EBK ACADEMY

Rebellious Box – Critical and Creative Thinking Curriculum Mapping

In the Rebellious Box project, students engineer an automated device that turns itself off when activated, combining mechanical design, electronics and Arduino/C++ programming. The following tables map this project against the Victorian Curriculum F–10 Version 2.0 Critical and Creative Thinking capability, for Levels 3–4, 5–6, 7–8 and 9–10. Each table lists the relevant content descriptions, how they are addressed through the project, and the interrelated strand(s) involved.

Levels 3 and 4

Table 1: Rebellious Box – Critical & Creative Thinking (Level 3–4)

Content Description	Project Application	Interrelated Strands
VC2CC4Q01 – *the construction and use of open and closed questions for different purposes*	Students ask open and closed questions throughout the engineering design process to investigate why the Rebellious Box does or doesn't turn itself off reliably. For example, "What happens if the servo arm reaches further before flipping the switch?" (open) or "Is the switch wired to the correct input pin?" (closed). These questions guide debugging of the Arduino code and circuit.	• Questions and Possibilities
VC2CC4Q02 – *how pre-established preferences may influence thinking when generating and responding to alternative ideas and possibilities*	Students reflect on whether their preference for a particular way the arm "reaches out" to flip the switch off influences which movement ideas they favour when brainstorming, and consider how a favourite early design might narrow the range of actuator movements they try.	• Questions and Possibilities
VC2CC4Q03 – *simple strategies for generating new ideas and possibilities, including repurposing or rearranging*	Students generate creative solutions by rearranging the order of instructions in their Arduino code, repurposing spare components (for example, using a leftover arm as a lever), and changing enclosure layouts to alter how convincingly the box appears to switch itself off.	• Questions and Possibilities
VC2CC4R01 – *ways to identify, structure and communicate a conclusion justified by a range of reasons*	Students explain why particular code or mechanical design choices were selected, using evidence gathered from testing. For example, they justify using a shorter delay() value because it made the switch-flipping action look quicker and more decisive.	• Reasoning
VC2CC4R02 – *what is meant by evidence and what is meant by a value and how they are used to support reasoning*	Students use testing evidence, such as timing how long it takes the arm to flip the switch off, to support claims about which servo angle works best, and consider values such as safety when justifying design choices, such as ensuring the arm doesn't move fast enough to pinch fingers.	• Reasoning

Content Description	Project Application	Interrelated Strands
VC2CC4R03 – *the use of 'if-then' thinking to come to a conclusion when reasoning, and simple errors that can be made when using this thinking*	Students use conditional statements in their Arduino/C++ code to control when the servo arm activates in response to the switch being turned on (for example, "if the switch input reads HIGH, then move the servo"), and identify reasoning errors when the box misbehaves, such as wrongly assuming one failed test means the whole program is broken.	• Reasoning
VC2CC4R04 – *the basis for different kinds of criteria, such as desired qualities or given rules; and how criteria are used to help make judgements when reasoning*	Students identify criteria for a successful Rebellious Box, such as switching itself off every time it is activated, operating safely, and having neat, secure wiring, and use these criteria to judge whether their prototype meets design expectations.	• Reasoning
VC2CC4M01 – *an extended range of general learning strategies including connecting to prior learning, self-questioning, self-explanation and peer instruction*	Students connect new knowledge about variables and functions in Arduino/C++ to prior experience with following simple step-by-step instructions, ask themselves questions to check their understanding of what each line of code does, and explain their code to a peer to test their own understanding.	• Metacognition
VC2CC4M02 – *the use of thinking processes to facilitate thinking, including for problem-solving, and verbal and non-verbal strategies for representing thinking processes*	Students develop and test hypotheses about the relationship between servo angle and how reliably the arm flips the switch off, recording their trials in a table to compare outcomes and identify patterns.	• Metacognition
VC2CC4M03 – *how to evaluate a proposed solution using given criteria*	Students use a teacher-provided checklist (for example, "Does the switch turn off every time?", "Is the wiring safe and tidy?") to evaluate their Rebellious Box prototype and identify areas for improvement.	• Metacognition

Levels 5 and 6

Table 2: Rebellious Box – Critical & Creative Thinking (Level 5–6)

Content Description	Project Application	Interrelated Strands
VC2CC6Q01 – *the construction of questions for identifying and building understanding of information,*	Students construct a range of questions — technical and design-focused — to build their understanding of how the switch state is read as an input and how the servo arm is controlled as an output, and construct questions for an expert (for example, a robotics	• Questions and Possibilities

Content Description	Project Application	Interrelated Strands
possibilities, processes and activities	mentor) about switch debounce, servo torque and gear ratios.	
VC2CC6Q03 – *an extended range of strategies to generate new ideas and possibilities including forming a link between different information sources*	Students research other automated or interactive devices — such as vending machines or other "self-switching-off" builds — to see how sensors and actuators work together, and form links between these examples to design a distinctive activation-and-shutoff sequence for their own Rebellious Box.	• Questions and Possibilities
VC2CC6R01 – *ways to identify, structure and communicate an argument that uses sub-arguments leading to a main conclusion*	Students construct a design justification with a main conclusion (for example, "Our box design is the most reliable") supported by several reasons — accurate switch detection, tested code logic and a sturdy enclosure — each of which is further supported by evidence from testing.	• Reasoning
VC2CC6R03 – *simple reasoning errors including hasty generalisations, false analogies and contradiction, and how reasoning associated with these errors can be improved*	Students examine whether concluding "the servo is faulty" after only one failed test is a hasty generalisation, and discuss how running repeated trials improves the reliability of their conclusions about the switch-detection code's performance.	• Reasoning
VC2CC6R04 – *the use of criteria to support analysis and evaluation when reasoning*	Students develop criteria — such as response time, reliability across many activations and robustness of the enclosure — to analyse and compare different versions of their Arduino code, using these criteria to justify their final design choice.	• Reasoning
VC2CC6M01 – *learning strategies suited to general and specific contexts, including different ways of identifying, expressing and organising key learning, and undertaking spaced practice*	Students use flowcharts to organise their understanding of the Rebellious Box's input–process–output logic and revisit their code across several sessions (spaced practice) to consolidate their understanding of variables, conditionals and loops.	• Metacognition
VC2CC6M02 – *thinking processes suited to different contexts and when and how to use them, including for problem-solving*	Students select and apply a structured problem-solving process (define the problem, generate options, test, refine) when systematically troubleshooting why the switch is sometimes not detected, reflecting on why this process suits hardware–software debugging tasks.	• Metacognition
VC2CC6M03 – *the use of criteria to*	Working in small groups, students each propose a different mechanical or code-based solution for	• Metacognition

Content Description	Project Application	Interrelated Strands
identify and compare proposed solutions	making the switch-off action more reliable, then use agreed criteria to compare solutions and select the most appropriate one.	

Levels 7 and 8

Table 3: Rebellious Box – Critical & Creative Thinking (Level 7–8)

Content Description	Project Application	Interrelated Strands
VC2CC8Q01 – *the construction of a main question and sub-questions for different purposes*	Students define a main investigation question, such as "How can we make the Rebellious Box detect activation and switch itself off reliably every time?", and break this into sub-questions covering switch debounce, servo torque, timing in code, and enclosure tolerances to guide their research and prototyping.	• Questions and Possibilities
VC2CC8Q02 – *when and how judgement is suspended to support generating and evaluating alternative ideas and possibilities*	Students engage with a guest maker or engineer to explore how professionals suspend judgement when prototyping unconventional deactivation mechanisms, and practise withholding critique during initial brainstorming of alternative ways the box could "turn itself off" before evaluating feasibility.	• Questions and Possibilities
VC2CC8Q03 – *strategies for generating new ideas and possibilities including identifying a pattern across multiple information sources*	Students examine several existing automated or sensor-driven devices and identify a common pattern in how a state change is detected (input) and triggers an actuator response (output), then apply this input–output pattern when structuring their own Arduino/C++ code.	• Questions and Possibilities
VC2CC8R01 – *ways to identify, structure and communicate a conclusion and its justification where competing claims, and grounds for claims, are analysed and evaluated*	Students research and weigh competing claims about the best way to detect activation of the switch — for example, a mechanical microswitch versus polling a digital input pin in code — structuring a written or verbal justification that analyses the strength of evidence for each option before reaching a conclusion.	• Reasoning
VC2CC8R04 – *when and how criteria are selected to improve clarity and support analysis and evaluation, including of competing claims, when reasoning*	Students develop necessary and sufficient criteria for judging whether their box design is "reliable" (for example, it must detect activation and switch itself off in twenty consecutive trials without failure) and use these refined criteria to analyse competing prototype designs within their group.	• Reasoning
VC2CC8M01 – *ways to select, use and reflect on general and*	Students select appropriate strategies, such as sketching a circuit diagram or explaining their code logic to a peer, to consolidate their understanding of	• Metacognition

Content Description	Project Application	Interrelated Strands
context-specific learning strategies	digital input/output relationships, and reflect on which strategy was most effective for this technical content.	
VC2CC8M02 – *broad strengths and limitations of thinking processes in different contexts, including problem-solving*	Students compare different design-thinking and engineering approaches — such as iterative prototyping (build, test, refine) versus working from a fixed design brief — and reflect on the strengths and limitations of each when applying engineering design principles to develop the Rebellious Box.	• Metacognition
VC2CC8M03 – *the development of criteria for evaluating a range of proposed solutions; ways to evaluate and incorporate new knowledge that could affect the final decision*	Students develop criteria to evaluate multiple proposed switch-detection mechanisms and adjust their final decision in light of new knowledge, such as discovering during testing that a microswitch "bounces" and causes false triggers.	• Metacognition

Levels 9 and 10

Table 4: Rebellious Box – Critical & Creative Thinking (Level 9–10)

Content Description	Project Application	Interrelated Strands
VC2CC10Q01 – *the construction and adaptation of questions to suit different contexts*	Students adapt their investigation questions to suit different audiences — technical questions about debounce circuits and interrupt handling for an engineering forum, user-experience questions for a peer survey about the moment the switch flips off — when researching how to refine the Rebellious Box's system.	• Questions and Possibilities
VC2CC10R01 – *ways to analyse and improve the structure, clarity, consistency and coherence of a conclusion and its justification in different contexts*	Students critically review their design justification report for the Rebellious Box, checking for unclear assumptions (for example, about servo lifespan or long-term switch reliability) and revising the structure and clarity of their argument before presenting it to peers or industry mentors.	• Reasoning
VC2CC10R02 – *ways to analyse and evaluate claims and grounds for claims for the qualities of accuracy, precision, depth or breadth when reasoning, and ways to identify what qualities are required in different contexts*	Students evaluate whether their testing data on switch-detection reliability is sufficiently precise and accurate for a formal design report, and determine whether greater breadth (testing multiple switch types) or depth (extensive trials on one input–output configuration) is required to support their conclusions.	• Reasoning

Content Description	Project Application	Interrelated Strands
VC2CC10M01 – *ways to select, monitor and adapt general and context-specific learning strategies*	Students maintain a design journal to monitor the effectiveness of their learning strategies — for example, trial-and-error testing versus researching component datasheets — throughout the project, adapting their approach as the hardware–software integration challenges evolve.	• Metacognition
VC2CC10M02 – *the importance of critical analysis of thinking processes in different contexts, including for problem-solving, considering factors such as cognitive biases*	Students critically analyse their own systematic debugging process when troubleshooting the Rebellious Box, identifying cognitive biases such as confirmation bias (favouring test results that support their preferred code architecture) and discussing strategies to mitigate this in future testing.	• Metacognition
VC2CC10M03 – *the development and adaptation of criteria for evaluating the viability and sustainability of proposed solutions in different contexts*	Students develop and adapt criteria to assess the viability and sustainability of their final Rebellious Box design, considering factors such as component cost, durability under repeated activation, environmental impact of materials and the feasibility of scaling up production, and justify their final design recommendation.	• Metacognition

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Rebellious Box – Design and Technologies Curriculum Mapping

In the Rebellious Box project, students engineer an automated device that turns itself off when activated, combining mechanical design, electronics and Arduino/C++ programming. The following tables map this project against the Victorian Curriculum F–10 Version 2.0 Design and Technologies curriculum, for Levels 3–4, 5–6, 7–8 and 9–10. Only content descriptions with a genuine link to the project are included; the Food and fibre production and Food specialisations sub-strands, and content descriptions focused on large-scale industry, cultural or global ethical considerations, have been left out, with a brief note after each table explaining what was excluded and why.

Levels 3 and 4

Table 1: Rebellious Box – Design and Technologies (Level 3–4)

Content Description	Project Application	Strand / Sub-strand
VC2TDE4S01 – *the role of people in design and technologies occupations and factors including sustainability that impact on the design of solutions to meet community needs*	Students consider the role of engineers and product designers who build automated electronic devices, and discuss sustainability factors such as choosing a durable, reusable enclosure material for their Rebellious Box.	• Technologies and Society
VC2TDE4C01 – *describe how forces affect function in a product or system*	Students describe how the force from the servo arm pushing against the switch affects the function of their Rebellious Box, and explore how changing the arm's length or angle changes this force.	• Technologies Contexts – Engineering principles and systems
VC2TDE4C04 – *describe how the properties of materials affect function in a product or system*	Students describe how the properties of their chosen enclosure material — such as its rigidity or weight — affect how well it houses and protects the circuit and mechanism inside.	• Technologies Contexts – Materials and technologies specialisations
VC2TDE4D01 – *explore needs or opportunities for designing and testing materials, components, tools and processes needed to create designed solutions*	Students explore what materials, components and tools they will need to build their Rebellious Box, and test different switch and servo arrangements to see which works best.	• Creating Designed Solutions – Investigating and defining
VC2TDE4D02 – *generate and communicate design ideas and decisions using technical terms and graphical*	Students generate and communicate their design ideas for the Rebellious Box using annotated diagrams that label components such as the switch, servo arm and enclosure.	• Creating Designed Solutions – Generating and designing

Content Description	Project Application	Strand / Sub-strand
representation techniques, using manual and digital tools		
VC2TDE4D03 – *select and use materials, components, tools and techniques to safely make designed solutions*	Students select and safely use materials, components and tools — such as wiring the switch and mounting the servo — to build their Rebellious Box, following safe practices when handling electronic components.	• Creating Designed Solutions – Producing and implementing
VC2TDE4D04 – *use given or predetermined design criteria including sustainability to evaluate design ideas and solutions*	Students use given design criteria, such as reliability and safe operation, to evaluate their Rebellious Box and identify improvements.	• Creating Designed Solutions – Evaluating
VC2TDE4D05 – *sequence steps to individually and collaboratively make designed solutions*	Students sequence the steps needed to build their Rebellious Box, such as assembling the enclosure, wiring the circuit, then programming and testing the device, recording this as a simple plan.	• Creating Designed Solutions – Planning and managing

Not mapped for this project: *VC2TDE4C02 (Food and fibre production) and VC2TDE4C03 (Food specialisations), since neither sub-strand relates to an electronics build.*

Levels 5 and 6

Table 2: Rebellious Box – Design and Technologies (Level 5–6)

Content Description	Project Application	Strand / Sub-strand
VC2TDE6S01 – *how people in design and technologies occupations consider competing ethical factors including sustainability in the design of products, services and environments*	Students consider competing factors engineers face when designing automated devices, such as balancing cost, durability and the environmental impact of the materials used for their Rebellious Box's enclosure.	• Technologies and Society
VC2TDE6C01 – *explain how electrical energy can be transformed into movement, sound or light in a product or system*	Students explain how electrical energy from the battery is transformed into the movement of the servo arm in their Rebellious Box, deconstructing a simple circuit to see how a switch controls this transformation.	• Technologies Contexts – Engineering principles and systems

Content Description	Project Application	Strand / Sub-strand
VC2TDE6C04 – *explain how characteristics and properties of materials, systems, components and tools affect their use when producing designed solutions*	Students explain how the characteristics of their chosen switch, servo and enclosure material affect how they are used and combined to produce a working Rebellious Box.	• Technologies Contexts – Materials and technologies specialisations
VC2TDE6D01 – *investigate needs or opportunities for designing, and the materials, components, tools and processes needed to create designed solutions*	Students investigate the materials, components, tools and processes needed to build a reliable Rebellious Box, testing different switch types and servo arm designs.	• Creating Designed Solutions – Investigating and defining
VC2TDE6D02 – *generate, iterate and communicate design ideas, decisions and processes using technical terms and graphical representation techniques, using manual and digital tools*	Students generate and iterate design ideas for their Rebellious Box, using labelled drawings and digital tools to communicate how the mechanism will work and how their design has changed through testing.	• Creating Designed Solutions – Generating and designing
VC2TDE6D03 – *select, explain and use suitable materials, components, tools and techniques to safely make designed solutions*	Students select and explain their choice of materials, components and tools, and safely use them to assemble the circuit and mechanism for their Rebellious Box.	• Creating Designed Solutions – Producing and implementing
VC2TDE6D04 – *negotiate design criteria that address ethical considerations, including sustainability, to evaluate design ideas, processes and solutions*	Students negotiate design criteria as a class, such as "materials should be reusable" and "the mechanism must not pose a safety risk", and use these to evaluate their Rebellious Box.	• Creating Designed Solutions – Evaluating
VC2TDE6D05 – *develop project plans that include consideration of resources to individually and collaboratively make designed solutions*	Students develop a project plan that identifies the resources, time and roles needed to build their Rebellious Box, whether working individually or in a team.	• Creating Designed Solutions – Planning and managing

Not mapped for this project: *VC2TDE6C02 (Food and fibre production) and VC2TDE6C03 (Food specialisations).*

Levels 7 and 8

Table 3: Rebellious Box – Design and Technologies (Level 7–8)

Content Description	Project Application	Strand / Sub-strand
VC2TDE8C01 – *analyse how force, motion and energy are used to manipulate and control engineered systems that are ethical*	Students analyse how force, motion and energy are used to control their Rebellious Box's mechanism, programming a microcontroller to control the servo's response to the switch and testing the durability of their battery over repeated activations.	• Technologies Contexts – Engineering principles and systems
VC2TDE8C04 – *analyse how characteristics and properties of tools, materials, systems and components can be selected, manipulated and combined to create designed solutions that are ethical*	Students analyse how the properties of their chosen materials, switch and servo can be combined to create a reliable, safe Rebellious Box, considering the durability and safety implications of their component choices.	• Technologies Contexts – Materials and technologies specialisations
VC2TDE8D01 – *explain needs or opportunities for designing, and investigate and select tools, materials, processes and components to create designed solutions*	Students explain the need their Rebellious Box addresses (an engaging, reliable automated mechanism) and investigate and select appropriate tools, materials, processes and components to meet this need.	• Creating Designed Solutions – Investigating and defining
VC2TDE8D02 – *generate, test, iterate and communicate design ideas, processes and solutions using technical terms and graphical representation techniques and appropriate attributions, using manual and digital tools*	Students generate, test and iterate their Rebellious Box design, using annotated sketches and digital tools to communicate their process and attributing any external circuit designs or code they referenced.	• Creating Designed Solutions – Generating and designing
VC2TDE8D03 – *select, justify and use suitable tools, materials, processes and components to*	Students select and justify their choice of components — experimenting with resistors, switches and the servo to understand how the circuit functions and how to troubleshoot issues — and use safe working practices throughout.	• Creating Designed Solutions – Producing and implementing

Content Description	Project Application	Strand / Sub-strand
safely make designed solutions		
VC2TDE8D04 – *collaboratively develop design criteria that include ethical considerations to evaluate design ideas, processes and solutions*	Students collaboratively develop design criteria for their Rebellious Box, such as response reliability and safety, and iterate their design based on evaluation — for example, modifying the sensitivity of their switch-detection logic to reduce false triggers.	• Creating Designed Solutions – Evaluating
VC2TDE8D05 – *develop project plans to individually, collaboratively and in teams manage time, cost and production of designed solutions*	Students develop a project plan for building their Rebellious Box that manages time, cost and production steps, adjusting the plan as needed when testing reveals issues.	• Creating Designed Solutions – Planning and managing

Not mapped for this project: *VC2TDE8S01 and VC2TDE8S02 (Technologies and Society), which focus on broad ethical, cultural and industry-level considerations (such as biomimicry-driven manufacturing or Indigenous cultural and intellectual property) that don't meaningfully connect to a classroom electronics project; and VC2TDE8C02/C03 (Food and fibre production, Food specialisations).*

Levels 9 and 10

Table 4: Rebellious Box – Design and Technologies (Level 9–10)

Content Description	Project Application	Strand / Sub-strand
VC2TDE10C01 – *analyse and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to control engineered systems that are ethical*	Students analyse and make judgements on how the properties of their chosen materials, combined with the force and motion of the servo arm, control their Rebellious Box's mechanism, and justify their final design choices.	• Technologies Contexts – Engineering principles and systems
VC2TDE10C04 – *analyse and make judgements on how characteristics and properties of materials, systems, components and tools can be combined to create designed solutions that are ethical*	Students analyse and make judgements on how their chosen materials, switch, servo and control circuit are combined to create a safe, reliable Rebellious Box, justifying their final component selections.	• Technologies Contexts – Materials and technologies specialisations
VC2TDE10D01 – *analyse needs or*	Students analyse the need their Rebellious Box addresses, develop a design brief, and investigate,	• Creating Designed Solutions –

Content Description	Project Application	Strand / Sub-strand
opportunities for designing; develop design briefs; and investigate, analyse and select materials, systems, components and tools to create designed solutions	analyse and select appropriate materials, systems, components and tools to meet it.	Investigating and defining
VC2TDE10D02 – *apply innovation and enterprise skills to generate, test, iterate and communicate design ideas, processes and solutions, using technical terms and graphical representation techniques and appropriate attributions, using manual and digital tools*	Students apply innovation skills to generate, test and iterate original design ideas for their Rebellious Box, considering competing variables such as reliability, cost and build time, and communicate their process with appropriate attributions.	• Creating Designed Solutions – Generating and designing
VC2TDE10D03 – *select, justify, test and use suitable technologies, including processes and skills, and apply safety procedures to safely make designed solutions*	Students select, justify and test suitable materials, components and processes for their Rebellious Box, applying safety procedures throughout production and considering alternatives that maximise reliability.	• Creating Designed Solutions – Producing and implementing
VC2TDE10D04 – *develop design criteria including sustainability to evaluate design ideas, processes and solutions*	Students develop specific design criteria for their Rebellious Box, such as an acceptable failure rate across repeated activations, and make judgements about whether their design meets these criteria after testing.	• Creating Designed Solutions – Evaluating
VC2TDE10D05 – *develop project management plans for intended purposes and audiences to individually and collaboratively and in teams manage projects, taking into consideration time, cost, risk, processes and production of designed solutions*	Students develop a project management plan for building their Rebellious Box that accounts for time, cost, risk and production steps, adjusting the plan as needed and reflecting on their management of the project.	• Creating Designed Solutions – Planning and managing

Not mapped for this project: *VC2TDE10S01 and VC2TDE10S02 (Technologies and Society), which focus on large-scale, global and industry-level ethical considerations (such as Indigenous cultural and intellectual property, biomimicry-driven manufacturing and commercial enterprise trends) that don't meaningfully connect to a classroom electronics project; and VC2TDE10C02/C03 (Food and fibre production, Food specialisations).*

Rebellious Box – Digital Technologies Curriculum Mapping

In the Rebellious Box project, students engineer an automated device that turns itself off when activated, combining mechanical design, electronics and Arduino/C++ programming. The following tables map this project against the Victorian Curriculum F–10 Version 2.0 Digital Technologies curriculum, for Levels 3–4, 5–6, 7–8 and 9–10. Only content descriptions with a genuine link to the project are included; content descriptions about networking, cyber security, accounts/passwords, spreadsheets, databases, digital footprints and user-interface/experience design have largely been left out, since the Rebellious Box is a standalone offline device with no screen and no data-handling component, with a brief note after each table explaining what was excluded and why. Note also that Arduino/C++ is a text-based, general-purpose programming language: at Levels 3–4 and 5–6, where the curriculum expects a visual programming language, the underlying algorithmic concepts (branching, iteration, input) are genuinely present in this project, but the implementation exceeds what's typically expected at those levels.

Levels 3 and 4

Table 1: Rebellious Box – Digital Technologies (Level 3–4)

Content Description	Project Application	Strand / Sub-strand
VC2TDI4S01 – *explore and describe a range of digital systems and their peripherals for a variety of purposes*	Students explore the Arduino microcontroller as a digital system and identify the switch and servo motor as peripherals connected to it, describing how each expands what the system can sense and do.	• Digital Systems and Security
VC2TDI4C01 – *define simple problems with teacher-provided requirements*	Students define the problem of building a device that reliably switches itself off when activated, using teacher-provided requirements such as "the box must detect when the switch is turned on and respond within a few seconds."	• Creating Digital Solutions
VC2TDI4C02 – *follow, describe and represent algorithms involving sequencing, comparison operators (branching) and iteration*	Students describe and represent the algorithm behind their Rebellious Box as a sequence of steps involving a branching decision (checking whether the switch is on) that leads to the servo moving to flip it off.	• Creating Digital Solutions
VC2TDI4C04 – *implement simple algorithms as visual programs involving control structures and input*	Students implement their switch-detection algorithm in Arduino/C++ code that reads input from the switch and uses a control structure to decide when to move the servo. This is written as text-based code rather than a visual program, going beyond the typical visual-programming expectation at this level while covering the same underlying concepts of input and branching.	• Creating Digital Solutions
VC2TDI4C05 – *discuss how existing*	Students discuss whether their Rebellious Box satisfies the given requirements by testing how	• Creating Digital Solutions

Content Description	Project Application	Strand / Sub-strand
and student-created solutions satisfy the given requirements	reliably and quickly it responds when the switch is activated.	

Not mapped for this project: *VC2TDI4S02 (transmitting data between digital systems) and VC2TDI4S03 (memorised passwords), since the Rebellious Box is a standalone offline device with no data transmission or account access; VC2TDI4D01–D05 (Data, Information and Privacy), since the project doesn't involve collecting, representing or sharing data, or personal accounts; and VC2TDI4C03 (designing a user interface), since the box has no screen or app-style interface for students to design.*

Levels 5 and 6

Table 2: Rebellious Box – Digital Technologies (Level 5–6)

Content Description	Project Application	Strand / Sub-strand
VC2TDI6S01 – *investigate the main internal components of common digital systems and their function*	Students investigate the main components of their Arduino board — the microcontroller, memory and input/output pins — and explain how these work together to read the switch state and control the servo.	• Digital Systems and Security
VC2TDI6D01 – *explain how digital systems represent all data using numbers and explore how data can be represented using binary*	Students demonstrate that the on/off state of their switch circuit represents the digits 1 and 0, and explain how this binary representation is how their Arduino recognises whether the switch has been activated.	• Data, Information and Privacy
VC2TDI6C01 – *define problems with teacher-provided or co-developed functional requirements*	Students co-develop functional requirements for their Rebellious Box as a class, such as specifying the maximum acceptable response time and the reliability expected across repeated activations.	• Creating Digital Solutions
VC2TDI6C02 – *design and represent algorithms involving multiple alternatives (branching) and iteration*	Students design an algorithm with multiple alternatives, such as checking the switch state and choosing between different servo movements depending on how long the switch has been on, and represent this as a diagram before coding it.	• Creating Digital Solutions
VC2TDI6C04 – *implement algorithms as visual programs involving control structures, variables and input*	Students implement their branching algorithm in Arduino/C++ using variables to store the switch state and control structures to decide the servo's response. As at Level 3–4, this is implemented as text-based code rather than a visual program, extending beyond the typical expectation at this level.	• Creating Digital Solutions
VC2TDI6C05 – *evaluate existing and student-created*	Students evaluate their Rebellious Box against the class's agreed requirements and discuss its broader impact, such as whether a device designed to be	• Creating Digital Solutions

Content Description	Project Application	Strand / Sub-strand
solutions against the requirements and their broader community impact	deliberately unhelpful has any genuine usefulness or is purely for entertainment.	

Not mapped for this project: *VC2TDI6S02 (networks) and VC2TDI6S03 (passphrases), since the device doesn't connect to a network or use accounts; VC2TDI6D02–D06, since the project doesn't involve spreadsheets, data visualisation, shared online content or a digital footprint; and VC2TDI6C03 (user interface design), since there's no screen or app interface.*

Levels 7 and 8

Table 3: Rebellious Box – Digital Technologies (Level 7–8)

Content Description	Project Application	Strand / Sub-strand
VC2TDI8S01 – *explain how hardware specifications affect performance and select appropriate hardware for particular tasks and workloads*	Students compare the specifications of different microcontroller boards and servo motors, and select appropriate hardware for their Rebellious Box based on factors such as processing speed, number of input/output pins and torque.	• Digital Systems and Security
VC2TDI8C01 – *define and decompose real-world problems by taking into account functional requirements and constraints*	Students decompose the problem of building a reliable Rebellious Box into smaller parts — detecting the switch, timing the response, and controlling the servo — and define functional requirements and constraints such as response time and power consumption.	• Creating Digital Solutions
VC2TDI8C02 – *design algorithms involving nested control structures and represent them using flowcharts and pseudocode, and use tracing techniques to test and identify errors*	Students design their switch-detection and servo-control logic using nested control structures, represent this as a flowchart, and trace through their algorithm by hand to identify errors before testing it on the actual hardware.	• Creating Digital Solutions
VC2TDI8C04 – *implement, modify and debug programs involving control structures and functions in a general-purpose programming language*	Students implement, modify and debug their Rebellious Box code in Arduino/C++, a general-purpose programming language, writing a program that receives input from the switch and changes its behaviour accordingly — directly analogous to a program that reads a sensor and switches a device on or off.	• Creating Digital Solutions
VC2TDI8C05 – *evaluate existing and student-created*	Students evaluate their Rebellious Box against its functional requirements and constraints, and consider possible future impacts of automated switch-off	• Creating Digital Solutions

Content Description	Project Application	Strand / Sub-strand
solutions against the requirements, constraints and possible future impacts	devices, such as their use in safety systems or energy-saving technology.	

Not mapped for this project: *VC2TDI8S02 (wired/wireless network security) and VC2TDI8S03 (multi-factor authentication, phishing), since the device is offline and doesn't use accounts; VC2TDI8D01–D06 (Data, Information and Privacy), since the project doesn't involve acquiring, validating or visualising data sets, or managing a digital footprint; and VC2TDI8C03 (user interface/experience design), since there's no screen-based interface.*

Levels 9 and 10

Table 4: Rebellious Box – Digital Technologies (Level 9–10)

Content Description	Project Application	Strand / Sub-strand
VC2TDI10C01 – *define and decompose real-world problems, taking into account functional and non-functional requirements and by interviewing and surveying stakeholders to identify needs*	Students define and decompose the problem of building a reliable Rebellious Box, specifying functional requirements (must detect activation and respond) and non-functional requirements (such as reliability and response time), and gather feedback from classmates on what would make the device more engaging.	• Creating Digital Solutions
VC2TDI10C02 – *design algorithms involving logical operators and represent them as flowcharts and pseudocode, and validate algorithms and programs by comparing their output against a range of test cases*	Students use logical operators such as AND and OR to combine conditions in their switch-detection algorithm, represent this using pseudocode, and validate their program by comparing its output against a range of test cases, such as rapid switch toggling or a low battery.	• Creating Digital Solutions
VC2TDI10C04 – *implement, modify and debug modular programs, applying selected algorithms and data structures, including in an object-oriented programming language*	Students structure their Rebellious Box code into modular functions for reading the switch, controlling the servo and managing timing, and where appropriate define simple classes or structs to model the device's behaviour — noting that fully object-oriented design goes beyond what a typical Rebellious Box implementation requires unless the project is extended.	• Creating Digital Solutions
VC2TDI10C05 – *evaluate existing and student-created*	Students evaluate their Rebellious Box against its requirements and design criteria, gather feedback on user experience, and discuss potential enterprise	• Creating Digital Solutions

Content Description	Project Application	Strand / Sub-strand
solutions against the requirements and design criteria, user needs, possible future impact and opportunities for enterprise and innovation	opportunities, such as producing and selling a novelty version of the device.	

Not mapped for this project: *VC2TDI10S01 (hardware/software managing access to data in networked systems, including IoT) and VC2TDI10S02 (cyber security threat modelling), since the Rebellious Box is a standalone, offline device with no network connection or data access to secure; VC2TDI10D01–D07 (Data, Information and Privacy), since the project doesn't involve data compression, structured documents, databases or a digital footprint; and VC2TDI10C03 (user interface/experience design), since there's no screen-based interface to prototype.*

EBK ACADEMY

Rebellious Box – Science Curriculum Mapping

In the Rebellious Box project, students engineer an automated device that turns itself off when activated, combining mechanical design, electronics and Arduino/C++ programming. The following tables map this project against the Victorian Curriculum F–10 Version 2.0 Science curriculum, for Levels 3–4, 5–6, 7–8 and 9–10. Only content descriptions with a genuine link to the project are included; content descriptions from strands and sub-strands that don't meaningfully connect to the build (for example, most of Biological sciences, Chemical sciences beyond circuits, and Earth and space sciences) have been left out, with a brief note after each table explaining what was excluded and why.

Levels 3 and 4

Table 1: Rebellious Box – Science (Level 3–4)

Content Description	Project Application	Strand / Sub-strand
VC2S4H01 – *data from observations obtained through scientific inquiry can be used to develop explanations of natural phenomena*	Students collect data from repeated tests of their Rebellious Box, such as recording how many times out of ten the servo arm successfully flips the switch off, and use this data to explain why their design does or doesn't work reliably.	• Science as a Human Endeavour – Nature and development of science
VC2S4H02 – *scientific knowledge, skills and data can be used by people to explain how they will meet a need or solve a problem*	Students explain how their knowledge of forces and simple circuits was used to solve the problem of building a device that reacts to being switched on, in the same way that engineers apply scientific knowledge to design solutions for everyday problems.	• Science as a Human Endeavour – Use and influence of science
VC2S4U10 – *forces, including frictional, gravitational, electrostatic and magnetic, can be exerted by one object on another through direct contact or from a distance and affect the motion (speed and direction) of objects*	Students identify the forces acting on the servo arm as it pushes against the switch, including the direct contact force from the arm and the friction between the arm and the switch, and describe how these forces change the switch's position and motion.	• Science Understanding – Physical sciences
VC2S4I01 – *observations can be used as a basis for posing questions to identify patterns and relationships, and to predict the outcomes of investigations*	Students pose questions based on their observations of the box's behaviour, such as "Does a larger servo angle always flip the switch off faster?", and use these questions to predict the outcome of changing the servo's movement.	• Science Inquiry – Questioning and predicting

Content Description	Project Application	Strand / Sub-strand
VC2S4I02 – *scientific investigations to answer questions or test predictions can be planned and conducted using provided scaffolds, including identifying the attributes of fair tests, and considering the safe use of materials and equipment*	Students use a provided scaffold to plan a fair test of their switch-detection design, keeping the servo angle the same while changing only the distance of the switch, and follow safe practices when handling the battery and wiring.	• Science Inquiry – Planning and conducting
VC2S4I03 – *observations, including formal measurements, can be made and recorded by following procedures to use familiar scaled instruments and digital tools as appropriate*	Students use a stopwatch to measure and record how many seconds it takes for the arm to flip the switch off after activation, repeating the measurement several times to check for consistency.	• Science Inquiry – Planning and conducting
VC2S4I04 – *data and information can be organised and represented to identify patterns and simple relationships by constructing tables, graphs and visual or physical models*	Students construct a table recording the servo angle used and whether the switch was successfully flipped, and use this table to identify which angle produces the most reliable result.	• Science Inquiry – Processing, modelling and analysing
VC2S4I05 – *findings can be compared to those of others, including, as appropriate, whether a test was fair or not, to enable conclusions to be drawn, and may lead to the identification of further questions for investigation*	Students compare their test results with a partner group's results for the same servo angle, discuss whether either test was unfair (for example, due to different battery charge levels), and pose further questions about what else might affect reliability.	• Science Inquiry – Evaluating
VC2S4I06 – *observations, findings and ideas can be communicated for an identified purpose and audience by using scientific vocabulary and digital tools as appropriate*	Students communicate their findings about their Rebellious Box's performance to their class, using scientific vocabulary such as "force" and "motion" and simple diagrams to explain how the switch is activated and turned off.	• Science Inquiry – Communicating

Not mapped for this project: *VC2S4U09 (heat energy and temperature change), since the project doesn't meaningfully involve heat transfer; and the Biological, Chemical, and Earth and space sciences content descriptions (VC2S4U01–U08), which cover living things, life cycles, food chains, states of matter, Earth resources, the water cycle and weather/climate — none of which the Rebellious Box's electrical and mechanical build draws on.*

Levels 5 and 6

Table 2: Rebellious Box – Science (Level 5–6)

Content Description	Project Application	Strand / Sub-strand
VC2S6H02 – *scientific knowledge, skills and data can be used by individuals and communities to identify problems, consider responses and make decisions*	Students research how communities use motion sensors and automated switches to turn off streetlights and outdoor lighting, and compare this real-world application of automatic switching to the working principle behind their own Rebellious Box.	• Science as a Human Endeavour – Use and influence of science
VC2S6U09 – *materials may be electrical insulators or conductors; energy can be transferred and transformed in electrical circuits where the components of a circuit play particular roles in the function of the circuit*	Students identify the necessary components of their Rebellious Box's circuit — a battery as the energy source, conducting wires, and a switch — and explain the specific role each component plays, including how the switch controls whether electricity can flow to the motor.	• Science Understanding – Physical sciences
VC2S6I01 – *investigable questions and reasoned predictions can be used in guiding investigations to identify patterns and test relationships*	Students pose an investigable question such as "Does the type of switch affect how reliably the circuit turns off?" and make a reasoned prediction based on their understanding of conductors and circuit components.	• Science Inquiry – Questioning and predicting
VC2S6I02 – *repeatable scientific investigations to answer questions can be planned and conducted, including, as appropriate, deciding the variables to be changed, measured and controlled in fair tests, considering potential risks, planning for the safe and ethical use of*	Students plan a repeatable investigation into servo response reliability, identifying the servo angle as the variable to change, the success rate as the variable to measure, and factors such as battery charge to keep constant, while identifying electrical safety risks associated with handling the battery and wiring.	• Science Inquiry – Planning and conducting

Content Description	Project Application	Strand / Sub-strand
equipment and materials		
VC2S6I03 – *equipment can be used to observe, generate, measure and record data with reasonable precision for repeated measurements, using digital tools as appropriate*	Students use a multimeter to record the voltage supplied by their battery and the current drawn by the servo motor, using standard units, and record repeated measurements to check for precision.	• Science Inquiry – Planning and conducting
VC2S6I04 – *data and information can be organised and processed to show patterns, trends and relationships by constructing representations including tables, graphs and visual or physical models*	Students construct a circuit diagram of their Rebellious Box using accepted conventions, showing the direction of electricity flow from the battery through the switch to the motor.	• Science Inquiry – Processing, modelling and analysing
VC2S6I05 – *methods and findings can be compared with those of others to identify sources of error, to select evidence in support of reasoned explanations and conclusions, and to develop further questions for investigation*	Students compare their circuit's reliability data with another group's, identifying possible sources of error such as loose wiring or inconsistent battery charge, and use this comparison to refine their conclusions about which design works best.	• Science Inquiry – Evaluating
VC2S6I06 – *scientific ideas, findings, patterns, trends and relationships can be communicated for a specific purpose and audience, using various presentation formats, scientific vocabulary and digital tools as appropriate*	Students construct a short report or poster explaining how their circuit works, using appropriate scientific vocabulary such as "conductor", "insulator" and "circuit", to share with a younger class audience.	• Science Inquiry – Communicating

Not mapped for this project: *VC2S6U08 (light, shadows, reflection and refraction), since the project has no optical elements; VC2S6H01 (scientific knowledge changing over time through collaboration), which is a weak fit for a single build project; and the Biological, remaining Chemical, and Earth and space sciences content descriptions (VC2S6U01–U07), covering habitats, adaptation, particle models of matter, geological processes and the solar system.*

Levels 7 and 8

Table 3: Rebellious Box – Science (Level 7–8)

Content Description	Project Application	Strand / Sub-strand
VC2S8U13 – *simple machines, including the lever, inclined plane, wedge, pulley, screw, and wheel and axle, alter the direction and magnitude of forces*	Students identify the servo arm in their Rebellious Box as a lever, and investigate how changing the length of the arm or its pivot point alters the force needed to flip the switch, similar to identifying simple machines within a Rube Goldberg-style device.	• Science Understanding – Physical sciences
VC2S8U14 – *balanced and unbalanced forces acting on objects, including gravitational force, may be investigated and represented using force diagrams; changes in an object's motion can be related to its mass and the magnitude and direction of the forces acting on it*	Students draw force diagrams representing the forces acting on the switch as the servo arm makes contact, analysing how an unbalanced force from the arm changes the switch's position, and consider how the arm's mass and the applied force affect how quickly it moves.	• Science Understanding – Physical sciences
VC2S8U15 – *energy exists in different forms, including thermal, chemical, gravitational and elastic, and may be classified as kinetic or potential; energy transfers and transformations occur in simple systems and can be analysed in terms of energy efficiency*	Students trace the energy transformations in their Rebellious Box, from the chemical energy stored in the battery to the electrical energy in the circuit to the kinetic energy of the moving servo arm, and discuss where energy is lost as heat during this process.	• Science Understanding – Physical sciences
VC2S8U17 – *electrical circuits transfer energy when current flows and can be designed for diverse purposes using different components; the operation of circuits can be explained using the concepts of voltage and current*	Students explain how voltage and current in their circuit determine how quickly and reliably the servo motor responds, and compare their circuit design to how switches and sensors are used more broadly in robotics and control devices.	• Science Understanding – Physical sciences

Content Description	Project Application	Strand / Sub-strand
VC2S8I01 – *investigable questions, reasoned predictions and hypotheses can be developed in guiding investigations to identify patterns, test relationships and analyse and evaluate scientific models*	Students develop a hypothesis such as "A longer servo arm will require less rotation to flip the switch" and design an investigation to test this relationship.	• Science Inquiry – Questioning and predicting
VC2S8I02 – *reproducible investigations to answer questions and test hypotheses can be planned and conducted, including identifying independent, dependent and controlled variables where applicable, stating assumptions, recognising and managing risks*	Students plan a reproducible investigation into servo reliability, identifying servo angle as the independent variable, success rate as the dependent variable, and battery charge and switch type as variables to control, while identifying and managing electrical safety risks.	• Science Inquiry – Planning and conducting
VC2S8I03 – *equipment can be selected and used to generate and record data with attention to precision, using digital tools as appropriate*	Students select appropriate equipment, such as a multimeter and a stopwatch, to record voltage, current and response time with precision, recording data in a spreadsheet.	• Science Inquiry – Planning and conducting
VC2S8I04 – *data and information can be organised and processed by selecting and constructing representations including tables, graphs, keys, models and mathematical relationships*	Students construct a graph comparing servo angle against response time across multiple trials, and use this representation to identify the relationship between the two variables.	• Science Inquiry – Processing, modelling and analysing
VC2S8I05 – *information and processed data can be analysed to show patterns, trends and relationships, and to identify anomalies*	Students analyse their response-time data to identify trends, such as whether increasing the servo angle consistently decreases response time, and investigate any anomalous results that don't fit the pattern.	• Science Inquiry – Processing, modelling and analysing
VC2S8I06 – *scientific methods, conclusions and claims can be*	Students evaluate their testing method for possible sources of error, such as inconsistent battery charge or manual timing errors, and discuss how confident they	• Science Inquiry – Evaluating

Content Description	Project Application	Strand / Sub-strand
analysed to identify assumptions, possible sources of error, conflicting evidence and unanswered questions	can be in their conclusions about which design is most reliable.	
VC2S8I07 – *evidence-based arguments can be constructed to support conclusions or evaluate claims, including consideration of ethical issues and protocols associated with using or citing secondary data or information*	Students construct an evidence-based argument for their final circuit design, citing their own testing data and referencing manufacturer specifications for their servo and switch components.	• Science Inquiry – Evaluating
VC2S8I08 – *communicating ideas, findings and arguments for specific purposes and audiences involves the selection and use of appropriate presentation formats, scientific vocabulary, models and other representations, and may include the use of digital tools*	Students create a presentation explaining the forces, energy transformations and circuit operation of their Rebellious Box for a technical audience, using appropriate scientific vocabulary, diagrams and data.	• Science Inquiry – Communicating

Not mapped for this project: *VC2S8U16 (household energy audits), which doesn't apply to a small battery-powered device; all four Science as a Human Endeavour content descriptions (VC2S8H01–H04), since they focus on the history, philosophy and socio-scientific dimensions of science rather than applied circuit or mechanical design; and the Biological, remaining Chemical, and Earth and space sciences content descriptions (VC2S8U01–U12), covering cells, ecosystems, particle theory of matter, plate tectonics and astronomy.*

Levels 9 and 10

Table 4: Rebellious Box – Science (Level 9–10)

Content Description	Project Application	Strand / Sub-strand
VC2S10U14 – *wave and particle models can be used to describe energy transfer (conduction, convection and radiation) through different media; waves (electromagnetic and*	Students use the particle model of electricity to explain how current flows through their circuit when the switch is closed, relating this to voltage and the role of conductors and insulators in their design.	• Science Understanding – Physical sciences

Content Description	Project Application	Strand / Sub-strand
mechanical) have different properties, features (including amplitude, wavelength, frequency and speed) and applications		
VC2S10U15 – *the Law of Conservation of Energy can be analysed in systems, including Earth systems, by assessing the efficiency of energy inputs, outputs, transfers and transformations*	Students apply the Law of Conservation of Energy to their Rebellious Box, analysing how chemical energy from the battery is transformed into electrical, then kinetic and some wasted heat energy, and assess where efficiency could be improved.	• Science Understanding – Physical sciences
VC2S10U17 – *Newton's laws of motion can be used to quantitatively analyse the relationship between force, mass and acceleration of objects*	Students use Newton's laws to quantitatively analyse how the force applied by the servo relates to the mass and acceleration of the arm, in the same way engineers apply Newton's laws to analyse the motion of autonomous or automated mechanical systems.	• Science Understanding – Physical sciences
VC2S10I01 – *investigable questions, reasoned predictions and hypotheses can be used in guiding investigations to test and develop explanatory models and relationships*	Students develop a hypothesis about the relationship between servo torque and the mass of the switch mechanism, and design an investigation to test it.	• Science Inquiry – Questioning and predicting
VC2S10I02 – *valid, reproducible investigations to answer questions and test hypotheses can be planned and conducted, including identifying and controlling for possible sources of error and bias in sampling or in making observations; safe, ethical investigations include undertaking risk assessments*	Students plan a valid, reproducible investigation into circuit reliability, identifying and controlling for possible sources of error such as inconsistent battery voltage, and complete a risk assessment for working with electrical components.	• Science Inquiry – Planning and conducting
VC2S10I03 – *equipment can be selected and used to*	Students determine an appropriate sample size for their reliability testing (for example, running at least	• Science Inquiry – Planning and conducting

Content Description	Project Application	Strand / Sub-strand
generate and record data sets that show precision, including consideration of sample size and using digital tools as appropriate	twenty trials) and use a multimeter and digital timer to record data with precision.	
VC2S10I04 – *data and information can be organised, processed and summarised by selecting and constructing representations including tables, graphs, descriptive statistics, models, symbols, formulas and mathematical relationships*	Students calculate descriptive statistics, such as the mean and range of their response-time measurements, and represent their energy transformation data using a Sankey diagram.	• Science Inquiry – Processing, modelling and analysing
VC2S10I05 – *information and processed data can be analysed and compared to identify and explain qualitative and quantitative patterns, trends, relationships and anomalies*	Students compare their experimental data on circuit efficiency with published specifications for their components, identifying trends and any anomalies that require further explanation.	• Science Inquiry – Processing, modelling and analysing
VC2S10I06 – *the validity and reproducibility of investigation methods and the validity of conclusions and claims can be evaluated, including by identifying assumptions, conflicting evidence, biases that may influence observations and conclusions, sources of error and areas of uncertainty*	Students evaluate the validity of their investigation into servo reliability, identifying assumptions such as consistent battery voltage across trials and discussing areas of uncertainty in their measurements.	• Science Inquiry – Evaluating
VC2S10I07 – *arguments based on a variety of evidence can be constructed to support conclusions or evaluate claims, including*	Students construct an evidence-based argument for their final design choice, drawing on their own testing data and citing manufacturer datasheets for their components.	• Science Inquiry – Evaluating

Content Description	Project Application	Strand / Sub-strand
consideration of any ethical issues and cultural protocols associated with accessing, using or citing secondary data or information		
VC2S10I08 – *communicating and justifying scientific ideas, findings and arguments for diverse audiences involves the selection of appropriate presentation formats, content, scientific vocabulary, conventions, models and other representations, and may include the use of digital tools*	Students prepare a technical report justifying their final circuit and mechanism design, using appropriate scientific vocabulary, formulas and data representations for an audience of peers or industry mentors.	• Science Inquiry – Communicating

Not mapped for this project: *VC2S10U16 (electricity generation via AC turbines or DC photovoltaic cells), which concerns large-scale power generation methods rather than a simple battery-powered circuit; all four Science as a Human Endeavour content descriptions (VC2S10H01–H04), which focus on the contestability, history and societal influence of scientific knowledge rather than applied circuit design; and the Biological, remaining Chemical, and Earth and space sciences content descriptions (VC2S10U01–U13), covering reproduction, genetics, atomic structure, the periodic table, chemical reactions, the carbon cycle, climate change and astronomy.*