(no-code)

recognise in applied , including and

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Elaborations

• recognising that the real number system includes which can be approximately located on the ; for example, the value of lies somewhere between 3.141 3.141 3 . 1 4 1 and 3.142 3.142 3 . 1 4 2 that is, 3.141 < < 3.142 3.141 < < 3.142 3 . 1 4 1 < < 3 . 1 4 2

• using to systematically explore or situations that use , such as finding the length of the hypotenuse in a right-angled triangle with the other 2 2 2 sides having lengths of one metre or 2 2 2 metres and one metre; or given the of a square, finding the length of the side where the result is irrational; or finding involved with the side lengths of paper sizes A 0 A0 A 0 , A 1 A1 A 1 , A 2 A2 A 2 , A 3 A3 A 3 and A 4 A4 A 4

• investigating the golden in art and design, and historical to in different societies

• connecting the between the and of any to the irrational value of using circular and string or dynamic drawing software

Students learn to:

recognise irrational numbers in applied contexts, including square roots and $\pi \ \pi \ \pi$

(AC9M8N01)

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

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 .

Managing and operating

• Select and operate tools

Inquiring

• Identify, process and evaluate information

Managing and operating

• Select and operate tools

Measurement and geometry

• Understanding geometric properties

• Understanding units of measurement

Number sense and algebra

• Proportional thinking

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8N01

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

AC9M8N01

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 – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M8N01

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 – Identify, process and evaluate information

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

Content description

AC9M8N01

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

AC9M8N01

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 geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8N01

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

AC9M8N01

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; 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 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 ($45°$, $90°$, $180°$, $360°$) to define other angles according to their size (e.g. measures a right angle to be $90°$ and uses this to determine if 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
• calculates the circumference and the area of a circle using π and a known diameter or radius

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8N01

Learning progression extract

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

Identifies ratios as a part-to-part comparison

• represents ratios using diagrams, physical or virtual materials (e.g. in a ratio $1 : 4$ of red to blue counters, for each red counter there are 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 hydrogen atoms for every oxygen atom)
• interprets ratios as a comparison between 2 like quantities (e.g. ratio of students to teachers in a school is $20 : 1$; 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 different types of quantities (e.g. water flow can be measured at a rate of 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)

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

AC9M8A01

create, expand, factorise, rearrange and simplify , applying the , , identity, and inverse properties

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Elaborations

• rearranging and simplifying involving with integer coefficients and constants; using manipulatives such as tiles to support calculations; for example, using manipulatives to demonstrate that 2 x + 4 = 2 (x + 2) , 3 (a − b) = 3 a − 3 b 2x+4\;=\;2(x+2),\;3(a-b)=3a -3b 2 x + 4 = 2 (x + 2) , 3 (a − b) = 3 a − 3 b, or 5 (m + 2 n) + 3 m − 4 n = 5 m + 10 n + 3 m − 4 n = 8 m + 6 n 5(m+2n)+3m-4n\;=\;5m+10n+3m-4n\;=\;8m+6n 5 (m + 2 n) + 3 m − 4 n = 5 m + 1 0 n + 3 m − 4 n = 8 m + 6 n

• demonstrating the relationship between factorising and expanding using manipulatives, such as tiles or models, and describing with mathematical language

• using the , , , identity and inverse properties to expand and factorise using strategies such as the model

Students learn to:

create, expand, factorise, rearrange and simplify linear expressions, applying the as commutative, identity, distributive and inverse properties

(AC9M8A01)

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

Number sense and algebra

• Understanding money

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8A01

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

AC9M8A01

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 $12n$ $12n$ $1\,2\,n$; 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 $= 48 \times = 48\space\times = 4\,8\times$ number of boxes; $C = 20 + 30h$ $C = 20 + 30h$ $C = 2\,0 + 3\,0\,h$ where C C C is the total cost and h h h is the hours of labour; uses $v = \frac{d}{t}$ $v=\frac{d}{t}$ $v = \frac{d}{t}$ ■ 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 , $F = ma$ $F=ma$ $F = m\,a$ 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 $C = 5 + 2.3d$ $C=5+2.3d$ $C = 5 + 2\,.\,3\,d$ 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 $A = \pi r^2$ $\mathrm{A}=\mathrm{\pi r}^2$ $A = \pi r 2$ to calculate the area of a circular space; uses $A = P(1 + \frac{r}{n})^{nt}$ $\mathrm{A}=\mathrm{P}(1+\frac{\mathrm{r}}{\mathrm{n}})^{\mathrm{nt}}$ A

$= P (1 + n r \blacksquare) n t$ 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

AC9M8A01

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 – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8A01

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)

AC9M8A02

graph linear on the using where appropriate; solve and one-variable inequalities using graphical and algebraic techniques; verify solutions by substitution

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Elaborations

- recognising that in a table of values, if the first difference between consecutive values of the dependent variable is constant, then it is a linear
- graphing and of the form $x = a$, $y = a$, $x \leq a$, $x > a$, $y \leq a$, $y > a$ $x\;=\;a,\;y\;=\;a,\;x\;\leq\;a,\;x\;>\;a,\;y\leq\;a,\;y>\;a$ $x = a$, $y = a$, $x \leq a$, $x > a$, $y \leq a$, $y > a$ on the for known values of a a a
- completing a table of values, plotting the resulting on the and determining whether the relationship is linear
- graphing the linear relationship $ax + b = c$ $ax+b\;=\;c$ $a x + b = c$ for given values of a a a, b b b and c c c and identifying from the graph where $ax + b < c$ $ax+b\;<\;c$ $a x + b < c$ or where $ax + b > c$ $ax+b\;>\;c$ $a x + b > c$
- solving of the form $ax + b = c$ $ax+b\;=\;c$ $a x + b = c$ and one-variable inequalities of the form $ax + b < c$ $ax+b\;<\;c$ $a x + b < c$ or $ax + b > c$ $ax+b\;>\;c$ $a x + b > c$ where $a > 0$ $a>0$ $a > 0$ using and , and checking solutions by substitution
- solving such as $3x + 7 = 6x - 9$ $3x+7\;=\;6x-9$ $3 x + 7 = 6 x - 9$, representing these graphically, and verifying solutions by substitution

Students learn to:

graph linear relations on the Cartesian plane using digital tools where appropriate; equations and one-variable inequalities using graphical and algebraic techniques; by substitution

(AC9M8A02)

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

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
• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

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• Interpret concepts and problems
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• Interpret concepts and problems
• Draw conclusions and provide reasons

Resources

Work Samples

WS01 - Linear Relationships in the real world

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8A02

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

AC9M8A02

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 – Number patterns and algebraic thinking

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

Content description

AC9M8A02

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

AC9M8A02

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

AC9M8A02

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

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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

Content description

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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

Content description

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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
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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

Content description

AC9M8A02

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

Resource – WS01 - Linear Relationships in the real world

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals.■They apply the exponent laws to calculations with numbers involving positive integer exponents.■Students solve problems involving the 4 operations with integers and positive rational numbers.■They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. Students apply algebraic properties to rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context.■They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and

area of composite shapes, and volume of right prisms.■They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles.■Students use formulas to solve problems involving the area and circumference of circles.■They solve problems of duration involving 12- and 24-hour cycles across multiple time zones.■Students use 3 dimensions to locate and describe position.■They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity.■Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling.■Students analyse and describe the distribution of data.■They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range.■Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems.■They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8A02

graph linear relations on the Cartesian plane using digital tools where appropriate; solve linear equations and one-variable inequalities using graphical and algebraic techniques; verify solutions by substitution

AC9M8M05

recognise and use rates to solve problems involving the comparison of 2 related quantities of different units of measure

AC9M8A03

use to solve applied problems involving linear , including financial ; formulate problems with , choosing a representation; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

•

•

Elaborations

• situations involving , including practical such as taxi fares involving flag fall fees, motion in a straight at a constant speed, trade quotes involving call out fees, cooking that includes resting or cooling times, or water leakage from water tanks, interpreting the constant of change and initial value in , and identifying when values of a model lie within a given

• problems in practical situations and interpreting solutions within the of the problem, including giving attention to all of and whether results are suitable; for example, once a water tank is empty no more water can flow from it

• financial problems involving pay , using a table of values to represent the pay amounts and hours worked using an hourly of pay, and graphing the relationship to make

• patterns on and exploring their connections and meaning to , using the model as a predictive tool and critiquing results by connecting back to

Students learn to:

use mathematical modelling to solve applied problems involving linear relations, in financial contexts; formulate problems with linear functions, choosing a representa and communicate solutions in terms of the situation, reviewing the appropriateness

(AC9M8A03)

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

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
• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Number sense and algebra

• Understanding money

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

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.

AC9S8I02
AC9S8I04

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8A03

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

AC9M8A03

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 – Number patterns and algebraic thinking

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

Content description

AC9M8A03

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 $v = \frac{d}{t}$ 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 , $F = ma$ 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 $A = \mathrm{A}=\mathrm{\pi r}^2$ A = π r 2 to calculate the area of a circular space; uses $A = \mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}}$ 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

AC9M8A03

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

AC9M8A03

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

AC9M8A03

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

AC9M8A03

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

AC9M8A03

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

AC9M8A03

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 money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8A03
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)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8A03
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

AC9M8A03
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

AC9M8A04

experiment with and using , making and testing and generalising emerging patterns

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•

•

Elaborations

• using graphing software to investigate the effect of systematically varying of on the corresponding graphs, making and testing ; for example, making a that if the co-efficient of x x x is negative, then the will slope down from left to right

• using graphing software to systematically contrast the graphs of $y = 2x$ $y\;=\;2x$ $y = 2x$, $- y = 2x$ $y\;=\;2x$ $y = 2x$, $y = y\;=\;$ $y = -2x$ $2x$ $2x$ and $- y = y\;=\;$ $y = -2x$ $2x$ $2x$ with those of $y < 2x$ $y<2x$ $y < 2x$, $- y < 2x$ $-y<2x$ $-y < 2x$, $y < y<$ $y < -2x$ $2x$ $2x$ and $- y < y<$ $y < -2x$ $2x$ $2x$ and those of $y > 2x$ $y>2x$ $y > 2x$, $- y > 2x$ $y>2x$ $y > 2x$, $y > y>$ $y > -2x$ $2x$ $2x$ and $- y > y>$ $y > -2x$ $2x$ $2x$, making and testing about sign and direction of the

• using to investigate integer solutions to such as $2x + 3y = 48$ $2x+3y\;=\;48$ $2x + 3y = 48$

• exploring how are used in linear regression models as a statistical technique in machine learning of artificial intelligence agents; for example, are used to model the relationship between input and a target variable, to predict stock or house prices in the financial and real-estate sectors

Students learn to:

experiment with linear functions and relations using digital tools, making and testing and generalising emerging patterns

(AC9M8A04)

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

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

• Draw conclusions and provide reasons

Generating

• Create possibilities

• Put ideas into action

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons

Generating

• Create possibilities

• Put ideas into action

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons
Managing and operating

• Select and operate tools
Investigating

• 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.
AC9TDI8P02
Snapshot – Draw conclusions and provide reasons
Critical and Creative Thinking: Analysing: Draw conclusions and provide reasons
Content description

AC9M8A04
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

AC9M8A04
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

AC9M8A04
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

AC9M8A04
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

AC9M8A04

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 $= 48 \times = 48\space\times = 4 8 \times$ 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 $v = \frac{d}{t}$ $v=\frac{d}{t}$ $v = \frac{d}{t}$ ■ 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 $A = \pi r^2$ $\mathrm{A}=\mathrm{\pi r}^2$ $A = \pi r 2$ to calculate the area of a circular space; uses $A = P(1 + \frac{r}{n})^{nt}$ $\mathrm{A}=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}}$ $A = P (1 + n r ■) n t$ 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 – Draw conclusions and provide reasons

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

Content description

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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

AC9M8A04

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 data

Digital Literacy: Investigating: Interpret data

Content description

AC9M8A04

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

AC9M8A04

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 $12n$ $12n$ $12n$; 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 $= 48 \times = 48\space\times = 48 \times$ number of boxes; $C = 20 + 30h$ $C = 20 + 30h$ $C = 20 + 30h$ where C C C is the total cost and h h h is the hours of labour; uses $v = \frac{d}{t}$ $v = \frac{d}{t}$ $v = \frac{d}{t}$ ■ 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, $F = ma$ $F = ma$ $F = ma$ 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 $\$2.30$ $\$2.30$ $\$2.30$ per km travelled, represents this algebraically as $C = 5 + 2.3d$ $C = 5 + 2.3d$ $C = 5 + 2.3d$ 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 $\mathrm{A}=\mathrm{\pi r}^2$ $\mathrm{A}=\mathrm{\pi r}^2$ $A = \pi r 2$ to calculate the area of a circular space; uses $\mathrm{A}=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}}$ $\mathrm{A}=\mathrm P(1+\frac{\mathrm r}{\mathrm n})^{\mathrm{nt}}$ $A = P(1 + n r$ ■ $)nt$ when working with compound interest; uses $v=u+at$ $v=u+at$ $v = u + at$ 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)

AC9M8M01

solve problems involving the and of irregular and using appropriate

•

Elaborations

• determining the of by composing or decomposing

• using and to the of in situations such as a council needing to work out how much mosquito spray to use for a swamp or a farmer needing to work out how much seed, fertilizer and herbicide are required to cover a paddock

• determining the and of by sums of increasingly accurate covering measurements, such as and grids; for example, using millimetres or square millimetres as opposed to centimetres or square centimetres

Students learn to:

solve problems involving the area and perimeter of irregular and composite shapes units

(AC9M8M01)

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 .

Resources

Work Samples

WS04 - Design a putt putt course

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M8M01

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

Resource – WS04 - Design a putt putt course

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals. They apply the exponent laws to calculations with numbers involving positive integer exponents. Students solve problems involving the 4 operations with integers and positive rational numbers. They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. Students apply algebraic properties to rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context. They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms. They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles. Students use formulas to solve problems involving the area and circumference of circles. They solve problems of duration involving 12- and 24-hour cycles across multiple time zones. Students use 3 dimensions to locate and describe position. They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity. Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling. Students analyse and describe the distribution of data. They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems. They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8N04

use the 4 operations with integers and with rational numbers, choosing and using efficient strategies and digital tools where appropriate

AC9M8M01

solve problems involving the area and perimeter of irregular and composite shapes using appropriate units

AC9M8M02

solve problems involving the volume and capacity of right prisms using appropriate units

AC9M8M03

solve problems involving the circumference and area of a circle using formulas and appropriate units

AC9M8M07

use mathematical modelling to solve practical problems involving ratios and rates, including financial contexts; formulate problems; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

AC9M8M02

solve problems involving the and of using appropriate

•

Elaborations

• using models to demonstrate the number of cubic centimetres in a cubic metre and relating this to capacities of millilitres and litres, recognising that one millilitre is to one cm 3 ^3 3

• solving practical problems involving and ; for example, optimal packaging and production

• choosing which measurements are useful to consider when solving practical problems in ; for example, when purchasing a new washing machine, the dimensions are useful when determining whether it will fit in the available space in the laundry and its is useful when considering the maximum washing load it can carry

• investigating, reasoning and finding solutions to measurement problems involving dimensions, , and of ; for example, given the dimensions of a pool and the of flow from a tap, determining how long it will take to fill the pool to its normal

Students learn to:

solve problems involving the volume and capacity of right prisms using appropriate

(AC9M8M02)

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 .

Analysing

• Interpret concepts and problems

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

Resources

Work Samples

WS04 - Design a putt putt course

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M8M02

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

AC9M8M02

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 – Identify, process and evaluate information

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

Content description

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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 information

Content description

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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

AC9M8M02

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 – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M8M02

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
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• identify, plan and justify opportunities to transfer knowledge into new contexts

AC9M8M03

solve problems involving the and of a using formulas and appropriate

•

Elaborations

• deducing that the of a is between 2 2 2 squares and 4 4 4 squares, and using 3 × 3\times 3 × 2 ^2 2 as a rough estimate for the of a
• investigating the of using a square grid or by rearranging a divided into smaller and smaller sectors or slices to resemble a close approximation of a
• applying the formulas for the and of a to solve practical problems, and using one of the of , , or to deduce the value of the other ; for example, determining the length of material needed to edge a round table, given its dimensions as the of the tabletop
• exploring traditional weaving designs by First Nations Australians and investigating the significance and use of

Students learn to:

solve problems involving the circumference and area of a circle using formulas and

(AC9M8M03)
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 .

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Reflecting

• Transfer knowledge

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.

Resources

Work Samples

WS04 - Design a putt putt course

Snapshot – Understanding units of measurement

Numeracy: Measurement and geometry: Understanding units of measurement

Content description

AC9M8M03

Learning progression extract

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

Converting units

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Using metric units and formulas

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Angles as measures of turn

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• 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

AC9M8M03

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

AC9M8M03

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

AC9M8M03

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 – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M8M03

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

AC9M8M03

Continuum extract

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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

AC9M8M03

Continuum extract

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Snapshot – Identify, process and evaluate information

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

Content description

AC9M8M03

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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Snapshot – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M8M03

Continuum extract

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Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8M03

Continuum extract

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

AC9M8M03

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• 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 – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M8M03

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 informatic

Content description

AC9M8M03

Continuum extract

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

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M8M03

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

AC9M8M03

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

AC9M8M03

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

AC9M8M03

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

AC9M8M04

solve problems involving , including using 12- and 24-hour time across multiple

•

Elaborations

• using to investigate around the world and convert from one zone to another, such as time in Perth, Western Australia compared to Suva in Fiji or Toronto in Canada
• recognising the challenges of planning regular virtual meeting times for a company that has both international staff and staff within different states and territories, and the impact daylight savings has due to multiple , explaining the mathematical language used to communicate current time such as Coordinated Universal Time (UTC)+ 8 8 8 , AEST, ACST and AWST
• planning an international travel itinerary that covers destinations in different across Asia

Students learn to:

solve problems involving duration, including using 12- and 24-hour time across mul

(AC9M8M04)

General capabilities and cross-curriculum priorities

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

Measurement and geometry

• Measuring time

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 .

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Reflecting

• Transfer knowledge

Growing Asia-Australia engagement

• Australia's developing and deepening relationships with the peoples of Asia influence both mutual understandings and expressions of citizenship and culture nationally, regionally and globally.

Snapshot – Measuring time

Numeracy: Measurement and geometry: Measuring time

Content description

AC9M8M04

Learning progression extract

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

Relating units of time

• identifies the relationship between units of time (e.g. months and years; seconds, minutes and hours)

• uses am and pm notation to distinguish between morning and afternoon using 12 12 1 2 -hour time

• determines elapsed time using different units such as hours and minutes, weeks and days (e.g. when developing project plans, time schedules and tracking growth)

• interprets and uses a timetable

• constructs timelines using a time scale (e.g. chronologically sequences the history of the school)

Converting between units of time

• interprets and converts between 12 12 1 2 -hour and 24 24 2 4 -hour digital time, and analog and digital representations of time to solve duration problems

• converts between units of time, using appropriate conversion rates, to solve problems involving time (e.g. uses that there are 60 60 6 0 seconds in a minute to calculate the percentage improvement a 1500 1500 1 5 0 0 m runner made to their personal best time)

• uses rates involving time to solve problems (e.g. "travelling at 60 60 6 0 km/h, how far will I travel in 30 30 3 0 minutes?"; adjusts cooking or baking times based on weight or the size of the container)

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)

Snapshot – Select and operate tools

Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M8M04

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

AC9M8M04

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

AC9M8M04

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 – Transfer knowledge

Critical and Creative Thinking: Reflecting: Transfer knowledge

Content description

AC9M8M04

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

AC9M8M05

recognise and use to solve problems involving the comparison of 2 related quantities of different of

•

Elaborations

• identifying examples of in the real world, including constant , of pay, cost per kilogram, recipes, simple interest and average
• applying to solve problems involving the conversion between different of ; for example, using a conversion to convert distances from miles into kilometres; using currency exchange to determine the price of items
• applying to calculate solutions to problems in different ; for example, required run in cricket, dilution of concentrated chemicals and comparing the petrol consumption of different vehicles
• using taxation tables to calculate an individual's annual income tax
• investigating the application of in First Nation Australians' land management practices, including the of fire under different environmental conditions such as fuel types, wind speed, temperature and relative humidity; the conservation of water by First Nations Australians by estimating of water evaporation based on and climatic conditions
Students learn to:

recognise and use rates to solve problems involving the comparison of 2 related qu different units of measure

(AC9M8M05)

General capabilities and cross-curriculum priorities

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

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 .

Number sense and algebra

• Understanding money

Measurement and geometry

• Understanding units of measurement

Number sense and algebra

• Proportional thinking

Number sense and algebra

• Understanding money

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.

AC9HC8K01
AC9HE8K01
AC9HE8K04
AC9HE8K05
AC9HG8K07

Resources

Work Samples

WS01 - Linear Relationships in the real world

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8M05

Learning progression extract

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

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)

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide

would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Snapshot – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8M05

Learning progression extract

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

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)

Working with money proportionally

• makes decisions about situations involving compound interest (e.g. compares total outlay and time taken to pay off a credit card debt as soon as possible as opposed to making minimum monthly repayments)

• chooses and uses proportional strategies for decision making (e.g. in purchasing a car calculates the depreciation, ongoing maintenance, insurance and the effect of loan repayments on disposable income; evaluates the benefits of "buy now pay later" schemes)

Snapshot – Understanding units of measurement
Numeracy: Measurement and geometry: Understanding units of measurement
Content description
AC9M8M05
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 – Proportional thinking
Numeracy: Number sense and algebra: Proportional thinking
Content description
AC9M8M05
Learning progression extract
The following learning progression extract shows the alignment of the learning progression with this content.

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 litres of cordial given instructions for making 5 litres using one part cordial to 6 parts water)

• uses rates to determine how quantities change (e.g. when travelling at a constant speed of 60 km/h, determines the distance travelled in 30 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)

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 % is 13 millilitres, determines the whole is 65 millilitres; given 20 % is 1300 kilojoules, determines the whole is 6500 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio $1:4:15$ for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is $3:2$ then a picture that is 600 pixels wide would be 400 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 % (e.g. the entry price to the show has gone up from $\$20$ last year to $\$25$ this year, that's 125 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 % or 0.7 of the original marked price to apply a 30 % discount; multiplies by 1.03 when predicting a 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 locations; draws engineering drawings to scale)

Snapshot – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8M05

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)

Resource – WS01 - Linear Relationships in the real world

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals.■They apply the exponent laws to calculations with numbers involving positive integer exponents.■Students solve problems involving the 4 operations with integers and positive rational numbers.■They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. Students apply algebraic properties to rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context.■They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms.■They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles.■Students use formulas to solve problems involving the area and circumference of circles.■They solve problems of duration involving 12- and 24-hour cycles across multiple time zones.■Students use 3 dimensions to locate and describe position.■They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity.■Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling.■Students analyse and describe the distribution of data.■They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range.■Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems.■They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8A02

graph linear relations on the Cartesian plane using digital tools where appropriate; solve linear equations and one-variable inequalities using graphical and algebraic techniques; verify solutions by substitution

AC9M8M05

recognise and use rates to solve problems involving the comparison of 2 related quantities of different units of measure

AC9M8M06

use to solve problems involving the side lengths of right-angled triangles

•

Elaborations

• discussing and comparing different applications, demonstrations and of , from Egypt and Mesopotamia, Greece, India and China with other historical and contemporary applications and

• using to determine unknown lengths of sides in right-angled triangles and finding lengths of sides of right-angled triangles in practical applications

• recognising the relationship between the squares of lengths of sides for different types of triangles: right-angled, or

• identifying Pythagorean triples, such as (3 , 4 , 5 3,4,5 3 , 4 , 5), (5 , 12 , 13 5,12,13 5 , 1 2 , 1 3), (7 , 24 , 25 7, 24, 25 7 , 2 4 , 2 5) and (8 , 15 , 17 8,15, 17 8 , 1 5 , 1 7)

• investigating how Pythagoras' can be applied to determine the distance between two in the plane, and how this can be used by predictive to navigate autonomous vehicles

Students learn to:

use Pythagoras' theorem to solve problems involving the side lengths of right-angle

(AC9M8M06)

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

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 .

Speaking and listening

• Interacting

Measurement and geometry

• Understanding geometric properties

• Understanding units of measurement

Related content

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

AC9TDE8P02

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8M06

Learning progression extract

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

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

AC9M8M06

Learning progression extract

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

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 – Multiplicative strategies
Numeracy: Number sense and algebra: Multiplicative strategies

Content description

AC9M8M06
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. $2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$ 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 × 3 is the same as 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 $15 \times \frac{1}{2} = 7.5$ 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 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 $0.5 \div 0.25$ 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 . 1 3 × 1 6 0 0 or $1600 \div 100 \times 13$ 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. $0.461 \times 200 = 0.461 \times 100 \times 2 = 46.1 \times 2 = 92.2$ 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 2.56×10^{-6} 2 . 5 6 × 1 0 − 6 m in width by 1.4×10^{-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)

Snapshot – Interacting

Literacy: Speaking and listening: Interacting

Content description

AC9M8M06

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 – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8M06

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

AC9M8M06

Learning progression extract

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

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

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use to solve practical problems involving and , including financial ; formulate problems; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

-

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Elaborations

- and solving problems related to situations such as on maps and plans, the mixing of chemicals or ingredients, or calculating magnification applying relevant and
- problems involving converting money amounts using different exchange and applying them when planning and budgeting for overseas travel
- situations involving financial ; for example, income tax, using taxation on annual income, comparing different taxation brackets and of pay; comparing the benefits of different phone plans using different call and associated fees to determine the best plan
- situations involving the use of in radiocarbon dating methods, including the of carbon- 14 14 1 4 to carbon- 12 12 1 2 isotopes in organisms, to dates of First Peoples of Australia's habitation on the Australian continent
- situations involving and its application in the making of string and cordage by First Nations Australians, including the of length to the of a rope, the strength of the ply in to a rope's pulling force, and the of fibre for the length of string required

Students learn to:

use mathematical modelling to solve practical problems involving ratios and rates, financial contexts; formulate problems; interpret and communicate solutions in ter situation, reviewing the appropriateness of the model

(AC9M8M07)

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

Number sense and algebra

- Interpreting fractions
- 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 .

Measurement and geometry

- Positioning and locating

Number sense and algebra

- Proportional thinking

Analysing

- Interpret concepts and problems

• Draw conclusions and provide reasons

Number sense and algebra

• Interpreting fractions
• Proportional thinking
• Understanding money

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Number sense and algebra

• Proportional thinking
• Understanding money

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

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.

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.
AC9HE8K01
AC9HE8K04
AC9HP8P10

Resources

Work Samples

WS04 - Design a putt putt course

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8M07

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

AC9M8M07

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 fractions

Numeracy: Number sense and algebra: Interpreting fractions

Content description

AC9M8M07

Learning progression extract

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

Operating with fractions

• adds or subtracts fractions with the same denominators and justifies the need for a common denominator
• uses strategies to calculate a fraction of a quantity (e.g. to find a time-point two-thirds of the way through a music video or animation, determines one-third then doubles; locates a position a third of the way across the stage by measuring the width of the stage and dividing by 3 3 3)
• explains the difference between multiplying and dividing fractions (e.g. recognises 1 2 × 1 4 $\frac12\times\frac14$ 2 1 ■ × 4 1 ■ as one-half of a quarter and 1 2 $\frac12$ 2 1 ■ divided by 1 4 $\frac14$ 4 1 ■ as how many quarters are in one half)
• expresses one quantity as a fraction of another (e.g. 12 12 1 2 defective items from the 96 96 9 6 that were produced represents one-eighth of all items produced)
• demonstrates why dividing by a fraction can result in a larger number

Operating with fractions proportionally

• demonstrates that a fraction can also be used as a ratio to compare the size of 2 2 2 sets (e.g. if the colour ratio of a black and white pattern is 2 : 3 2:3 2 : 3 , 2 5 $\frac25$ 5 2 ■ is black and 3 5 $\frac35$ 5 3 ■ is white and the representation of black is 2 3 $\frac23$ 3 2 ■ of the white)

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8M07

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)
• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)
• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)
• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form
• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)
• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = \frac{n}{v}$ c = v n ■ and uses this relationship to make decisions when diluting solutions)

• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by $(1.03)^4$ (1.03)^4 (1 . 0 3) 4 to make meaning of the formula

Snapshot – Positioning and locating

Numeracy: Measurement and geometry: Positioning and locating

Content description

AC9M8M07

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description
AC9M8M07

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = \frac{n}{v}$ c=\frac nv $c = v n$ ■ and uses this relationship to make decisions when diluting solutions)

• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by $(1.03)^4$ (1.03)^4 $(1 . 0 3) 4$ to

make meaning of the formula

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8M07

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

AC9M8M07

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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Snapshot – Interpreting fractions

Numeracy: Number sense and algebra: Interpreting fractions

Content description

AC9M8M07

Learning progression extract

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Operating with fractions

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Operating with fractions proportionally

• demonstrates that a fraction can also be used as a ratio to compare the size of 2 2 2 sets (e.g. if the colour ratio of a black and white pattern is 2 : 3 2:3 2 : 3 , 2 5 $\frac25$ 5 2 ■ is black and 3 5 $\frac35$ 5 3 ■ is white and the representation of black is 2 3 $\frac23$ 3 2 ■ of the white)

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8M07

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

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• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

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• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

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• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

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• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula c = n v $c=\frac{n}{v}$ c = v n ■ and uses this relationship to make decisions when diluting solutions)

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Snapshot – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8M07
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)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8M07
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

AC9M8M07
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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arguments before making recommendations

Snapshot – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8M07

Learning progression extract

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Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

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Applying proportion

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Snapshot – Understanding money

Numeracy: Number sense and algebra: Understanding money

Content description

AC9M8M07

Learning progression extract

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

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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)

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• 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)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8M07

Continuum extract

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

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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

AC9M8M07

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

AC9M8M07

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

AC9M8M07

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

AC9M8SP01

identify the conditions for congruence and of triangles and explain the conditions for other of common to be or , including those formed by

•

Elaborations

• developing an understanding of what it for to be or
• using the and to develop of
• investigating sufficient conditions to establish that 2 2 2 triangles are
• applying logical reasoning and tests for congruence and , to problems and involving plane
• comparing and side measurements of under to answer questions such as "What changes?" and "What stays the same?"
• establishing that 2 2 2 are if one lies exactly on top of the other after one or more including , and , and recognising that the matching sides and the matching are equal
Students learn to:

identify the conditions for congruence and similarity of triangles and explain the co other sets of common shapes to be congruent or similar, including those formed by

(AC9M8SP01)
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

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

Managing and operating

• Select and operate tools

Measurement and geometry

• Understanding geometric properties

Analysing

• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Related content

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

AC9TDE8P02

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8SP01

Learning progression extract

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

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 – Proportional thinking
Numeracy: Number sense and algebra: Proportional thinking
Content description
AC9M8SP01
Learning progression extract
The following learning progression extract shows the alignment of the learning progression with this content.

Proportionality and the whole
• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)
• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)
• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)
• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form
• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion
• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)
• uses common fractions and decimals for proportional increase or decrease of a given amount
• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)
• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)
• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)
• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)
• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula c = n v $c=\frac{n}{v}$ $c = \frac{n}{v}$ ∎ and uses this relationship to make decisions when diluting solutions)

• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by (1.03) 4 (1.03)^4 (1 . 0 3) 4 to make meaning of the formula

Snapshot – Interpret concepts and problems
Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8SP01

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 – Select and operate tools
Digital Literacy: Managing and operating: Select and operate tools

Content description

AC9M8SP01

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 geometric properties
Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8SP01

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

AC9M8SP01

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

AC9M8SP01

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

AC9M8SP01

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

AC9M8SP01

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

AC9M8SP01

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

AC9M8SP02

establish properties of using and properties, and solve related problems explaining reasoning
•
•

Elaborations

• establishing the properties of squares, , , rhombuses, trapeziums and kites using geometric properties and , such as the sum of the exterior of a polygon is equal to a complete turn or 360 360 $360°$
• identifying properties of related to side lengths, parallel sides, , and symmetry
• applying the properties of triangles and to construction designs such as car jacks, scissor lifts,

folding umbrellas, toolboxes and cherry pickers

Students learn to:

establish properties of quadrilaterals using congruent triangles and angle propertie
related problems explaining reasoning

(AC9M8SP02)

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 .

Analysing

• Draw conclusions and provide reasons

Analysing

• Draw conclusions and provide reasons

Analysing

• Draw conclusions and provide reasons

Snapshot – Draw conclusions and provide reasons

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

Content description

AC9M8SP02

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

AC9M8SP02

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
AC9M8SP02
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
AC9M8SP02
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

AC9M8SP02

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

AC9M8SP03

describe the position and location of in 3 dimensions in different ways, including using a with the use of and other

•

Elaborations

• locating aircraft/drones using latitude, longitude and altitude as a
• constructing using 3 3 3 D printers or designing software that uses a
• comparing and contrasting and by highlighting what is the same and what is different, including virtual maps versus street views
• using dynamic geometry software to and within the first octant of a
• interpreting coordinate■locations■for in■multi-storey■car parks;■playing■games based on such as Noughts and Crosses (Tic-Tac-Toe)
• exploring position and through geospatial technologies used by First Nations Australians' communities
Students learn to:

describe the position and location of objects in 3 dimensions in different ways, inclu

three-dimensional coordinate system with the use of dynamic geometric software a

tools

(AC9M8SP03)

General capabilities and cross-curriculum priorities

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

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

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 .

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Interpret concepts and problems

Creating and exchanging

• Create, communicate and collaborate

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons

Generating

• Consider alternatives

Creating and exchanging

• Create, communicate and collaborate

Managing and operating

• Select and operate tools

Analysing

• Draw conclusions and provide reasons

Analysing

• Interpret concepts and problems

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.

AC9TDE8P02

Snapshot – Create, communicate and collaborate

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

Content description

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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 – Create, communicate and collaborate

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

Content description

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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 – Create, communicate and collaborate

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

Content description

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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, communicate and collaborate

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

Content description

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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

AC9M8SP03

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 – Create, communicate and collaborate

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

Content description

AC9M8SP03

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

AC9M8SP03
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

AC9M8SP03
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

AC9M8SP03
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

AC9M8SP04

design, create and test involving a sequence of steps and decisions that identify or of , and describe how the algorithm works

-
-

Elaborations
- listing the properties or criteria necessary to determine if are or
- using the conditions for congruence of triangles and of triangles to develop a sorting algorithm; for example, creating a flow chart
- evaluating for accuracy in classifying and distinguishing between and

Students learn to:
design, create and test algorithms involving a sequence of steps and decisions that congruency or similarity of shapes, and describe how the algorithm works

(AC9M8SP04)
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
- Evaluate actions and outcomes

Generating

- Consider alternatives

Measurement and geometry

- Understanding geometric properties

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 .

Measurement and geometry

- Understanding geometric properties

Number sense and algebra

- Proportional thinking

Analysing

- Interpret concepts and problems
- Draw conclusions and provide reasons

Measurement and geometry

- Understanding geometric properties

Number sense and algebra

- Proportional thinking

Analysing

- Interpret concepts and problems
- Draw conclusions and provide reasons
- Evaluate actions and outcomes

Measurement and geometry

- Understanding geometric properties

Number sense and algebra

- Proportional thinking

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

AC9M8SP04

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

AC9M8SP04

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 – Evaluate actions and outcomes

Critical and Creative Thinking: Analysing: Evaluate actions and outcomes

Content description

AC9M8SP04

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

AC9M8SP04

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

AC9M8SP04

Learning progression extract

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

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8SP04

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the

mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = n v$ $c=\frac{n}{v}$ $c = \frac{n}{v}$ ■ and uses this relationship to make decisions when diluting solutions)

• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by $(1.03) 4$ $(1.03)^4$ $(1 . 0 3) 4$ to make meaning of the formula

Snapshot – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8SP04

Learning progression extract

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

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8SP04

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)

• uses common fractions and decimals for proportional increase or decrease of a given amount

• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)

• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)

• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)

• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)

• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = \frac{n}{v}$ c = n v ∎ and uses this relationship to make decisions when diluting solutions)

• identifies, represents and chooses appropriate strategies to solve percentage problems involving

proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by (1.03) 4 (1.03)^4 (1 . 0 3) 4 to make meaning of the formula

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8SP04

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

AC9M8SP04

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

AC9M8SP04

Learning progression extract

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

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8SP04

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)
• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)
• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)
• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form
• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)
• uses common fractions and decimals for proportional increase or decrease of a given amount
• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)
• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)
• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)
• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that

travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)
• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = \frac{n}{v}$ ■ and uses this relationship to make decisions when diluting solutions)
• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3, and 4 4 4 successive increases is achieved by multiplying by $(1.03)^4$ (1 . 0 3) 4 to make meaning of the formula

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8SP04

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

AC9M8SP04

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 – Evaluate actions and outcomes

Critical and Creative Thinking: Analysing: Evaluate actions and outcomes

Content description

AC9M8SP04

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 – Understanding geometric properties

Numeracy: Measurement and geometry: Understanding geometric properties

Content description

AC9M8SP04

Learning progression extract

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

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8SP04

Learning progression extract

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

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)
• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)
• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of

physical activities)
• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form
• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Applying proportion

• recognises that percentages can be greater than 100 100 1 0 0 % (e.g. the entry price to the show has gone up from $ 20 \$20 $ 2 0 last year to $ 25 \$25 $ 2 5 this year, that's 125 125 1 2 5 % of last year's price; examines food labels and nutritional tables to determine whether the percentage a fast food meal exceeds a recommended daily intake for sugar/fats)
• uses common fractions and decimals for proportional increase or decrease of a given amount
• increases and decreases quantities by a percentage and expresses a percentage increase or decrease using a multiplier (e.g. calculates 70 70 7 0 % or 0.7 0.7 0 . 7 of the original marked price to apply a 30 30 3 0 % discount; multiplies by 1.03 1.03 1 . 0 3 when predicting a 3 3 3 % future capital gain; calculates percentage increase or decrease in international migration in Australia)
• models situations uses percentages, rates and ratios (e.g. calculates interest payable on loans; compares taxation rates and the effect of a pay increase on how much annual income tax is payable; mixes chemical solutions using ratios; uses Mendelian inheritance to predict the ratio of offspring genotypes and phenotypes in monohybrid crosses)
• identifies and interprets situations where direct proportion is involved (e.g. hours worked and payment received; increase in income and increase in demand for branded products; increasing the mass will increase the force provided that acceleration remains constant)
• identifies and interprets situations where inverse proportion is involved (e.g. number of people working on a job and time taken to complete the job; speed and time taken to travel recognising that travelling at a greater speed will mean the journey takes less time; decrease in price and increase in demand)
• uses ratio and scale factors to enlarge or reduce the size of objects (e.g. interprets the scale used on a map and determines the real distance between 2 2 2 locations; draws engineering drawings to scale)

Flexible proportional thinking

• identifies proportional relationships in formulas and uses proportional thinking flexibly to explore this relationship (e.g. recognises the proportional relationship between concentration and volume of a solution in the formula $c = \frac{n}{v}$ c=\frac nv c = v n ∎ and uses this relationship to make decisions when diluting solutions)
• identifies, represents and chooses appropriate strategies to solve percentage problems involving proportional thinking (e.g. percentage of a percentage for calculating successive discounts; uses percentages to calculate compound interest on loans and investments; uses percentage increases or decreases as an operator, such as a 3 3 3 % increase is achieved by multiplying by 1.03 1.03 1 . 0 3 , and 4 4 4 successive increases is achieved by multiplying by $(1.03)^4$ (1.03)^4 (1 . 0 3) 4 to make meaning of the formula

AC9M8ST01

investigate techniques for collection including , , experiment and observation, and explain the practicalities and implications of obtaining through these techniques

•

•

Elaborations

• identifying situations where can be collected by and those where a is appropriate
• investigating the practicalities and implications of obtaining through , using a variety of investigative processes; for example, investigating situations when random or non-random is used to collect and the implication of each method
• discussing how observations, experiments and methods can be impacted by ; for example, recognising that a occurs when certain members of a are more likely to be selected in a than others, such as a conducted at a shopping ; recognising that environmental conditions may the results of scientific investigations if experiments are conducted at different times or under different conditions

• using such as and digital measuring devices to observe, and record qualitative and quantitative ,
discussing precision and the implications of
• investigating how decisions concerning relate to the training of artificial intelligence systems,
recognising the need to mitigate any potential that may lead to the development of biased models
Students learn to:

investigate techniques for data collection including census, sampling, experiment a and explain the practicalities and implications of obtaining data through these techn

(AC9M8ST01)

General capabilities and cross-curriculum priorities

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

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

Understanding ethical concepts and perspectives

• Examine values, rights and responsibilities and ethical norms

Analysing

• Interpret concepts and problems
• Draw conclusions and provide reasons

Generating

• Consider alternatives

Inquiring

• Identify, process and evaluate information

Responding to ethical issues

• Explore ethical issues

Understanding ethical concepts and perspectives

• Explore ethical concepts

Investigating

• Acquire and collate data
• Interpret data

Managing and operating

• Select and operate tools

Responding to ethical issues

• Making and reflecting on ethical decisions

Understanding ethical concepts and perspectives

• Examine values, rights and responsibilities and ethical norms

Statistics and probability

• Interpreting and representing data

Related content

This content description can be taught with the following content descriptions from other learning
areas.
AC9HC8K01
AC9HG8S02
AC9S8I05
AC9TDI8P01

Resources

Work Samples
WS03 - 2040 smart school

Snapshot – Explore ethical issues

Ethical Understanding: Responding to ethical issues: Explore ethical issues

Content description

AC9M8ST01

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

AC9M8ST01

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

AC9M8ST01

Learning progression extract

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

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
Recognising bias
• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)
• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST01

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 – Examine values, rights and responsibilities and ethical norms

Ethical Understanding: Understanding ethical concepts and perspectives: Examir responsibilities and ethical norms

Content description

AC9M8ST01

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• describe how the relationships between values, rights and responsibilities, and ethical norms influence responses and decisions related to ethical issues
• describe the relationship between the role of individual and community values, rights and responsibilities, and ethical norms when responding to ethical issues
• describe the importance of values, rights and responsibilities when reaching a position on an ethical issue, and evaluate their role in challenging and defending ethical norms

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST01
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

AC9M8ST01
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

AC9M8ST01
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 information

Content description

AC9M8ST01
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 – Explore ethical issues

Ethical Understanding: Responding to ethical issues: Explore ethical issues

Content description

AC9M8ST01
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

AC9M8ST01

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 – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M8ST01

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

AC9M8ST01

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

AC9M8ST01

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 – Making and reflecting on ethical decisions

Ethical Understanding: Responding to ethical issues: Making and reflecting on et

Content description

AC9M8ST01

Continuum extract

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

• consider alternative■ethical responses■to an issue when making and reflecting on ethical decisions

• consider how values and beliefs influence approaches to ethical issues, and■analyse■how these affect■outcomes

• analyse■biases■when applying ethical concepts,■values■and ethical frameworks,■in order to explore and evaluate ethical decisions

Snapshot – Examine values, rights and responsibilities and ethical norms

Ethical Understanding: Understanding ethical concepts and perspectives: Examin responsibilities and ethical norms

Content description

AC9M8ST01

Continuum extract

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

• describe how the relationships between values, rights and responsibilities, and ethical norms influence responses and decisions related to ethical issues

• describe the relationship between the role of individual and community values, rights and responsibilities, and ethical norms when responding to ethical issues

• describe the importance of values, rights and responsibilities when reaching a position on an ethical issue, and evaluate their role in challenging and defending ethical norms

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M8ST01

Learning progression extract

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

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 $\frac{2}{3}$ 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

Recognising bias

• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)
• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

Resource – WS03 - 2040 smart school

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals.■They apply the exponent laws to calculations with numbers involving positive integer exponents.■Students solve problems involving the 4 operations with integers and positive rational numbers.■They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts.■Students apply algebraic properties to rearrange, expand and factorise linear expressions.■They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically.■Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context.■They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms.■They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles.■Students use formulas to solve problems involving the area and circumference of circles.■They solve problems of duration involving 12- and 24-hour cycles across multiple time zones.■Students use 3 dimensions to locate and describe position.■They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity.■Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling.■Students analyse and describe the distribution of data.■They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems.■They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8ST01

investigate techniques for data collection including census, sampling, experiment and observation, and explain the practicalities and implications of obtaining data through these techniques

AC9M8ST02

analyse and report on the distribution of data from primary and secondary sources using random and non-random sampling techniques to select and study samples

AC9M8ST03

compare variations in distributions and proportions obtained from random samples of the same size drawn from a population and recognise the effect of sample size on this variation

AC9M8ST04

plan and conduct statistical investigations involving samples of a population; use ethical and fair methods to make inferences about the population and report findings, acknowledging uncertainty

AC9M8ST02

analyse and report on the distribution of from primary and secondary sources using random and non-random techniques to select and study

•

•

Elaborations

• investigating different methods of used to collect , considering the source and size of

• comparing the methods of simple random, systematic, stratified, quota, clustered or convenience, or judgement, and discussing the reliability of conclusions about the that could be drawn

• defining and distinguishing between probabilistic terms such as random, , and distribution

• investigating primary and secondary sources relating to reconciliation between First Nations Australians and non-Indigenous Australians, analysing and reporting on findings

Students learn to:

analyse and report on the distribution of data from primary and secondary sources

non-random sampling techniques to select and study samples

(AC9M8ST02)

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

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

Inquiring

• Identify, process and evaluate information

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Inquiring

• Identify, process and evaluate information

Responding to ethical issues

• Explore ethical issues

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

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.

• First Nations Australians have sophisticated political, economic and social organisation systems, which include family and kinship structures, laws, traditions, customs, land tenure systems, and protocols for strong governance and authority.

Related content

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

AC9HE8S03

AC9HG8S03

Resources

Work Samples

WS03 - 2040 smart school

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST02

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

AC9M8ST02

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 information

Content description

AC9M8ST02
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 – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M8ST02
Learning progression extract

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

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 $\frac{2}{3}$ 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

Recognising bias

• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that

the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)
• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST02

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

AC9M8ST02

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 information

Content description

AC9M8ST02

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

AC9M8ST02

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

AC9M8ST02

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 information

Content description

AC9M8ST02

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 – Explore ethical issues

Ethical Understanding: Responding to ethical issues: Explore ethical issues

Content description

AC9M8ST02

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 – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST02

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

AC9M8ST02

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 information

Content description

AC9M8ST02

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

AC9M8ST02

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

AC9M8ST02

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 informatio

Content description

AC9M8ST02

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

AC9M8ST03

compare in distributions and obtained from of the same size drawn from a and recognise the effect of size on this

•

•

Elaborations

• comparing the of students in favour of a proposal for a change in school uniform between different of 50 50 5 0 students from the school
• using to simulate repeated of the same , such as heights or arm spans of students, recording and comparing , and of between
• using relative frequencies from historical to predict and the likely number of outcomes in situations such as weather forecasting or the countries of origin of visitors to tourist attractions
• investigating the effect that adding or removing from a has on and
• investigating First Nations Ranger Groups and other groups' use of techniques to track biodiversity of species
• exploring how the comparison of in distributions and from the same applies to data-driven decision-making and how this relates to training of artificial intelligence systems
Students learn to:

compare variations in distributions and proportions obtained from random samples drawn from a population and recognise the effect of sample size on this variation

(AC9M8ST03)

General capabilities and cross-curriculum priorities

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

Generating

• Consider alternatives

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

Inquiring

• Identify, process and evaluate information

Number sense and algebra

• Proportional thinking

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Statistics and probability

• Interpreting and representing data

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.

Systems

• All life forms, including human life, are connected through Earth's systems (geosphere, biosphere, hydrosphere and atmosphere) on which they depend for their wellbeing and survival.

Responding to ethical issues

• Making and reflecting on ethical decisions

Understanding ethical concepts and perspectives

• Examine values, rights and responsibilities and ethical norms

Statistics and probability

• Interpreting and representing data

Related content

This content description can be taught with the following content descriptions from other learning areas.
AC9HC8K01
AC9HC8K02
AC9HC8S02

Resources

Work Samples

WS03 - 2040 smart school

Snapshot – Consider alternatives

Critical and Creative Thinking: Generating: Consider alternatives

Content description

AC9M8ST03

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 – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M8ST03

Learning progression extract

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

content.

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

Recognising bias

• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)

• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)

• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST03

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

AC9M8ST03

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

AC9M8ST03

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 information

Content description

AC9M8ST03

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 – Proportional thinking

Numeracy: Number sense and algebra: Proportional thinking

Content description

AC9M8ST03

Learning progression extract

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

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)

Proportionality and the whole

• determines the whole given a percentage (e.g. given 20 20 2 0 % is 13 13 1 3 millilitres, determines the whole is 65 65 6 5 millilitres; given 20 20 2 0 % is 1300 1300 1 3 0 0 kilojoules, determines the whole is 6500 6500 6 5 0 0 kilojoules when calculating the amount of energy consumed as part of a daily recommended intake)

• identifies the common unit rate to compare rates expressed in different units (e.g. calculates best buys; compares the relative speed of 2 2 2 vehicles)

• identifies, compares, represents and solves problems involving different rates in real world contexts (e.g. measures heart rate and breathing rate to monitor the body's reaction to a range of physical activities)

• determines the equivalence between 2 2 2 rates or ratios by expressing them in their simplest form

• describes how the proportion is preserved when using a ratio (e.g. uses the ratio 1 : 4 : 15 1:4:15 1 : 4 : 1 5 for the composition of silver, copper and gold to determine the mass of copper in a rose gold ring that weighs 8 8 8 grams; applies an aspect ratio when resizing images of an artwork such as if the aspect ratio is 3 : 2 3:2 3 : 2 then a picture that is 600 600 6 0 0 pixels wide would be 400 400 4 0 0 pixels tall)

Snapshot – Interpret data

Digital Literacy: Investigating: Interpret data

Content description

AC9M8ST03

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

AC9M8ST03

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

AC9M8ST03

Learning progression extract

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

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 $\frac{2}{3}$ 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

Recognising bias

• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game";

investigates media claims on attitudes to government responses to market failure or income redistribution)
• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

Snapshot – Making and reflecting on ethical decisions

Ethical Understanding: Responding to ethical issues: Making and reflecting on et

Content description

AC9M8ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternative■ethical responses■to an issue when making and reflecting on ethical decisions
• consider how values and beliefs influence approaches to ethical issues, and■analyse■how these affect■outcomes
• analyse■biases■when applying ethical concepts,■values■and ethical frameworks,■in order to explore and evaluate ethical decisions

Snapshot – Examine values, rights and responsibilities and ethical norms

Ethical Understanding: Understanding ethical concepts and perspectives: Examin responsibilities and ethical norms

Content description

AC9M8ST03

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• describe how the relationships between values, rights and responsibilities, and ethical norms influence responses and decisions related to ethical issues
• describe the relationship between the role of individual and community values, rights and responsibilities, and ethical norms when responding to ethical issues
• describe the importance of values, rights and responsibilities when reaching a position on an ethical issue, and evaluate their role in challenging and defending ethical norms

Snapshot – Interpreting and representing data

Numeracy: Statistics and probability: Interpreting and representing data

Content description

AC9M8ST03

Learning progression extract

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

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

Recognising bias

- applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
- identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)
- justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)

AC9M8ST04

plan and conduct involving of a ; use ethical and fair methods to make about the and report findings, acknowledging uncertainty

-
-
-

Elaborations

- using such as electricity consumption to draw conclusions about the impacts of , such as pandemics, on households or business
- identifying situations where the collection of from a is necessary due to efficiency, cost or restricted time for collection of , and sufficiently reliable for making about a
- exploring progress in reconciliation between First Nations Australians and non-Indigenous Australians, investigating and evaluating techniques and methods to gather relevant to progress

Students learn to:

plan and conduct statistical investigations involving samples of a population; use e methods to make inferences about the population and report findings, acknowledgi

(AC9M8ST04)

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

Inquiring

- Develop questions
- Identify, process and evaluate information

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 .

Responding to ethical issues

• Explore ethical perspectives and frameworks

• Making and reflecting on ethical decisions

Futures

• Sustainable futures are achieved through informed individual, community, business and political action that values local, national and global equity and fairness across generations into the future.

Analysing

• Interpret concepts and problems

• Draw conclusions and provide reasons

Responding to ethical issues

• Making and reflecting on ethical decisions

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.

AC9HE8S03

AC9HP8P09

AC9S8I02

AC9S8I07

AC9TDI8P02

Resources

Work Samples

WS03 - 2040 smart school

Snapshot – Draw conclusions and provide reasons

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

Content description

AC9M8ST04

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

AC9M8ST04

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 – Identify, process and evaluate information

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

Content description

AC9M8ST04

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 – Explore ethical issues

Ethical Understanding: Responding to ethical issues: Explore ethical issues

Content description

AC9M8ST04

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

AC9M8ST04

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

AC9M8ST04

Learning progression extract

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

content.
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. $\frac{2}{3}$ ■ 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 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 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
Recognising bias
• applies an understanding of distributions to evaluate claims based on data (e.g. recognises that the accuracy of using a sample for predicting population values depends on both the relative size of the sample and how well the characteristics of the sample reflect the characteristics of the population; critically analyses statistics that reinforce stereotypes; evaluates claims made by the media regarding young people in relation to drugs and/or risk-taking behaviours)
• identifies and explains bias as a possible source of error in media reports of survey data (e.g. uses data to evaluate veracity of review headlines such as "everybody's favourite game"; investigates media claims on attitudes to government responses to market failure or income redistribution)
• justifies criticisms of data sources that include biased statistical elements (e.g. inappropriate sampling from populations; identifying sources of uncertainty in a scientific investigation; checks the authenticity of a data set)
Snapshot – Explore ethical perspectives and frameworks
Ethical Understanding: Responding to ethical issues: Explore ethical perspective
Content description
AC9M8ST04
Continuum extract
The following continuum extract shows the alignment of the continuum with this content.
• describe how ethical frameworks that use consequences, virtues and duties guide ethical decision-making

• explain how different ethical frameworks support developing ethical perspectives and inform
ethical decision-making
• analyse and utilise different ethical frameworks when responding to ethical issues and making
ethical decisions

Snapshot – Making and reflecting on ethical decisions

Ethical Understanding: Responding to ethical issues: Making and reflecting on et

Content description

AC9M8ST04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternative■ethical responses■to an issue when making and reflecting on ethical decisions
• consider how values and beliefs influence approaches to ethical issues, and■analyse■how these
affect■outcomes
• analyse■biases■when applying ethical concepts,■values■and ethical frameworks,■in order to explore
and evaluate ethical decisions

Snapshot – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8ST04

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

AC9M8ST04

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 – Making and reflecting on ethical decisions

Ethical Understanding: Responding to ethical issues: Making and reflecting on et

Content description

AC9M8ST04

Continuum extract

The following continuum extract shows the alignment of the continuum with this content.
• consider alternative■ethical responses■to an issue when making and reflecting on ethical decisions
• consider how values and beliefs influence approaches to ethical issues, and■analyse■how these
affect■outcomes
• analyse■biases■when applying ethical concepts,■values■and ethical frameworks,■in order to explore
and evaluate ethical decisions

AC9M8P01

recognise that have a combined of one; use this relationship to calculate probabilities in applied

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Elaborations

• understanding that knowing the of an allows the of its complement to be found, including for those that are not equally likely, such as getting a specific novelty toy in a supermarket promotion

• using the relationship that for a single A A A , P r (A) + P r (n o t A) = 1 $Pr(A)+Pr(\;not\;A)\;=\;1$ $Pr(A) + Pr(not A) = 1$; for example, if the that it rains on a particular day is 80 % 80% 80% , the that it does not rain on that day is 20 % 20% 20% , or the of not getting a 6 6 6 on a single roll of a fair dice is $1-\frac16=\frac56$ $1 - \frac16 = \frac56$ ■ $= \frac65$ ■

• using the sum of probabilities to solve problems, such as the of starting a game by throwing a 5 5 5 or 6 6 6 on a dice is $\frac13$ ■ and of not throwing a 5 5 5 or 6 6 6 is $\frac23$ ■

• investigating how various applications of artificial intelligence use the of when assessing the likelihood of favourable and unfavourable outcomes and making informed decisions based on these probabilities; for example, in binary classification problems where is classified into one of two categories, such as spam or not spam, fraud or not fraud

Students learn to:

recognise that complementary events have a combined probability of one; use this calculate probabilities in applied contexts

(AC9M8P01)

General capabilities and cross-curriculum priorities

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

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 .

Analysing

• Interpret concepts and problems

Analysing

• Interpret concepts and problems

Generating

• Create possibilities

Statistics and probability

• Understanding chance

Resources

Work Samples

WS02 - Random selection

WS05 - Canteen conundrums

Snapshot – Understanding chance

Numeracy: Statistics and probability: Understanding chance

Content description

AC9M8P01

Learning progression extract

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

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 – Interpret concepts and problems

Critical and Creative Thinking: Analysing: Interpret concepts and problems

Content description

AC9M8P01

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

AC9M8P01

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 – Understanding chance
Numeracy: Statistics and probability: Understanding chance
Content description
AC9M8P01
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

Resource – WS02 - Random selection

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals.■They apply the exponent laws to calculations with numbers involving positive integer exponents.■Students solve problems involving the 4 operations with integers and positive rational numbers. They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts.■Students apply algebraic properties to rearrange, expand and factorise linear expressions.■They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically.■Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context.■They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms.■They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles.■Students use formulas to solve problems involving the area and circumference of circles.■They solve problems of duration involving 12- and 24-hour cycles across multiple time zones.■Students use 3 dimensions to locate and describe position.■They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity.■Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling.■Students analyse and describe the distribution of data.■They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems. They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8N04

use the 4 operations with integers and with rational numbers, choosing and using efficient strategies and digital tools where appropriate

AC9M8P01

recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts

AC9M8P02

determine all possible combinations for 2 events, using two way tables, tree diagrams and Venn diagrams, and use these to determine probabilities of specific outcomes in practical situations

Resource – WS05 - Canteen conundrums

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals. They apply the exponent laws to calculations with numbers involving positive integer exponents. Students solve problems involving the 4 operations with integers and positive rational numbers. They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. Students apply algebraic properties to rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context. They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms. They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles. Students use formulas to solve problems involving the area and circumference of circles. They solve problems of duration involving 12- and 24-hour cycles across multiple time zones. Students use 3 dimensions to locate and describe position. They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity. Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling. Students analyse and describe the distribution of data. They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems. They conduct experiments and simulations using digital tools to determine related probabilities of

compound events.

AC9M8P01

recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts

AC9M8P02

determine all possible combinations for 2 events, using two-way tables, tree diagrams and Venn diagrams, and use these to determine probabilities of specific outcomes in practical situations

AC9M8P02

determine all possible combinations for 2 , using , and , and use these to determine probabilities of specific outcomes in practical situations

•

Elaborations

• describing using language of "at least", exclusive "or" (A A A or B B B but not both), inclusive "or" (A A A or B B B or both) and "and"

• using the $Pr(A \text{ and } B) + Pr(A \text{ and not } B) + Pr(\text{not } A \text{ and } B) + Pr(\text{not } A \text{ and not } B) = 1$ Pr(A\;and\;B)+Pr(A\;and\;not\;B)+Pr(not\;A\;and\;B)+Pr(not\;A\;and\;not\;B)=\;1 $Pr(A \text{ and } B) + Pr(A \text{ and not } B) + Pr(\text{not } A \text{ and } B) + Pr(\text{not } A \text{ and not } B)$ = 1 to calculate probabilities, including the special case of mutually exclusive where $Pr(A \text{ and } B) = 0$ Pr(A\;and\;B)\;=\;0 $Pr(A \text{ and } B) = 0$

• using or to demonstrate the difference between that are mutually exclusive, such as whether a coin toss will land on a head or a tail, or those that are not mutually exclusive, such as people who have blonde hair and people who have blue eyes

• exploring First Nations Australian children's instructive games; for example, Battendi from the Ngarrindjeri Peoples of Lake Murray and Lake Albert in southern Australia, applying possible combinations and relationships and calculating probabilities using and

Students learn to:

determine all possible combinations for 2 events, using two-way tables, tree diagrams, and use these to determine probabilities of specific outcomes in practical

(AC9M8P02)

General capabilities and cross-curriculum priorities

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

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

People

• The significant and ongoing contributions of First Nations Australians and their histories and cultures are acknowledged locally, nationally and globally.

Resources

Work Samples

WS02 - Random selection

WS05 - Canteen conundrums

Snapshot – Understanding chance

Numeracy: Statistics and probability: Understanding chance

Content description

AC9M8P02

Learning progression extract

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

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 $\frac{1}{6}$ 6 1 ■ and the probability of not rolling a 3 3 3 is 5 6 $\frac{5}{6}$ 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

AC9M8P02

Learning progression extract

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

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")

Crafting ideas

- creates complex and creative spoken texts which analyse and evaluate issues drawn from research or learning area content
- includes a range of alternative viewpoints in spoken texts, where appropriate
- controls and manipulates a sophisticated range of language features to affect the audience
- uses a range of rhetorical devices and humour to engage an audience
- references and quotes authorities or statistics to add authority (e.g. "according to a recent OECD report")
- delivers spoken text flexibly, allowing for questions and maintaining the flow of ideas

AC9M8P03

conduct repeated and , using to determine probabilities for , and describe results

-
-

Elaborations

- using , including generative artificial intelligence, to conduct involving
- using a random number generator and , including generative artificial intelligence, to simulate rolling 2 2 2 dice and calculating the difference between them, investigating what difference is likely to occur more often
- using online software to conduct to determine in the long run if are complementary

Students learn to:

conduct repeated chance experiments and simulations, using digital tools to determ for compound events, and describe results

(AC9M8P03)

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

Managing and operating

• Select and operate tools

Investigating

• Acquire and collate data

• Interpret data

Managing and operating

• Select and operate tools

Investigating

• Interpret data

Managing and operating

• Select and operate tools

Related content

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

AC9HC8K02

AC9TDI8P02

Snapshot – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M8P03

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

AC9M8P03

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

AC9M8P03

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

AC9M8P03

Learning progression extract

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

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 $\frac{1}{6}$ 6 1 ∎ and the probability of not rolling a 3 3 3 is 5 6 $\frac{5}{6}$ 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

AC9M8P03

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

AC9M8P03

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

AC9M8P03

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 – Acquire and collate data

Digital Literacy: Investigating: Acquire and collate data

Content description

AC9M8P03

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

AC9M8P03

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

AC9M8P03

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 data

Digital Literacy: Investigating: Interpret data

Content description

AC9M8P03

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

AC9M8P03

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