recognise the vertices of two-dimensional shapes as the vertices of angles that have the sides of the shape as their arms  identify right angles in squares and 	<p>Activity 1: Introducing the Special Quadrilaterals</p> <ul style="list-style-type: none"> Review the names used for two-dimensional shapes when named according to the number of sides (see Stage 1), ie triangles, quadrilaterals, pentagons, hexagons, etc. Ask students to identify quadrilaterals that can be seen in the classroom and/or in pictures. They may need to be prompted to look for four-sided figures that are not squares or rectangles. Point to a rectangle and ask students 'Is this a quadrilateral?' Follow up this question by asking students for another name for the same shape ('rectangle' is introduced in ES1). Repeat for a square. Conclude that quadrilaterals are all around us and so we have special names for those that have special features. Write the names of each of the six special quadrilaterals on the board: rectangle, square, parallelogram, rhombus, trapezium and kite. Students cut out a set of special quadrilaterals printed onto coloured paper (it would be useful to include at least two different trapeziums, where one has two right angles). Review the meaning of the word 'parallel' and ask students to identify parallel lines that can be seen in the classroom. Introduce the phrase 'pair of parallel lines' to describe two lines that are parallel to each other. It may be helpful to relate this to other uses of the word 'pair', such as 'pair of shoes', 'pair of sunglasses'. Review the use of the term 'vertex' (plural: vertices) when referring to the point where two sides of a shape meet. Review the concept of an angle as an 'amount of turning' and the use of the terms 'vertex' and 'arms' in relation to angles. Guide students to recognise the vertices of shapes as the vertices of angles that have the sides of the shape as their arms. Establish that all quadrilaterals have four vertices and four angles. Review the concept of a right angle. Consider each special quadrilateral in turn, starting with the rectangle and the square, to determine the features of each particular shape. Record on a diagram on the board the name and features of each special quadrilateral as they are encountered. Prompt students to consider particular features if necessary, such as: <ul style="list-style-type: none"> Does the shape have any pairs of parallel sides? (Encourage correct use of the phrase 'pair of parallel sides', eg 'A parallelogram has two pairs of parallel sides'.) 	<p><i>Online resources</i></p> <ul style="list-style-type: none"> Website: MathOpenRef – Quadrilaterals – manipulate the special quadrilaterals, including on an interactive whiteboard

Content	Teaching, learning and assessment	Resources
<p>rectangles</p> <ul style="list-style-type: none"> group parallelograms, rectangles, rhombuses, squares, trapeziums and kites using one or more attributes, eg quadrilaterals with parallel sides and right angles 	<ul style="list-style-type: none"> Are all four angles right angles? Are all four sides equal in length? (Paper-folding to match sides can assist students in determining this.) Students paste their quadrilaterals into their workbooks (one per page) and record the name and features of each quadrilateral using short sentences, eg 'A trapezium has one pair of parallel sides'. Online tools and applications can be used to demonstrate quadrilaterals in different orientations, eg MathOpenRef – Quadrilaterals page. 	<p><i>Online resources</i></p> <ul style="list-style-type: none"> Website: MathOpenRef – Quadrilaterals – manipulate the special quadrilaterals, including on an interactive whiteboard
	<p>Activity 2: Special Quadrilaterals Rule!</p> <ul style="list-style-type: none"> Warm up: Students practise identifying and naming special quadrilaterals when presented with flash cards showing quadrilaterals in different orientations, eg using a presentation on an interactive whiteboard. The teacher stops the presentation at various points to prompt students to recall the properties of the special quadrilaterals, such as: <ul style="list-style-type: none"> parallelogram: 'How do you know it is a parallelogram?' rectangle: 'What is the same about a parallelogram and a rectangle? What is different?' trapezium: 'How do you know it is a trapezium?' rhombus: 'How do you know it is a rhombus?', 'What makes a rhombus different from a parallelogram?' square: 'What makes a square different from a rhombus?' kite: 'Does a kite have any pairs of parallel sides?' Students work in six groups (one per special quadrilateral) with one ruler per student. Each group is allocated one type of quadrilateral to investigate. Remind students how to use a ruler correctly. Teachers can differentiate through the careful composition of groups and the selection of the special quadrilateral for each group. Each group is provided with a number of examples of the particular special quadrilateral they are investigating, in different sizes and orientations. Students use rulers to measure all the sides of the quadrilaterals to the nearest millimetre and record these measurements on the quadrilaterals. Each group uses the side measurements of each quadrilateral to find a common side 'property' that always describes the length of the 'opposite sides' and/or 'all four sides' of their particular quadrilateral (if a property exists), ie: <ul style="list-style-type: none"> parallelogram/rectangle: 'The opposite sides of a parallelogram are equal in length' rhombus/square: 'The opposite sides of a rhombus are equal in length', 	<p><i>Resources</i></p> <ul style="list-style-type: none"> One ruler per student A number of examples of each special quadrilateral in different sizes and different orientations Cardboard for posters or access to appropriate ICT

Content	Teaching, learning and assessment	Resources
	<p>'All four sides of a rhombus are equal in length'</p> <ul style="list-style-type: none"> – kite: 'A kite has two pairs of adjacent sides that are equal in length' – trapezium: 'A trapezium does not have to have any opposite sides that are equal in length, but sometimes has one pair of opposite sides that is equal in length'. <ul style="list-style-type: none"> • Each group creates a poster or digital presentation that includes a diagram of its special quadrilateral and lists its features, including any side properties. • Each group presents the features and side properties of its special quadrilateral to the class with the aid of its poster or digital presentation. • Students can record the additional side properties of each of the special quadrilaterals on the quadrilaterals pasted into their workbooks in Activity 1. 	<p><i>Resources</i></p> <ul style="list-style-type: none"> • One ruler per student • A number of examples of each special quadrilateral in different sizes and different orientations • Cardboard for posters or access to appropriate ICT
	<p>Activity 3: Describing Quadrilaterals</p> <ul style="list-style-type: none"> • Each student is given a prepared table in which to record the features of each of the special quadrilaterals. The following headings should be included: <ul style="list-style-type: none"> – name of quadrilateral (word answer) – examples of quadrilateral (diagrams can be pre-printed) – number of pairs of parallel sides (numerical answer) – opposite sides are equal in length (yes/no answer) – all four sides are equal in length (yes/no answer) – all four angles are right angles (yes/no answer). • Students work as a class with teacher guidance or in small groups to complete the table of features. • Students paste the completed table into their workbooks. 	<p><i>Extension</i></p> <ul style="list-style-type: none"> • Students can explore the symmetry properties of the special quadrilaterals by paper-folding. They can then add the 'number of axes of symmetry' to the empty column provided on the table of features.
	<p>Activity 4: Quadrilaterals in Pictures</p> <ul style="list-style-type: none"> • Students identify quadrilaterals in a variety of photographs, diagrams, company logos, floor tiles, artworks and elsewhere in the environment. • Using pen and paper, digital drawing software or manipulatives (such as pattern blocks), students create a picture using quadrilaterals, eg a picture of their house or a man-made landmark such as a bridge. Students identify and/or label each of the special quadrilaterals used in their picture. 	<p><i>Resources</i></p> <ul style="list-style-type: none"> • A variety of photographs, diagrams and artworks that show a variety of quadrilaterals • Access to appropriate ICT or manipulatives (such as pattern blocks) <p><i>Variation</i></p> <ul style="list-style-type: none"> • Students photograph at least one of each of the special quadrilaterals within the school grounds and/or at home and then

Content	Teaching, learning and assessment	Resources
	<p data-bbox="674 325 1503 352">Activity 5: Which Special Quadrilateral Could I Be? (outdoor activity)</p> <ul data-bbox="674 363 1518 448" style="list-style-type: none"> • Use chalk or masking tape to draw large-scale outlines of each of the special quadrilaterals on level ground and write the name of each shape inside its outline. <p data-bbox="674 491 745 518"><i>Part 1</i></p> <ul data-bbox="674 529 1552 1007" style="list-style-type: none"> • Start with all students standing outside the shapes and explain the activity. • Call out a clue describing one or more features of the special quadrilaterals and ask students to stand inside a shape that fits the clue. Clues can be repeated later if further practice is necessary. If some of the shapes that fit a particular clue are not selected by any students, prompt the students to consider if any of the other shapes have that feature, and ensure that there is at least one student standing in each of the relevant quadrilaterals before calling out the next clue. Take these opportunities to discuss and reaffirm the features of special quadrilaterals. Possible clues include: <ul data-bbox="719 836 1509 1007" style="list-style-type: none"> – All my angles are right angles. – I only have one pair of parallel sides. – I have two pairs of parallel sides. – I have two pairs of parallel sides and all my angles are right angles. – My opposite sides are parallel. <p data-bbox="674 1050 745 1077"><i>Part 2</i></p> <ul data-bbox="674 1088 1552 1430" style="list-style-type: none"> • Start with all students standing outside the shapes and explain the activity. • Call out a clue describing one feature that applies to two or more special quadrilaterals and ask students to stand inside a shape that fits the clue. If some of the shapes that fit a particular clue are not selected by any students, prompt the students to consider if any of the other shapes have that feature, and ensure that there is at least one person standing in each of the relevant quadrilaterals before calling out the next clue. • The teacher then calls out a second clue (and then possibly a third or fourth clue) that adds to the feature of the first clue and narrows down the number of shapes that can be selected. One possible set of clues is: <ul data-bbox="719 1401 1182 1430" style="list-style-type: none"> – I have two pairs of parallel sides, then 	<p data-bbox="1621 197 2056 312">use appropriate software to label each photograph (and possibly outline the shape), before presenting their photographs to the class.</p>

Content	Teaching, learning and assessment	Resources
	<ul style="list-style-type: none"> - I have two pairs of parallel sides AND four right angles, then - I have two pairs of parallel sides AND four right angles AND all sides are equal in length. • At the end of each set of clues, prompt the students to consider the movements they made and use this to discuss the relationships between the various special quadrilaterals, eg the features that are common to parallelograms and squares. • Repeat with a different set of related clues. 	
	<p>Activity 6: Quadrilaterals: Match Up!</p> <ul style="list-style-type: none"> • Working in small groups, students are given three sets of cards: <ul style="list-style-type: none"> - set A – six cards with the names of the special quadrilaterals - set B – six cards with a diagram of each of the special quadrilaterals - set C – cards describing one of the features of each of the quadrilaterals (if a particular feature applies to more than one quadrilateral, then the feature should be repeated on enough cards so that it can be matched with all quadrilaterals for which it applies). • Students match each quadrilateral with its name and a set of features. Features to be considered include: <ul style="list-style-type: none"> - the opposite sides are equal - the opposite sides are parallel - all four angles are right angles - all four sides are equal. 	<p><i>Extension</i></p> <ul style="list-style-type: none"> • Students can be given an additional set of cards that state the number of lines of symmetry of each of the special quadrilaterals.
	<p>Activity 7: Celebrity Quadrilateral Heads</p> <ul style="list-style-type: none"> • Students work as a class or in small groups. One student is chosen to be the 'quadrilateral guesser'. The teacher or another student writes the name of one of the special quadrilaterals onto a sticky note or paper hat and affixes it to the guesser's forehead so that he or she cannot see it. • Inform the guesser that he or she is only allowed to make a maximum of two guesses of the name of the quadrilateral. Inform the class that it is only allowed to respond with 'yes' or 'no' and should not provide any other hints. • The guesser asks the rest of the class or group questions about the features of the unknown quadrilateral to assist him or her to identify the quadrilateral. To assist the guesser and reinforce features of quadrilaterals, another student can record correctly guessed features on the board. Once the guesser thinks that he or she can correctly name the quadrilateral, he or she can ask 'Is it a ...?' 	<p><i>Resources</i></p> <ul style="list-style-type: none"> • Sticky notes or paper hats <p><i>Variation</i></p> <ul style="list-style-type: none"> • One student selects a 'mystery quadrilateral'. Others in the class or group take turns to ask yes/no questions to determine the features of the quadrilateral in order to name it correctly. If the selector of the mystery quadrilateral requires support, he or she can be given a list of features of special quadrilaterals.

Content	Teaching, learning and assessment	Resources
	<p>Activity 8: Quadrilateral Sort</p> <ul style="list-style-type: none"> • Working in pairs, students cut out (or are given) sets of six cards. On each card in a set, there is a diagram of one of the special quadrilaterals and its name. • Students sort the quadrilaterals according to one or more given features, including: <ul style="list-style-type: none"> – number of pairs of parallel sides – lengths of opposite sides – lengths of all four sides – right angles – two pairs of parallel sides AND four right angles. • Students record their results in their workbooks by pasting the quadrilaterals into appropriate groups and writing a short sentence to describe each group. 	<p><i>Variation</i></p> <ul style="list-style-type: none"> • If only one set of cards is being used per pair, students record their results by writing the name of the shape and tracing or drawing a diagram of it into their workbooks for each of the groupings.

Assessment overview
<ul style="list-style-type: none"> • Students create a written record of the features of each of the special quadrilaterals throughout the various activities. • Students demonstrate their knowledge and understanding of the features of the special quadrilaterals by matching features to quadrilaterals, and by sorting quadrilaterals according to the features that they have in common.