Year 4 unit overview — Australian Curriculum: Mathematics

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Mathematics for Foundation–10*, <www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10>.

| School name | Unit title | Duration of unit |
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| Our School | Shapes, area, angles and symmetry in the environment  | 10 hours |

| Unit outline |
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| Students investigate mathematics in the environment, focusing on the concepts of shape, area, symmetry and angles.The concept of 2-D shapes is investigated at the beginning of the unit and the concepts of area, symmetry and angles are investigated through the concept of shape to build upon the learning experiences. The Australian Curriculum proficiency strands of Understanding, Fluency, Problem Solving and Reasoning describe how content is explored or developed throughout the unit. The big idea of the unit is that we can learn about mathematical concepts through our environment.Inquiry questions for the unit:* In what ways can we compare the area of shapes?
* How many different composite shapes can be made from a number of squares and triangles?
* How can we use different arrangements of composite shapes?
* Where is symmetry found in our environment?
* Where are angles found in our environment?
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| Identify curriculum |
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| Content descriptions to be taught | General capabilities and cross‑curriculum priorities |
| Number and Algebra | Measurement and Geometry | Statistics and Probability |
|  | Shape * Compare the areas of regular and irregular shapes by informal means [(ACMMG087)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG087)
* Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies [(ACMMG088)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG088)

Location and transformation* Create symmetrical patterns, pictures and shapes with and without digital technologies [(ACMMG091)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG091)

Geometric reasoning* Compare angles and classify them as equal to, greater than or less than a right angle [(ACMMG089)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG089)
 |  | gc_literacy Literacy* Use appropriate mathematical language specific to the topic, discuss mathematical prefixes relevant to shapes

gc_numeracy Numeracy* Make links to real-life applications

gc_ict **ICT capability*** Use an electronic geoboard to explore composite shapes
* Use a digital camera to record combinations
* Use drawing tools to create diagrams of composite shapes

gc_critical Critical and creative thinking* Use thinking skills to complete group activities and open-ended tasks

gc_personal_social **Personal and social capability*** Work together to participate in mathematical investigations and learning experiences
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| Achievement standard |
| By the end of Year 4, students choose appropriate strategies for calculations involving multiplication and division. They recognise common equivalent fractions in familiar contexts and make connections between fraction and decimal notations up to two decimal places. Students solve simple purchasing problems. They identify unknown quantities in number sentences. They describe number patterns resulting from multiplication. Students compare areas of regular and irregular shapes using informal units. They solve problems involving time duration. They interpret information contained in maps. Students identify dependent and independent events. They describe different methods for data collection and representation, and evaluate their effectiveness.Students use the properties of odd and even numbers. They recall multiplication facts to 10 x 10 and related division facts. Students locate familiar fractions on a number line. They continue number sequences involving multiples of single digit numbers. Students use scaled instruments to measure temperatures, lengths, shapes and objects. They convert between units of time. Students create symmetrical shapes and patterns. They classify angles in relation to a right angle. Students list the probabilities of everyday events. They construct data displays from given or collected data. |
| Proficiencies |
| Opportunities to develop proficiencies include:Understanding * making connections between representations of numbers
* describing properties of symmetrical shapes

Fluency * communicating sequences of simple fractions
* creating patterns with shapes
 | Problem Solving * formulating, modelling and recording authentic situations involving operations
* using properties of numbers to continue patterns

Reasoning * comparing angles
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| Relevant prior curriculum | Curriculum working towards |
| **In the Australian Curriculum: Mathematics at Year 2**Measurement and GeometryShape * Describe and draw two-dimensional shapes, with and without digital technologies.

**In the Australian Curriculum: Mathematics at Year 3**Measurement and GeometryShape* Make models of three-dimensional objects and describe key features.

Location and transformation* Identify symmetry in the environment.

Geometric reasoning* Identify angles as measures of turn and compare angle sizes in everyday situations.
 | **In the Australian Curriculum: Mathematics at Year 5**Measurement and GeometryUsing units of measurement* Choose appropriate units of measurement for length, area, volume, capacity and mass.
* Calculate the perimeter and area of rectangles using familiar metric units.

Shape * Connect three-dimensional objects with their nets and other two-dimensional representations.

Location and transformation* Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries.
* Apply the enlargement transformation to familiar two-dimensional shapes and explore the properties of the resulting image compared with the original.

Geometric reasoning* Estimate, measure and compare angles using degrees. Construct angles using a protractor.
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| Bridging content |
| In the Essential Learnings by the end of Year 3, the concept of angles has not been addressed. Students have previously been taught about simple common fractions and mixed numbers, but the Essential Learnings do not prepare students to count using these fractions.  |
| Links to other learning areas |
| Studies of Society and Environment — location and direction, compass pointsVisual Art — viewing, discussing and creating symmetrical and asymmetrical pictures and paintings |

| Assessment | Make judgments |
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| Describe the assessment | Assessment date | Teachers gather evidence to make judgements about the following characteristics of student work:Understanding* application of mathematical knowledge to solve problems and to describe and identify concepts
* description of choices made, strategies used and conclusions reached, and checks of the reasonableness of solutions
* modelling and representation

Skills* application of problem-solving strategies to investigate situations
* description of the results of mathematical investigations
* use of mathematical procedures and calculations to find solutions
* communication of explanations, solutions and calculations, using mathematical language, conventions and symbols

For further advice and guidelines on constructing guides to making judgments refer to the Learning area standard descriptors: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |
| Students are given opportunities to demonstrate their knowledge, skills and understanding through both formative and summative assessment. The assessment is collated in student folios and allows for ongoing feedback to students on their learning.Year 4 teachers make decisions about the length of time required to complete the tasks and the conditions under which the assessment is to be conducted.The teaching and learning experiences throughout the term provide opportunities for students to develop the understanding and skills required to complete these assessments. As students engage with these learning experiences the teacher can provide feedback on specific skills. | Weeks 6–8 |
| Mathematical investigation: Journal (Written) Investigate shapes, area, angles and symmetry in the environment.Student journals may include:* an outline of a composite shape where students have marked in dotted lines to show at least three different combinations of squares and/or triangles that could have been used to make the composite shape
* diagrams to show all possible combinations including labels and explanations to communicate thinking and reasoning and justify
* an annotated picture or photograph of a familiar scene, e.g. classroom or landscape, that displays understanding and knowledge of the range of concepts addressed: symmetry, angles, shapes, area. Students may photograph examples of these concepts within their environment and annotate the photograph/s to demonstrate understanding.

The assessment package *Angles and symmetry in the built environment* in the QSA Assessment Bank could be used in this unit. |

| Teaching and learning | Supportive learning environment |
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| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| * Ascertain students’ prior knowledge through a class KWL chart about mathematics in the school environment.
* Create a word wall to record specific mathematical language used in this topic, which will be added to throughout the learning experiences.
* Use the school environment, including the classroom, to take photos of shapes.
* Use the photos to discuss and revise shape names and properties.
* Discuss the terms “regular” and “irregular” in regard to shapes.
* Discuss prefixes used in shapes, e.g. *tri-* meaning three, *octa-* meaning eight.
* Create composite shapes by combining other shapes using attribute or pattern blocks. Draw an outline of the composite shapes and mark in the component parts.
* Mark dotted lines on blank shapes to show three or four 2-D shapes within the shape. Cut along the lines, remake the shape within an outline of the original shape, then swap parts with a classmate and remake the shape.
* Provide composite shapes partially marked to show component 2-D shapes and students mark in other shapes.
* Use the outline of a shape, for example a square, and ask students to show different ways 2-D shapes could have been used to construct the square (e.g. using only squares, only triangles, squares and triangles).
* Explore tetrominoes and describe the different ways four squares can be combined to make different shapes.
* Explore the use of symmetry and tessellation in the traditions of other world cultures, e.g. islamic mosaics.
* Visualise different ways four triangles could be combined and then use materials to make what has been visualised.
* Use the interactive whiteboard to manipulate shapes to combine and split.
* Locate angles within two-dimensional shapes within the environment. Students begin by locating right angles and discussing the definition of a right angle. They then take photos of the environment and select parts of the photo to use to identify and classify angles as equal to, less than or greater than a right angle.
* Define symmetry through completing a “butterfly print” or finding a picture of a butterfly. Students make predictions about the definition of symmetry.
* Identify objects and living things that display symmetry.
* Create symmetrical patterns, pictures and shapes with and without the use of digital technologies.
* Relate symmetry to two-dimensional shapes to identify which shapes show symmetry and draw in the lines of symmetry.
* Discuss the concept of area by investigating ways to compare areas of regular and irregular shapes using informal means.
* Use a range of regular and irregular shapes to compare areas. These may be objects within the classroom or within the school environment. Students investigate and select a range of informal units to compare areas.
 | Section 6 of the *Disability Standards for Education* (The Standards for Curriculum Development, Accreditation and Delivery) states that education providers, including class teachers, must take reasonable steps to ensure a course/program is designed to allow any student to participate and experience success in learning. The *Disability Standards for Education 2005* (Cwlth) is available from: <www.ag.gov.au> select Human rights and anti-discrimination > Disability standards for education. | **Equipment*** digital camera/s
* attribute blocks, pattern blocks, polydrons or geoshapes
* access to computer drawing tools
* geoboard
* tangrams
* egg-shaped tangrams
* pentominoes and tetrominoes
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| Use feedback |
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| Ways to monitor learning and assessment | Teachers meet to collaboratively plan the teaching, learning and assessment to meet the needs of all learners in each unit.Teachers create opportunities for discussion about levels of achievement to develop shared understandings; co-mark or cross mark at key points to ensure consistency of judgments; and participate in moderating samples of student work at school or cluster level to reach consensus and consistency. |
| Feedback to students | Teachers strategically plan opportunities and ways to provide ongoing feedback (both written and informal) and encouragement to students on their strengths and areas for improvement.Students reflect on and discuss with their teachers or peers what they can do well and what they need to improve.Teachers reflect on and review learning opportunities to incorporate specific learning experiences and provide multiple opportunities for students to experience, practise and improve. |
| Reflection on the unit plan | Identify what worked well during and at the end of the unit, including:* activities that worked well and why
* activities that could be improved and how
* assessment that worked well and why
* assessment that could be improved and how
* common student misconceptions that need, or needed, to be clarified.
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