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Programme and Course Outline
Year 11 Mathematics : Methods
Stages 1 & 2
This outline is subject to change!

The program you have been issued references all objectives in the Australian Curriculum. The syllabus may be easily downloaded from the Schools Curriculum and Standards Authority (SCASA) website at (http://www.scsa.wa.edu.au/).

UNIT Name of course: Mathematics Methods

Rationale

Mathematics is the study of order, relation and pattern. From its origins in counting and measuring, it has evolved in highly sophisticated and elegant ways to become the language now used to describe much of the modern world. Statistics are concerned with collecting, analysing, modelling and interpreting data in order to investigate and understand real-world phenomena and solve problems in context. Together, mathematics and statistics provide a framework for thinking and a means of communication that is powerful, logical, concise and precise.

The major themes of the Mathematics Methods ATAR course are calculus and statistics. They include, as necessary prerequisites, studies of algebra, functions and their graphs, and probability. They are developed systematically, with increasing levels of sophistication and complexity. Calculus is essential for developing an understanding of the physical world because many of the laws of science are relationships involving rates of change. Statistics is used to describe and analyse phenomena involving uncertainty and variation. For these reasons, this course provides a foundation for further studies in disciplines in which mathematics and statistics have important roles. It is also advantageous for further studies in the health and social sciences. This course is designed for students whose future pathways may involve mathematics and statistics and their applications in a range of disciplines at the tertiary level.

Aims

The Mathematics Methods ATAR course aims to develop students':

- understanding of concepts and techniques drawn from algebra, the study of functions, calculus, probability and statistics
- ability to solve applied problems using concepts and techniques drawn from algebra, functions, calculus, probability and statistics
- reasoning in mathematical and statistical contexts and interpretation of mathematical and statistical information, including ascertaining the reasonableness of solutions to problems
- capacity to communicate in a concise and systematic manner using appropriate mathematical and statistical language
- capacity to choose and use technology appropriately and efficiently.

Organisation

This course is organised into a Year 11 syllabus and a Year 12 syllabus. The cognitive complexity of the syllabus content increases from Year 11 to Year 12.

Structure of the syllabus

The Year 11 syllabus is divided into two units, each of one semester duration, which are typically delivered as a pair. The notional time for each unit is 55 class contact hours.

Organisation of content

Unit 1

Contains the three topics:

- Functions and graphs
- Trigonometric functions
- Counting and probability.

Unit 1 begins with a review of the basic algebraic concepts and techniques required for a successful introduction to the study of functions and calculus. Simple relationships between variable quantities are reviewed, and these are used to introduce the key concepts of a function and its graph. The study of probability and statistics begins in this unit with a review of the fundamentals of probability, and the introduction of the concepts of conditional probability and independence. The study of the trigonometric functions begins with a consideration of the unit circle using degrees and the trigonometry of triangles and its application. Radian measure is introduced, and the graphs of the trigonometric functions are examined and their applications in a wide range of settings are explored.

Unit 2

Contains the three topics:

- Exponential functions
- Arithmetic and geometric sequences and series
- Introduction to differential calculus.

In Unit 2, exponential functions are introduced and their properties and graphs examined. Arithmetic and geometric sequences and their applications are introduced and their recursive definitions applied. Rates and average rates of change are introduced and this is followed by the key concept of the derivative as an ‘instantaneous rate of change’. These concepts are reinforced numerically (by calculating difference quotients), geometrically (as slopes of chords and tangents), and algebraically. This first calculus topic concludes with derivatives of polynomial functions, using simple applications of the derivative to sketch curves, calculate slopes and equations of tangents, determine instantaneous velocities, and solve optimisation problems.

Each unit includes:

- a unit description – a short description of the focus of the unit
- learning outcomes – a set of statements describing the learning expected as a result of studying the unit
- unit content – the content to be taught and learned.

Role of technology

It is assumed that students will be taught this course with an extensive range of technological applications and techniques. If appropriately used, these have the potential to enhance the teaching and learning of the course. However, students also need to continue to develop skills that do not depend on technology. The ability to be able to choose when or when not to use some form of technology and to be able to work flexibly with technology are important skills in this course.

Week/s	Essential Content	ACARA Reference and Elaborations	Reference and Resources	Skills / General Capabilities	Assessment
1 Term I 2022	Lines and linear relationships.	1.1.1 Determine the coordinates of the mid-point between two points. 1.1.2 Determine an end-point given the other end-point and the mid-point. 1.1.4 Recognise features of the graph of $y = mx + c$, including its linear nature, its intercepts and its slope or gradient. 1.1.5 Determine the equation of a straight line given sufficient information; including parallel and perpendicular lines. 1.1.6 Solve linear equations, including those with algebraic fractions and variables on both sides.	Cambridge Senior Mathematical Methods Yr 11 **Ch 1&2** **Excl. 1E & 2F** **Mathspace adaptive task.**		**TEST 1 Mon Week 2**
2-3 Term I 2022	Quadratic relationships	1.1.7 Examine examples of quadratically related variables 1.1.8 Recognise features of the graphs of $y = x^2$, $y = a(x-b)^2 + c$, and $y = a(x-b)(x-c)$, including their parabolic nature, turning points, axes of symmetry and intercepts 1.1.9 Solve quadratic equations, including the use of quadratic formula and completing the square 1.1.10 Determine the equation of a quadratic given sufficient information 1.1.11 Determine turning points and zeros of quadratics and understand the role of the discriminant 1.1.12 Recognise features of the graph of the general quadratic $y = ax^2 + bx + c$	Cambridge Senior Mathematical Methods Yr 11 **Ch 3** **Excl. 3G & 3K** **Mathspace adaptive task.**		**21CLD Study Skills:** Test1 Reflection
4-5 Term I 2022 Swimming Carnival	Graphs	1.1.14 Recognise features and determine equations of the graphs of $y = \frac{1}{x}$ and $y = \frac{a}{x-b}$, including their hyperbolic shapes and their asymptotes. 1.1.15 Recognise features of the graphs of $y = x^n$ for $n \in \boldsymbol{N}, n = -1$ and $n = ½$, including shape, and behaviour as $x \to \infty$ and $x \to -\infty$ 1.1.16 Identify the coefficients and the degree of a polynomial 1.1.21 Recognise features and determine equations of the graphs of $x^2 + y^2 = r^2$ and $(x-a)^2 + (y-b)^2 = r^2$, including their circular shapes, their centres and their radii 1.1.22 Recognise features of the graph of $y^2 = x$, including its parabolic shape and its axis of symmetry	Cambridge Senior Mathematical Methods Yr 11 **Ch 4**		**21CLD** **Graphs – recognise features and determine equations.** **RealWorld Problem Solving21CLD Level 3**
6-8 Term I 2022 Monday Holiday Photo Day	Functions relations and transformations	1.1.23 Understand the concept of a function as a mapping between sets and as a rule or a formula that defines one variable quantity in terms of another 1.1.24 Use function notation; determine domain and range; recognise independent and dependent variables 21CLT– Use of technology – introduction to transformations. https://student.desmos.com/ 1.1.25 Understand the concept of the graph of a function 1.1.28 Recognise the distinction between functions and relations and apply the vertical line test 1.1.26 Examine translations and the graphs of $y = f(x) + a$ and $y = f(x-b)$ 1.1.27 Examine dilations and the graphs of $y = cf(x)$ and $y = f(dx)$	Cambridge Senior Mathematical Methods Yr 11 **Ch 6** **DESMOS transformation activity.**		**INV 1 Mon Week7**
9-10 Term I 2022	Polynomials	1.1.17 Expand quadratic and cubic polynomials from factors 1.1.18 Recognise features and determine equations of the graphs of $y = x^3$, $y = a(x-b)^3 + c$ and $y = k(x-a)(x-b)(x-c)$, including shape, intercepts and behaviour as $x \to \infty$ and $x \to -\infty$ 1.1.19 Factorise cubic polynomials in cases where a linear factor is easily obtained 1.1.20 Solve cubic equations using technology, and algebraically in cases where a linear factor is easily obtained	Cambridge Senior Mathematical Methods Yr 11 **Ch 7** **Excl. 7H**		
11 Term II 2022	Probability	1.3.6 Review the concepts and language of outcomes, sample spaces, and events, as sets of outcomes 1.3.7 Use set language and notation for events, including: $\bar{A}$ (or A') for the complement of an event A $A \cap B$ and $A \cup B$ for the intersection and union of events A and B respectively	Cambridge Senior Mathematical Methods Yr 11 **Ch 9** **Excl. 9H**		Review and applyTest1 reflection before attempting

		$A \cap B \cap C$ and $A \cup B \cup C$ for the intersection and union of the three events A, B and C respectively recognise mutually exclusive events. 1.3.8 Use everyday occurrences to illustrate set descriptions and representations of events and set operations 1.3.9 Review probability as a measure of 'the likelihood of occurrence' of an event 1.3.10 Review the probability scale: $0 \leq P(A) \leq 1$ for each event A, with $P(A) = 0$ if A is an impossibility and $P(A) = 1$ if A is a certainty 1.3.11 Review the rules: $P(\overline{A}) = 1 - P(A)$ and $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 1.3.12 Use relative frequencies obtained from data as estimates of probabilities	**Mathspace**		**21CLD** **Study Skills:** Reflection. Test 2 reflection
12 Term II 2022	Probability	1.3.13 Understand the notion of a conditional probability and recognise and use language that indicates conditionality 1.3.14 Use the notation $P(A\|B)$ and the formula $P(A \cap B) = P(A\|B)P(B)$ 13.15 Understand the notion of independence of an event A from an event B, as defined by $P(A\|B) = P(A)$ 1.3.16 Establish and use the formula $P(A \cap B) = P(A)P(B)$ for independent events A and B, and recognise the symmetry of independence 1.3.17 Use relative frequencies obtained from data as estimates of conditional probabilities and as indications of possible independence of events	Cambridge Senior Mathematical Methods Yr 11 **Ch 9**		**TEST 2 T2 Week 2**
13 Term II 2022	Combinations, Counting and probability	1.3.1 Understand the notion of a combination as a set of r objects taken from a set of n distinct objects 1.3.2 Use the notation $\binom{n}{r}$ and the formula $\binom{n}{r} = \frac{n!}{r!(n-r)!}$ for the number of combinations of r objects taken from a set of n distinct objects 1.3.1 Expand $(x + y)^n$ for small positive integers n 1.3.4 Recognise the numbers $\binom{n}{r}$ as binomial coefficients (as coefficients in the expansion of $(x + y)^n$ 1.3.5 Use Pascal's triangle and its properties	Cambridge Senior Mathematical Methods Yr 11 **Ch 10**		
14	Revision	**SEMESTER 1 EXAMS** **Term 2 Exam in weeks 5&6.**			
15 – 16 Term II 2022		**SEMESTER 1 EXAMS** **Term 2 Exam in weeks 5&6.**			EXAM

Unit 2

Week/s	Essential Content	Elaborations	Reference and Resources	Cross Curricular Priorities / General Capabilities	Assessment
17-20	Introduction to differential calculus Rates of change	2.3.1 Interpret the difference quotient $\frac{f(x+h)-f(x)}{h}$ as the average rate of change of a function f 2.3.2 Use the Leibniz notation δx and δy for changes or increments in the variables x and y 2.3.3 Use the notation $\frac{\delta y}{\delta x}$ for the difference quotient $\frac{f(x+h)-f(x)}{h}$ where $y = f(x)$ 2.3.4 Interpret the ratios $\frac{f(x+h)-f(x)}{h}$ and $\frac{\delta y}{\delta x}$ as the slope or gradient of a chord or secant of the graph of $y = f(x)$	Cambridge Senior Mathematical Methods Yr 11 **Ch 17** Classpad Activity 28 from Yellow Sheppard & Pateman		**Take Home Desmos Modelling Task** **21CLD** **ICT 4 Learning** **Level 2**
17-20	Introduction to differential calculus The concept of the derivative	2.3.5 Examine the behaviour of the difference quotient $\frac{f(x+h)-f(x)}{h}$ as $h \to 0$ as an informal introduction to the concept of a limit 2.3.6 Define the derivative $f'(x)$ as $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$ 2.3.7 Use the Leibniz notation for the derivative: $\frac{dy}{dx} = \lim_{\delta x \to 0} \frac{\delta y}{\delta x}$ and the correspondence $\frac{dy}{dx} = f'(x)$ where $y = f(x)$ 2.3.8 Interpret the derivative as the instantaneous rate of change 2.3.9 Interpret the derivative as the slope or gradient of a tangent line of the graph of $y = f(x)$	Cambridge Senior Mathematical Methods Yr 11 **Ch 17**		
Term II 2022	Introduction to differential calculus Computation of derivatives Properties of derivatives	2.3.10 Estimate numerically the value of a derivative for simple power functions 2.3.11 Examine examples of variable rates of change of non-linear functions 2.3.12 Establish the formula $\frac{d}{dx}(x^n) = nx^{n-1}$ for non-negative integers n expanding $(x+h)^n$ or by factorising $(x+h)^n - x^n$ 2.3.13 Understand the concept of the derivative as a function 2.3.14 Identify and use linearity properties of the derivative 2.3.15 Calculate derivatives of polynomials	Cambridge Senior Mathematical Methods Yr 11 **Ch 17** **Excl. 17H,17I**		**Inv 2** **Fri week 10**
	Introduction to differential calculus Applications of derivatives	2.3.16 Determine instantaneous rates of change 2.3.17 Determine the slope of a tangent and the equation of the tangent	Cambridge Senior Mathematical Methods Yr 11 **Ch 17**		
	Introduction to differential calculus	2.3.22 Calculate anti-derivatives of polynomial functions 2.3.20 Sketch curves associated with simple polynomials, determine stationary points, and local and global maxima	Cambridge Senior Mathematical Methods Yr 11		

17-20	Applications of derivatives Anti-derivatives Introduction to differential calculus Applications of derivatives	and minima, and examine behaviour as $x \to \infty$ and $x \to -\infty$ 2.3.21 Solve optimisation problems arising in a variety of contexts involving polynomials on finite interval domains	**Ch 18** **Excl. 18H**		
		2.3.18 Construct and interpret position-time graphs with velocity as the slope of the tangent 2.3.19 Recognise velocity as the first derivative of displacement with respect to time			
21-23 Term III 2022	Circular Functions	1.2.5 Define and use radian measure and understand its relationship with degree measure 1.2.7 Understand the unit circle definition of $\sin\theta$, $\cos\theta$ and $\tan\theta$ and periodicity using radians 1.2.8 Recognise the exact values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ at integer multiples of $\frac{\pi}{6}$ and $\frac{\pi}{4}$ 1.2.9 Recognise the graphs of $y = \sin x, y = \cos x$, and $y = \tan x$ on extended domains 1.2.10 Examine amplitude changes and the graphs of $y = a\sin x$ and $y = a\cos x$ 1.2.11 Examine period changes and the graphs of $y = \sin bx$, $y = \cos bx$ and $y = \tan bx$ 1.2.12 Examine phase changes and the graphs of $y = \sin(x - c)$, $y = \cos(x - c)$ and $y = \tan(x - c)$ 1.2.13 Examine the relationships $\sin\left(x + \frac{\pi}{2}\right) = \cos x$ and $\cos\left(x - \frac{\pi}{2}\right) = \sin x$ 1.2.14 Prove and apply the angle sum and difference identities 1.2.15 Identify contexts suitable for modelling by trigonometric functions and use them to solve practical problems 1.2.16 Solve equations involving trigonometric functions using technology, and algebraically in simple cases	Cambridge Senior Mathematical Methods Yr 11 **Ch 12** **Excl. part of 12L.**	 **21CLD** **ICT 4 Learning** **Desmos** (In Class Activity) **Level 2**	**TEST 3** Fri Week 2 T3
24-25 Term III 2022	Trig ratios and applications	1.2.4 Establish and use the cosine and sine rules, including consideration of the ambiguous case and the formula $Area = \frac{1}{2}bc\ sin\ A$ for the area of a triangle 1.2.6 Calculate lengths of arcs and areas of sectors and segments in circles	Cambridge Senior Mathematical Methods Yr 11 **Ch 13**		
26 Term III 2022	Exponential functions Exponential functions	2.1.1 review indices (including fractional and negative indices) and the index laws 2.1.2 use radicals and convert to and from fractional indices 2.1.3 understand and use scientific notation and significant figures 2.1.4 establish and use the algebraic properties of exponential functions 2.1.5 recognise the qualitative features of the graph of $y=a^x$ (a>0), including asymptotes, and of its translations ($y=a^x+b$ and $y = a^{x-c}$) 2.1.6 identify contexts suitable for modelling by exponential functions and use them to solve practical problems 2.1.7 solve equations involving exponential functions using technology, and algebraically in simple cases	Cambridge Senior Mathematical Methods Yr 11 **Ch 14** **Excl. 14F,14G,14H.** **Mathspace**		
27 Term III 2022	Arithmetic and geometric sequences and series Arithmetic sequences	2.2.1 Recognise and use the recursive definition of an arithmetic sequence: $t_{n+1} = t_n + d$ 2.2.2 Develop and use the formula $t_n = t_1 + (n-1)d$ for the general term of an arithmetic sequence and recognise its linear nature 2.2.3 Use arithmetic sequences in contexts involving discrete linear growth or decay, such as simple interest	Cambridge Senior Mathematical Methods Yr 11 **Ch 15**		

		2.2.4 Establish and use the formula for the sum of the first n terms of an arithmetic sequence			
28 Term III 2022	Arithmetic and geometric sequences and series Geometric sequences	2.2.5 Recognise and use the recursive definition of a geometric sequence: $t_{n+1} = t_n \times r$ 2.2.6 Develop and use the formula $t_n = t_1 \times r^{n-1}$ for the general term of a geometric sequence and recognise its exponential nature 2.2.7 Understand the limiting behaviour as $n \to \infty$ of the terms t_n in a geometric sequence and its dependence on the value of the common ratio r 2.2.8 Establish and use the formula $S_n = t_1 \frac{r^n - 1}{r - 1}$ for the sum of the first n terms of a geometric sequence 2.2.9 Use geometric sequences in contexts involving geometric growth or decay, such as compound interest	Cambridge Senior Mathematical Methods Yr 11 **Ch 15**		Test 4 Fri Week 8
29 Term III 2022	Inverse proportion	1.1.3 Examine examples of direct proportion and linearly related variables. 1.1.13 Examine examples of inverse proportion	Cambridge Senior Mathematical Methods Yr 11 **Ch 5** **Excl. 5D & 5E**		
30-32 Term III 2022		Revision			**TEST 4** **Week 7 Fri** **Term 3**
33 to 34 Term IV 2022		EXAMS Term 4 Week 3&4.			

Icon Key

Habits of Mind

 Persisting	 Manage Impulsivity	 Understanding and empathy	 Thinking flexibly	 Think about thinking	 Strive for Accuracy	 Posing Questions	 Apply past knowledge
 Clarity and precision	 Use all senses	 Imagining and Creating	 Wonderment and awe	 Responsible risk taking	 Find humour	 Think interdependently	 Continuous learning

General Capabilities

 Literacy	 Numeracy	 Critical and Creative thinking	 ICT	 Social Capability	 Intercultural understanding	 Ethical Understanding

Cross Curricular Priorities

 Aboriginal and Torres Strait Islander Cultures	 Asia and Australia's engagement	 Sustainability

- **FIND OUT ALL YOU CAN ABOUT THE FORMAT OF THE EXAM:**

Time allowed, number of questions, marks and average time spent per question.

Do past WACE. papers to be familiar with the format and standard.

- **BE PREPARED:**

Revise, revise, revise! Means PRACTICE, PRACTICE, PRACTICE,

Bring pens, pencil, drawing instruments, tables books, calculator (check calculator works!), spare batteries, your brain (ditto!).

Eat and sleep well, be early, be confident, be a little nervous.

- **USE THE READING TIME TO PLAN YOUR EXAM:**

Read all instructions carefully.

Skim through all questions to see the work that is ahead of you.

Note the difficult questions which will require more time; plan your time! What order will you do the questions in?

- **SPEND THE FIRST MINUTE OF EACH QUESTION PLANNING AND THINKING:**

You don't need to be writing all of the time. (What you're writing may be wrong and a waste of time!)

Read each question carefully and decide what needs to be found.

Make sure you use all the information given.

- **PACE YOURSELF; KEEP AN EYE ON THE TIME:**

Work steadily; make sure you are not spending too much time on one question.

Don't rush or you'll make silly mistakes, and your work will be messy.

Don't panic if you run out of time; it is better to get *most* **questions right than to get *all* questions wrong.**

Complete the work you *do* know, rather than rushing.

- **WRITE CLEARLY, DRAW BIG DIAGRAMS:**

Show working; spread out your work neatly, use as much paper as you like.

Demonstrate to the marker that you *know* your Maths.

Write *down* the page, not across; use words and diagrams if appropriate.

Don't use liquid paper; draw a line through mistakes; use pencil only for diagrams.

- **MAKE SURE YOU HAVE ANSWERED THE QUESTION:**

Does it sound reasonable? Correct units included? Correct number of decimal places?

Highlight the final answer in a box. Should you write it in a sentence?

Feel confident about yourself when you have answered a question correctly.

Cont…

- **ATTEMPT EVERY QUESTION:**

Aim to earn *some* marks for every question, even if it requires an educated guess.

Try to finish each question before moving on, so that you don't have to worry about coming back to it.

If a question is too hard, skip it and leave time to come back to it later.

- **MOVE ON IF YOU'RE GETTING NOWHERE:**

If your working-out of a hard question is taking too long, then it's probably *wrong*!

If you're stuck, don't waste valuable time getting bogged down. Stop, retrace your steps, think about a simpler method, or start again. Sometimes it's even better to skip the question and return to it with a fresh mind.

- **AT THE END OF THE EXAM:**

Check your work, and go back

Achievement Standards Units 1 and 2

Concepts and Techniques

A	B	C	D	E
• demonstrates knowledge of concepts of functions, calculus and statistics in routine and non-routine problems in a variety of contexts	• demonstrates knowledge of concepts of functions, calculus and statistics in routine and non-routine problems	• demonstrates knowledge of concepts of functions, calculus and statistics that apply to routine problems	• demonstrates knowledge of concepts of simple functions, calculus and statistics	• demonstrates limited familiarity with concepts of simple functions, calculus and statistics
• selects and applies techniques in functions, calculus and statistics to solve routine and non-routine problems in a variety of contexts	• selects and applies techniques in functions, calculus and statistics to solve routine and non-routine problems	• selects and applies techniques in functions, calculus and statistics to solve routine problems	• uses simple techniques in functions, calculus and statistics in routine problems	• uses simple techniques in a structured context
• develops, selects and applies mathematical and statistical models in routine and non-routine problems in a variety of contexts	• selects and applies mathematical and statistical models in routine and non-routine problems	• applies mathematical and statistical models in routine problems	• demonstrates familiarity mathematical and statistical models	• demonstrates limited familiarity with mathematical or statistical models
• uses digital technologies effectively to graph, display and organise mathematical and statistical information and to solve a range of routine and non-routine problems in a variety of contexts	• uses digital technologies appropriately to graph, display and organise mathematical and statistical information and to solve a range of routine and non-routine problems	• uses digital technologies to graph, display and organise mathematical and statistical information to solve routine problems	• uses digital technologies to display some mathematical and statistical information in routine problems	• uses digital technologies for arithmetic calculations and to display limited mathematical and statistical information

Reasoning and Communication

A	B	C	D	E
• represents functions, calculus and statistics in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts	• represents functions, calculus and statistics in numerical, graphical and symbolic form in routine and non-routine problems	• represents functions, calculus and statistics in numerical, graphical and symbolic form in routine problems	• represents simple functions and distributions in numerical, graphical or symbolic form in routine problems	• represents limited mathematical or statistical information in a structured context
• communicates mathematical and statistical judgments and arguments, which are succinct and reasoned, using appropriate language	• communicates mathematical and statistical judgments and arguments, which are clear and reasoned, using appropriate language	• communicates mathematical and statistical arguments using appropriate language	• communicates simple mathematical and statistical information using appropriate language	• communicates simple mathematical and statistical information
• interprets the solutions to routine and non-routine problems in a variety of contexts	• interprets the solutions to routine and non-routine problems	• interprets the solutions to routine problems	• describes solutions to routine problems	• identifies solutions to routine problems
• explains the reasonableness of the results and solutions to routine and non-routine problems in a variety of contexts	• explains the reasonableness of the results and solutions to routine and non-routine problems	• describes the reasonableness of results and solutions to routine problems	• describes the appropriateness of the result of calculations	• describes with limited familiarity the appropriateness of the results of calculations
• identifies and explains the validity and limitations of models used when developing solutions to routine and non-routine problems	• identifies and explains the limitations of models used when developing solutions to routine problems	• identifies the limitations of models used when developing solutions to routine problems	• identifies the limitations of simple models used	• identifies simple models