Australian Curriculum Year 7 Mathematics Sample assessment | Teacher guidelines

Refreshing drinks

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| **Assessment description** | **Category** |
| Students apply understanding of ratios, fractions and percentages to solve problems when mixing ingredients for fruity drinks. | Written |
| Technique |
| Supervised assessment |
| Context for assessment | Alignment |
| The assessment gathers evidence about how well students demonstrate their Understanding, Fluency and Problem solving when using the concept of ratio to represent ratios in a variety of ways, to adapt a recipe for a larger or smaller quantity, and to communicate the mathematical steps involved.  This assessment can be used with the QSA Australian Curriculum resource titled *Year 7 unit overview — Mathematics exemplar* (Recipe ratios), available at: [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html) | *Australian Curriculum* [*v5.1*](http://www.australiancurriculum.edu.au/Mathematics/Rationale),  Year 7 Mathematics Australian Curriculum content and achievement standard ACARA — Australian Curriculum, Assessment and Reporting Authority  [www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au)  Year 7 Mathematics standard elaborations  [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html) |
| Connections |
| This assessment can be used with the QSA Australian Curriculum resource titled *Year* 7 *unit overview — Mathematics exemplar* available at: [[www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html)](http://www.qsa.qld.edu.au/XXX) |
| Definitions |
| Refer to the Australian Curriculum definitions at [www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au) and the Year 7 Mathematics standards elaborations glossary at [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html) |
| In this assessment | |
| * Teacher guidelines * Task-specific standards — continua * Task-specific standards — matrix * Model response * Student booklet | |

# Teacher guidelines

## Identify curriculum

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| Content descriptions to be taught |
| Number and algebra |
| Real numbers   * Connect fractions, decimals and percentages and carry out simple conversions [ACMNA157](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA157) * Recognise and solve problems involving simple ratios [ACMNA173](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA173) * Compare fractions using equivalence. Locate and represent positive and negative fractions and mixed numbers on a [number line](http://www.australiancurriculum.edu.au/Glossary?a=M&t=Number%20line) [ACMNA152](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA152) * Solve problems involving addition and subtraction of fractions, including those with unrelated denominators [ACMNA153](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA153) * Multiply and divide fractions and decimals using efficient written strategies and digital technologies * Find percentages of quantities and express one quantity as a [percentage](http://www.australiancurriculum.edu.au/Glossary?a=M&t=Percentage) of another, with and without digital technologies [ACMNA158](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA158) |
| General capabilities (GCs) and cross‑curriculum priorities (CCPs)  This assessment may provide opportunities to engage with the following GCs and CCPs. Refer also to the Resources tab on the Mathematics curriculum hub: [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html) |
| Description: gc_literacy **Literacy**  Description: Description: gc_numeracy **Numeracy**  Description: gc_ict **ICT capability**  *Description: Description: gc_critical* **Critical and creative thinking** |

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| Achievement standard This assessment provides opportunities for students to demonstrate the following highlighted aspects. |
| By the end of Year 7, students [solve](http://www.australiancurriculum.edu.au/Glossary?a=&t=Solve) problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They [solve](http://www.australiancurriculum.edu.au/Glossary?a=&t=Solve) problems involving percentages and all four operations with fractions and decimals. They [compare](http://www.australiancurriculum.edu.au/Glossary?a=&t=Compare) the cost of items to make financial decisions. Students [represent](http://www.australiancurriculum.edu.au/Glossary?a=&t=Represent) numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students [describe](http://www.australiancurriculum.edu.au/Glossary?a=&t=Describe) different views of three-dimensional objects. They [represent](http://www.australiancurriculum.edu.au/Glossary?a=&t=Represent) transformations in the Cartesian plane. They [solve](http://www.australiancurriculum.edu.au/Glossary?a=&t=Solve) simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students [identify](http://www.australiancurriculum.edu.au/Glossary?a=&t=Identify) issues involving the collection of continuous data. They [describe](http://www.australiancurriculum.edu.au/Glossary?a=&t=Describe) the relationship between the median and mean in data displays.  Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students [solve](http://www.australiancurriculum.edu.au/Glossary?a=&t=Solve) simple linear equations and [evaluate](http://www.australiancurriculum.edu.au/Glossary?a=&t=Evaluate) algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots. |
| Source: ACARA, The Australian Curriculum v5.1, [www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au) |

**Sequence learning**

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| **Suggested learning experiences** |
| This assessment leads on from the learning experiences outlined in the QSA’s Year 7 Mathematics unit overview. The knowledge, understanding and skills developed in the exemplar unit will prepare students to engage in this assessment:   * See unit overview — Mathematics exemplar [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html) |
| Adjustments for needs of learners |
| To make adjustments, teachers refer to learning area content aligned to the student’s chronological age, personalise learning by emphasising alternate levels of content, general capabilities or cross‑curriculum priorities in relation to the chronological age learning area content. The emphasis placed on each area is informed by the student’s current level of learning and their strengths, goals and interests. Advice on the process of curriculum adjustment for all students and in particular for those with disability, gifted and talented or for whom English is an additional language or dialect are addressed in *Australian Curriculum — Student Diversity* materials.  For information to support students with diverse learning needs, see:   * Queensland Studies Authority materials for supporting students with diverse learning needs [www.qsa.qld.edu.au/10188.html](http://www.qsa.qld.edu.au/10188.html) * Australian Curriculum Student Diversity [www.australiancurriculum.edu.au/StudentDiversity/Overview](http://www.australiancurriculum.edu.au/StudentDiversity/Overview) * The *Melbourne Declaration* *on Educational Goals for Young Australians* [www.mceecdya.edu.au/mceecdya/melbourne\_declaration,25979.html](http://www.mceecdya.edu.au/mceecdya/melbourne_declaration,25979.html) * The *Disability Standards for Education* [www.ag.gov.au](http://www.ag.gov.au). |

## Develop assessment

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| **Preparing for the assessment** |
| * Recognise commonalities and make connections between fractions, decimals, percentages and ratios, with and without digital technologies, e.g. interactive programs, websites. * Describe relationships between quantities using ratios. * Represent ratios in various ways, including fractions, decimals and percentages  (see Appendix A: Background information for teachers). * Explore the concept of equivalence, with and without digital technologies, e.g. hands-on resources. * Select and use mathematical language associated with ratios. * Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies. * Convert between different representations of ratios, e.g. fractions, decimals, percentages. * Simplify fractions and ratios. * Choose and carry out appropriate procedures to divide an amount into a given ratio or to increase and decrease different quantities in ratio, with and without digital technologies. * Formulate, interpret and solve authentic ratio problems involving money, time and other measures, using fractions, decimals, or percentages, e.g. playdough recipes, best buys in supermarkets, the nature of traffic passing the school, food preferences, ratio of boys to girls in the class. * Verify the reasonableness of solutions by checking that answers fit the questions using a variety of techniques, including applying existing strategies such as estimation and working backwards. * Interpret ratio word problems. * Apply an understanding of ratio. * Explain the connection between ratios and everyday life, e.g. finances, recipes. * Communicate solutions effectively using mathematical language and visual representations of ratios. * Explain or justify strategies used to solve ratio problems. |

| **Implementing** |
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| * Read questions aloud to the class to ensure literacy demands do not prevent students from providing evidence of their understanding and skills in mathematics. * Clarify what is required in the assessment and the task-specific standards as needed. * Supervise students and assist where appropriate. |

## Make judgments

When making judgments about the evidence in student responses to this assessment, teachers are advised to use the task-specific standards provided. The development of these task-specific standards has been informed by the Queensland Year 7 standard elaborations. See [www.qsa.qld.edu.au/yr7-maths-resources.html](http://www.qsa.qld.edu.au/yr7-maths-resources.html).

### The Queensland standard elaborations for Mathematics

The Queensland Year 7 standard elaborations for Mathematics is a resource to assist teachers to make consistent and comparable evidence-based A to E (or equivalent) judgments. It should be used in conjunction with the Australian Curriculum achievement standard and content descriptions for the relevant year level.

The Queensland Mathematics standard elaborations provide a basis for judging *how well* students have demonstrated what they know, understand and can do using the Australian Curriculum achievement standard.

The Australian Curriculum achievement standards dimensions of Understanding and Skills are used to organise the Queensland Mathematics standard elaborations. Understanding and Skills in Mathematics are organised as Understanding, Fluency, Problem solving and Reasoning.

The valued features of Mathematics drawn from the achievement standard and the content descriptions for Understanding, Fluency, Problem solving and Reasoning are organised as:

* Mathematical understandings
* Recall and use of facts, definitions, technologies and procedures
* Use of mathematical language, conventions and symbols
* Use of problem-solving approaches
* Modelling and representation
* Results and conclusions of investigations and inquiries
* Communication of mathematical thinking, choices and strategies.

#### Task-specific standards

Task-specific standards give teachers:

* a tool for directly matching the evidence of learning in the student response to the standards
* a focal point for discussing student responses
* a tool to help provide feedback to students.

Task-specific standards are not a checklist; rather they are a guide that:

* highlights the valued features that are being targeted in the assessment and the qualities that will inform the overall judgment
* specifies particular *targeted aspects* of the curriculum content and achievement standard
* aligns the valued feature, task-specific descriptor and assessment
* allows teachers to make consistent and comparable on-balance judgments about student work by matching the qualities of student responses with the descriptors
* clarifies the curriculum expectations for learning at each of the five grades (A–E or the early years equivalent)
* shows the connections between what students are expected to know and do, and how their responses will be judged and the qualities that will inform the overall judgment
* supports evidence-based discussions to help students gain a better understanding of how they can critique their own responses and achievements, and identify the qualities needed to improve
* encourages and provides the basis for conversations among teachers, students and parents/carers about the quality of student work and curriculum expectations and related standards.

#### Task-specific valued features

Task-specific valued features are the discrete aspects of the valued features of Mathematics targeted in a particular assessment and incorporated into the task-specific standards for that assessment. They are selected from the Queensland Mathematics standard elaborations valued features drawn from the Australian Curriculum achievement standard and content descriptions.

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| Task-specific valued features for this assessment | | |
| The following table identifies the valued features for this assessment and makes explicit the understandings and skills that students will have the opportunity to demonstrate. This ensures that the alignment between what is taught, what is assessed and what is reported is clear. | | |
| Australian Curriculum achievement standard dimensions | Queensland standard elaborations valued features | Task-specific valued features |
| Understanding & Skills | **Understanding and Fluency** | * Expressing quantities as ratios, fractions, and percentages. * Operating with fractions and percentages to solve ratio problems. * Using conventions to express quantities as ratios, fractions and percentages. Showing working and making use of units. |
| **Problem solving and Reasoning** | * Applying problem-solving approaches to complex and unfamiliar situations involving ratios. |

The task-specific standards for this assessment are provided in two models using the same task‑specific valued features:

* a matrix
* a continua.

#### Matrix and continua

Task-specific standards can be prepared as a matrix or continua. Both the continua and the matrix:

* use the Queensland standard elaborations to develop task-specific descriptors to convey expected qualities in student work — A to E or equivalent
* highlight the same valued features from the Queensland standard elaborations that are being targeted in the assessment and the qualities that will inform the overall judgment
* incorporate the same task-specific valued features, i.e. make explicit the particular understanding or skills students have the opportunity to demonstrate for each selected valued feature
* provide a tool for directly matching the evidence of learning in the student response to the standards to make an on-balance judgment about student achievement
* assist teachers to make consistent and comparable evidence-based A to E or equivalent judgments.

##### Continua

The continua model of task-specific standards uses the dimensions of the Australian Curriculum achievement standard to organise task-specific valued features and standards as a number of reference points represented progressively along an A–E continuum. The task-specific valued features at each point are described holistically. The task-specific descriptors of the standard use the relevant degrees of quality described in the Queensland standard elaborations.

Teachers determine a position along each continuum that best matches the evidence in the students’ responses to make an on-balance judgment about student achievement on the task.

The continua model is a tool for making an overall on-balance judgment about the assessment and for providing feedback on task specific valued features.

##### Matrix

The matrix model of task-specific standards uses the structure of the Queensland standard elaborations to organise the task-specific valued features and standards A to E. The task-specific descriptors of the standard described in the matrix model use the same degrees of quality described in the Queensland standard elaborations.

Teachers make a judgment about the task-specific descriptor in the A to E (or equivalent) cell of the matrix that best matches the evidence in the students’ responses in order to make an on-balance judgment about how well the pattern of evidence meets the standard.

The matrix is a tool for making both overall on-balance judgments and analytic judgments about the assessment. Achievement in each valued feature of the Queensland standard elaboration targeted in the assessment can be recorded and feedback can be provided on the task-specific valued features.

## Use feedback

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| Feedback to students | This assessment provides opportunities to give feedback to students on how well they:   * demonstrate understanding of the concept of ratio * demonstrate understanding of equivalent fractions and ratios * convert ratios to fractions and percentages * use fractions and/or percentages to solve ratio problems * apply problem-solving approaches to ratio problems * use mathematical conventions when expressing ratios and fractions * show systematic working and units. |
| Resources | For guidance on providing feedback, see the professional development packages titled:   * *About feedback* [www.qsa.qld.edu.au/downloads/p\_10/as\_feedback\_about.doc](http://www.qsa.qld.edu.au/downloads/p_10/as_feedback_about.doc) * *Seeking and providing feedback* [www.qsa.qld.edu.au/downloads/p\_10/as\_feedback\_provide.doc](http://www.qsa.qld.edu.au/downloads/p_10/as_feedback_provide.doc) |

## Background information for teachers

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| Ratios |
| A ratio is a set of numbers that show the relationship between two or more like quantities or measures. |
| A ratio is *not* a fraction, but can be represented as a fraction.  For example, a ratio of 1 part lemonade to 2 parts ginger ale can be written as 1:2 or .  In this case, the fraction is *not* referring to the fraction of lemonade to the whole, which is . |
| Ratios can be represented as a percentage.  For example, a ratio of 1:3 could be represented as 25% and 75%. |
| Ratios can be represented using a colon ‘:’ to show the relationship between the values, where the colon means ‘is to’.  For example, 5:1 means ‘five is to one’. |
| The order of values is very important when representing ratios.  That is, 5:1 is different from 1:5. |
| Ratios represented in ratio or fraction form can be simplified down to their simplest terms. For example, 2:10 = 1:5;  = . |