(no-code)

describe the relationship between numbers and , and use squares of numbers and of numbers to solve problems

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Elaborations

• investigating squares of from one to 20 20 2 0 , and connecting them to visual representations such as dots arranged in a square pattern
• using the square and notation, and the and diagrams to calculate the squares of two-digit numbers; for example, 4 3 2 = (40 + 3) 2 = 4 0 2 + 2 × 40 × 3 + 3 2 = 1600 + 240 + 9 = 1849 43^2=(40+3)^2=40^2+2\times40\times3+3^2=1600+240+9=1849 4 3 2 = (4 0 + 3) 2 = 4 0 2 + 2 × 4 0 × 3 + 3 2 = 1 6 0 0 + 2 4 0 + 9 = 1 8 4 9
• determining between which 2 2 2 consecutive the of a given number lies; for example, 43 43 4 3 is between the 36 36 3 6 and 49 49 4 9 so 43 \sqrt{43} 4 3 ■ is between 36 \sqrt{36} 3 6 ■ and 49 \sqrt{49} 4 9 ■ and therefore between 6 6 6 and 7 7 7
• generating a list of numbers and describing any emerging patterns; for example, the last of numbers, or the difference between consecutive , and recognising the constant second difference
• using the relationship between numbers and their to determine the of a square tiled floor using square tiles; for example, an of floor with 144 144 1 4 4 square tiles has a of 48 48 4 8 tile lengths

Students learn to:

describe the relationship between perfect square numbers and square roots, and us numbers and square roots of perfect square numbers to solve problems

(AC9M7N01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Number sense and algebra

• Multiplicative strategies

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Snapshot – Multiplicative strategies

Numeracy: Number sense and algebra: Multiplicative strategies

Content description

AC9M7N01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Flexible strategies for multi-digit multiplication and division

• solves multi-step problems involving multiplicative situations using appropriate mental strategies, digital tools and algorithms (e.g. uses a rate of application to determine the amount of paint required to cover a large area and determines how many tins of paint are required)
• interprets, represents and solves multifaceted problems involving all 4 4 4 operations with natural numbers

Flexible strategies for multiplication and division of rational numbers

• expresses a number as a product of its prime factors for a purpose
• expresses repeated factors of the same number in exponent form (e.g. 2 × 2 × 2 × 3 × 3 = 2 3 × 3 2 2 \times 2 \times 2 \times 3 \times 3 = 2^3\times 3^2 2 × 2 × 2 × 3 × 3 = 2 3 × 3 2
• identifies and describes products of the same number as square or cube numbers (e.g. 3 × 3 3 \times 3 3 × 3 is the same as 3 2 3^2 3 2 which is read as 3 3 3 squared)
• describes the effect of multiplication by a decimal or fraction less than one (e.g. when multiplying natural numbers by a fraction or decimal less than one such as 15 × 1 2 = 7.5 15 \times\frac12 = 7.5 1 5 × 2 1 ■ = 7 . 5)
• connects and converts decimals to fractions to assist in mental computation involving

multiplication or division (e.g. to calculate 16 × 0.25 16 \times 0.25 1 6 × 0 . 2 5 , recognises 0.25 0.25 0 . 2 5 as a quarter, and determines a quarter of 16 16 1 6 or determines 0.5 ÷ 0.25 0.5 ÷ 0.25 0 . 5 ÷ 0 . 2 5 , by reading this as "one half, how many quarters?" and gives the answer as 2 2 2)

• calculates the percentage of a quantity flexibly using multiplication and division (e.g. to calculate 13 13 1 3 % of 1600 1600 1 6 0 0 uses 0.13 × 1600 0.13 \times 1600 0 . 1 3 × 1 6 0 0 or 1600 ÷ 100 × 13 1600 ÷ 100 \times 13 1 6 0 0 ÷ 1 0 0 × 1 3)

• uses multiplicative strategies efficiently to solve problems involving rational numbers including integers (e.g. calculates the average temperature for Mt Wellington for July to be ■ 1.6 1.6 1 . 6 ■C)

Flexible strategies for working multiplicatively

• uses knowledge of place value and multiplicative partitioning to multiply and divide decimals efficiently (e.g. 0.461 × 200 = 0.461 × 100 × 2 = 46.1 × 2 = 92.2 0.461 \times 200 = 0.461 \times 100 \times 2 = 46.1 \times 2 = 92.2 0 . 4 6 1 × 2 0 0 = 0 . 4 6 1 × 1 0 0 × 2 = 4 6 . 1 × 2 = 9 2 . 2)

• flexibly operates multiplicatively with extremely large or very small numbers expressed in scientific notation (e.g. calculates the area of a computer chip measuring 2.56 × 1 0 – 6 2.56 \times 10^{-6} 2 . 5 6 × 1 0 – 6 m in width by 1.4 × 1 0 – 7 1.4 \times 10^{-7} 1 . 4 × 1 0 – 7 m in length)

• chooses and uses appropriate strategies to solve multi-step problems and model situations involving rational numbers

• represents and solves multifaceted problems in a wide range of multiplicative situations including scientific notation for those involving very small or very large numbers (e.g. chooses to calculate the percentage of a percentage to determine successive discounts; determines the time it takes for sunlight to reach the earth)

AC9M7A01

recognise and use to represent everyday formulas and substitute values into formulas to determine an unknown

•

•

Elaborations

• linking to and being modelled when using formulas, such as the of a is equal to the length x width as A = l × w A\;=\;l\;\times\;w A = l × w or using p = 6 g + b p\;=\;6g\;+\;b p = 6 g + b to describe a total of expressed as goals (worth 6 6 6) and behinds (worth one)

• interpreting and using formulas obtained from other sources; for example, maximum heart and target heart for moderate exercise

• substituting numerical values for when using formulas and calculating the value of an unknown in practical situations; for example, calculating weekly wage W W W given base wage b b b and overtime hours h h h at 1.5 1.5 1 . 5 times r r r , W = b + 1.5 × h × r W\;=\;b+1.5\times h\times r W = b + 1 . 5 × h × r , using values for m m m and v v v to determine density d d d of a substance where d = m v d\;=\;\frac mv d = v m ■

• using everyday formulas and their application to on , investigating the relationships between

Students learn to:

recognise and use variables to represent everyday formulas algebraically and subst formulas to determine an unknown

(AC9M7A01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems

Number sense and algebra

• Number patterns and algebraic thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to

general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

Analysing

• Interpret concepts and problems

Analysing

• Interpret concepts and problems

Analysing

• Interpret concepts and problems

Country/Place

• First Nations communities of Australia maintain a deep connection to, and responsibility for, Country/Place and have holistic values and belief systems that are connected to the land, sea, sky and waterways.

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9S7I04

Resources

Work Samples

WS04 - Algebraic patterns

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Generalising patterns

• creates and interprets tables used to summarise patterns (e.g. the cost of hiring a bike based on the cost per hour)

• identifies a single operation rule in numerical patterns and records it in words (e.g. European dress size = Australian dress size + 30 +30 + 3 0)

• relates the position number of shapes within a pattern to the rule for the sequence (e.g. number of counters = = = shape number + 2 + 2 + 2)

• determines a higher term of a pattern using the pattern’s rule

• extends number patterns to include rational numbers (e.g. 2 , 2 1 4 , 2 1 2 , 2 3 4 , 3 2, 2 \frac14, 2\frac12, 2\frac34, 3 2 , 2 4 1 ■ , 2 2 1 ■ , 2 4 3 ■ , 3 …; 2 , 2, 2 , - 4 , 8 , 4, 8, 4 , 8 , - 16 16 1 6 …; 10 , 9.8 , 9.6 , 9.4 10, 9.8, 9.6, 9.4 1 0 , 9 . 8 , 9 . 6 , 9 . 4 …)

Relational thinking

• solves numerical equations involving one or more operations following conventions of order of operations (e.g. 5 × 2 + 4 = 4 × 2 + 5 \times 2 + 4 = 4 \times 2 + 5 × 2 + 4 = 4 × 2 + ?; 6 + 6 + 6

+ ? × 4 = 9 × 2 \times 4 = 9 \times 2 × 4 = 9 × 2)
• identifies and uses equivalence in number sentences to solve multiplicative problems involving numerical equations (e.g. uses a number balance or other materials to represent the number sentence 6 × 4 = 12 × 6 \times 4 = 12 \times 6 × 4 = 1 2 × ? in order to solve a problem)

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Resource – WS04 - Algebraic patterns

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation. They solve problems involving squares of numbers and square roots of perfect square numbers. Students solve problems involving addition and subtraction of integers. They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies. Students choose between equivalent representations of rational numbers and percentages to assist in calculations. They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios in financial and other applied contexts, justifying choices of representation. Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values. They solve linear equations with natural number solutions. Students create tables of values related to algebraic expressions and formulas, and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems. They describe the relationships between the radius, diameter and circumference of a circle. Students classify polygons according to their features and create an algorithm designed to sort and classify shapes. They represent objects two-dimensionally in different ways, describing the usefulness of these representations. Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays. Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is most suitable and explain their reasoning. Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events. They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7A01

recognise and use variables to represent everyday formulas algebraically and substitute values into formulas to determine an unknown

AC9M7A02

formulate algebraic expressions using constants, variables, operations and brackets

AC9M7A03

solve one-variable linear equations with natural number solutions; verify the solution by

substitution

AC9M7A04

describe relationships between variables represented in graphs of functions from authentic data

AC9M7A05

generate tables of values from visually growing patterns or the rule of a function; describe and plot these relationships on the Cartesian plane

AC9M7A02

formulate using constants, , and brackets

•

Elaborations

• generalising arithmetic to involving constants, , and brackets; for example, 7 + 7 + 7 = 3 × 7 , x + x + x = 3 × x 7+7+7=3\times7,\;x+x+x=3\times x 7 + 7 + 7 = 3 × 7 , x + x + x = 3 × x noting that 3 x 3x 3 x includes implied multiplication and recognising the difference between 3 x + 4 3x+4 3 x + 4 and 3 (x + 4) 3(x+4) 3 (x + 4)

• formulating that represent mathematical relationships; for example, translating from words to symbols, “think of a number” type of activities

• recognising and applying the concept of variable as something that can change in value, investigating the relationships between , and the application to processes on , including how cultural of First Nations Australians, such as storytelling, communicate mathematical relationships that can be represented as mathematical

Students learn to:

formulate algebraic expressions using constants, variables, operations and bracket

(AC9M7A02)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Number sense and algebra

• Number patterns and algebraic thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Country/Place

• First Nations communities of Australia maintain a deep connection to, and responsibility for, Country/Place and have holistic values and belief systems that are connected to the land, sea, sky and waterways.

Resources

Work Samples

WS03 - Blending and using paint

WS04 - Algebraic patterns

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Generalising patterns

• creates and interprets tables used to summarise patterns (e.g. the cost of hiring a bike based on the cost per hour)

• identifies a single operation rule in numerical patterns and records it in words (e.g. European dress size = Australian dress size + 30 +30 + 3 0)

• relates the position number of shapes within a pattern to the rule for the sequence (e.g. number

of counters = = = shape number + 2 + 2 + 2)
• determines a higher term of a pattern using the pattern's rule
• extends number patterns to include rational numbers (e.g. 2 , 2 1 4 , 2 1 2 , 2 3 4 , 3 2, 2 \frac14, 2\frac12, 2\frac34, 3 2 , 2 4 1 ■ , 2 2 1 ■ , 2 4 3 ■ , 3 …; 2 , 2, 2 , - 4 , 8 , 4, 8, 4 , 8 , - 16 16 1 6 …; 10 , 9.8 , 9.6 , 9.4 10, 9.8, 9.6, 9.4 1 0 , 9 . 8 , 9 . 6 , 9 . 4 …)

Relational thinking

• solves numerical equations involving one or more operations following conventions of order of operations (e.g. 5 × 2 + 4 = 4 × 2 + 5 \times 2 + 4 = 4 \times 2 + 5 × 2 + 4 = 4 × 2 + ?; 6 + 6 + 6 + ? × 4 = 9 × 2 \times 4 = 9 \times 2 × 4 = 9 × 2)
• identifies and uses equivalence in number sentences to solve multiplicative problems involving numerical equations (e.g. uses a number balance or other materials to represent the number sentence 6 × 4 = 12 × 6 \times 4 = 12 \times 6 × 4 = 1 2 × ? in order to solve a problem)

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Resource – WS03 - Blending and using paint

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation. They solve problems involving squares of numbers and square roots of perfect square numbers. Students solve problems involving addition and subtraction of integers. They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies. Students choose between equivalent representations of rational numbers and percentages to assist in calculations. They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios in financial and other applied contexts, justifying choices of representation. Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values. They solve linear equations with natural number solutions. Students create tables of values related to algebraic expressions and formulas, and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems. They describe the relationships between the radius, diameter and circumference of a circle. Students classify polygons according to their features and create an algorithm designed to sort and classify shapes. They represent objects two-dimensionally in different ways, describing the usefulness of these representations. Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays. Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is

most suitable and explain their reasoning. Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events. They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7N04

find equivalent representations of rational numbers and represent rational numbers on a number line

AC9M7N06

use the 4 operations with positive rational numbers including fractions, decimals and percentages to solve problems using efficient calculation strategies

AC9M7N08

recognise, represent and solve problems involving ratios

AC9M7A02

formulate algebraic expressions using constants, variables, operations and brackets

AC9M7A03

solve one-variable with natural number solutions; verify the solution by substitution

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Elaborations

• recognising that solving an is a process of determining a value that makes the true; using substitution to determine whether a given number is a solution to an or not
• solving using concrete materials, the balance model, and backtracking, explaining the process
• solving such as 3 x + 7 = 19 3x+7=19 3 x + 7 = 1 9 , and verifying the solution by substitution

Students learn to:

solve one-variable linear equations with natural number solutions; verify the solutio substitution

(AC9M7A03)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Number sense and algebra

• Number patterns and algebraic thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Resources

Work Samples

WS04 - Algebraic patterns

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h

where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

AC9M7A04

describe relationships between represented in graphs of from authentic

•
•

Elaborations

• using graphs to analyse a building’s electricity or gas usage over a period of time, the value of shares on a stock market, or the temperature during a day, interpreting and discussing the relationships they represent
• using travel graphs to compare the distance travelled to and from school, interpreting and discussing features of travel graphs such as the slope of and the meaning of horizontal
• telling the story behind what is being represented in graphs of ; for example, graphs representing pouring or distance versus time
• exploring how are used in machine learning to model relationships; for example, in linear regression models, a linear is used to map input features to predictions
• using graphs of evaporation to explore and discuss First Nations Australians’ methods of water resource management

Students learn to:

describe relationships between variables represented in graphs of functions from a

(AC9M7A04)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Investigating

• Interpret data

Measurement and geometry

• Measuring time

Number sense and algebra

• Number patterns and algebraic thinking

Statistics and probability

• Interpreting and representing data

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Number sense and algebra

• Number patterns and algebraic thinking

Speaking and listening

• Speaking

Measurement and geometry

• Measuring time

Number sense and algebra

• Number patterns and algebraic thinking

Analysing

• Interpret concepts and problems

Number sense and algebra

• Number patterns and algebraic thinking

Number sense and algebra

• Number patterns and algebraic thinking

Country/Place

• The First Peoples of Australia are the Traditional Owners of Country/Place, protected in Australian Law by the Native Title Act 1993 which recognises pre-existing sovereignty, continuing■systems of law and customs, and connection to Country/Place. This recognised legal right provides for economic sustainability and a voice into the development■and management of Country/Place.

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9S7I04

AC9TDI8P02

Resources

Work Samples

WS04 - Algebraic patterns

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7A04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Measuring time

Numeracy: Measurement and geometry: Measuring time

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Measuring time with large and small timescales

• uses appropriate metric prefixes to measure both large and small durations of time (e.g. millennia, nanoseconds)

• constructs timelines using an appropriate scale (e.g. chronologically sequences historical events)

Measuring how things change over time

• investigates, describes and interprets data collected over time (e.g. uses a travel graph to describe a journey; interprets data collected over a period of time using a graphical representation and makes a prediction for the future behaviour of the data)

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)

• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)

• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object

• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)

• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)

• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)

• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central

tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs
• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

Sampling

• considers the context when determining whether to use data from a sample or a population
• determines what type of sample to use from a population (e.g. decides to use a representative sample when conducting targeted market research or when researching beliefs about a health-related issue)
• makes reasonable statements about a population based on evidence from samples (e.g. considers accuracy of representation of marginalised individuals or population groups)
• plans, executes and reports on sampling-based investigations, taking into account validity of methodology and consistency of data, to answer questions formulated by the student

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to

represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Snapshot – Speaking

Literacy: Speaking and listening: Speaking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Crafting ideas

• creates detailed spoken texts on a broad range of learning area topics
• includes details and elaborations to expand ideas
• uses connectives to signal a change in relationship (e.g. "however", "although", "on the other hand") or to show causal relationships (e.g. "due to", "since") (see Grammar)
• uses a range of expressions to introduce an alternative point of view (e.g. "in my opinion", "he did not agree with")
• rehearses spoken text to accommodate time and technology
• controls tone, volume, pitch and pace to suit content and audience
• uses technologies or audio and visual features to enhance spoken text (e.g. videos a spoken presentation with music, sound effect enhancements)

Vocabulary

• uses a broader range of more complex noun groups/phrases to expand description (e.g. "protective, outer covering")
• selects more specific and precise words to replace general words (e.g. uses "difficult" or "challenging" for "hard")
• uses some rhetorical devices (e.g. "don’t you agree?")

Crafting ideas

• creates spoken texts responsive to audience and a broad range of learning area topics, clearly articulating words and ideas
• organises more complex ideas or concepts logically, selecting details to accentuate key points
• speaks audibly and coherently to a less familiar audience for a sustained period
• shows increasing awareness of audience by moderating length, content and delivery of spoken texts
• adjusts register according to purpose and audience
• does research to prepare spoken texts
• uses a range of technology, and audio and visual resources to engage audience and enhance content

Vocabulary

• varies vocabulary to add interest and to describe with greater precision (e.g. uses topic-specific noun groups/phrases such as "exploitation of resources") (see Grammar)
• uses language creatively (e.g. "the moon shines bravely")

• uses sensory vocabulary to engage the audience (e.g. "a gasp of dismay")
• uses technical vocabulary to demonstrate topic knowledge (e.g. "deforestation")
• consistently uses a range of synonyms to add variety and precision to spoken text
• uses abstractions (e.g. "freedom", "fairness")

Crafting ideas

• creates spoken texts which explore and interpret concepts drawn from research or learning area content
• selects voice appropriate to purpose (e.g. third person to create distance and authority or first person to achieve personal connection)
• develops complex ideas or a central theme across a spoken text
• uses language features according to purpose, to impact the audience (e.g. uses more complex connectives such as "consequently", "accordingly" to explain)
• rephrases or clarifies to repair or refine meaning
• uses language structures and features appropriate to learning area content
• uses technologies and visual and audio resources to enhance meaning and effect in presentations

Vocabulary

• selects vocabulary to intensify and sharpen the focus (e.g. "scarcely", "absolutely", "real", "simply")
• uses a range of evaluative language to express opinions or convey emotion (e.g. "significant benefits", "devastating consequences")
• uses a range of emotive language appropriate to topic, purpose and audience
• uses rich, evocative, descriptive language
• uses figurative language (e.g. "hungry for success")

Snapshot – Measuring time

Numeracy: Measurement and geometry: Measuring time

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Measuring time with large and small timescales

• uses appropriate metric prefixes to measure both large and small durations of time (e.g. millennia, nanoseconds)
• constructs timelines using an appropriate scale (e.g. chronologically sequences historical events)

Measuring how things change over time

• investigates, describes and interprets data collected over time (e.g. uses a travel graph to describe a journey; interprets data collected over a period of time using a graphical representation and makes a prediction for the future behaviour of the data)

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)

• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object

• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)

• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)

• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

AC9M7A05

generate tables of values from visually or the rule of a ; describe and plot these relationships on the

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Elaborations

• plotting from a table of values generated using simple and recognising patterns, such as the lie on a straight
• discussing and using to create a general rule and use the rule to determine the value of the dependent variable for any given value of the independent variable; for example, plotting the value of the of a for varying values of
• using to generate a table of ordered pairs using input and output values, plotting the relationships on a and describing the graph in terms of
• using diagrams and manipulatives to form linear patterns, representing these patterns in tables and describing the relationship in terms of the way the pattern is growing and in the of the

situation
• using a simple general-purpose programming language to create and use that generate and graphing the relationships on a
Students learn to:

generate tables of values from visually growing patterns or the rule of a function; de

plot these relationships on the Cartesian plane

(AC9M7A05)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Investigating

• Acquire and collate data
• Interpret data

Number sense and algebra

• Number patterns and algebraic thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Inquiring

• Identify, process and evaluate information

Investigating

• Acquire and collate data
• Interpret data

Number sense and algebra

• Number patterns and algebraic thinking

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9S7I04
AC9TDI8P02

Resources

Work Samples

WS04 - Algebraic patterns

WS05 - Possum population

Snapshot – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M7A05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• collect and access data using a range of digital tools and methods in response to a defined question or problem
• collect and access data from a range of sources, using specialised digital tools in response to problems, and evaluate it for relevance
• collect and evaluate quantitative and qualitative data using specialised digital tools and processes in the context of identified problems

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7A05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions
• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions
• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A05

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)
• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)
• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7A05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources
• compare information and opinion that can be verified against claims based on personal preference
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the information selected to determine bias and reliability

Snapshot – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M7A05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• collect and access data using a range of digital tools and methods in response to a defined question or problem

• collect and access data from a range of sources, using specialised digital tools in response to problems, and evaluate it for relevance

• collect and evaluate quantitative and qualitative data using specialised digital tools and processes in the context of identified problems

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7A05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A05

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Representing unknowns

• creates algebraic expressions to represent relationships involving one or more operations (e.g. when n = n = n = number of egg cartons, then the number of eggs can be represented by the expression 12 n 12n 1 2 n ; to find the number of neutrons n n n given the atomic mass A A A and number of protons p p p , uses n = A – p n = A - p n = A – p)

• uses words or symbols to express relationships involving unknown values (e.g. total number of apples = 48 × = 48\space\times = 4 8 × number of boxes; C = 20 + 30 h C = 20 + 30h C = 2 0 + 3 0 h where C C C is the total cost and h h h is the hours of labour; uses v = d t v=\frac dt v = t d ■ to represent the relationship between velocity, distance and time)

• evaluates an algebraic expression or equation by substitution (e.g. uses the formula for force F F F , F = m a F=ma F = m a to calculate the force given the mass m m m and the acceleration a a a)

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object

• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Resource – WS05 - Possum population

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation. They solve problems involving squares of numbers and square roots of perfect square numbers. Students solve problems involving addition and subtraction of integers. They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies. Students choose between equivalent representations of rational numbers and percentages to assist in calculations. They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios in financial and other applied contexts , justifying choices of representation. Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values. They solve linear equations with natural number solutions. Students create tables of values related to algebraic expressions and formulas , and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems. They describe the relationships between the radius, diameter and circumference of a circle. Students classify polygons according to their features and create an algorithm designed to sort and classify shapes. They represent objects two-dimensionally in different ways, describing the usefulness of these representations. Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays. Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is most suitable and explain their reasoning. Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events. They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7N05

round decimals to a given accuracy appropriate to the context and use appropriate rounding and estimation to check the reasonableness of solutions

AC9M7N06

use the 4 operations with positive rational numbers including fractions, decimals and percentages to solve problems using efficient calculation strategies

AC9M7A05

generate tables of values from visually growing patterns or the rule of a function; describe and plot these relationships on the Cartesian plane

AC9M7A06

manipulate formulas involving several using , and describe the effect of systematic in the values of the

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Elaborations

• experimenting with different of tables of values from formulas; for example, using of a rectangular = length × width × height, and specifying a fixed width and equal length and varying the height
• using spreadsheets and the formula to recognise the effect of changing on the entries in cells
• analysing distance travelled for different combinations of average speed and time of travel using

a table of values and the distance formula
• exploring how deep learning models used for training artificial intelligence agents can involve the manipulation of mathematical with multiple ; for example, conducting a sensitivity analysis to understand the artificial intelligence model's behaviour
• understanding that the relationship between in an artificial intelligence model assists with explainability and interpretability; for example, manipulating and analysing formulas allows researchers to gain insights into how and why a model makes certain predictions
Students learn to:

manipulate formulas involving several variables using digital tools, and describe th systematic variation in the values of the variables

(AC9M7A06)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Draw conclusions and provide reasons

Generating

• Create possibilities

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Number sense and algebra

• Number patterns and algebraic thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

Generating

• Create possibilities
• Consider alternatives
• Put ideas into action

Measurement and geometry

• Understanding units of measurement

Analysing

• Interpret concepts and problems
• Evaluate actions and outcomes

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems

Reflecting

• Transfer knowledge

Measurement and geometry

• Measuring time

Analysing

• Evaluate actions and outcomes

Number sense and algebra

• Number patterns and algebraic thinking

Analysing

• Evaluate actions and outcomes

Number sense and algebra

• Number patterns and algebraic thinking

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways

• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations

• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Create, communicate and collaborate

Digital Literacy: Creating and exchanging: Create, communicate and collaborate

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and control a variety of features in appropriate digital tools to create content and communicate and collaborate with trusted groups

• select and control advanced features of appropriate digital tools to independently create content and effectively communicate and collaborate with wider groups

• select and control the features of digital tools to purposefully create content and effectively communicate and collaborate, inclusive of diverse groups

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• analyse and visualise data using a range of digital tools to identify patterns and make predictions
• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions
• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)
• identifies and justifies equivalent algebraic expressions
• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object
• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Linear and non-linear relationships

• identifies the difference between linear and non-linear relationships in everyday contexts (e.g. explains that in a linear relationship, the rate of change is constant such as the cost of babysitting by the hour, whereas in a non-linear relationship the rate of change will vary and it could grow multiplicatively or exponentially such as a social media post going viral)
• describes and interprets the graphical features of linear and non-linear growth in authentic problems (e.g. compares simple and compound interest graphs; describes the relationship between scientific data plotted on a graph; analyses a graph to identify the inverse relationship between price and quantity demanded or the relationship between Human Development Index (HDI) and standards of living)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways

• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations

• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option

• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option

• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• put ideas into action by predicting potential or future outcomes and systematically testing a range of options

• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations

• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7A06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using metric units

• calculates perimeter using properties of two-dimensional shapes to determine unknown lengths
• measures and calculates the area of different shapes using metric units and a range of strategies

Angles as measures of turn

• estimates and measures angles in degrees up to one revolution (e.g. uses a protractor to measure the size of an angle; estimates angles, such as those formed at the elbows when releasing an object; determines the effect of angles on the trajectory, height and distance of flight during jumps and throws in athletics)

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)
• describes and uses the relationship between metric units of measurement and the base- 10 10 1 0 place value system to accurately measure and record measurements using decimals

Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites
• establishes and uses formulas for calculating the volume and surface area of a range of right prisms

Circle measurements

• informally estimates the circumference of a circle using the radius or diameter
• establishes the relationship between the circumference and the diameter of a circle as the constant π \pi π
• calculates the circumference and the area of a circle using π \pi π and a known diameter or radius

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Evaluate actions and outcomes

Critical and Creative Thinking: Analysing: Evaluate actions and outcomes

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• evaluate the effectiveness of a course of action or the outcome of a task, including using a given or co-developed set of criteria to support decisions
• evaluate the effectiveness of a course of action or the outcome of a task and account for expected and unexpected results, including using a given or co-developed set of criteria to support decisions
• evaluate the effectiveness of a course of action to achieve desired outcomes and suggest

improvements, including using a personally developed set of criteria to support judgements and decisions

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option

• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option

• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

• compare information and opinion that can be verified against claims based on personal preference

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose

• transfer knowledge and skills gained in previous experiences to both similar and different contexts, and explain reasons for decisions and choices made

• identify, plan and justify opportunities to transfer knowledge into new contexts

Snapshot – Create, communicate and collaborate

Digital Literacy: Creating and exchanging: Create, communicate and collaborate

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and control a variety of features in appropriate digital tools to create content and communicate and collaborate with trusted groups

• select and control advanced features of appropriate digital tools to independently create content and effectively communicate and collaborate with wider groups

• select and control the features of digital tools to purposefully create content and effectively communicate and collaborate, inclusive of diverse groups

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks

• troubleshoot basic problems and identify repetitive tasks to automate

• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks

• troubleshoot common problems and automate repetitive tasks

• select and operate advanced and emerging digital tools confidently

• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose

• transfer knowledge and skills gained in previous experiences to both similar and different contexts, and explain reasons for decisions and choices made

• identify, plan and justify opportunities to transfer knowledge into new contexts

Snapshot – Measuring time

Numeracy: Measurement and geometry: Measuring time

Content description

AC9M7A06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Measuring time with large and small timescales

• uses appropriate metric prefixes to measure both large and small durations of time (e.g. millennia, nanoseconds)

• constructs timelines using an appropriate scale (e.g. chronologically sequences historical events)

Measuring how things change over time

• investigates, describes and interprets data collected over time (e.g. uses a travel graph to describe a journey; interprets data collected over a period of time using a graphical representation and makes a prediction for the future behaviour of the data)

Snapshot – Evaluate actions and outcomes

Critical and Creative Thinking: Analysing: Evaluate actions and outcomes

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• evaluate the effectiveness of a course of action or the outcome of a task, including using a given or co-developed set of criteria to support decisions

• evaluate the effectiveness of a course of action or the outcome of a task and account for expected and unexpected results, including using a given or co-developed set of criteria to support decisions

• evaluate the effectiveness of a course of action to achieve desired outcomes and suggest improvements, including using a personally developed set of criteria to support judgements and decisions

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object

• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Linear and non-linear relationships

• identifies the difference between linear and non-linear relationships in everyday contexts (e.g. explains that in a linear relationship, the rate of change is constant such as the cost of babysitting by the hour, whereas in a non-linear relationship the rate of change will vary and it could grow multiplicatively or exponentially such as a social media post going viral)

• describes and interprets the graphical features of linear and non-linear growth in authentic problems (e.g. compares simple and compound interest graphs; describes the relationship between scientific data plotted on a graph; analyses a graph to identify the inverse relationship between price and quantity demanded or the relationship between Human Development Index (HDI) and standards

of living)

Snapshot – Evaluate actions and outcomes

Critical and Creative Thinking: Analysing: Evaluate actions and outcomes

Content description

AC9M7A06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• evaluate the effectiveness of a course of action or the outcome of a task, including using a given or co-developed set of criteria to support decisions

• evaluate the effectiveness of a course of action or the outcome of a task and account for expected and unexpected results, including using a given or co-developed set of criteria to support decisions

• evaluate the effectiveness of a course of action to achieve desired outcomes and suggest improvements, including using a personally developed set of criteria to support judgements and decisions

Snapshot – Number patterns and algebraic thinking

Numeracy: Number sense and algebra: Number patterns and algebraic thinking

Content description

AC9M7A06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Algebraic expressions

• creates and identifies algebraic equations from word problems involving one or more operations (e.g. if a taxi charges $ 5 \$5 $ 5 call out fee then a flat rate of $ 2.30 \$2.30 $ 2 . 3 0 per km travelled, represents this algebraically as C = 5 + 2.3 d C=5+2.3d C = 5 + 2 . 3 d where d d d is the distance travelled in km and C C C is the total cost of the trip)

• identifies and justifies equivalent algebraic expressions

• interprets a table of values in order to plot points on a graph

Algebraic relationships

• interprets and uses formulas and algebraic equations that describe relationships in various contexts (e.g. uses A = π r 2 \mathrm A=\mathrm{πr}^2 A = π r 2 to calculate the area of a circular space; uses A = P (1 + r n) n t \mathrm A=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}} A = P (1 + n r ■) n t when working with compound interest; uses v = u + a t v=u+at v = u + a t to calculate the velocity of an object

• plots relationships on a graph using a table of values representing authentic data (e.g. uses data recorded in a spreadsheet to plot results of a science experiment)

Linear and non-linear relationships

• identifies the difference between linear and non-linear relationships in everyday contexts (e.g. explains that in a linear relationship, the rate of change is constant such as the cost of babysitting by the hour, whereas in a non-linear relationship the rate of change will vary and it could grow multiplicatively or exponentially such as a social media post going viral)

• describes and interprets the graphical features of linear and non-linear growth in authentic problems (e.g. compares simple and compound interest graphs; describes the relationship between scientific data plotted on a graph; analyses a graph to identify the inverse relationship between price and quantity demanded or the relationship between Human Development Index (HDI) and standards of living)

AC9M7M01

solve problems involving the of triangles and using established formulas and appropriate

•

Elaborations

• using the formula for the of a and the array structure to derive the formula for the of a triangle and the of a parallelogram , given their heights; for example, establish that the of a triangle is half the of an appropriate by using the spatial relationship between and different types of triangles

• using dynamic geometry software to demonstrate how the sliding of the vertex of a triangle at a fixed altitude opposite a side leaves the of the triangle unchanged
• using established formulas to solve practical problems involving the of triangles, and ; for example, estimating the cost of materials needed to make shade sails based on a price per metre or determining different combinations of dimensions that lead to a given
Students learn to:

solve problems involving the area of triangles and parallelograms using established appropriate units

(AC9M7M01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Measurement and geometry

• Understanding geometric properties
• Understanding units of measurement

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Managing and operating

• Select and operate tools

Number sense and algebra

• Understanding money

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7M01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length

of 2 2 2 sides of a triangle must always be greater than the length of the third side)
• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says ‘when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)
• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)
• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems
• identifies interior angles in shapes to calculate angle sum
• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras’ theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7M01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)
• describes and uses the relationship between metric units of measurement and the base- 10 10 1 0 place value system to accurately measure and record measurements using decimals

Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites
• establishes and uses formulas for calculating the volume and surface area of a range of right prisms

Circle measurements

• informally estimates the circumference of a circle using the radius or diameter
• establishes the relationship between the circumference and the diameter of a circle as the constant π \pi π
• calculates the circumference and the area of a circle using π \pi π and a known diameter or radius

Using metric units and formulas

• uses dissection, rearrangement and estimation to calculate or approximate the area and volume of composite shapes and objects
• uses metric units and formulas to calculate the volume and surface area of right prisms, cylinders, cones and pyramids
• uses the conversion between units of volume and capacity to calculate the capacity of objects based on the internal volume and vice versa
• identifies appropriate metric units to use according to the level of precision required (e.g. building plans show measurements in millimetres, but to purchase enough carpet you need to measure the length and width of the room and round up to the nearest whole metre)
• uses and applies Pythagoras' theorem to authentic contexts (e.g. determines the length of a cross brace given the width of a gate is 1050 1050 1 0 5 0 millimetres and its height is 1450 1450 1 4 5 0 millimetres)
• uses and applies properties of congruent and similar triangles to authentic contexts to determine the size of unknown angles and lengths of sides
• uses trigonometry to calculate the unknown lengths or angles in authentic problems
• chooses an appropriate method to solve problems involving right triangles in authentic contexts

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources
• compare information and opinion that can be verified against claims based on personal preference

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the information selected to determine bias and reliability

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7M01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M7M01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Working with money multiplicatively

• calculates the total cost of several identical items in dollars and cents
• connects the multiplicative relationship between dollars and cents to decimal notation (e.g. explains that a quarter of dollar is equal to $ 0.25 \$0.25 $ 0 . 2 5 or 25 25 2 5 cents; calculates what 150 150 1 5 0 copies will cost if they are advertised at 15 15 1 5 c a print and expresses this in dollars and cents as $ 22.50 \$22.50 $ 2 2 . 5 0)
• solves problems, such as repeated purchases, splitting a bill or calculating monthly subscription fees, using multiplicative strategies
• makes and uses simple financial plans (e.g. creates a classroom budget for an excursion; planning for a school fete)

Working with money proportionally

• calculates the percentage change with and without the use of digital tools (e.g. using GST as 10 10 1 0 % multiplies an amount by 0.1 0.1 0 . 1 to calculate the GST payable or divides the total paid by 11 11 1 1 to calculate the amount of GST charged; calculates the cost after a 25 25 2 5 % discount on items)
• calculates income tax payable using taxation tables
• interprets an interest rate from a given percentage and calculates simple interest payable on a short-term loan (e.g. calculates the total interest payable on a car loan)

Working with money proportionally

• applies proportional strategies for decision making, such as determining "best buys", currency conversion, determining gross domestic product (e.g. comparing cost per 100 100 1 0 0 g or comparing the cost of a single item on sale versus a multi-pack at the regular price)
• determines the best payment method or payment plan for a variety of contexts using rates, percentages and discounts (e.g. decides which phone plan would be better based on call rates, monthly data usage, insurance and other upfront costs)
• calculates the percentage change including the profit or loss made on a transaction (e.g. profit made from on-selling second-hand goods through an online retail site)

AC9M7M02

solve problems involving the of including rectangular and triangular , using established formulas and appropriate

•

Elaborations

• building a rectangular out of unit cubes and showing that the of is the same as would be found by multiplying the 3 3 3 edge lengths or by multiplying the of the base by the height/length
• developing the connection between the of the parallel (base), the height and of a rectangular or triangular to other
• connecting the of the floor space and the number of floors of a high-rise building to calculate the of a building
• using dynamic geometry software, spatial reasoning and prediction to derive the formula for the of

Students learn to:

solve problems involving the volume of right prisms including rectangular and trian using established formulas and appropriate units

(AC9M7M02)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Measurement and geometry

• Understanding units of measurement

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Measurement and geometry

• Understanding units of measurement

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Managing and operating

• Select and operate tools

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7M02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)
• describes and uses the relationship between metric units of measurement and the base- 10 10 1 0 place value system to accurately measure and record measurements using decimals

Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites

• establishes and uses formulas for calculating the volume and surface area of a range of right prisms

Circle measurements

• informally estimates the circumference of a circle using the radius or diameter

• establishes the relationship between the circumference and the diameter of a circle as the constant π \pi π

• calculates the circumference and the area of a circle using π \pi π and a known diameter or radius

Using metric units and formulas

• uses dissection, rearrangement and estimation to calculate or approximate the area and volume of composite shapes and objects

• uses metric units and formulas to calculate the volume and surface area of right prisms, cylinders, cones and pyramids

• uses the conversion between units of volume and capacity to calculate the capacity of objects based on the internal volume and vice versa

• identifies appropriate metric units to use according to the level of precision required (e.g. building plans show measurements in millimetres, but to purchase enough carpet you need to measure the length and width of the room and round up to the nearest whole metre)

• uses and applies Pythagoras' theorem to authentic contexts (e.g. determines the length of a cross brace given the width of a gate is 1050 1050 1 0 5 0 millimetres and its height is 1450 1450 1 4 5 0 millimetres)

• uses and applies properties of congruent and similar triangles to authentic contexts to determine the size of unknown angles and lengths of sides

• uses trigonometry to calculate the unknown lengths or angles in authentic problems

• chooses an appropriate method to solve problems involving right triangles in authentic contexts

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7M02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using metric units

• calculates perimeter using properties of two-dimensional shapes to determine unknown lengths

• measures and calculates the area of different shapes using metric units and a range of strategies

Angles as measures of turn

• estimates and measures angles in degrees up to one revolution (e.g. uses a protractor to measure the size of an angle; estimates angles, such as those formed at the elbows when releasing an object; determines the effect of angles on the trajectory, height and distance of flight during jumps and throws in athletics)

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)

• describes and uses the relationship between metric units of measurement and the base- 10 10 1 0 place value system to accurately measure and record measurements using decimals

Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites

• establishes and uses formulas for calculating the volume and surface area of a range of right prisms

Circle measurements

• informally estimates the circumference of a circle using the radius or diameter

• establishes the relationship between the circumference and the diameter of a circle as the constant π \pi π

• calculates the circumference and the area of a circle using π \pi π and a known diameter or radius

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

• compare information and opinion that can be verified against claims based on personal preference

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

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• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M02

Continuum extract

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• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks

• troubleshoot basic problems and identify repetitive tasks to automate

• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks

• troubleshoot common problems and automate repetitive tasks

• select and operate advanced and emerging digital tools confidently

• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

AC9M7M03

describe the relationship between and the features of including the , and

•

•

Elaborations

• recognising the features of and their relationships to one another; for example, labelling the parts of a including , , , and using one of , or to determine the of the other 2 2 2 ; understanding that the of a is twice the , or that the is the divided by 2 2 2

• comparing the of in to their and with materials and measuring, to establish measurement formulas; for example, using a compass to draw several , then using string to the , comparing the length of string to the of the

• investigating as the constant in the proportional relationship between the of a and its , and historical from different civilisations, including Egypt, Babylon, Greece, India and China

• investigating the applications and significance of in everyday life of First Nations Australians such as in basketry, symbols and architecture, recognising the relationships between the , , and

Students learn to:

describe the relationship between π π π and the features of circles including the circ radius and diameter

(AC9M7M03)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Measurement and geometry

• Understanding units of measurement

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Navigating intercultural contexts

• Consider responses to intercultural contexts

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Culture

• First Nations Australians' ways of life reflect unique ways of being, knowing, thinking and doing.

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

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• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M03

Continuum extract

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• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7M03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)

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Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and

triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites

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Circle measurements

• informally estimates the circumference of a circle using the radius or diameter

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Using metric units and formulas

• uses dissection, rearrangement and estimation to calculate or approximate the area and volume of composite shapes and objects

• uses metric units and formulas to calculate the volume and surface area of right prisms, cylinders, cones and pyramids

• uses the conversion between units of volume and capacity to calculate the capacity of objects based on the internal volume and vice versa

• identifies appropriate metric units to use according to the level of precision required (e.g. building plans show measurements in millimetres, but to purchase enough carpet you need to measure the length and width of the room and round up to the nearest whole metre)

• uses and applies Pythagoras' theorem to authentic contexts (e.g. determines the length of a cross brace given the width of a gate is 1050 1050 1 0 5 0 millimetres and its height is 1450 1450 1 4 5 0 millimetres)

• uses and applies properties of congruent and similar triangles to authentic contexts to determine the size of unknown angles and lengths of sides

• uses trigonometry to calculate the unknown lengths or angles in authentic problems

• chooses an appropriate method to solve problems involving right triangles in authentic contexts

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and

arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

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• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M03

Continuum extract

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• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

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• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M03

Continuum extract

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Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M03

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• identify and clarify significant information and opinion from a range of sources, including visual

information and digital sources
• evaluate the information selected to determine bias and reliability

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
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• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
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Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M03

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• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the information selected to determine bias and reliability

Snapshot – Consider responses to intercultural contexts

Intercultural Understanding: Navigating intercultural contexts: Consider response contexts

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• explain how intercultural experiences affect what they learn about relationship-building and interactions
• analyse how cultural representations in a range of intercultural contexts influence self-awareness of culturally appropriate behaviour
• apply learning to improve communication outcomes in unfamiliar intercultural contexts, considering

and developing alternative responses

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M03

Continuum extract

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• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

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• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

AC9M7M04

identify corresponding, alternate and relationships between formed when are crossed by a ; use them to solve problems and explain reasons

•

•

Elaborations

• constructing a pair of and a pair of using their properties, a pair of compasses and a ruler, squares or using dynamic geometry software

• using dynamic geometry software to identify relationships between alternate, corresponding and for a pair of cut by a

• using dynamic geometry software to demonstrate how and their properties are involved in the design and construction of scissor lifts, folding umbrellas, toolboxes and cherry pickers

• using geometric reasoning of properties to generalise the relationships of and , and related

properties such as the size of an exterior of a triangle is equal to the sum of the sizes of opposite and non-adjacent interior , and the sum of the sizes of interior in a triangle in the plane is equal to the size of 2 2 2 or 180 180 1 8 0 °

Students learn to:

identify corresponding, alternate and co-interior relationships between angles forme lines are crossed by a transversal; use them to solve problems and explain reasons

(AC9M7M04)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Measurement and geometry

• Understanding geometric properties

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Resources

Work Samples

WS01 - Geometric reasoning

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to

context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7M04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)

• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems

• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)

• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems

• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length of 2 2 2 sides of a triangle must always be greater than the length of the third side)

• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says ‘when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)

• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)

• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems

• identifies interior angles in shapes to calculate angle sum

• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras' theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks

• troubleshoot basic problems and identify repetitive tasks to automate

• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks

• troubleshoot common problems and automate repetitive tasks

• select and operate advanced and emerging digital tools confidently

• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• analyse and visualise data using a range of digital tools to identify patterns and make predictions
• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions
• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
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• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Resource – WS01 - Geometric reasoning

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation.■They solve problems involving squares of numbers and square roots of perfect square numbers.■Students solve problems involving addition and subtraction of integers.■They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies.■Students choose between equivalent representations of rational numbers and percentages to assist in calculations.■They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios, in financial and other applied contexts, justifying choices of representation.■Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values.■They solve linear equations with natural number solutions.■Students create tables of values related to algebraic expressions and formulas, and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems.■They describe the relationships between the radius, diameter and circumference of a circle.■Students classify polygons according to their features and create an algorithm designed to sort and classify shapes.■They represent objects two-dimensionally in different ways, describing the usefulness of these representations.■Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays.■Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers.■They decide which measure of central tendency is most suitable and explain their reasoning.■Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events.■They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7M04

identify corresponding, alternate and co interior relationships between angles formed when parallel lines are crossed by a transversal; use them to solve problems and explain reasons

AC9M7M05

demonstrate that the interior angle sum of a triangle in the plane is 180° and apply this to determine the interior angle sum of other shapes and the size of unknown angles

AC9M7M05

demonstrate that the interior sum of a triangle in the plane is 180° and apply this to determine the interior sum of other and the size of unknown

•

Elaborations

• using concrete materials to demonstrate that the sum of the interior of a triangle is 180°; for example, using paper triangles and tearing to demonstrate that the interior when combined form 180°
• using decomposition and the sum of a triangle to generalise the interior sum of an n n n -sided polygon, as 180 (n – 2) = 180 n – 360 180(n-2)\;=\;180n-360 1 8 0 (n – 2) = 1 8 0 n – 3 6 0

Students learn to:

demonstrate that the interior angle sum of a triangle in the plane is 180° and apply t determine the interior angle sum of other shapes and the size of unknown angles

(AC9M7M05)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Measurement and geometry

• Understanding geometric properties

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Resources

Work Samples

WS01 - Geometric reasoning

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7M05

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length of 2 2 2 sides of a triangle must always be greater than the length of the third side)
• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says ‘when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)
• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)
• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems
• identifies interior angles in shapes to calculate angle sum

• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras' theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M05

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

AC9M7M06

use to solve practical problems involving ; formulate problems, interpret and communicate solutions in terms of the situation, justifying choices made about the representation

•
•

Elaborations

• using to model and solve problems involving comparison of quantities, and considering part-part and part-whole
• and solving practical problems involving of length, or , such as in construction, design, food or textile production; for example, mixing concrete, the golden in design, mixing a salad dressing
• the situation using manipulatives, diagrams and/or mathematical discussion; for example, mixing primary colours in a variety of to investigate how new colours are created and the strength of those colours
• investigating commercialised substances founded on First Nations Australians' knowledges of

substances including pharmaceuticals and toxins, understanding how are used in their development

Students learn to:

use mathematical modelling to solve practical problems involving ratios; formulate interpret and communicate solutions in terms of the situation, justifying choices ma representation

(AC9M7M06)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Measurement and geometry

• Understanding units of measurement

Number sense and algebra

• Proportional thinking

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Culture

• The First Peoples of Australia (Aboriginal Peoples) belong to the world’s oldest continuous cultures. First Nations Australians demonstrate resilience in the maintenance, practice and revitalisation of culture despite the many historic and enduring impacts of colonisation, and continue to celebrate and share the past, present and future manifestations of their cultures.

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that

approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources
• compare information and opinion that can be verified against claims based on personal preference
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study
• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources
• evaluate the information selected to determine bias and reliability

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M7M06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using metric units

• calculates perimeter using properties of two-dimensional shapes to determine unknown lengths
• measures and calculates the area of different shapes using metric units and a range of strategies

Angles as measures of turn

• estimates and measures angles in degrees up to one revolution (e.g. uses a protractor to measure the size of an angle; estimates angles, such as those formed at the elbows when releasing an object; determines the effect of angles on the trajectory, height and distance of flight during jumps and throws in athletics)

Converting units

• converts between metric units of measurement of the same attribute (e.g. converts centimetres into millimetres by multiplying by 10 10 1 0 ; uses the consistent naming of metric prefixes to convert between adjacent units)
• describes and uses the relationship between metric units of measurement and the base- 10 10 1 0 place value system to accurately measure and record measurements using decimals

Using metric units and formulas

• establishes and uses formulas and metric units for calculating the area of rectangles and triangles

Angles as measures of turn

• measures and uses key angles (45 45 4 5 ■, 90 90 9 0 ■, 180 180 1 8 0 ■, 360 360 3 6 0 ■) to define other angles according to their size (e.g. measures a right angle to be 90■ and uses this to determine if 2 2 2 lengths are perpendicular)

Using metric units and formulas

• establishes and uses formulas for calculating the area of parallelograms, trapeziums, rhombuses and kites

• establishes and uses formulas for calculating the volume and surface area of a range of right prisms

Circle measurements

• informally estimates the circumference of a circle using the radius or diameter

• establishes the relationship between the circumference and the diameter of a circle as the constant π \pi π

• calculates the circumference and the area of a circle using π \pi π and a known diameter or radius

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M7M06

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Determines a percentage as a part of a whole

• explains and fluently uses interchangeably the equivalence relationship between a fraction, decimal and percentage (e.g. 1 2 = 0.5 = 50 \frac12 = 0.5 = 50 2 1 ■ = 0 . 5 = 5 0 %; explains that at quarter time, 75 75 7 5 % of the game is left to play; ; interchangeably refers to a response from 50 50 5 0 %, 0.5 0.5 0 . 5 or half of the audience when evaluating how an audience responded to an aspect of a performance)

• uses key percentages and their equivalences to determine the percentage of a quantity (e.g. to solve 75 75 7 5 % of 160 160 1 6 0 , knows that 50 50 5 0 % [half] of 160 160 1 6 0 is 80 80 8 0 , and 25 25 2 5 % [quarter] is 40 40 4 0 so 75 75 7 5 % is 120 120 1 2 0)

• calculates a percentage of an amount (e.g. interprets that a 15 15 1 5 % discount on an $ 80 \$80 $ 8 0 purchase means 15 15 1 5 % × $ 80 \times \space\$80 × $ 8 0 and determines 10 10 1 0 % × $ 80 \times\space\$80 × $ 8 0 is $ 8 \$8 $ 8 , so 5 5 5 % × $ 80 \times\space\$80 × $ 8 0 is $ 4 \$4 $ 4 therefore 15 15 1 5 % × $ 80 \times \$80 × $ 8 0 is $ 8 + $ 4 = $ 12 \$8 + \$4 = \$12 $ 8 + $ 4 = $ 1 2 ; calculates the amount of sugar/fat in a breakfast cereal to make a recommendation on a healthy choice, such as 12 12 1 2 % of 250 250 2 5 0 grams = 30 30 3 0 grams)

• expresses one quantity as a percentage of another (e.g. determines what percentage 7 7 7 is of 35 35 3 5 ; determines what percentage 10 10 1 0 millilitres is of 200 200 2 0 0 millilitres when calculating appropriate doses of medicine)

• uses the complement of the percentage to calculate the amount after a percentage discount (e.g. to calculate how much to pay after a 20 20 2 0 % discount, calculates 80 80 8 0 % of the original cost)

Identifies ratios as a part-to-part comparison

• represents ratios using diagrams, physical or virtual materials (e.g. in a ratio 1 : 4 1:4 1 : 4 of red to blue counters, for each red counter there are 4 4 4 blue counters; uses physical or virtual materials to represent the ratio of hydrogen atoms to oxygen atoms in water molecules as 2 : 1 2:1 2 : 1 , 2 2 2 hydrogen atoms for every oxygen atom)

• interprets ratios as a comparison between 2 2 2 like quantities (e.g. ratio of students to teachers in a school is 20 : 1 20:1 2 0 : 1 ; ratio of carbohydrates to fat to protein in a food; interprets ratios such as debt equity ratio or savings-income ratio)

• interprets a rate as a comparison between 2 2 2 different types of quantities (e.g. water flow can be measured at a rate of 5 5 5 litres per second; change of concentration of reactants per time; the relationship between beats per minute and the pulse/rhythm of a dance phrase)

• expresses a ratio as equivalent fractions or percentages (e.g. the ratio of rainy days to fine

days in Albany is 1 : 2 1:2 1 : 2 and so 1 3 \frac13 3 1 ■ of the days are rainy; in a ratio of 1 : 1 1:1 1 : 1 each part represents one 1 2 \frac12 2 1 ■ or 50 50 5 0 % of the whole; when interpreting food labels and making healthy eating choices)

Using ratios and rates

• uses a ratio to create, increase or decrease quantities to maintain a given proportion (e.g. creates mixtures such as adhesives, finishes, salad dressings; scales a recipe up or down; makes 100 100 1 0 0 litres of cordial given instructions for making 5 5 5 litres using one part cordial to 6 6 6 parts water)

• uses rates to determine how quantities change (e.g. when travelling at a constant speed of 60 60 6 0 km/h, determines the distance travelled in 30 30 3 0 minutes; uses price rate of change to measure the direction and speed of a financial trend, such as an upward momentum in stock prices; compares the effect of different frame rates, frames per second, when producing a slow-motion sequence)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7M06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7M06

Continuum extract

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Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7M06

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

• compare information and opinion that can be verified against claims based on personal preference

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• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

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Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

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Critical and Creative Thinking: Analysing: Interpret concepts and problems

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Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

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Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

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Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

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Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

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• evaluate the information selected to determine bias and reliability

AC9M7SP01

represent in 2 dimensions; discuss and reason about the advantages and disadvantages of different representations

•
•

Elaborations

• deconstructing packaging to identify and
• using different to and determining which will make a cube, rectangular , triangular or pyramid
• using aerial views of buildings and other structures to visualise the footprint made by the building or structure, identifying that could the structure
• building by interpreting isometric and perspective drawings
• using isometric and square grid paper to draw views of front, back, side, top and bottom of
• exploring different representations of in First Nations Australians' artworks or cultural maps of

Students learn to:

represent objects in 2 dimensions; discuss and reason about the advantages and d different representations

(AC9M7SP01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Measurement and geometry

• Positioning and locating

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Measurement and geometry

• Understanding geometric properties

Analysing

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Measurement and geometry

• Understanding geometric properties

Analysing

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Measurement and geometry

• Understanding geometric properties

Generating

• Put ideas into action

Generating

• Put ideas into action

Culture

• First Nations Australian societies are diverse and have distinct cultural expressions such as language, customs and beliefs. As First Nations Peoples of Australia, they have the right to maintain, control, protect and develop their cultural expressions, while also maintaining the right to control, protect and develop culture as Indigenous Cultural and Intellectual Property.

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9TDE8P02

AC9TDI8P02

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option

• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option

• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Positioning and locating

Numeracy: Measurement and geometry: Positioning and locating

Content description

AC9M7SP01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using formal maps and plans

• locates position on maps using grid references (e.g. locates the school in cell E5; uses grid references to identify specific locations on a stage and when creating a stage plan, lighting design or prompt script)

• describes routes using landmarks and directional language including reference to quarter, half, three-quarter turns; turns to the left and right; clockwise and anticlockwise turns (e.g. communicates strategic plays in relation to coaching a team game or sport)

• interprets keys, simple scales and compass directions contained within a map to locate features (e.g. uses a map and compass directions when bush walking or orienteering)

Using proportional thinking for scaling

• interprets the scale used to create plans, drawings or maps (e.g. interprets scale to determine the approximate distance between two locations when orienteering)
• interprets and uses plans and maps involving scale (e.g. creates and interprets scale drawings when designing and making set pieces for a production)
• describes and interprets maps to determine the geographical location and positioning of states and territories within Australia and of countries relative to Australia
• interprets and uses more formal directional language such as compass bearings, degrees of turn, coordinates and distances to locate position or the distance from one location to another (e.g. identifies coordinates using GPS technologies)

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length of 2 2 2 sides of a triangle must always be greater than the length of the third side)
• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says ‘when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)
• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)
• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems
• identifies interior angles in shapes to calculate angle sum
• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras’ theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option
• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option
• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length of 2 2 2 sides of a triangle must always be greater than the length of the third side)
• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says 'when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)
• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)
• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems
• identifies interior angles in shapes to calculate angle sum
• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras' theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option
• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option
• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Properties of shapes and objects

• investigates and uses reasoning to explain the properties of a triangle (e.g. explains why the longest side is always opposite the largest angle in a triangle; recognises that the combined length of 2 2 2 sides of a triangle must always be greater than the length of the third side)
• uses relevant properties of common geometrical shapes to determine unknown lengths and angles

Transformations

• enlarges and reduces shapes according to a given scale factor and explains what features change and what stay the same (e.g. says ‘when I double the dimensions of the rectangle, all of the lengths are twice as long as they were, but the size of the angles stay the same)
• applies angle properties to solve problems that involve the transformation of shapes and objects and how they are used in practice (e.g. determines which shapes tessellate)

Angles

• uses angle properties to identify perpendicular and parallel lines (e.g. develops a computer-aided design drawing involving the creation of parallel and perpendicular lines)
• demonstrates that the angle sum of a triangle is 180 180 1 8 0 ■ and uses this to solve problems
• identifies interior angles in shapes to calculate angle sum
• uses angle properties to identify and calculate unknown angles in familiar two-dimensional shapes

Geometric properties

• uses Pythagoras’ theorem to solve right-angled triangle problems
• determines the conditions for triangles to be similar
• determines the conditions for triangles to be congruent

Transformations

• uses the enlargement transformation to explain similarity and develop the conditions for triangles to be similar
• solves problems using ratio and scale factors in similar figures

Angles

• uses angle properties to reason geometrically, in order to solve spatial problems (e.g. applies an understanding of the relationship between the base angles of an isosceles triangle to determine the size of a similar shape in order to solve a problem)
• uses trigonometry to calculate the unknown angles and unknown distances in authentic problems (e.g. measures the height of a tree using a clinometer to measure the angle of inclination and trigonometry to approximate the vertical height; calculates the angle of inclination for a ramp)

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• put ideas into action by predicting potential or future outcomes and systematically testing a range of options
• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations
• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• put ideas into action by predicting potential or future outcomes and systematically testing a range of options
• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations
• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

AC9M7SP02

classify triangles, and other polygons according to their side and properties; identify and reason about relationships

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Elaborations

• using strips of paper with parallel sides to make triangles and , and contrasting the rigidity of triangles with the flexibility of
• constructing triangles with 3 3 3 given side lengths and discussing the question, “Can any 3 3 3 lengths be used to form the sides of a triangle?”
• identifying and communicating about side and properties of scalene, isosceles, equilateral, right-angled, and triangles using geometric conventions
• describing, comparing and contrasting squares, , rhombuses, , kites and trapeziums, explaining the relationships between these

Students learn to:

classify triangles, quadrilaterals and other polygons according to their side and ang

identify and reason about relationships

(AC9M7SP02)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Draw conclusions and provide reasons

Measurement and geometry

• Understanding geometric properties

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Speaking and listening

• Interacting

Speaking and listening

• Interacting

Speaking and listening

• Interacting

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• identifies the relationship between the number of sides of a two-dimensional shape and the number of vertices (e.g. if the shape has 4 4 4 sides, it has 4 4 4 vertices)

• describes and identifies the two-dimensional shapes that form the faces of three-dimensional objects (e.g. recognises the faces of a triangular prism as triangles and rectangles)

• represents shapes and objects (e.g. drawing and sketching; model building such as skeletal models and centi-cubes; using digital drawing packages; manipulates body to create shapes and objects when choreographing dance)

Transformations

• determines whether a shape has line symmetry (e.g. folds paper cut-outs of basic shapes to demonstrate which has line symmetry and which does not)

• identifies symmetry in the environment

• identifies and creates geometrical patterns involving the repetition of familiar shapes (e.g. uses pattern blocks to create a pattern and describes how the pattern was created)

Angles

• compares angles to a right angle, classifying them as greater than, less than or equal to a right angle

Properties of shapes and object

• identifies, names and classifies two-dimensional shapes according to their side and angle properties (e.g. describes a square as a regular rectangle)

• identifies key features of shapes (e.g. explains that quadrilaterals have 2 2 2 diagonals however they are not always equal in length)

• aligns three-dimensional objects to their two-dimensional nets

• identifies the relationship between the number of faces, edges and the number of vertices of a three-dimensional object (e.g. uses a table to list the number of faces, edges and vertices of common three-dimensional objects and identifies the relationships in the data)

Transformations

• identifies that shapes can have rotational symmetry (e.g. "this drawing of a flower is symmetrical as I can spin it around both ways and it always looks exactly the same")
• creates symmetrical designs using a range of shapes and identifies the type of symmetry as appropriate (e.g. uses symmetry as a stimulus for choreographing a dance; analyses the symmetrical qualities, shapes and lines in examples of Islamic art)
• creates tessellating patterns with common shapes, deciding which will tessellate and which will not by referring to their sides and angles

Angles

• estimates, compares and constructs angles (e.g. uses a ruler and protractor to construct a 45■ angle; compares the size of angles in the environment and estimates their size)
• describes angles in the environment according to their size as acute, obtuse, right, straight, reflex or a revolution and identifies them in shapes and objects (e.g. identifies slope as angles in the environment such as the ramp outside of the school block)

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Snapshot – Interacting

Literacy: Speaking and listening: Interacting

Content description

AC9M7SP02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

• critically evaluate ideas and claims made by a speaker
• explains new learning from interacting with others
• appropriately presents an alternative point to the previous speaker
• initiates interactions confidently in group and whole-class discussions
• poses pertinent questions to make connections between a range of ideas
• uses open questions to prompt a speaker to provide more information
• clarifies task goals and negotiates roles in group learning
• monitors discussion to manage digression from the topic
• identifies and articulates the perspective of a speaker, to move a conversation forward
• interacts within school context or the broader community, adjusting language and responses to suit purpose and audience
• synthesises ideas from group discussion into a common theme or hypothesis
• poses problems, hypothesises and formulates questions about abstract ideas in group situations
• restates different views and makes suggestions to negotiate agreement

• poses questions to clarify assumptions made by the speaker
• questions others to evaluate accuracy of thinking or problem-solving processes
• uses language to align the listener with personal position (e.g. "of course", "as you can imagine", "obviously")
• interacts strategically and confidently with a broad range of interactional partners
• gives an extended explanation and evaluation of a complex concept, issue or process
• justifies a personal stance, after analysis of arguments on a particular issue, using evidence and elaboration in a group situation
• uses language strategically to subtly align others to own perspective as appropriate to audience and purpose

Snapshot – Interacting

Literacy: Speaking and listening: Interacting

Content description

AC9M7SP02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

• critically evaluate ideas and claims made by a speaker
• explains new learning from interacting with others
• appropriately presents an alternative point to the previous speaker
• initiates interactions confidently in group and whole-class discussions
• poses pertinent questions to make connections between a range of ideas
• uses open questions to prompt a speaker to provide more information
• clarifies task goals and negotiates roles in group learning
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• questions others to evaluate accuracy of thinking or problem-solving processes
• uses language to align the listener with personal position (e.g. "of course", "as you can imagine", "obviously")
• interacts strategically and confidently with a broad range of interactional partners
• gives an extended explanation and evaluation of a complex concept, issue or process
• justifies a personal stance, after analysis of arguments on a particular issue, using evidence and elaboration in a group situation
• uses language strategically to subtly align others to own perspective as appropriate to audience and purpose

Snapshot – Interacting

Literacy: Speaking and listening: Interacting

Content description

AC9M7SP02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

• critically evaluate ideas and claims made by a speaker
• explains new learning from interacting with others
• appropriately presents an alternative point to the previous speaker
• initiates interactions confidently in group and whole-class discussions
• poses pertinent questions to make connections between a range of ideas
• uses open questions to prompt a speaker to provide more information
• clarifies task goals and negotiates roles in group learning

• monitors discussion to manage digression from the topic
• identifies and articulates the perspective of a speaker, to move a conversation forward
• interacts within school context or the broader community, adjusting language and responses to suit purpose and audience
• synthesises ideas from group discussion into a common theme or hypothesis
• poses problems, hypothesises and formulates questions about abstract ideas in group situations
• restates different views and makes suggestions to negotiate agreement
• poses questions to clarify assumptions made by the speaker
• questions others to evaluate accuracy of thinking or problem-solving processes
• uses language to align the listener with personal position (e.g. "of course", "as you can imagine", "obviously")
• interacts strategically and confidently with a broad range of interactional partners
• gives an extended explanation and evaluation of a complex concept, issue or process
• justifies a personal stance, after analysis of arguments on a particular issue, using evidence and elaboration in a group situation
• uses language strategically to subtly align others to own perspective as appropriate to audience and purpose

AC9M7SP03

describe of a of using in the , and on an axis, and about a given

•

Elaborations

• using to transform in the , describing and recording the
• describing patterns and investigating different ways to produce the same , such as using 2 2 2 successive to provide the same result as a translation
• experimenting with, creating and re-creating patterns using combinations of , and , using

Students learn to:

describe transformations of a set of points using coordinates in the Cartesian plane and reflections on an axis, and rotations about a given point

(AC9M7SP03)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Measurement and geometry

• Positioning and locating
• Understanding geometric properties

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Creating and exchanging

• Create, communicate and collaborate

Managing and operating

• Select and operate tools

Measurement and geometry

• Positioning and locating

Snapshot – Positioning and locating

Numeracy: Measurement and geometry: Positioning and locating

Content description

AC9M7SP03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using formal maps and plans

• locates position on maps using grid references (e.g. locates the school in cell E5; uses grid references to identify specific locations on a stage and when creating a stage plan, lighting design or prompt script)
• describes routes using landmarks and directional language including reference to quarter, half, three-quarter turns; turns to the left and right; clockwise and anticlockwise turns (e.g. communicates strategic plays in relation to coaching a team game or sport)
• interprets keys, simple scales and compass directions contained within a map to locate features (e.g. uses a map and compass directions when bush walking or orienteering)

Using proportional thinking for scaling

• interprets the scale used to create plans, drawings or maps (e.g. interprets scale to determine the approximate distance between two locations when orienteering)
• interprets and uses plans and maps involving scale (e.g. creates and interprets scale drawings when designing and making set pieces for a production)
• describes and interprets maps to determine the geographical location and positioning of states and territories within Australia and of countries relative to Australia
• interprets and uses more formal directional language such as compass bearings, degrees of turn, coordinates and distances to locate position or the distance from one location to another (e.g. identifies coordinates using GPS technologies)

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• identifies the relationship between the number of sides of a two-dimensional shape and the number of vertices (e.g. if the shape has 4 4 4 sides, it has 4 4 4 vertices)
• describes and identifies the two-dimensional shapes that form the faces of three-dimensional objects (e.g. recognises the faces of a triangular prism as triangles and rectangles)
• represents shapes and objects (e.g. drawing and sketching; model building such as skeletal models and centi-cubes; using digital drawing packages; manipulates body to create shapes and objects when choreographing dance)

Transformations

• determines whether a shape has line symmetry (e.g. folds paper cut-outs of basic shapes to demonstrate which has line symmetry and which does not)
• identifies symmetry in the environment
• identifies and creates geometrical patterns involving the repetition of familiar shapes (e.g. uses pattern blocks to create a pattern and describes how the pattern was created)

Angles

• compares angles to a right angle, classifying them as greater than, less than or equal to a right angle

Properties of shapes and object

• identifies, names and classifies two-dimensional shapes according to their side and angle properties (e.g. describes a square as a regular rectangle)
• identifies key features of shapes (e.g. explains that quadrilaterals have 2 2 2 diagonals however they are not always equal in length)
• aligns three-dimensional objects to their two-dimensional nets
• identifies the relationship between the number of faces, edges and the number of vertices of a three-dimensional object (e.g. uses a table to list the number of faces, edges and vertices of common three-dimensional objects and identifies the relationships in the data)

Transformations

• identifies that shapes can have rotational symmetry (e.g. "this drawing of a flower is symmetrical as I can spin it around both ways and it always looks exactly the same")
• creates symmetrical designs using a range of shapes and identifies the type of symmetry as appropriate (e.g. uses symmetry as a stimulus for choreographing a dance; analyses the symmetrical qualities, shapes and lines in examples of Islamic art)
• creates tessellating patterns with common shapes, deciding which will tessellate and which will not by referring to their sides and angles

Angles

• estimates, compares and constructs angles (e.g. uses a ruler and protractor to construct a 45■ angle; compares the size of angles in the environment and estimates their size)
• describes angles in the environment according to their size as acute, obtuse, right, straight, reflex or a revolution and identifies them in shapes and objects (e.g. identifies slope as angles in the environment such as the ramp outside of the school block)

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7SP03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7SP03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option
• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option
• consider alternatives by creatively revising and modifying ideas and recommendations when

circumstances change

Snapshot – Identify, process and evaluate information

Critical and Creative Thinking: Inquiring: Identify, process and evaluate informati

Content description

AC9M7SP03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and examine relevant information and opinion from a range of sources, including visual information and digital sources

• compare information and opinion that can be verified against claims based on personal preference

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the accuracy, validity and relevance of the information and opinion to the topic of study

• identify and clarify significant information and opinion from a range of sources, including visual information and digital sources

• evaluate the information selected to determine bias and reliability

Snapshot – Create, communicate and collaborate

Digital Literacy: Creating and exchanging: Create, communicate and collaborate

Content description

AC9M7SP03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and control a variety of features in appropriate digital tools to create content and communicate and collaborate with trusted groups

• select and control advanced features of appropriate digital tools to independently create content and effectively communicate and collaborate with wider groups

• select and control the features of digital tools to purposefully create content and effectively communicate and collaborate, inclusive of diverse groups

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7SP03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks

• troubleshoot basic problems and identify repetitive tasks to automate

• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks

• troubleshoot common problems and automate repetitive tasks

• select and operate advanced and emerging digital tools confidently

• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Positioning and locating

Numeracy: Measurement and geometry: Positioning and locating

Content description

AC9M7SP03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Using formal maps and plans

• locates position on maps using grid references (e.g. locates the school in cell E5; uses grid references to identify specific locations on a stage and when creating a stage plan, lighting design or prompt script)

• describes routes using landmarks and directional language including reference to quarter, half,

three-quarter turns; turns to the left and right; clockwise and anticlockwise turns (e.g. communicates strategic plays in relation to coaching a team game or sport)
• interprets keys, simple scales and compass directions contained within a map to locate features (e.g. uses a map and compass directions when bush walking or orienteering)

Using proportional thinking for scaling

• interprets the scale used to create plans, drawings or maps (e.g. interprets scale to determine the approximate distance between two locations when orienteering)
• interprets and uses plans and maps involving scale (e.g. creates and interprets scale drawings when designing and making set pieces for a production)
• describes and interprets maps to determine the geographical location and positioning of states and territories within Australia and of countries relative to Australia
• interprets and uses more formal directional language such as compass bearings, degrees of turn, coordinates and distances to locate position or the distance from one location to another (e.g. identifies coordinates using GPS technologies)

AC9M7SP04

design and create involving a sequence of steps and decisions that will sort and classify of according to their , and describe how the work

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•

Elaborations

• creating a classification scheme for triangles based on sides and , using a flow chart using sequences and decisions
• creating a flow chart or hierarchy for that shows the relationships between trapeziums, , rhombuses, , squares and kites
• creating a classification scheme for regular, irregular, concave or convex polygons that are sorted according to the number of sides

Students learn to:

design and create algorithms involving a sequence of steps and decisions that will … classify sets of shapes according to their attributes, and describe how the algorithm

(AC9M7SP04)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Create possibilities
• Put ideas into action

Reflecting

• Transfer knowledge

Measurement and geometry

• Understanding geometric properties

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Create possibilities
• Put ideas into action

Reflecting

• Transfer knowledge

Analysing
• Interpret concepts and problems
• Draw conclusions and provide reasons
Generating
• Create possibilities
• Put ideas into action
Reflecting
• Transfer knowledge
Analysing
• Interpret concepts and problems
• Draw conclusions and provide reasons
Generating
• Create possibilities
• Put ideas into action
Reflecting
• Transfer knowledge

Related content

This content description can be taught with the following content descriptions from other learning areas.
AC9TDI8P05
AC9TDI8P06

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways

• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations
• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• put ideas into action by predicting potential or future outcomes and systematically testing a range of options
• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations
• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose
• transfer knowledge and skills gained in previous experiences to both similar and different contexts, and explain reasons for decisions and choices made
• identify, plan and justify opportunities to transfer knowledge into new contexts

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M7SP04

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Properties of shapes and objects

• identifies the relationship between the number of sides of a two-dimensional shape and the number of vertices (e.g. if the shape has 4 4 4 sides, it has 4 4 4 vertices)
• describes and identifies the two-dimensional shapes that form the faces of three-dimensional objects (e.g. recognises the faces of a triangular prism as triangles and rectangles)
• represents shapes and objects (e.g. drawing and sketching; model building such as skeletal models and centi-cubes; using digital drawing packages; manipulates body to create shapes and objects when choreographing dance)

Transformations

• determines whether a shape has line symmetry (e.g. folds paper cut-outs of basic shapes to demonstrate which has line symmetry and which does not)
• identifies symmetry in the environment
• identifies and creates geometrical patterns involving the repetition of familiar shapes (e.g. uses pattern blocks to create a pattern and describes how the pattern was created)

Angles

• compares angles to a right angle, classifying them as greater than, less than or equal to a right angle

Properties of shapes and object

• identifies, names and classifies two-dimensional shapes according to their side and angle properties (e.g. describes a square as a regular rectangle)

• identifies key features of shapes (e.g. explains that quadrilaterals have 2 2 2 diagonals however they are not always equal in length)
• aligns three-dimensional objects to their two-dimensional nets
• identifies the relationship between the number of faces, edges and the number of vertices of a three-dimensional object (e.g. uses a table to list the number of faces, edges and vertices of common three-dimensional objects and identifies the relationships in the data)

Transformations

• identifies that shapes can have rotational symmetry (e.g. "this drawing of a flower is symmetrical as I can spin it around both ways and it always looks exactly the same")
• creates symmetrical designs using a range of shapes and identifies the type of symmetry as appropriate (e.g. uses symmetry as a stimulus for choreographing a dance; analyses the symmetrical qualities, shapes and lines in examples of Islamic art)
• creates tessellating patterns with common shapes, deciding which will tessellate and which will not by referring to their sides and angles

Angles

• estimates, compares and constructs angles (e.g. uses a ruler and protractor to construct a 45■ angle; compares the size of angles in the environment and estimates their size)
• describes angles in the environment according to their size as acute, obtuse, right, straight, reflex or a revolution and identifies them in shapes and objects (e.g. identifies slope as angles in the environment such as the ramp outside of the school block)

Properties of shapes and objects

• classifies three-dimensional objects according to their properties (e.g. describes the difference between a triangular prism and a triangular pyramid)
• creates two-dimensional nets for pyramids and prisms

Transformations

• uses combinations of reflecting, translating and rotating shapes to describe and create patterns and solve problems
• identifies tessellations used in the environment and explains why some combinations of shapes will tesselate while others will not (e.g. tiling a wall using a combination of different shaped tiles; exploring regular and semi-regular tessellations in architectural design)
• explains the result of changing critical and non-critical properties of shapes (e.g. "if I enlarge a square, it’s still a square, or if I rotate a square, it remains a square, but if I change the length of one of its sides, it’s no longer a square")

Angles

• identifies supplementary and complementary angles and uses them to solve problems
• identifies that angles at a point add to 360 360 3 6 0 ° and that vertically opposite angles are equal and reasons to solve problems

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways
• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations
• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• put ideas into action by predicting potential or future outcomes and systematically testing a range of options
• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations
• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose
• transfer knowledge and skills gained in previous experiences to both similar and different contexts, and explain reasons for decisions and choices made
• identify, plan and justify opportunities to transfer knowledge into new contexts

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to

context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways

• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations

• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• put ideas into action by predicting potential or future outcomes and systematically testing a range of options

• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations

• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose

• transfer knowledge and skills gained in previous experiences to both similar and different contexts, and explain reasons for decisions and choices made

• identify, plan and justify opportunities to transfer knowledge into new contexts

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Create possibilities

Critical and Creative Thinking: Generating: Create possibilities

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways

• create possibilities by adapting, combining or elaborating on new and known ideas, and proposing a range of different or creative combinations

• create possibilities by connecting or adapting complex ideas and proposing innovative and detailed variations or combinations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• put ideas into action by predicting potential or future outcomes and systematically testing a range of options

• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations

• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M7SP04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• apply aspects of knowledge and skills gained in one context to a new or unrelated context to achieve a specific purpose

• transfer knowledge and skills gained in previous experiences to both similar and different

contexts, and explain reasons for decisions and choices made
• identify, plan and justify opportunities to transfer knowledge into new contexts

AC9M7ST01

for discrete and and calculate the , , and ; make and justify decisions about which provide useful insights into the nature of the distribution of

•
•
•

Elaborations

• understanding that summarising by calculating of can help make sense of the , commenting on skewness or symmetry of and the use of and as representative
• comparing the , , and of displays of from a given , and explaining how may affect summary statistics
• recognising how different can have the same and experimenting with how varying affects these
• acquire continuous by taking measurement during a science experiment, observation or field study, comparing and identifying any anomalies in the distribution of
• exploring how descriptive statistics are used by artificial intelligence developers to summarise and analyse , assist the artificial intelligence in making informed decisions, and gain insights from the processed ; for example, descriptive statistics in recommendation systems can help analyse user behaviour and preferences

Students learn to:

acquire data sets for discrete and continuous numerical variables and calculate the mean and mode; make and justify decisions about which measures of central tende insights into the nature of the distribution of data

(AC9M7ST01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Responding to ethical issues

• Explore ethical issues

Understanding ethical concepts and perspectives

• Explore ethical concepts

Statistics and probability

• Interpreting and representing data

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Consider alternatives

Investigating

• Interpret data

Statistics and probability

• Interpreting and representing data

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9S7I04
AC9TDI8P01

Resources

Work Samples

WS02 - Statistical investigation

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Explore ethical issues

Ethical Understanding: Responding to ethical issues: Explore ethical issues

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• describe how ethical perspectives or approaches to ethical issues may vary in different situations

• analyse■the relationships between values, ethical perspectives■and ethical frameworks when responding to ethical issues

• apply knowledge of ethical concepts, values, perspectives and frameworks when responding to ethical issues

Snapshot – Explore ethical concepts

Ethical Understanding: Understanding ethical concepts and perspectives: Explor

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify and describe ethical concepts, such as truth and justice, and explain how perspectives may vary according to the situation or context

• analyse■the similarities and differences between ethical concepts, such as integrity, loyalty and equality, in a range of situations and contexts

• evaluate■the consistency in meaning of ethical concepts, such as trust, freedom and rights and responsibilities, in a range of situations and contexts

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7ST01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying and interpreting numerical data

• collects and records discrete numerical data using an appropriate method for recording (e.g. uses a frequency table to record the experimental results for rolling a dice; records sample measurements taken during a science investigation)
• constructs graphical representations of numerical data and explains the difference between continuous and discrete data (e.g. explains that measurements such as length, mass and temperature are continuous data whereas a count such as the number of people in a queue is discrete)
• explains how data displays can be misleading (e.g. whether a scale should start at zero; not using uniform intervals on the axes)
• interprets visual representations of data displayed using a multi-unit scale, reading values between the marked units and describing any variation and trends in the data

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)
• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)
• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)
• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs
• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when

investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option
• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option
• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• analyse and visualise data using a range of digital tools to identify patterns and make predictions
• analyse and visualise data by selecting and using a range of digital tools to infer relationships

and make predictions
• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7ST01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying and interpreting numerical data

• collects and records discrete numerical data using an appropriate method for recording (e.g. uses a frequency table to record the experimental results for rolling a dice; records sample measurements taken during a science investigation)
• constructs graphical representations of numerical data and explains the difference between continuous and discrete data (e.g. explains that measurements such as length, mass and temperature are continuous data whereas a count such as the number of people in a queue is discrete)
• explains how data displays can be misleading (e.g. whether a scale should start at zero; not using uniform intervals on the axes)
• interprets visual representations of data displayed using a multi-unit scale, reading values between the marked units and describing any variation and trends in the data

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)
• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)
• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)
• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs

• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

Resource – WS02 - Statistical investigation

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation.■They solve problems involving squares of numbers and square roots of perfect square numbers.■Students solve problems involving addition and subtraction of integers.■They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies.■Students choose between equivalent representations of rational numbers and percentages to assist in calculations.■They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios, in financial and other applied contexts, justifying choices of representation.■Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values.■They solve linear equations with natural number solutions.■Students create tables of values related to algebraic expressions and formulas, and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons.■Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems.■They describe the relationships between the radius, diameter and circumference of a circle.■Students classify polygons according to their features and create an algorithm designed to sort and classify shapes.■They represent objects two-dimensionally in different ways, describing the usefulness of these representations.■Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays.■Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is most suitable and explain their reasoning.■Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events.■They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7ST01

acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data

AC9M7ST02

create different types of numerical data displays including stem and leaf plots using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode

AC9M7ST03

plan and conduct statistical investigations involving data for discrete and continuous numerical variables; analyse and interpret distributions of data and report findings in terms of shape and

summary statistics

AC9M7ST02

create different types of displays including using software where appropriate; describe and compare the distribution of , commenting on the , and including and determining the , , and

•

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Elaborations

• using ordered to record and display collected in a class investigation, such as constructing a class plot of height in centimetres on a shared for which the stems 12 , 13 , 14 , 15 , 16 12, 13, 14, 15, 16 1 2 , 1 3 , 1 4 , 1 5 , 1 6 and 17 17 1 7 have been produced

• comparing in by category using split or ; interpreting the of the distribution using qualitative terms to describe symmetry or skewness, “average” in terms of the , and , and the amount of based on qualitative descriptions of the of the

• connecting features of the display; for example, highest , clusters, gaps, symmetry or skewness, to the , and , and the question in ; describing the of distributions using terms such as "positive skew", "negative skew", "symmetric" and "bi-modal" and discussing the location of the and on these distributions

• using and to compare , identifying possible and explaining how these may affect the comparison; recognising how different displays make specific information about more evident, including , and of , or , and extreme values; understanding that the and the will be the same or for symmetric distributions but different for distributions that are skewed

• comparing the and of with and without extremes; for example, of standard for length or , informally considering for a given of what might constitute an unexpected, unusual or extreme value

• exploring how artificial intelligence systems can also use descriptive statistics to identify or anomalies in ; for example, fraud detection and quality control

Students learn to:

create different types of numerical data displays including stem-and-leaf plots using appropriate; describe and compare the distribution of data, commenting on the sha spread including outliers and determining the range, median, mean and mode

(AC9M7ST02)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Statistics and probability

• Interpreting and representing data

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Analysing

• Draw conclusions and provide reasons

Statistics and probability

• Interpreting and representing data

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9HE7S02

AC9HE7S03

AC9TDI8P02

Resources

Work Samples

WS02 - Statistical investigation

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7ST02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7ST02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks

• troubleshoot basic problems and identify repetitive tasks to automate

• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks

• troubleshoot common problems and automate repetitive tasks

• select and operate advanced and emerging digital tools confidently

• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7ST02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying and interpreting numerical data

• collects and records discrete numerical data using an appropriate method for recording (e.g. uses a frequency table to record the experimental results for rolling a dice; records sample measurements taken during a science investigation)

• constructs graphical representations of numerical data and explains the difference between continuous and discrete data (e.g. explains that measurements such as length, mass and temperature are continuous data whereas a count such as the number of people in a queue is discrete)

• explains how data displays can be misleading (e.g. whether a scale should start at zero; not using uniform intervals on the axes)

• interprets visual representations of data displayed using a multi-unit scale, reading values between the marked units and describing any variation and trends in the data

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)

• uses numerical and graphical representations relevant to the purpose of the collection of the data

and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)
• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)
• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs
• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7ST02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7ST02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying and interpreting numerical data

• collects and records discrete numerical data using an appropriate method for recording (e.g. uses a frequency table to record the experimental results for rolling a dice; records sample measurements taken during a science investigation)

• constructs graphical representations of numerical data and explains the difference between continuous and discrete data (e.g. explains that measurements such as length, mass and temperature are continuous data whereas a count such as the number of people in a queue is discrete)

• explains how data displays can be misleading (e.g. whether a scale should start at zero; not using uniform intervals on the axes)

• interprets visual representations of data displayed using a multi-unit scale, reading values between the marked units and describing any variation and trends in the data

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)

• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)

• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)

• calculates simple descriptive statistics such as mode, mean or median as measures to represent

typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs
• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

AC9M7ST03

plan and conduct involving for discrete and ; analyse and interpret distributions of and report findings in terms of and summary statistics

•
•

Elaborations

• conducting an investigation to draw conclusions about whether teenagers have faster reaction times than adults
• conducting an investigation to support claims that a modification of a Science, Technology, Engineering and Mathematics (STEM) related design has improved performance
• using secondary from the Reconciliation Barometer to conduct and report on relating to First Nations Australians

Students learn to:

plan and conduct statistical investigations involving data for discrete and continuou variables; analyse and interpret distributions of data and report findings in terms of summary statistics

(AC9M7ST03)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Develop questions

Statistics and probability

• Interpreting and representing data

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Analysing

• Draw conclusions and provide reasons

Analysing

• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

People

• Australia has 2 distinct First Nations Peoples; each encompasses a diversity of nations across Australia. Aboriginal Peoples are the first peoples of Australia and have occupied the Australian continent for more than 60,000 years. Torres Strait Islander Peoples are the First Nations Peoples of the Torres Strait and have occupied the region for over 4,000 years.

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9HC7S02
AC9HE7S02
AC9HE7S03
AC9HG7S03
AC9S7I02
AC9TDI8P02

Resources

Work Samples

WS02 - Statistical investigation

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Develop questions

Critical and Creative Thinking: Inquiring: Develop questions

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• develop■questions to examine unfamiliar ideas and topics
• questions developed focus on improving understanding about a topic and clarifying information about processes or procedures
• develop questions to investigate complex issues and topics
• questions developed assist in forming an understanding of why phenomena or issues arise
• develop questions to investigate complex issues and topics
• questions developed facilitate increasing understanding of abstract ideas and concepts

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7ST03

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)
• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)
• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)
• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Interpreting graphical representations

• uses features of graphical representations to make predictions (e.g. predicts audience numbers based on historical data; interprets a range of graphs to identify possible trends and make predictions such as economic growth, stock prices, interest rates, population growth)
• summarises data using fractions, percentages and decimals (e.g. 2 3 \frac23 3 2 ■ of a class live in the same suburb; represents road safety and sun safety statistics as a percentage of the Australian population)
• explains that continuous variables depicting growth or change often vary over time (e.g. creates

growth charts to illustrate impacts of financial decisions; describes patterns in inflation rates, employment rates, migration rates over time; represents changes to fitness levels following the implementation of a personal fitness plan; interprets temperature charts)
• interprets graphs depicting motion such as distance–time and velocity–time graphs
• interprets and describes patterns in graphical representations of data from real-life situations such as the motion of a rollercoaster, flight trajectory of a basketball shot and the spread of disease
• investigates the association of 2 2 2 numerical variables through the representation and interpretation of bivariate data (e.g. uses scatter plots to represent bivariate data when investigating the relationship between 2 2 2 variables, such as income per capita, population density and life expectancy for different socio-economic groups)
• investigates, represents and interprets time series data (e.g. interrogates a time series graph showing the change in costs over time; uses a maximum daily temperature chart to determine the average temperature for the month)
• interprets the impact of changes to data (e.g. recognises the impact of outliers on a data set such as the income of a world-class professional athlete on the average income of players at the state/territory level; uses digital tools to enhance the quality of data in a science investigation)

Sampling

• considers the context when determining whether to use data from a sample or a population
• determines what type of sample to use from a population (e.g. decides to use a representative sample when conducting targeted market research or when researching beliefs about a health-related issue)
• makes reasonable statements about a population based on evidence from samples (e.g. considers accuracy of representation of marginalised individuals or population groups)
• plans, executes and reports on sampling-based investigations, taking into account validity of methodology and consistency of data, to answer questions formulated by the student

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

AC9M7P01

identify the for single-stage ; to the outcomes of these and predict relative frequencies for related

•

•

Elaborations

• discussing the meaning of terminology; for example, , , “favourable outcome”, “trial”, “experiment” and

• listing for games involving throwing a coin or a dice, spinners, or lucky dip

• exploring how relative frequencies can be used to make predictions by estimating the of an ; for example, in natural language processing (NLP), predictive text use the relative of words in a of texts to predict the next word in a sentence

• assigning the for throwing a 6 6 6 on a dice and using this to predict the number of times a 6 6 6 will occur when a dice is thrown multiple times

Students learn to:

identify the sample space for single-stage events; assign probabilities to the outcor events and predict relative frequencies for related events

(AC9M7P01)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Analysing

• Interpret concepts and problems

Generating

• Consider alternatives

Statistics and probability

• Understanding chance

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Speaking and listening

• Speaking

Statistics and probability

• Interpreting and representing data

Analysing

• Draw conclusions and provide reasons

Statistics and probability

• Understanding chance

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7P01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M7P01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• consider alternatives by challenging or creatively adjusting existing ideas in situations where current approaches do not work and recommend a preferred option

• consider alternatives by creatively adapting ideas when information is limited or conflicting and recommend a preferred option

• consider alternatives by creatively revising and modifying ideas and recommendations when circumstances change

Snapshot – Understanding chance

Numeracy: Statistics and probability: Understanding chance

Content description

AC9M7P01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Probabilities

• expresses the theoretical probability of an event as the number of ways an event can happen out of the total number of possibilities

• identifies a range of chance events that have a probability from 0 – 1 0 – 1 0 – 1 (e.g. you have zero probability of rolling a 7 7 7 with one roll of a standard 6 6 6 -sided dice; the probability that tomorrow is Wednesday given today is Tuesday is one)

• describes probabilities as fractions of one (e.g. the probability of an even number when rolling a dice is 3 6 \frac36 6 3 ■)

• expresses probabilities as fractions, decimals, percentages and ratios recognising that all probabilities lie on a measurement scale of zero to one (e.g. uses numerical representations such as 75 75 7 5 % chance of rain or 4 4 4 out 5 5 5 people liked the story; explains why you can’t have a probability less than zero)

Calculating probabilities

• determines the probability of compound events and explains why some results have a higher probability than others (e.g. the results from tossing 2 2 2 coins)

• represents diagrammatically all possible outcomes (e.g. tree diagrams, two-way tables, Venn diagrams)

• measures and compares expected results to the actual results of a chance event over a number of

trials, and compares and explains the variation in results (e.g. uses probability to determine expected results of a spinner prior to trial)
• recognises that the chance of something occurring or its complement has a total probability of one (e.g. the probability of rolling a 3 3 3 is 1 6 \frac16 6 1 ■ and the probability of not rolling a 3 3 3 is 5 6 \frac56 6 5 ■
• calculates and explains the difference between the probabilities of chance events with and without replacement (e.g. "if we put all of the class names in a hat and draw them out one at a time without putting the name back in, the probability of your name getting called out increases each time because the total number of possible outcomes decreases")
• calculates the probabilities of future events based on historical data (e.g. uses historical rainfall data to plan the date for an outdoor event)

Probabilistic reasoning

• recognises combinations of events and the impact they have on assigning probabilities (e.g. and, or, not, if not, at least)
• solves conditional probability problems informally using data in two-way tables and authentic contexts
• evaluates chance data reported in media for meaning and accuracy
• applies probabilistic/chance reasoning to data collected in statistical investigations when making decisions acknowledging uncertainty

Snapshot – Speaking

Literacy: Speaking and listening: Speaking

Content description

AC9M7P01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Crafting ideas

• creates detailed spoken texts on a broad range of learning area topics
• includes details and elaborations to expand ideas
• uses connectives to signal a change in relationship (e.g. "however", "although", "on the other hand") or to show causal relationships (e.g. "due to", "since") (see Grammar)
• uses a range of expressions to introduce an alternative point of view (e.g. "in my opinion", "he did not agree with")
• rehearses spoken text to accommodate time and technology
• controls tone, volume, pitch and pace to suit content and audience
• uses technologies or audio and visual features to enhance spoken text (e.g. videos a spoken presentation with music, sound effect enhancements)

Vocabulary

• uses a broader range of more complex noun groups/phrases to expand description (e.g. "protective, outer covering")
• selects more specific and precise words to replace general words (e.g. uses "difficult" or "challenging" for "hard")
• uses some rhetorical devices (e.g. "don’t you agree?")

Crafting ideas

• creates spoken texts responsive to audience and a broad range of learning area topics, clearly articulating words and ideas
• organises more complex ideas or concepts logically, selecting details to accentuate key points
• speaks audibly and coherently to a less familiar audience for a sustained period
• shows increasing awareness of audience by moderating length, content and delivery of spoken texts
• adjusts register according to purpose and audience
• does research to prepare spoken texts
• uses a range of technology, and audio and visual resources to engage audience and enhance content

Vocabulary

• varies vocabulary to add interest and to describe with greater precision (e.g. uses topic-specific noun groups/phrases such as "exploitation of resources") (see Grammar)

• uses language creatively (e.g. "the moon shines bravely")
• uses sensory vocabulary to engage the audience (e.g. "a gasp of dismay")
• uses technical vocabulary to demonstrate topic knowledge (e.g. "deforestation")
• consistently uses a range of synonyms to add variety and precision to spoken text
• uses abstractions (e.g. "freedom", "fairness")

Crafting ideas

• creates spoken texts which explore and interpret concepts drawn from research or learning area content
• selects voice appropriate to purpose (e.g. third person to create distance and authority or first person to achieve personal connection)
• develops complex ideas or a central theme across a spoken text
• uses language features according to purpose, to impact the audience (e.g. uses more complex connectives such as "consequently", "accordingly" to explain)
• rephrases or clarifies to repair or refine meaning
• uses language structures and features appropriate to learning area content
• uses technologies and visual and audio resources to enhance meaning and effect in presentations

Vocabulary

• selects vocabulary to intensify and sharpen the focus (e.g. "scarcely", "absolutely", "real", "simply")
• uses a range of evaluative language to express opinions or convey emotion (e.g. "significant benefits", "devastating consequences")
• uses a range of emotive language appropriate to topic, purpose and audience
• uses rich, evocative, descriptive language
• uses figurative language (e.g. "hungry for success")

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M7P01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Collecting, displaying and interpreting categorical data

• designs survey questions to collect categorical data (e.g. creates a suite of survey questions to plan the end of year class party)
• collects, records and displays one-variable data in variety of ways such as tables, charts, plots and graphs using the appropriate digital tools (e.g. uses a spreadsheet to record data collected in a class survey and generates a column graph to display the results)
• displays and interprets categorical data in one-to-many data displays
• interprets and represents categorical data in simple displays such as bar and column graphs, pie charts, models, maps, colour wheels, and pictorial timelines, and makes simple inferences from such displays
• makes comparisons from categorical data displays using relative heights from a common baseline (e.g. compares the heights of the columns in a simple column graph to determine the tallest and recognises this as the most frequent response)

Collecting, displaying and interpreting numerical data

• collects and records discrete numerical data using an appropriate method for recording (e.g. uses a frequency table to record the experimental results for rolling a dice; records sample measurements taken during a science investigation)
• constructs graphical representations of numerical data and explains the difference between continuous and discrete data (e.g. explains that measurements such as length, mass and temperature are continuous data whereas a count such as the number of people in a queue is discrete)
• explains how data displays can be misleading (e.g. whether a scale should start at zero; not using uniform intervals on the axes)
• interprets visual representations of data displayed using a multi-unit scale, reading values between the marked units and describing any variation and trends in the data

Collecting, displaying, interpreting and analysing numerical data

• poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data (e.g. collects information on the heights of buildings or daily temperatures, tabulates the results and represents these graphically; uses a survey to collect primary data or secondary data extracted from census data)
• uses numerical and graphical representations relevant to the purpose of the collection of the data and explains their reasoning (e.g. "I can’t use a frequency histogram for categorical data because there is no numerical connection between the categories"; converts their data to percentages in order to compare the girls' results to those of the boys, as the total number of boys and girls who participated in the survey was different)
• determines and calculates the most appropriate statistic to describe the spread of data (e.g. when creating an infographic, uses the mean of the data to describe household income and the median of the data for house prices)
• calculates simple descriptive statistics such as mode, mean or median as measures to represent typical values of a distribution (e.g. describes the mean kilojoule intake and median hours of exercise of a sample population when investigating community health and wellbeing; describes central tendency when analysing road safety statistics)
• compares the usefulness of different representations of the same data (e.g. chooses to use a line graph to illustrate trends, a bar graph to compare the living standards of different economies and a histogram to show income distribution)
• describes the spread of a data distribution in terms of the range, clusters, skewness and symmetry of the graphical display, and determines and makes connections to the mode, median and mean of the data

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7P01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Understanding chance

Numeracy: Statistics and probability: Understanding chance

Content description

AC9M7P01

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Fairness

• identifies all possible outcomes of one-step experiments and records outcomes in tables and charts
• explains why outcomes of chance experiments may differ from expected results (e.g. "just because there are 6 6 6 numbers on a dice doesn’t mean you are going to roll a 6 6 6 every 6 6 6 rolls, you may not roll a 6 6 6 in the entire game")
• explains the difference between the notion of equal likelihood of possible outcomes and those that are not equally likely (e.g. explains the use of phrases such as fifty-fifty when there are 2 2 2 outcomes and when 2 2 2 events occurring are equally likely as opposed to head and tail are more likely than 2 2 2 heads or 2 2 2 tails)
• identifies unfair elements in games that affect the chances of winning (e.g. having an unequal number of turns; weighted dice)
• explains that the outcomes of chance events are either "certain to happen", "certain not to happen" or lie somewhere in between and knows that impossible events are events that are "certain not to happen"

• identifies events where the chance of one event occurring will not affect the occurrence of the other (e.g. if a coin is tossed and heads have come up 7 7 7 times in a row, it is still equally likely that the next toss will be either a head or a tail)

Probabilities

• expresses the theoretical probability of an event as the number of ways an event can happen out of the total number of possibilities

• identifies a range of chance events that have a probability from 0 – 1 0 – 1 0 – 1 (e.g. you have zero probability of rolling a 7 7 7 with one roll of a standard 6 6 6 -sided dice; the probability that tomorrow is Wednesday given today is Tuesday is one)

• describes probabilities as fractions of one (e.g. the probability of an even number when rolling a dice is 3 6 \frac36 6 3 ■)

• expresses probabilities as fractions, decimals, percentages and ratios recognising that all probabilities lie on a measurement scale of zero to one (e.g. uses numerical representations such as 75 75 7 5 % chance of rain or 4 4 4 out 5 5 5 people liked the story; explains why you can’t have a probability less than zero)

Calculating probabilities

• determines the probability of compound events and explains why some results have a higher probability than others (e.g. the results from tossing 2 2 2 coins)

• represents diagrammatically all possible outcomes (e.g. tree diagrams, two-way tables, Venn diagrams)

• measures and compares expected results to the actual results of a chance event over a number of trials, and compares and explains the variation in results (e.g. uses probability to determine expected results of a spinner prior to trial)

• recognises that the chance of something occurring or its complement has a total probability of one (e.g. the probability of rolling a 3 3 3 is 1 6 \frac16 6 1 ■ and the probability of not rolling a 3 3 3 is 5 6 \frac56 6 5 ■

• calculates and explains the difference between the probabilities of chance events with and without replacement (e.g. "if we put all of the class names in a hat and draw them out one at a time without putting the name back in, the probability of your name getting called out increases each time because the total number of possible outcomes decreases")

• calculates the probabilities of future events based on historical data (e.g. uses historical rainfall data to plan the date for an outdoor event)

AC9M7P02

conduct repeated and run with■a■large number of using ; compare predictions about outcomes■with observed results, explaining the differences

•

•

Elaborations

• developing an understanding of the law of large numbers through using experiments and to conduct large numbers of for seemingly random and discussing findings

• conducting using online tools and comparing the combined results of a large number of to predicted results

• exploring and observing First Nations Australian children’s instructive games; for example, Koara from the Jawi and Bardi Peoples of Sunday Island in Western Australia, to investigate , predicting outcomes for an and comparing with increasingly larger numbers of , and between observed and expected results

Students learn to:

conduct repeated chance experiments and run simulations■with■a■large number o tools; compare predictions about outcomes■with observed results, explaining the d

(AC9M7P02)

General capabilities and cross-curriculum priorities

This content description connects to the following general capabilities and cross-curriculum priorities.

Investigating

• Acquire and collate data

• Interpret data

Managing and operating

• Select and operate tools

Statistics and probability

• Understanding chance

Elaborations

Content elaborations provide suggestions of ways to teach the content description and connect it to general capabilities and cross-curriculum priorities. Content elaborations are optional .

Investigating

• Acquire and collate data
• Interpret data

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Put ideas into action

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Culture

• First Nations Australians' ways of life reflect unique ways of being, knowing, thinking and doing.

Related content

This content description can be taught with the following content descriptions from other learning areas.

AC9TDI8P02

Snapshot – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• collect and access data using a range of digital tools and methods in response to a defined question or problem
• collect and access data from a range of sources, using specialised digital tools in response to problems, and evaluate it for relevance
• collect and evaluate quantitative and qualitative data using specialised digital tools and processes in the context of identified problems

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions
• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions
• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Understanding chance

Numeracy: Statistics and probability: Understanding chance

Content description

AC9M7P02

Learning progression extract

The following learning progression extract shows the alignment of the learning progression with this content.

Probabilities

• expresses the theoretical probability of an event as the number of ways an event can happen out of the total number of possibilities
• identifies a range of chance events that have a probability from 0 – 1 0 – 1 0 – 1 (e.g. you have zero probability of rolling a 7 7 7 with one roll of a standard 6 6 6 -sided dice; the probability that tomorrow is Wednesday given today is Tuesday is one)
• describes probabilities as fractions of one (e.g. the probability of an even number when rolling a dice is 3 6 \frac36 6 3 ■)
• expresses probabilities as fractions, decimals, percentages and ratios recognising that all probabilities lie on a measurement scale of zero to one (e.g. uses numerical representations such as 75 75 7 5 % chance of rain or 4 4 4 out 5 5 5 people liked the story; explains why you can’t have a probability less than zero)

Calculating probabilities

• determines the probability of compound events and explains why some results have a higher probability than others (e.g. the results from tossing 2 2 2 coins)
• represents diagrammatically all possible outcomes (e.g. tree diagrams, two-way tables, Venn diagrams)
• measures and compares expected results to the actual results of a chance event over a number of trials, and compares and explains the variation in results (e.g. uses probability to determine expected results of a spinner prior to trial)
• recognises that the chance of something occurring or its complement has a total probability of one (e.g. the probability of rolling a 3 3 3 is 1 6 \frac16 6 1 ■ and the probability of not rolling a 3 3 3 is 5 6 \frac56 6 5 ■
• calculates and explains the difference between the probabilities of chance events with and without replacement (e.g. "if we put all of the class names in a hat and draw them out one at a time without putting the name back in, the probability of your name getting called out increases each time because the total number of possible outcomes decreases")
• calculates the probabilities of future events based on historical data (e.g. uses historical rainfall data to plan the date for an outdoor event)

Probabilistic reasoning

• recognises combinations of events and the impact they have on assigning probabilities (e.g. and, or, not, if not, at least)
• solves conditional probability problems informally using data in two-way tables and authentic contexts
• evaluates chance data reported in media for meaning and accuracy
• applies probabilistic/chance reasoning to data collected in statistical investigations when making decisions acknowledging uncertainty

Snapshot – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• collect and access data using a range of digital tools and methods in response to a defined question or problem

• collect and access data from a range of sources, using specialised digital tools in response to problems, and evaluate it for relevance

• collect and evaluate quantitative and qualitative data using specialised digital tools and processes in the context of identified problems

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• analyse and visualise data using a range of digital tools to identify patterns and make predictions

• analyse and visualise data by selecting and using a range of digital tools to infer relationships and make predictions

• analyse and visualise multidimensional data by selecting and using a range of interactive tools to draw conclusions and make predictions

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context

• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.

• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made

• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations

Snapshot – Put ideas into action

Critical and Creative Thinking: Generating: Put ideas into action

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• put ideas into action by predicting potential or future outcomes and systematically testing a range of options
• put ideas into action by making predictions, testing and evaluating options, and reconsidering approaches in complex or unfamiliar situations
• put ideas into action by making predictions, testing and evaluating options, proposing modifications and adapting approaches in complex or unfamiliar situations

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• select and use the core features of digital tools to efficiently complete tasks
• troubleshoot basic problems and identify repetitive tasks to automate
• select and use the advanced or unfamiliar features of digital tools to efficiently complete tasks
• troubleshoot common problems and automate repetitive tasks
• select and operate advanced and emerging digital tools confidently
• troubleshoot common problems systematically and seek to improve efficiency by developing new skills

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area
• identify the relevant aspects of a concept or problem, recognising gaps or missing elements necessary for understanding by using approaches and strategies suitable for the context
• identify the objective and subjective aspects of a complex concept or problem, with sensitivity to context

Snapshot – Draw conclusions and provide reasons

Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons

Content description

AC9M7P02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• draw conclusions and make choices when completing tasks, using discipline knowledge to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks by connecting evidence from within and across discipline areas to provide reasons and evaluate arguments for choices made
• draw conclusions and make choices when completing tasks, using analysis of complex evidence and arguments before making recommendations