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Recommendation Guide

Introduction: What is SumIt Maths Studio

SumIt Maths Studio is an accessible mathematics and science software environment designed to support disabled students who experience barriers to entering, interpreting, navigating and working with mathematical and scientific notation.

Mathematical and scientific notation can present distinct accessibility barriers because meaning is communicated not only through individual characters but through symbols, spatial arrangement and structure. Fractions, superscripts, subscripts, roots, summations, multi-line equations, chemical notation and graphs can therefore remain difficult to access and work with even where a student is able to use standard text-based software.

SumIt Maths Studio brings together a range of ways to enter, access, review and work with mathematical, scientific and chemistry notation. Rather than requiring the student to use one fixed method, it provides different ways of working with the same content. Students can:

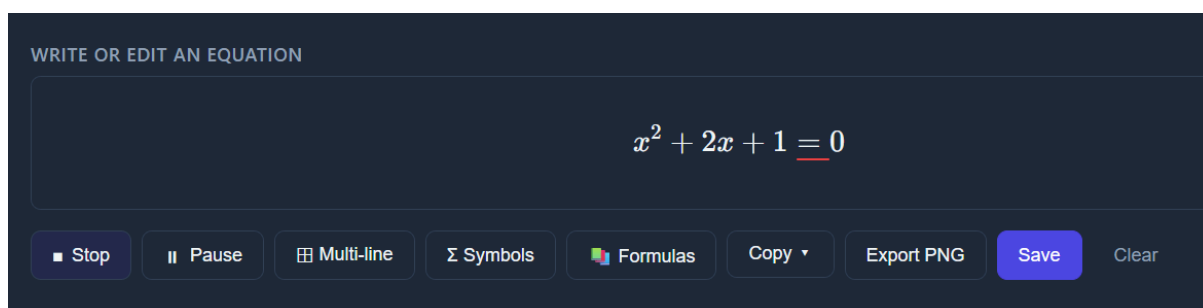
- **Type mathematical notation directly** using a live mathematical editor. Autocomplete can suggest relevant symbols and structures as the student enters information, while an on-screen mathematical keyboard, symbol palettes and a searchable formula library provide additional ways to find and insert mathematical content.
- **Dictate an equation using speech**, providing an alternative way to enter mathematical content.
- **Handwrite an equation** using a finger, stylus or trackpad and have the handwriting recognised and converted into mathematical notation.
- **Recognise mathematical content from an image**. An equation can be uploaded, pasted, dragged and dropped, or photographed, allowing existing mathematical content to be converted into editable notation rather than manually reproduced.
- **Listen to an equation being read aloud**. SumIt Maths Studio converts the mathematical notation into a spoken description so that the student can hear the structure of the equation.
- **Follow synchronised highlighting while an equation is spoken**. The corresponding parts of the equation are highlighted as they are read aloud, helping the student maintain their position and connect the spoken description with the relevant mathematical structure.
- **Review the same equation in different forms**. The student can view it as rendered mathematical notation, LaTeX, MathML or a visible plain-English description showing how the equation is verbalised. This provides different ways to access, inspect and check the same content.
- **Use a scientific calculator** within the same environment for scientific calculations.

- **Create and explore graphs** in Cartesian, polar and parametric forms. Audio Trace can also provide an auditory representation of a plotted curve, offering an additional way to explore graphical information.
- **Work with mathematical, physics and chemistry notation**, including specialist symbols and structures.
- **Save equations and return to them later.** History and saved equations are held on the student's device, allowing work to be paused, revisited and reused.
- **Copy or export work in different formats**, including LaTeX, MathML and PNG, or copy content to the clipboard for use elsewhere.
- **Use a high-contrast, accessible interface** with keyboard access, screen-reader support and other accessibility features designed to reduce barriers to navigating and operating the software.
- **Offline availability.** No account; local work and preferences; offline operation once loaded.

The benefit of bringing these functions together is that a student does not have to rely on one fixed way of working with mathematical and scientific content. The same information can be entered through typing, speech, handwriting, image recognition, symbols or formula selection; accessed through visual, auditory and text-based representations; and then reviewed, calculated, graphed, saved or exported within the same environment. This allows the student to use the method, or combination of methods, that best reduces the particular disability-related barriers they experience.

Essentially, SumIt Maths Studio is designed to provide more than one route into and through mathematical content. This is particularly relevant where disability affects a student's ability to rely consistently on a single method of input, such as sustained typing, handwriting, mouse use or visual interpretation of notation. It is designed to support learners who need flexible, accessible ways to create, explore and understand mathematical notation. It works across all major devices, requires no account, and continues to function offline once loaded.

A key accessibility function is Read Aloud. SumIt Maths Studio converts mathematical notation into structured spoken English and synchronises the speech with visual highlighting of the corresponding part of the rendered equation. Individual elements such as variables, numbers and operators are underlined as they are spoken, while larger mathematical structures such as fractions, roots and sums are outlined. The student can also review the complete spoken representation separately before or after listening. The graphing environment includes an audio trace function for sonification and can read aloud descriptions of plotted functions.



Accessibility

SumIt Maths Studio helps individuals with disabilities access, create, understand, hear, draw, explore and communicate maths independently. Disability-related barriers vary between students and may also fluctuate for an individual over time. SumIt Maths Studio's design acknowledges this by providing multiple complementary methods of accessing the same mathematical information, allowing the software to be adapted to the individual rather than requiring the individual to adapt to the software

Students can select the approach that best reduces the impact of their disability. The accessibility challenge for many disabled students is not limited to entering mathematical notation. Students may also experience barriers when reviewing, checking, navigating, interpreting or revisiting symbolic information. SumIt Maths Studio has been designed to support each stage of this process.

For many disabled students, the most appropriate method of interaction may change according to pain, fatigue, concentration, cognitive overload or dexterity. SumIt Maths Studio enables the student to move between different methods of input and access without recreating the work. Rather than adapting to one fixed method of working, students can work more independently by selecting the combination of input, review and accessibility features that best supports their learning and participation.

The software can be operated by keyboard, with shortcuts, visible focus, managed focus in pop-up windows and a skip-to-content link. Screen readers receive automatic updates and structured mathematical information through MathML. SumIt Maths Studio also respects reduced-motion settings, offers WCAG AA contrast themes and uses larger touch targets to support visual, sensory and fine-motor access needs.

Essentially, SumIt Maths Studio has been designed around a broader disability-access question: how can the same mathematical or scientific information be made accessible to a student who may experience barriers not only when entering it, but also when perceiving, processing, navigating, reviewing and checking it?

This distinction is important. A disabled student may be able to create an equation but still experience substantial difficulties working with it. For example, a student may:

- lose their position within dense or multi-level notation;
- find it difficult to process several mathematical elements at once;
- need an equation presented through more than one sensory or representational route;
- experience physical or mental fatigue that makes one fixed way of working difficult to sustain;
- be unable to rely consistently on a mouse, touchscreen, handwriting, speech or another single input method;
- require graphical information in a form that is not exclusively visual;
- need to stop and resume work because of pain, fatigue, brain fog or fluctuating symptoms; or

- experience cognitive or sensory overload when required to move repeatedly between different applications and workflows.

A student can change not only how mathematical content is entered, but also how it is perceived, reviewed and explored according to their individual disability-related needs.

Difficulties helped by SumIt Maths Studio across disability types

Dyscalculia

Dyscalculia is a specific learning difficulty affecting the processing and understanding of numbers and numerical information. Its impact varies. A recommendation should therefore be based on the student's evidenced experience rather than an assumed profile. A student may understand the wider academic concept yet require substantially more effort to identify, interpret and manipulate the numerical or symbolic information involved. A small transcription or positional error can change the meaning of an entire equation. The issue is not related to subject knowledge; it centres around access to the notation through conventional methods

SumIt Maths Studio is an accessible mathematics and science environment designed for disabled students who experience barriers to entering, interpreting, navigating and working with mathematical, scientific and chemistry notation.

How SumIt Maths Studio can reduce dyscalculia-related barriers

Difficulty	Relevant SumIt Maths Studio feature	Disability-related outcome
Dense notation is difficult to process or visually track.	Read Aloud, structured Spoken view and synchronised highlighting.	Makes mathematical structure explicit through combined auditory and visual routes and helps the student maintain position.
Errors are difficult to notice through visual checking alone.	Listen to the expression and compare it with the rendered and Spoken views.	Provides an additional checking route for missing numbers, incorrect operators or unexpected structure.
Formula structure or component position is difficult to recall.	Searchable library of 300+ named formulae with rendered previews.	Reduces memory and transcription demand while leaving the student responsible for selecting and applying the correct formula.
Manual copying leads to omission, reversal or misplacement.	Image recognition, handwriting recognition, speech input, paste and direct editing.	Reduces symbol-by-symbol reproduction and enables the recognised result to be checked in more than one form.
One symbolic presentation creates overload.	Rendered mathematics, Spoken, Read Aloud, MathML and LaTeX.	Allows the same expression to be accessed through complementary representations.
Moving repeatedly between tools disrupts concentration.	Equation editing, formula access, calculation, graphing, chemistry and history in one environment.	Reduces avoidable task switching and supports continuity of work.

Writing and Reviewing Academic work

Students with dyscalculia may experience disability-related difficulties processing dense numerical and symbolic information and frequently lose their position within multi-level equations. The presence of dyscalculia can mean that substantially more effort is needed to identify the relationship between elements and may not notice an omitted number or incorrect operator when reviewing the notation visually.

Where a persistent difficulty exists in accurately copying complex expressions and recalling the sequence and position of formula components, numbers, operators or exponents may be omitted, reversed or incorrectly positioned when notation is recreated manually.

Dyscalculia may affect how a student processes and understands numbers and numerical information. Within Writing and Reviewing Academic Work, the relevant issue is not simply that mathematics feels difficult. The question is whether dyscalculia creates an additional barrier to composing, accessing, tracking or checking the notation required by the course.

Potential barriers may include:

- Difficulty recognising, retaining or accurately recalling numerical and symbolic information.
- Loss of position within dense, spatial or multi-level notation.
- Working-memory overload when several elements or intermediate values must be held in mind.
- Omission, reversal or misplacement of numbers, operators, exponents or other components during transcription.
- Difficulty recalling formula structure or the position of components within it.
- Difficulty identifying an error when the expression is reviewed only in conventional visual notation.

SumIt Maths Studio is recommended to support *Writing and Reviewing Academic Work* as a specialist mathematical composition tool because it allows mathematical content to be entered through image recognition, handwriting, speech, direct typing or formula selection. The searchable formula library provides rendered previews, reducing the need to reconstruct complex structures entirely from memory. Recognised or selected content can then be reviewed visually and through Read Aloud. The student remains responsible for choosing the appropriate formula and applying it correctly.

SumIt Maths Studio's Read Aloud function can also convert the expression into structured spoken English while synchronised highlighting identifies the corresponding part of the rendered notation. The student can also review the visible Spoken representation. This visible Spoken representation provides a further text-based route for review. This will support position tracking and provide an additional method of checking work.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics. Its benefit for a student with dyscalculia is that it can reduce the additional disability-related demands involved in accessing, entering, maintaining position within and checking numerical and symbolic information. By providing visual, auditory, spoken and recognition-based routes to the same content, SumIt Maths Studio can support more independent and manageable engagement with mathematical information where dyscalculia creates a substantial barrier.

SumIt Maths Studio may also be relevant where another disability creates a specific barrier to mathematical or scientific notation.

Specific Learning Difficulty (SpLD) including dyslexia

Writing and Reviewing Academic work

Students with a specific learning difficulty may experience difficulties with working memory, processing speed, sequencing, transcription and maintaining position within complex information. These effects can become particularly significant when mathematical meaning is carried by symbols and spatial relationships rather than ordinary linear text.

Potential barriers may include:

- Difficulty holding several parts of an expression in working memory while entering or reviewing it.
- Slower processing of dense symbolic material and specialist mathematical vocabulary.
- Difficulty sequencing components or transferring notation accurately from a source.
- Loss of position when moving between an equation, explanatory text and another application.
- Increased cognitive effort when translating between handwritten, printed, spoken and digital formats.
- Difficulty detecting errors through visual checking alone.
- Poor concentration.

As a direct result of disability symptoms, students can experience working-memory and processing difficulties when composing and reviewing mathematical notation. They can understand the academic content but may struggle within dense expressions and make transcription errors when moving between source material, notes and assignments. Reviewing the expression only in its visual symbolic form does not provide an adequate checking route.

SumIt Maths Studio is recommended to support *Writing and Reviewing Academic Work*. As

a specialist mathematical composition tool as it provides complementary methods of composition and review. Speech, image recognition, formula selection and mathematical palettes reduce reliance on manual formula reconstruction, while the Spoken view and Read Aloud with synchronised highlighting make the structure available through additional text and auditory routes. This will reduce avoidable transcription demand and support more independent checking and reuse of mathematical content. The student remains responsible for choosing the appropriate formula and applying it correctly.

Read Aloud with synchronised highlighting gives the student a paced route through the expression and identifies the current component, helping them re-establish focus after attention shifts.

Integrated composition, calculation, graphing and saved history reduce avoidable task switching and support return after interruption.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics

Dyspraxia

Writing and Reviewing Academic work

Dyspraxia may affect motor coordination, sequencing and the organisation of movement. When composing mathematical notation, it is often necessary to alternate repeatedly between letters, numbers, operators and specialist structures, making small inaccuracies or repeated physical actions especially disruptive.

Potential barriers may include:

- Reduced fine-motor control affecting keyboard, mouse, stylus or handwriting accuracy.
- Difficulty positioning symbols, superscripts, subscripts or fraction components precisely.
- Increased physical effort and fatigue during sustained equation entry.
- Slower output where many precise selections are required.
- Difficulty switching efficiently between several input modes or applications.
- Increased cognitive load when motor planning and mathematical composition must be managed together.

Where a student experiences reduced fine-motor coordination and cannot reliably sustain the precise keyboard, pointer and handwriting actions required to compose complex mathematical notation, tasks such as entering superscripts, subscripts, fractions and specialist symbols can be slow and physically effortful, and repeated attempts to correct placement may interrupt the student's concentration and increase fatigue.

SumIt Maths Studio is recommended within *Writing and Reviewing Academic Work* because it provides several routes for composing the same notation, including speech, handwriting recognition, image recognition, autocomplete, mathematical palettes and formula selection. Full keyboard operation, visible focus and larger touch targets reduce reliance on precise mouse control. The student can then review the resulting expression through rendered, Spoken and Read Aloud views before transfer, supporting more accurate and sustainable independent work.

Reduced-motion support can also make the interface more predictable.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics

ADHD

Writing and Reviewing Academic work

Given the student's profile of ADHD, this can bring significant challenges associated with the process of written composition, particularly where difficulties with attention, concentration, and executive functioning impact the ability to sustain and organise written work.

Potential barriers may include:

- Difficulties with sustaining attention and maintaining focus during writing tasks
- Reduced ability to initiate and maintain writing momentum
- Challenges with working memory, affecting the ability to hold and develop ideas while writing
- Increased susceptibility to distraction and interruption
- Frequent task switching causing context loss or transcription errors.
- Difficulty initiating a complex notation task when the route into it is unclear.
- Reduced persistence where repeated corrections and transfers interrupt momentum.
- Distraction from visually changing interfaces or unnecessary navigation.
- Increased cognitive fatigue, particularly when managing multiple demands simultaneously

The presence of ADHD can affect sustained attention, working memory, task initiation, inhibition and the ability to manage multi-stage workflows. Mathematical composition can intensify these demands because the student must maintain position, select precise structures, retain intermediate information and often move between entry, calculation, checking and graphing. For students with attention and executive-function difficulties, bringing input, rendering, spoken representation, formula access, calculation and graphing into one environment can also reduce unnecessary task switching and the cognitive demands associated with repeatedly transferring information between separate applications.

When composing mathematical notation, losing position within multi-level expressions and repeated movement between an equation editor, calculator, graphing tool and assignment document disrupts concentration and increases transcription errors. Students generally understand the mathematical method but the workflow creates an additional barrier to recording and checking it accurately.

SumIt Maths Studio is therefore recommended within *Writing and Reviewing Academic Work* to provide a more continuous mathematical composition workflow. Read Aloud with synchronised highlighting supports position tracking, while the visible Spoken representation and formula previews reduce the need to retain structure entirely in working memory. Integrated composition, calculation, graphing and saved history reduce avoidable task switching and support return after interruption. This will improve continuity and independent

review without supplying the academic reasoning.

Reduced-motion support can also make the interface more predictable and less distracting.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Autism Spectrum Condition (ASC)

Writing and Reviewing Academic work

Given the student's profile of Autism Spectrum Condition (ASC), there are likely to be significant challenges associated with the process of written composition, particularly where differences in language processing, organisation, and sensory regulation impact written expression.

Potential barriers may include:

- Cognitive overload when several tools, interfaces or methods must be coordinated.
- Difficulty switching between applications or re-establishing the context of a task.
- Difficulty converting between spoken explanation, written text and symbolic notation.
- Sensory distraction from animation, visual clutter or unpredictable interface changes.
- Difficulty initiating or returning to a multi-stage mathematical task after interruption.
- A need for persistent, predictable representations that can be reviewed at the student's own pace.

Mathematical work requires repeated movement between separate applications and frequent conversion between spoken explanation, written instructions and symbolic notation. These barriers affect the ability to compose and review notation independently, rather than the understanding of the underlying mathematical concept. This can bring cognitive overload and loss of task continuity. Due to the difficulties arising from the diagnosis, predictable interfaces and persistent representations that can be inspected at their own pace are beneficial.

SumIt Maths Studio is recommended within *Writing and Reviewing Academic Work* because it keeps mathematical composition, alternative representations, calculation, graphing and saved history within a consistent environment. The student can compare rendered notation with a visible Spoken representation and use Read Aloud with synchronised highlighting where helpful. Keyboard access, reduced-motion support and saved work provide greater predictability and continuity. This will reduce unnecessary interface and conversion demands while preserving the academic task.

SumIt can be beneficial by providing a consistent environment in which the same mathematical information can be entered, reviewed and represented in several different ways. A student can move between rendered notation, structured spoken language, LaTeX and MathML without having to recreate the content.

For students who find frequent switching between applications difficult, the combination of equation editing, Read Aloud, formula access, scientific calculation, graphing, chemistry and History within one environment may reduce unnecessary changes in workflow.

The ability to save and return to equations, use predictable keyboard navigation and adjust visual themes may also support students who benefit from consistency and reduced sensory

or cognitive demands.

Students who experience sensory overload, distraction or difficulty processing frequent visual changes may benefit from a calmer and more predictable interface. Where the student has enabled the 'reduce motion' setting on their device, SumIt Maths Studio disables interface transitions and the menu drawer animation. This removes non-essential movement that could otherwise add to sensory or cognitive demands. The bundled themes are also designed to meet WCAG AA contrast requirements, helping to ensure that text, labels and interface information remain clearly distinguishable from their backgrounds. Together, these features can reduce unnecessary interface demands and help the student focus on the content and task they are completing. Clearer contrast can reduce the additional effort required to identify instructions, labels and controls and can make the interface easier to navigate independently. By reducing unnecessary visual changes, the student may find it easier to maintain attention to the mathematical content and navigate between functions without additional sensory or cognitive demands.

Reduced-motion support can also make the interface more predictable and less distracting.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Mental Health conditions

Writing and Reviewing Academic work

Students experiencing anxiety, depression, PTSD and other mental-health conditions may experience difficulties with concentration, memory, cognitive stamina, information processing, task initiation and maintaining consistent engagement with study. During periods of increased symptoms, dense or complex information can feel overwhelming, particularly where a task involves multiple stages, unfamiliar processes or frequent movement between different applications.

Mathematical and scientific content can add to this sense of overwhelm because a student may be required to identify specialist symbols, construct or reproduce complex notation, remember the sequence of steps required to enter an equation, move between different tools for editing and calculation, and repeatedly transfer information between applications. Where anxiety, reduced concentration or cognitive overload are present, the number of separate decisions and actions required to complete a task can become a significant additional barrier.

Potential barriers may include:

- Overwhelm when a notation task involves many unfamiliar or separate stages.
- Reduced concentration while working with dense symbolic information.
- Difficulty initiating work when complex notation must be constructed from scratch.
- Cognitive fatigue caused by repeated transfer between applications.
- Anxiety about transcription mistakes or losing work after interruption.
- A need to stop and resume work when symptoms increase.

As a result, composition may feel overwhelming, effortful, and difficult to sustain, with increased likelihood of avoidance, disruption to thought processes, and reduced confidence.

SumIt Maths Studio is recommended within *Writing and Reviewing Academic Work* to reduce the number of separate processes required. Alternative input and formula selection provide manageable routes into composition, while the Spoken and Read Aloud views support review when visual concentration is reduced. Integrated calculation, graphing and saved history allow work to be paused and resumed within the same environment. This will support more sustainable and independent engagement without replacing subject teaching.

Overall, SumIt Maths Studio can help reduce feelings of overwhelm by simplifying the route into a task, reducing unnecessary switching between applications, providing alternative ways to complete the same action and allowing work to be paused and resumed. This can support more manageable, independent engagement with mathematical and scientific content where the functional impact of a mental-health condition affects concentration, cognitive capacity, task initiation or the ability to manage complex multi-stage processes.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Physical disability

Writing and Reviewing Academic work

Given the student's diagnosis, significant challenges can arise with the process of written composition, particularly where difficulties with the mechanics of writing and typing impact the ability to produce written work efficiently.

A physical or mobility disability may affect dexterity, strength, endurance, coordination, movement or the ability to use a conventional keyboard, mouse, stylus or touchscreen. Mathematical notation can add particular demands because it requires repeated selection and precise placement of varied symbols and structures.

Potential barriers may include:

- Difficulties with handwriting and keyboard use, impacting written output
- Reduced strength and endurance, leading to fatigue during writing tasks
- Increased pain or discomfort when typing for sustained periods
- Slower processing and output speed, due to the physical effort required
- Pain, tremor, weakness or involuntary movement affecting input accuracy.
- Difficulty sustaining keyboard, handwriting or pointer use.
- Reduced ability to select small controls or position elements precisely.
- High physical effort when notation must be entered symbol by symbol.
- Fatigue caused by repeated clicks, transfers and application changes.
- A need for different input methods at different times.

SumIt Maths Studio is recommended to offer support in the following areas:

Keyboard access and focus:

Where precise mouse use is difficult, every command can be reached without a mouse. Keyboard navigation covers controls, menus, tabs, formula categories and symbol palettes. Modal windows retain focus while open and return it to the control that launched them when closed. Visible focus indicators identify the selected button, field, tab or menu item, making it clear which control will respond when activated.

Larger touch targets:

On touch devices, controls have a minimum 44 × 44 pixel touch area. This provides a larger target and requires less precise finger or stylus placement, which can support students with tremor, reduced dexterity, weakness, involuntary movement or fine-motor difficulties. It can also reduce accidental selections, repeated attempts and unnecessary physical effort, supporting more independent use.

Reduced repetition:

Autocomplete can suggest relevant symbols and formula triggers as the student enters information, while the symbol palette and searchable formula library provide existing mathematical structures. This can reduce the actions needed to construct complex notation and the repeated movement between input methods or reference sources. Where manual formula construction would require numerous precise selections, the student can locate a

suitable structure and transfer it to the Editor. The student remains responsible for selecting and applying the correct mathematical content.

Flexible input:

Draw mode allows equations to be handwritten with a finger, stylus or trackpad. Its template matcher and neural-network recognition model operate locally on the device, providing another route where one form of physical interaction is more manageable than another. For example, the student may control a stylus more easily than a mouse, or prefer a touchscreen to repeated keyboard and pointer interaction.

Image recognition:

Where reproducing an existing equation would require prolonged or repetitive physical input, the student can provide an image, review the recognised result and transfer it to the Editor instead of recreating every number, symbol and structural element. This can reduce unnecessary physical effort where the academic task is to work with existing mathematical content rather than demonstrate manual reproduction.

Energy conservation and paced working:

If pain, weakness or fatigue increases during a study session, the student can change how they interact with the content rather than continue with a method that has become difficult to sustain. Saved History allows equations to be revisited later, so the student can stop when symptoms increase and resume without recreating earlier content.

Reduced movement between applications:

Equation editing, scientific calculation, graphing and chemistry are integrated within one environment. This can reduce repeated application changes, notation transfers and re-entry. Over a study session, avoiding additional clicks, pointer movements and repeated actions may help to reduce accumulated pain, fatigue and physical demand.

SumIt Maths Studio is therefore recommended within *Writing and Reviewing Academic Work* to provide alternative and lower-effort routes for mathematical composition. The student can use speech, handwriting or image recognition, autocomplete, palettes and formula selection rather than relying on one fixed manual method. Full keyboard access, visible focus and larger touch targets reduce precise pointer demands. Integrated review, calculation, graphing and saved history will also reduce repeated physical actions and support paced independent work.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Long Term Illness/Longstanding Illness

Writing and Reviewing Academic work

Long-term and fluctuating conditions may involve pain, physical or mental fatigue, brain fog, weakness, reduced concentration and variable stamina. SumIt Maths Studio may be relevant where the student cannot consistently sustain one method of composing or reviewing mathematical notation and where the combined task demands consume disproportionate energy.

Potential barriers may include:

- Reduced physical or cognitive stamina during extended notation tasks.
- Brain fog or fatigue affecting working memory, processing and position tracking.
- Pain or weakness making sustained typing, handwriting or pointer use difficult.
- A need to vary the method of interaction as symptoms change.
- Difficulty managing repeated transfer between tools when energy is limited.
- A need to pause and resume work without rebuilding previous expressions.

These difficulties can affect the amount of effort a student can sustain, the length of time for which they can concentrate, their ability to retain and process information, and their capacity to manage tasks involving multiple stages or repeated decisions.

When working with mathematical and scientific content, these difficulties can create additional barriers. Complex notation may require the student to concentrate on several elements at the same time, maintain their position within an expression, remember the relationship between different symbols and structures, and move between processes such as entering, checking, calculating and graphing information. During periods of increased fatigue or brain fog, this cumulative physical and cognitive demand can make study difficult to sustain.

SumIt Maths Studio can be beneficial by reducing the overall effort required to access and work with mathematical and scientific content. Rather than requiring the student to manage several separate tools and processes, SumIt Maths Studio brings equation entry, alternative representations, Read Aloud, formula access, scientific calculation, graphing, chemistry and saved History into one consistent environment. This can reduce unnecessary task switching and the additional cognitive effort involved in remembering where information is located, transferring content between applications and repeatedly re-establishing the context of a task.

Where mental fatigue or brain fog affects concentration, working memory or information processing, SumIt Maths Studio provides different ways to access and review the same content. A student can listen to an equation, follow synchronised highlighting, review its Spoken representation or use the formula library to locate an existing mathematical structure. This can reduce the need to hold several elements in mind at once or repeatedly reconstruct

complex notation from memory.

Where physical fatigue, pain or weakness affects the student's ability to sustain one method of working, SumIt Maths Studio provides alternative routes for completing the same task. Mathematical content can be entered through speech, handwriting, image recognition, formula selection or conventional input according to what is most manageable at that time. The benefit is not simply the availability of different input methods, but the ability to adapt the level and type of physical effort required when symptoms fluctuate.

Read Aloud can reduce reliance on prolonged visual concentration, while synchronised highlighting can help the student maintain their position within complex notation when concentration is reduced. Saved History allows equations to be returned to later, supporting students who need to stop when fatigue or other symptoms increase and resume work without recreating previous content.

The integration of equation editing, scientific calculation, graphing and chemistry can also support energy conservation. The student can move between related study activities within a consistent environment rather than repeatedly transferring notation, reopening work or adapting to separate interfaces. This can be particularly beneficial where even small additional processes accumulate and contribute to fatigue or cognitive overload.

SumIt Maths Studio can be used across phones, tablets, laptops and Chromebooks and can continue to work offline once loaded. This can support flexible and paced study where a student's symptoms affect when, where and for how long they are able to work.

Overall, SumIt Maths Studio can help students with long-term medical conditions conserve physical and cognitive energy by reducing unnecessary steps, supporting different ways of accessing the same information, allowing work to be paused and resumed, and providing alternative methods of interaction when symptoms fluctuate. This can support more sustainable and independent engagement with mathematical and scientific content where physical fatigue, mental fatigue, brain fog, pain or reduced stamina create disability-related barriers to study.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Sensory Impairments

Writing and Reviewing Academic work

Vision Loss

Students with visual impairments can experience significant difficulties accessing mathematical and scientific notation because meaning is frequently conveyed through two-dimensional spatial relationships. Superscripts, subscripts, fractions, roots, summations, integrals and multi-line equations may remain difficult to perceive. Students with visual impairments can experience significant difficulties accessing mathematical and scientific notation because meaning is frequently conveyed through two-dimensional spatial relationships. Superscripts, subscripts, fractions, roots, summations, integrals and multi-line equations may remain difficult to perceive, interpret or navigate even where ordinary linear text is accessible.

SumIt Maths Studio is particularly beneficial because it provides additional auditory and structured representations of mathematical content. Equations can be spoken aloud in structured language, with clear verbal treatment of mathematical constructs including fractions, roots, summations, Greek letters and number sets. The student can also review the complete spoken representation separately.

For students who combine residual vision with auditory information, SumIt Maths Studio synchronises speech with visual highlighting. Individual mathematical elements are underlined as they are spoken, while larger structures are outlined. This can support the student in maintaining their position within an expression and connecting the spoken information with the corresponding visual notation.

The software also provides keyboard access and exposes MathML information to assistive technology. Dynamic updates, including recognition results, are provided through live regions so that screen readers can announce changes automatically.

The Graphing environment provides a further important alternative to exclusively visual access. SumIt Maths Studio can plot up to six functions simultaneously in Cartesian, polar or parametric form, and Audio Trace enables a curve to be sonified so that its shape can be heard.

SumIt Maths Studio's visual accessibility features can also support students whose visual impairment makes low-contrast interface information difficult to perceive. The bundled themes are designed to meet WCAG AA contrast requirements for standard and secondary text against their background surfaces. This can make labels, instructions and interface information easier to distinguish, reducing the additional effort required to identify controls and navigate the software independently. Where a student uses their device's 'reduce motion' setting, SumIt Maths Studio also disables interface transitions and the menu drawer animation. For students whose visual impairment makes moving or changing interface elements difficult to perceive, follow or interpret, removing non-essential animation can provide a more stable and predictable interface and reduce additional demands when navigating between functions. These features are beneficial where low contrast, changing interface elements, or reliance on visual presentation create a specific disability-related barrier. These features complement SumIt Maths Studio's other methods of access, including structured Read Aloud, synchronised highlighting, keyboard navigation, MathML exposure to assistive technology and graph sonification, allowing the student to combine visual, auditory and assistive-technology-based methods according to their individual level of vision and access needs.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

Hearing Loss

For students with hearing loss, **SumIt Maths Studio** provides strong visual and text-based representations of mathematical information. Rendered notation can be reviewed alongside LaTeX, MathML and other visual output, providing alternative representations where an individual's disability-related needs make reliance on auditory information inappropriate.

Equations can be spoken aloud in structured language, with clear verbal treatment of mathematical constructs including fractions, roots, summations, Greek letters and number sets. The student can also review the complete Spoken representation separately.

For students who combine residual vision with auditory information, SumIt Maths Studio synchronises speech with visual highlighting. Individual mathematical elements are underlined as they are spoken, while larger structures are outlined. This can support the student in maintaining their position within an expression and connecting the spoken information with the corresponding visual notation.

The software also provides keyboard access and exposes MathML information to assistive technology. Dynamic updates, including recognition results, are provided through live regions so that screen readers can announce changes automatically.

The Graphing (Graph and Sonify functions) environment provides a further important alternative to exclusively visual access. The Graphing environment provides an alternative to relying solely on visual presentation of graphical information. SumIt Maths Studio can

plot up to six functions simultaneously in Cartesian, polar or parametric form. Its Audio Trace function sonifies a plotted curve, providing an auditory representation of the function. This can be beneficial for students with visual impairments who require an additional auditory method of accessing and exploring graphical information.

For students with hearing impairments, the barriers encountered when working with mathematical and scientific content can vary depending on the nature, degree and onset of the hearing loss, the student's preferred language and communication method. Students who are deaf or have had significant hearing loss from birth or early childhood may have experienced reduced access to incidental spoken language and to the mathematical vocabulary used to explain symbolic concepts, particularly where teaching has not been fully accessible in their preferred language. Mathematical terminology can be highly specialised, and the relationship between a spoken or written term and its symbolic representation may not always be immediately apparent. Complex notation may therefore place additional demands on students who benefit from clear, persistent visual representations of information and the ability to move between different forms of mathematical content.

Students who acquire hearing loss later in life may experience different barriers. They may previously have relied on spoken teaching, discussion and verbal explanation when learning or checking mathematical content, but may no longer be able to access this information consistently. During lectures, tutorials or collaborative study, it can also be difficult to divide attention between lip-reading, captions, an interpreter, a speaker, notes and mathematical information displayed elsewhere. Because mathematical notation is precise, missing a short spoken explanation of a symbol, operator, sign, variable or change in an equation can affect access to the information that follows.

It is important to note that SumIt Maths Studio does not teach mathematical concepts, provide answers in place of the student or remove the academic requirement to understand and apply mathematics.

