BitMaths

Digital Maths Resource

Years 7 & 8

Teacher User Guide

Firefly EDUCATION

bitmaths.com.au

BitMaths

Welcome to BitMaths

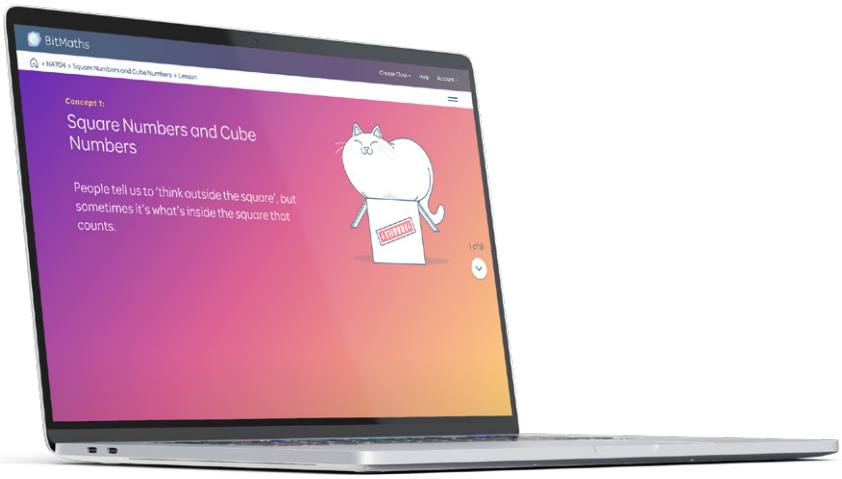
BitMaths is a digital maths resource for teachers and students. With comprehensive content, rigorous pedagogy and intuitive design, BitMaths provides a suite of powerful teaching and learning resources that explicitly target the core concepts of mathematics.

Teaching

Teachers use the comprehensive suite of resources to deliver effective and engaging lessons. Teachers also have access to activity trackers and portfolios so they can keep track of their students' progress.

Learning

After lessons are delivered by the teacher, students complete activities online. Students also have access to student texts that mirror the content taught in the lessons, so they can refer back to it at any time.



A digital maths resource
for junior secondary

BitMaths Teacher Guide

Learn how to utilise BitMaths resources to deliver powerful, explicit and engaging lessons. With this Teacher Guide you'll discover the rationale and purpose behind every BitMaths feature.

Contents

Program Structure

BitMaths is available in **Australian Curriculum**, **New South Wales Syllabus** and **Victorian Curriculum** editions.

Homepage Overview

Every year of BitMaths content is organised into modules. These modules are listed under their matching curriculum strand and sub-strand.

You have the choice to teach modules in any order, in line with your school's yearly plan, or you can follow our sample yearly plan available in the *Preparation and Planning* section.

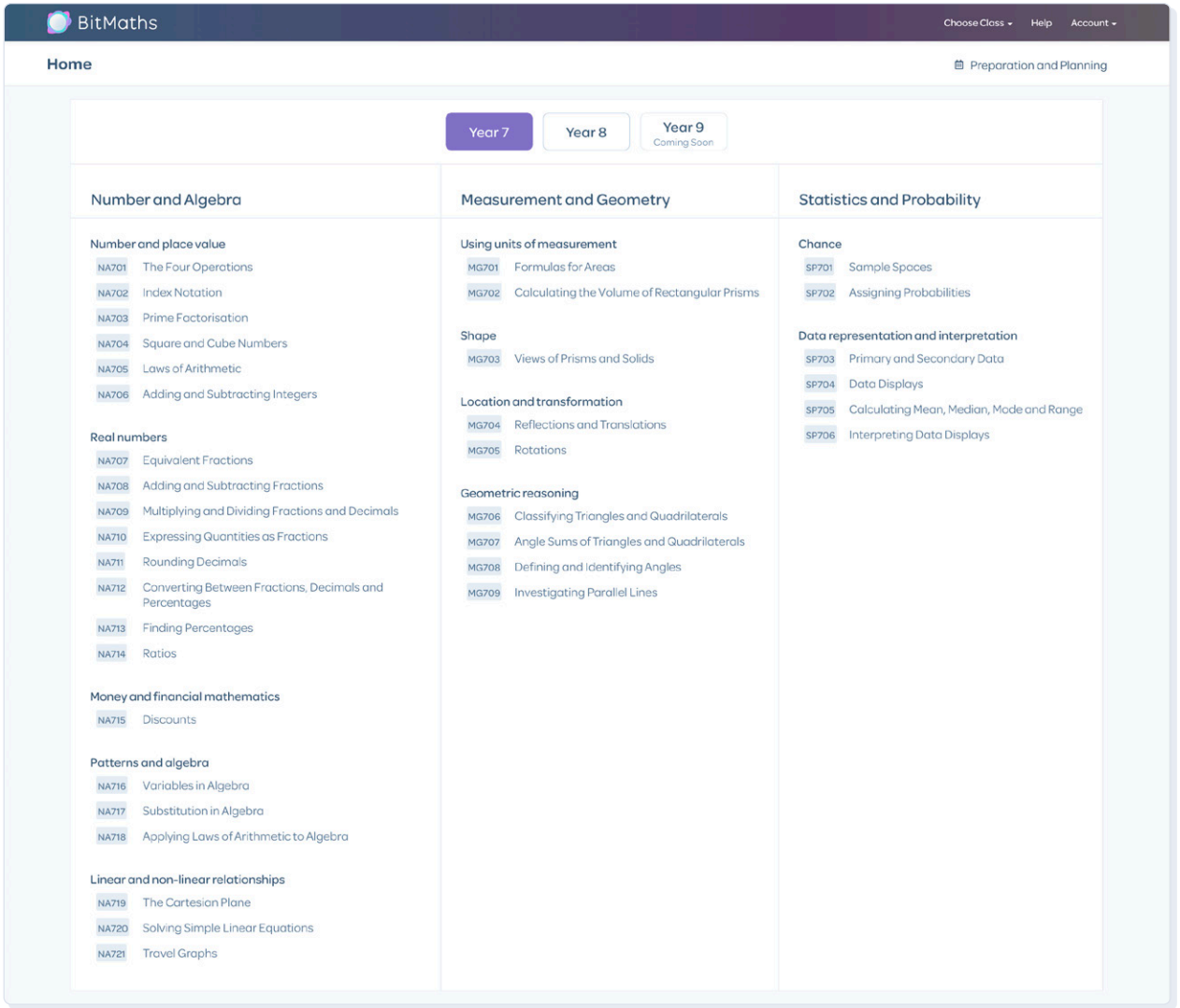


Fig 1: BitMaths homepage for Australian Curriculum, Year 7 content

Module Overview

Each BitMaths module contains one or more **maths concepts**, as well as **problem-solving** and **reasoning** activities, and a *Big Question* to extend students.

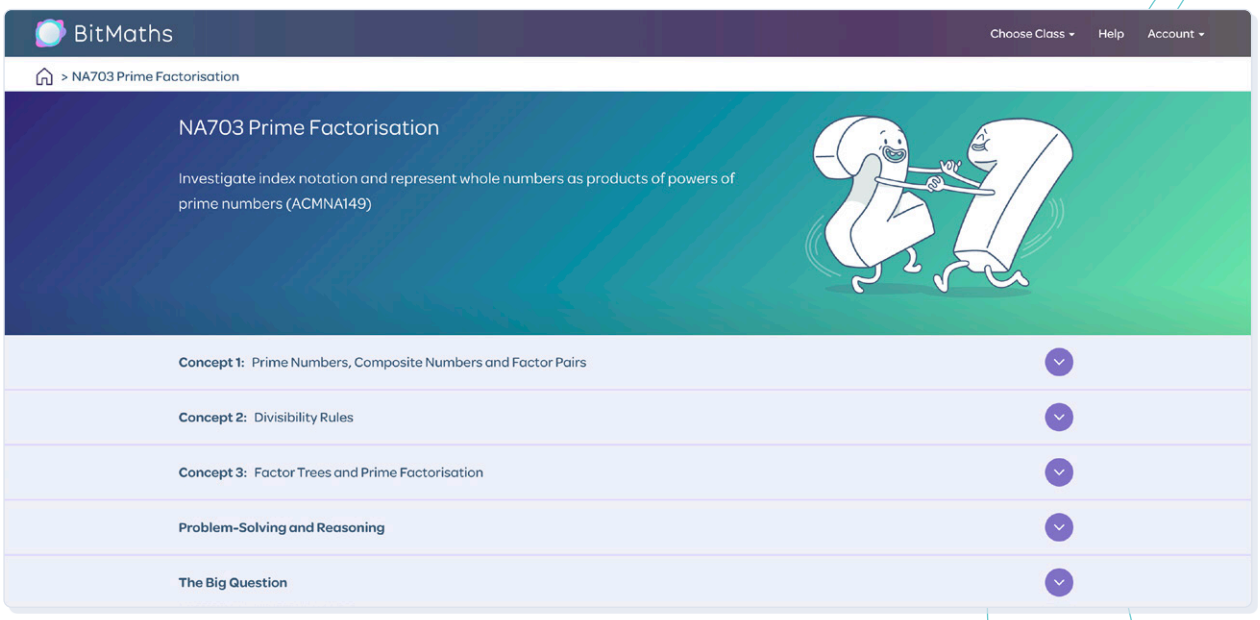


Fig 2: Module NA703 Prime Factorisation

Maths Concepts

Each concept includes:

- **Teaching and learning resources**
  Teaching and learning resources including videos, illustrations, worked examples and more are at the core of every concept. For teachers, content is organised into an interactive slideshow that can be used to deliver engaging and effective lessons at a pace that suits any class. For students, the same content is grouped into a single scrolling page, so they can review the concept independently.
- **Activities**
  Every concept includes four sets of differentiated activities that provide students with opportunities to apply the skills they have learned in the lesson.

Problem-Solving and Reasoning

Every module includes dedicated **problem-solving** and **reasoning** activities related to the concepts taught in the module.

The Big Question

Included at the end of every module is a challenging maths problem or brainteaser that is perfect for engaging fast finishers, and promoting critical and creative thinking.

Maths Concepts

Each BitMaths concept is a scaffolded teaching and learning package that facilitates the explicit teaching of mathematical concepts and concludes with targeted practice.

Teaching Slideshows

The interactive teaching slideshows are designed for classroom projection, with large fonts and clear illustrations. They provide focused stimuli to create engaging maths lessons and deliver information in a stepped-out sequence.

Gradual Release of Responsibility

The slideshows follow a gradual release of responsibility framework of instruction. This framework typically has four main components:

- **Focused instruction** delivered through introduction slides, learning intentions and success criteria
- **Guided instruction** delivered through explicit teaching slides and worked examples
- **Whole class practice** delivered through *Your Turn* and *Think Bit* questions
- **Independent learning** delivered through concept activities.

Introduction Slides

Maths can be difficult and stressful for students, so starting each lesson with something lighthearted is important.

That's why each slideshow begins with an engaging introductory slide to break the ice before launching into the lesson. This is a colourful slide with clever, fun artwork and a stimulus, such as a quote, fact, joke or problem.

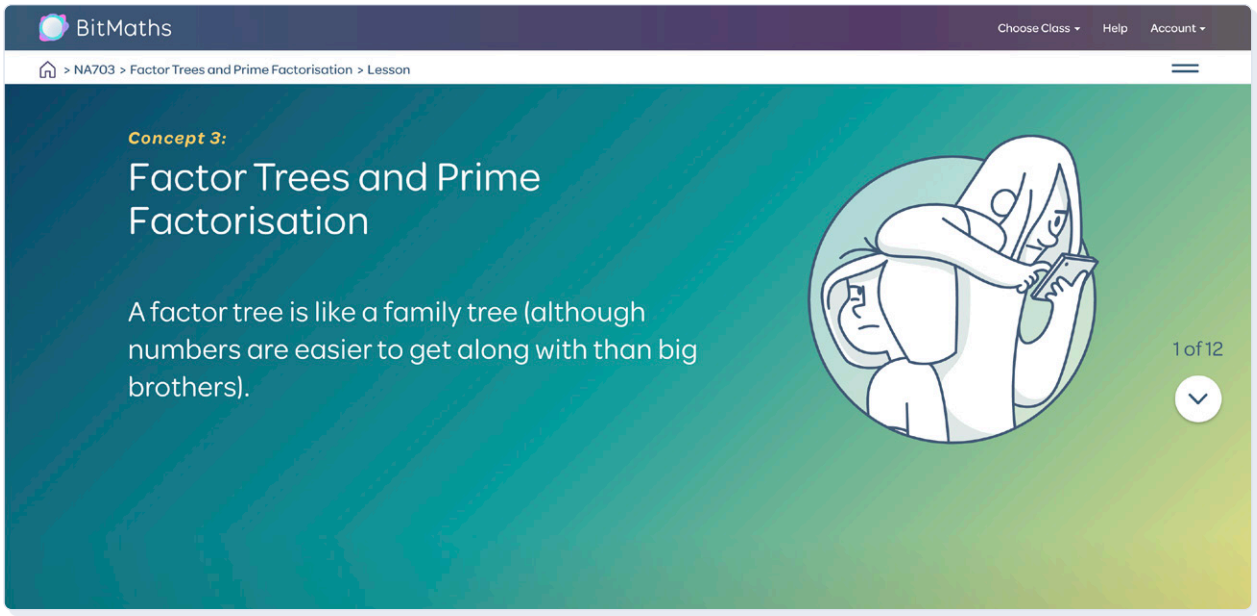


Fig 3: Introduction slide for NA703 Concept 3: Factor Trees and Prime Factorisation

Learning Intention and Success Criteria Slide

The learning intention succinctly describes the purpose of the lesson. Select the *Show Success Criteria* button to reveal a more detailed breakdown of what students can aim to achieve by the end of the lesson.

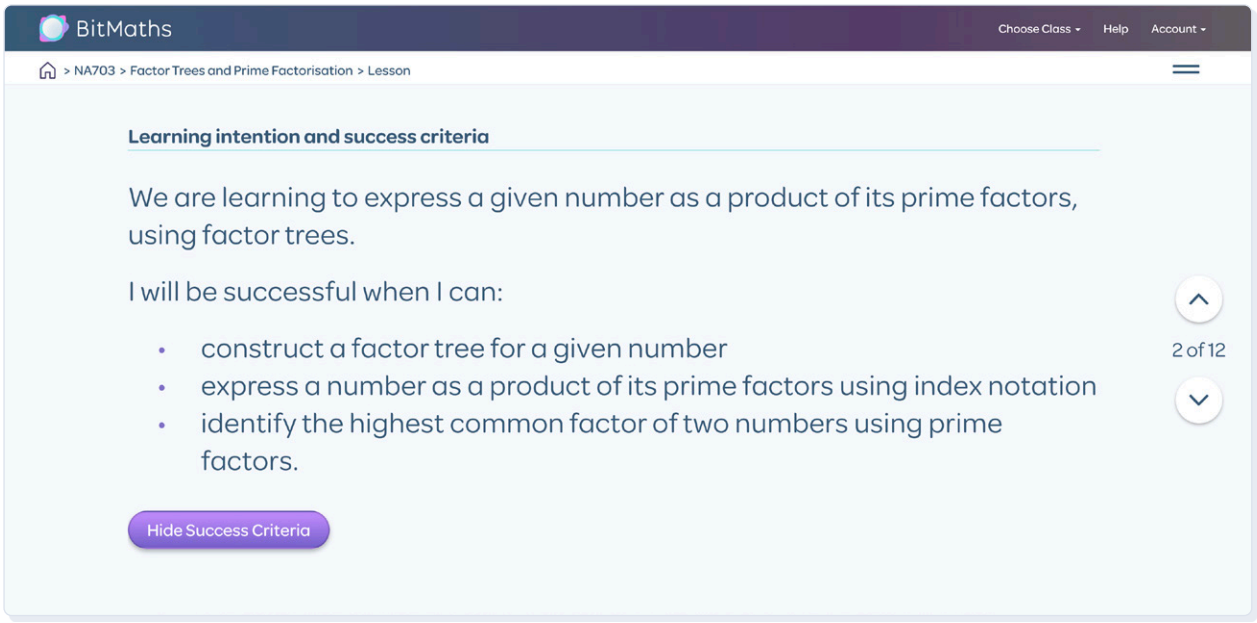


Fig 4: Learning intention and success criteria for NA703 Concept 3: Factor Trees and Prime Factorisation, with success criteria shown

Explicit Teaching Slides

Most teaching slideshows are **inquiry-driven**. They feature a stimulus question that can initiate discussion and be used as a springboard for your explicit teaching.

Stimulus questions are succinct to help you keep your students focused, however most slides also have a *Show Explanation* button, which reveals more detailed information, to use at your discretion. You may prefer to simply use the stimulus questions, drawing on your own explanations and worked examples, or use the BitMaths explanations and examples to model the concept.

Many teaching slides also include explicit teaching videos and GIFs to provide greater clarity on difficult concepts. You can use the prompts to expand any image to full screen for a more detailed display.

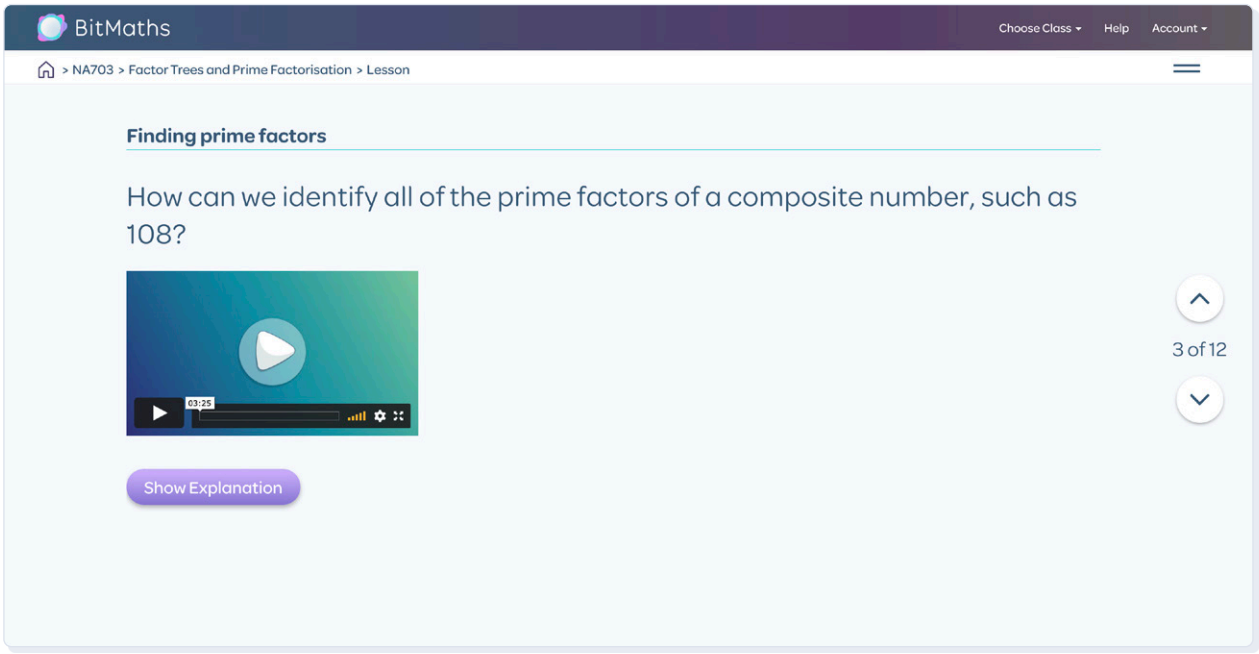


Fig 5: Example teaching slide for NA703 Concept 3: Factor Trees and Prime Factorisation

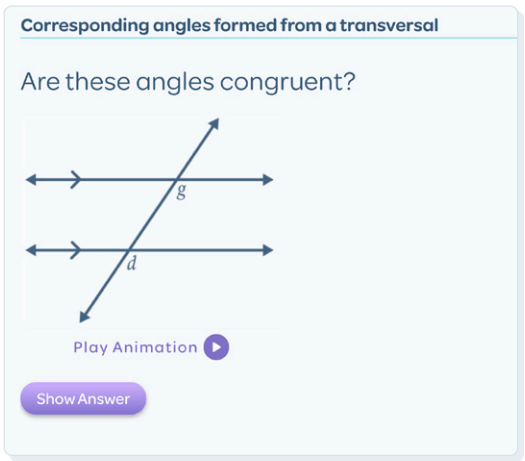


Fig 6: Example teaching slide for MG708 Concept 3: Angles Created by a Transversal Across Parallel Lines

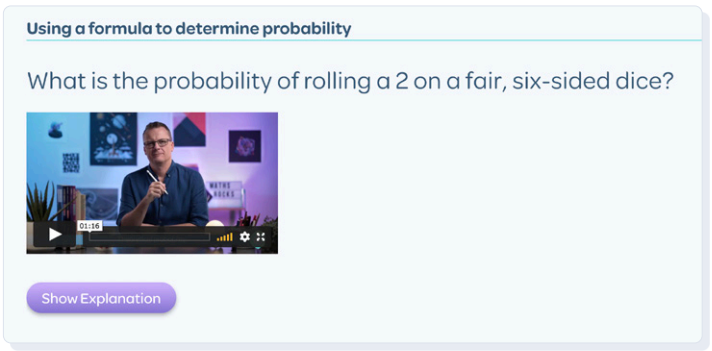


Fig 7: Example teaching slide for SP702 Concept 1: Determining Probability

Worked Example Slides

Worked examples each contain a stimulus question, with the steps and solution hidden by default. This gives you the option to use only the question and model the required processes in your own words. Otherwise, you can select *Show Steps* to talk through the stepped-out solution.

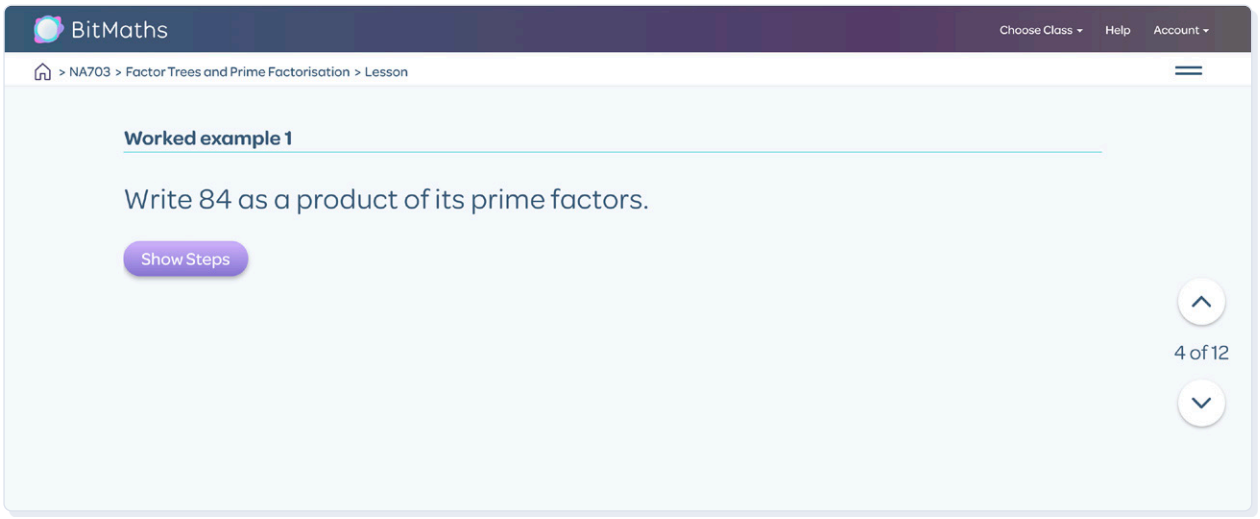


Fig 8: Worked solution for NA703 Concept 3: Factor Trees and Prime Factorisation, with solution steps hidden

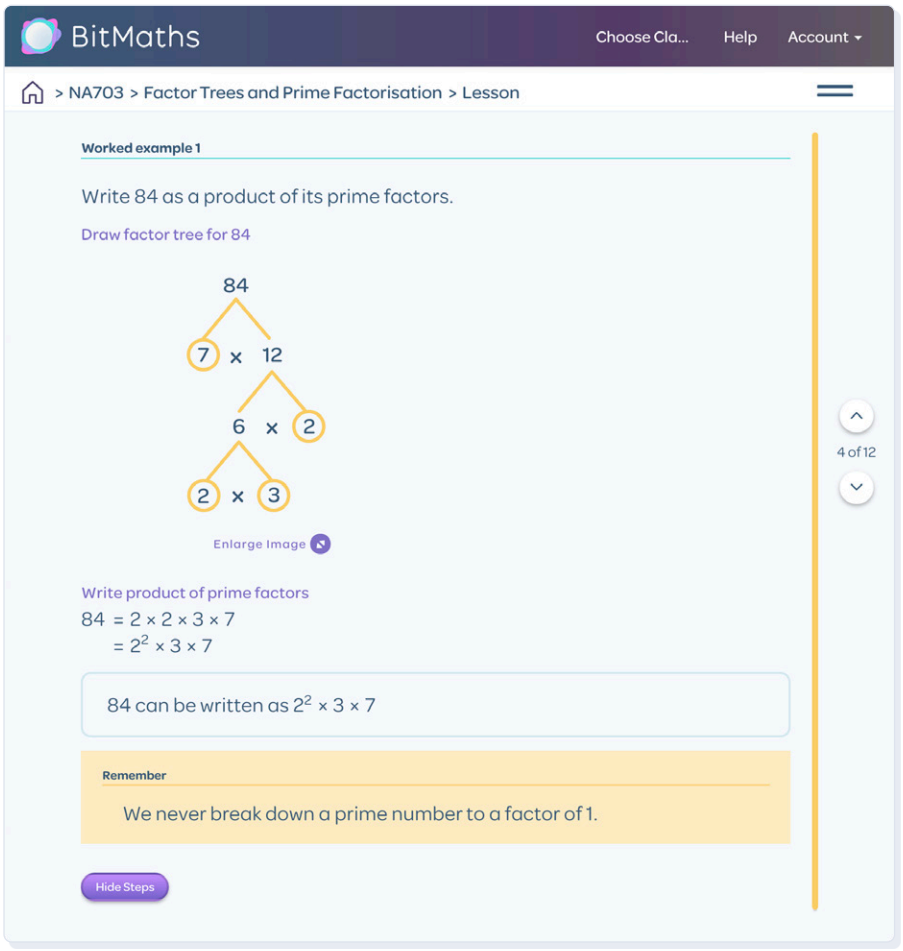


Fig 9: Worked solution for NA703 Concept 3: Factor Trees and Prime Factorisation, with solution steps shown

Your Turn Slides

Following the guided teaching and worked examples, *Your Turn* slides provide an opportunity for students to answer questions collaboratively – as a whole class or in groups. They also allow you to check for understanding. Once complete, you can reveal the answer as a focus for discussion.

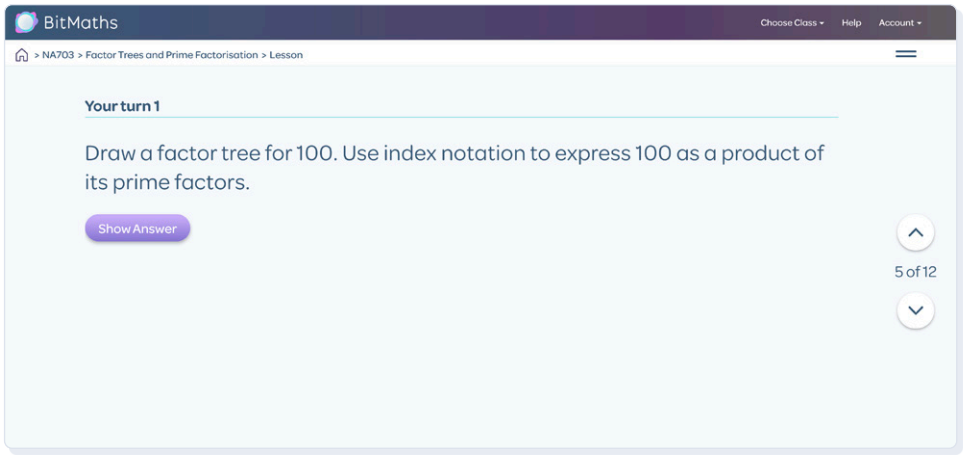


Fig 10: *Your Turn* question for NA703 Concept 3: Factor Trees and Prime Factorisation

Think Bit Slides

Think Bits provide opportunities to apply higher-order thinking skills. You can use them at your discretion to stretch your fast finishers, or if time permits you may choose to use them for collaborative group work during the lesson.

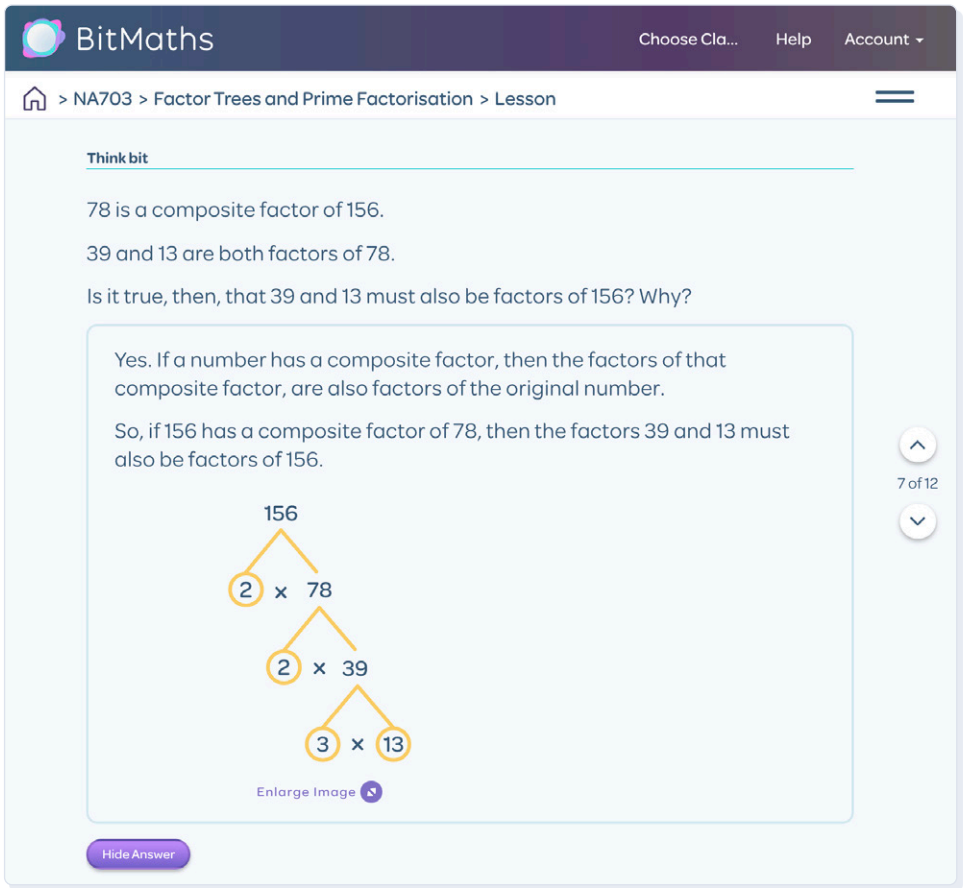


Fig 11: *Think Bit* for NA703 Concept 3: Factor Trees and Prime Factorisation, with solution shown

Student Texts

The student texts include all the same detailed explanations, examples, videos, illustrations and activities as the teaching slideshows to ensure consistency between the teaching and learning resources.

Students can also read the student texts independently, with each concept presented on a single scrolling page with clear headings.

Students can refer to this resource at any time during lessons or review it later. The digital platform allows it to be a truly interactive experience, which makes it far superior to a traditional textbook.

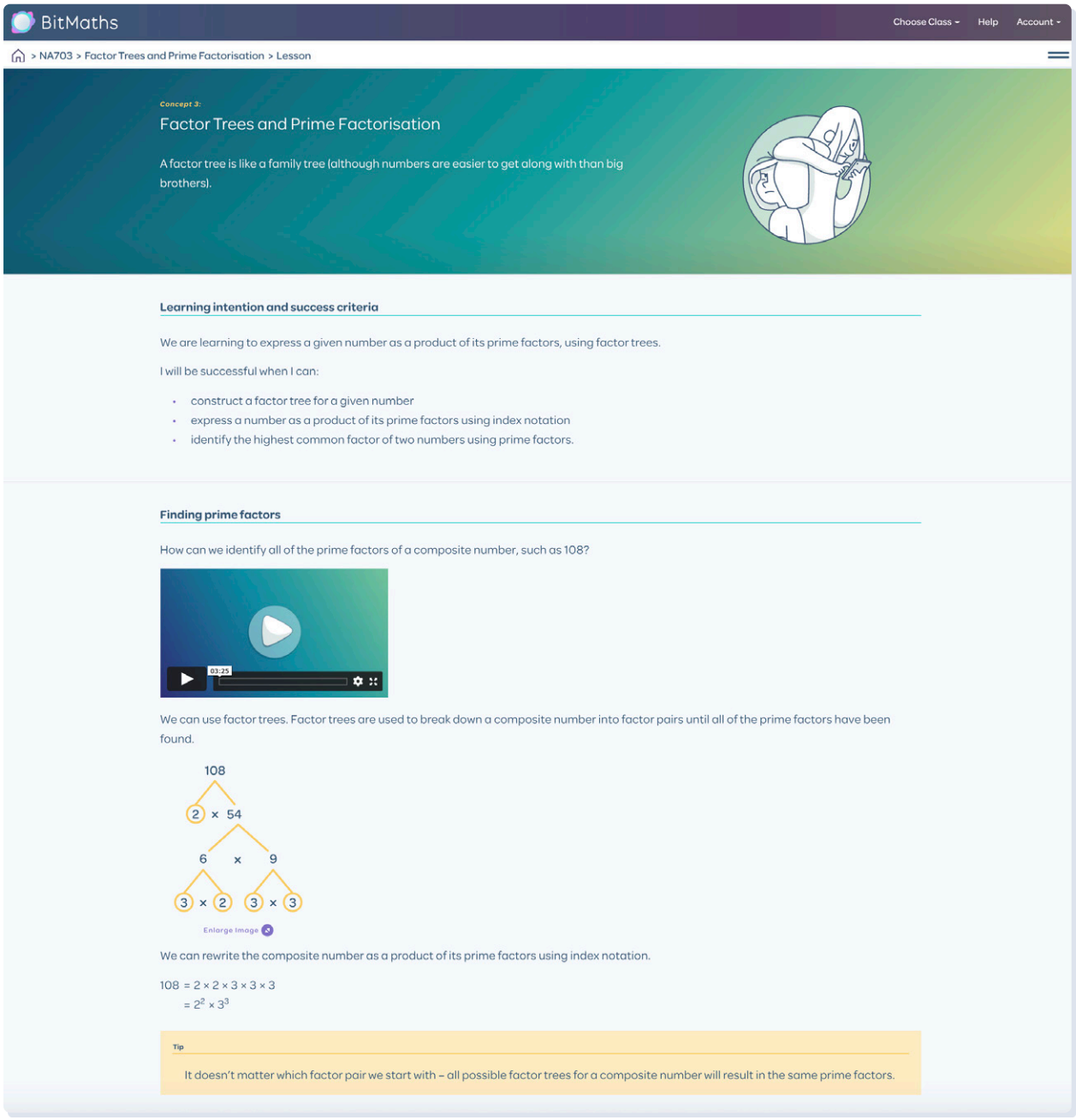


Fig 12: Example section of student text for NA703 Concept 3: Factor Trees and Prime Factorisation, which matches the corresponding teaching slides

Concept Activities

Students can complete activities online or use printed worksheets.

Online activities include:

- automatic marking
- two attempts to correctly answer each question
- the correct answer for reference if students answer incorrectly on their second attempt.

Differentiated Activities

Activities include four sets of differentiated questions. Students complete the **understanding** set before continuing to one of the three differentiated sets: **support**, **consolidation** or **extension**.

The **understanding** set is designed to solidify students' knowledge of the concept taught in the teaching slideshow.

Questions in this set graduate in difficulty from C-standard to A-standard questions. For example, the first few questions often call upon a basic knowledge of the mathematical concept, whereas later questions in the set require higher-order application and link to real-world contexts.

The results from the **understanding** set prompt students to complete a follow-up set of differentiated activities, targeted to their understanding level.

Result	Recommended activity
<50%	Support
50% to 80%	Consolidation
>80%	Extension

Remind students to record their working out

Even when completing activities online, BitMaths advocates for students to follow good practice by completing all of their working using pen and paper. While online activities provide the benefits of automatic marking and differentiation prompts, no tool can or should replace a pen and paper when it comes to working through problems.

Using paper also allows you to see how students are working and pinpoint where they are making errors.

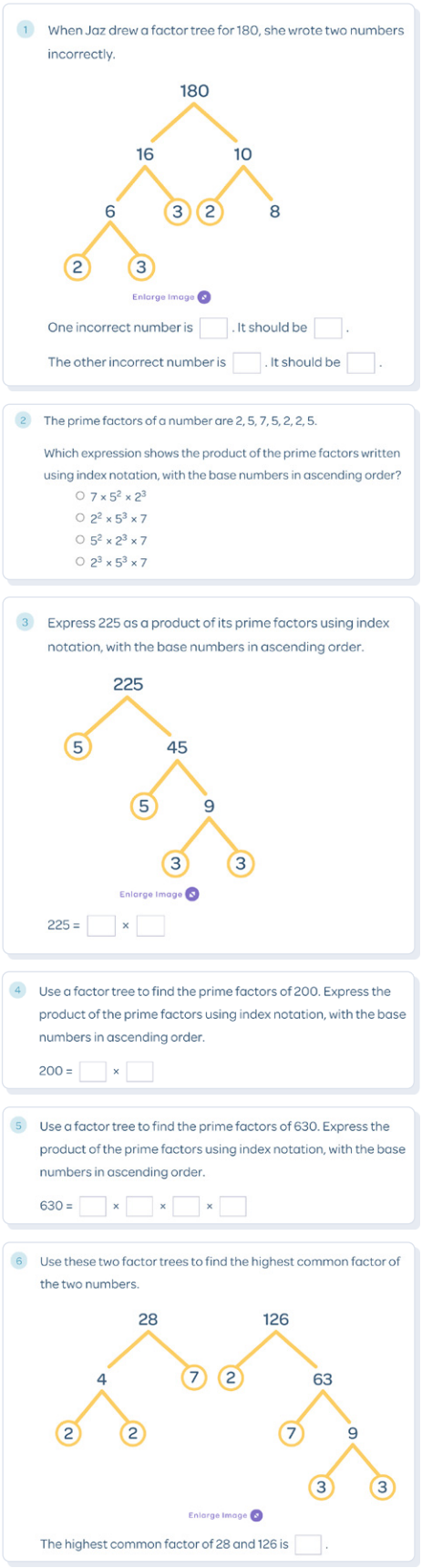


Fig 13: Example understanding activities for NA703 Concept 3: Factor Trees and Prime Factorisation

Activity Tracking

You can monitor student performance in real time using the *Activity Tracker*, which allows you to provide timely intervention when needed.

The *Activity Tracker* is a table that shows a segmented bar graph for each activity set, indicating the percentage of questions each student has answered correctly or incorrectly. Data can also be viewed numerically.

Click on any cell in the table to see an individual student's answers and whether questions have been answered correctly or incorrectly. Select a student's name to view their entire student portfolio.

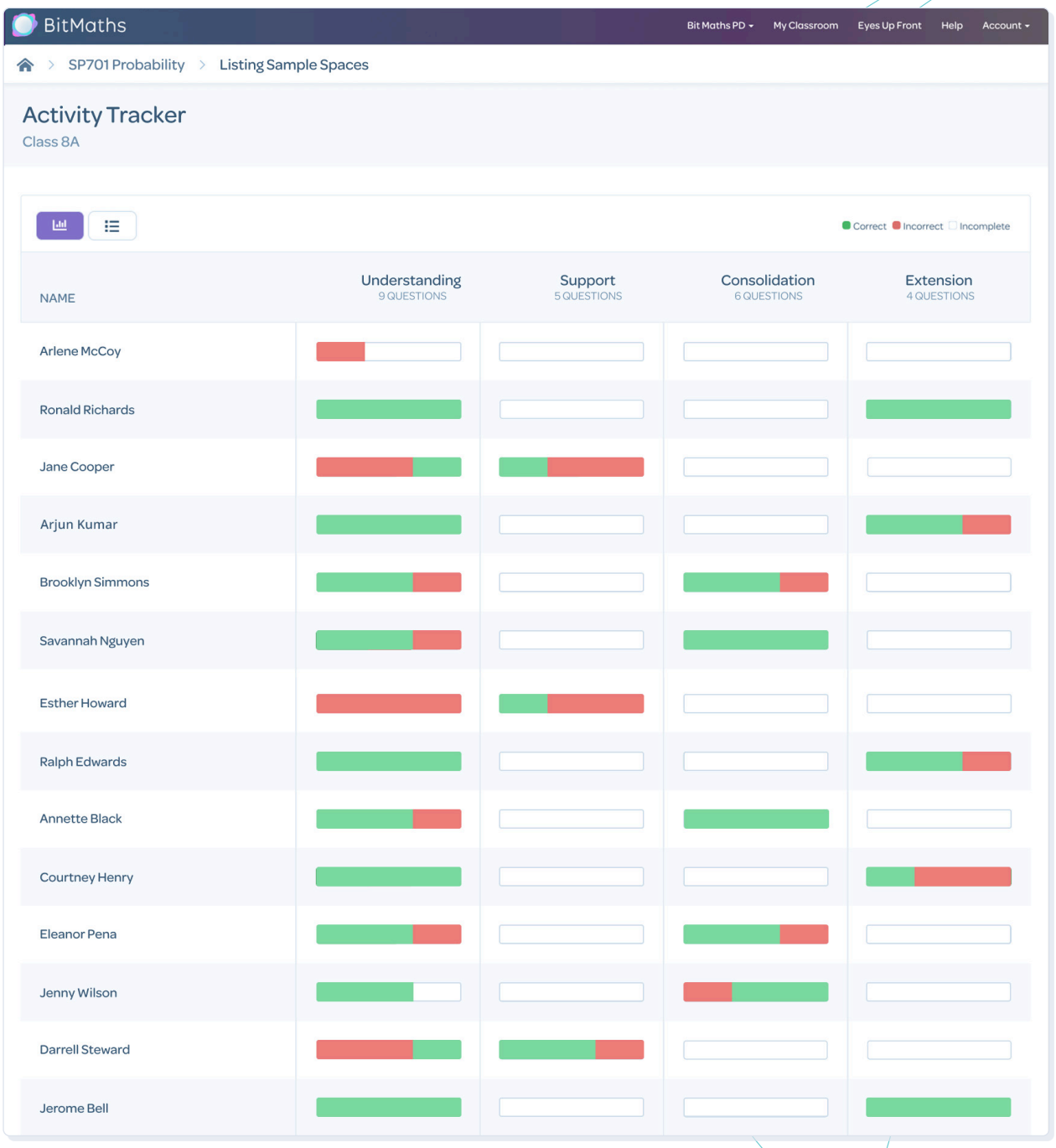


Fig 14: Example *Activity Tracker*

Problem-Solving and Reasoning

Develop higher-order thinking skills using the dedicated problem-solving and reasoning activities available in every module of BitMaths.

Problem-Solving

Students may use differing strategies to solve a problem and that's OK! BitMaths provides a framework that allows for student creativity and variance when it comes to the strategies they use to arrive at the correct solution.

This framework includes modelling critical literacy skills and strategic problem-solving using the *Guided Problem* before students apply these skills through independent activities.

Guided Problems

Display the *Guided Problem* to model good problem-solving practice and facilitate student collaboration and discussion using the following three questions:

1. **What is the question asking you to do?**

   Read the question aloud with the class. Ask students to explain, in their own words, what the question is asking them to solve. It is common for students to skim over questions, so this step ensures students read the question properly and understand what is being asked.

2. **What is the important information?**

   Many questions include irrelevant information. Discuss with the class what essential information is required to solve the problem.

3. **What should the solution include?**

   This step is often overlooked, but it helps students understand how their solution should be articulated. Identify and discuss the cognitive verbs in the question. Does the question ask students to provide their answer as a statement? What mathematical working/evidence do they need to show to support their answer?

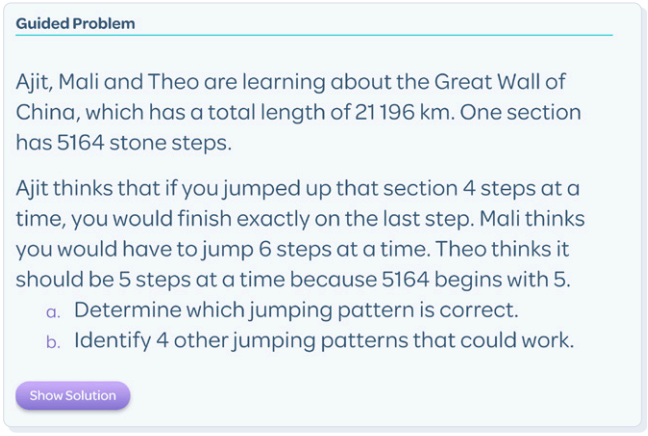


Fig 15: Example *Guided Problem* slide for NA703 Concept 3: Factor Trees and Prime Factorisation, with solution hidden

Once it is clear that students comprehensively understand the question, they are ready to solve the problem.

Ask students to share and discuss the different strategies they used to solve the problem. Explore these strategies and identify those that are most efficient. If required, you can use the provided worked solution to model an efficient strategy that leads to the correct answer.

Independent Problem-Solving

Opportunities for independent problem-solving are provided at three levels of difficulty: **support**, **consolidation** and **extension**. Direct students to the differentiated problem best suited to their level of competency or allow students to self-select which problems to solve.

Problems can be completed online or on the printed worksheet. Online activities include:

- automatic marking
- two attempts to correctly answer each question
- the correct answer for reference if students answer incorrectly on their second attempt.

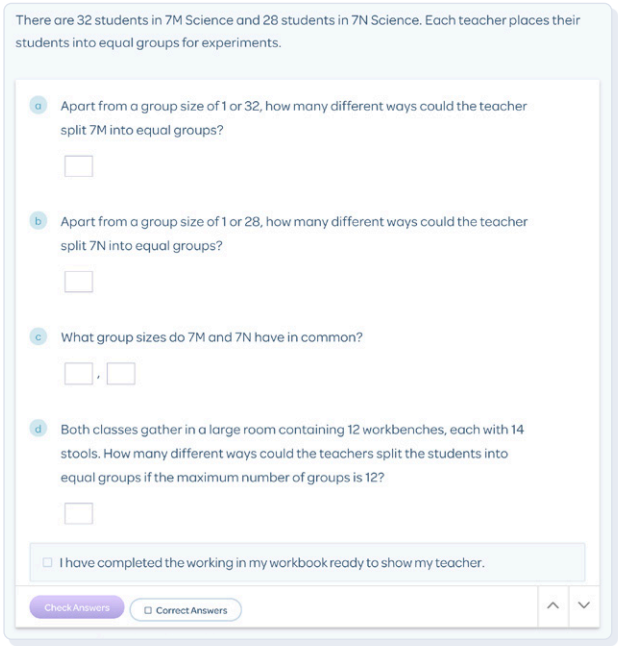


Fig 16: Example independent problem-solving activity (consolidation set) for NA703 Concept 3: Factor Trees and Prime Factorisation, with solution hidden

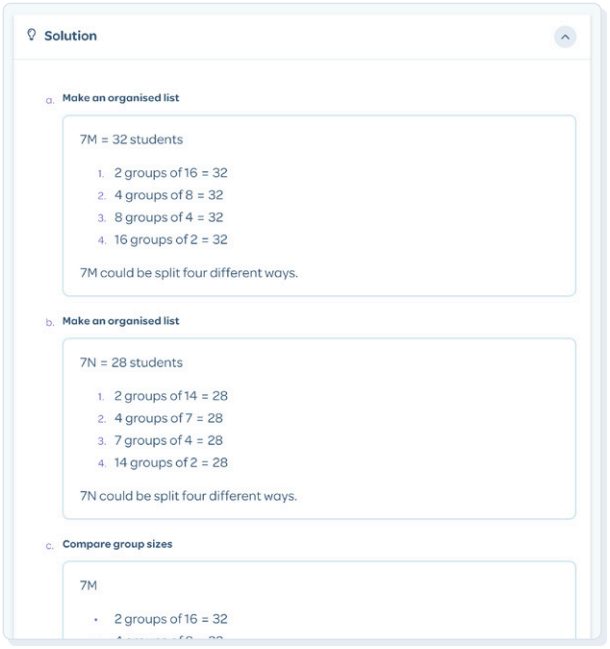


Fig 17: Example independent problem-solving solution (consolidation set) for NA703 Concept 3: Factor Trees and Prime Factorisation

Remind students to record their working out

Students are prompted to confirm they have completed their working in their exercise book before submitting their answer for each online problem-solving activity. This encourages students to follow good practice by completing all of their working using pen and paper.

Reasoning

BitMaths employs an innovative and comprehensive approach to mathematical reasoning, with a dedicated reasoning task in every module that relates to the concepts taught in that module.

Many students entering secondary school lack the knowledge, confidence or language to clearly articulate mathematical reasoning. To apply mathematical reasoning, students are required to solve problems and articulate their solutions using specific cognitive verbs, such as **prove**, **justify**, **determine** and so on. BitMaths reasoning tasks include cognitive verbs to prompt students to articulate their mathematical reasoning.

Cognitive verbs

Cognitive verbs are important to the explicit teaching of thinking, so students can recognise and verbalise abstract processes. Cognitive verbs include:

Prove: To use a sequence of steps to find a conclusive result. Answers should include 'is/is not' or 'does/does not' statements.

Justify: To show all evidence that supports a conclusion in a logical way. Answers should include 'because' statements.

Determine: To come to a conclusion after considering and/or investigating given information. Answers should include 'is' statements and provide justification.

Explain: To make a process clear by giving a detailed account of the given information and/or investigation. Answers should be written in sentences or a paragraph.

Decide: To consider options or given information and reach a conclusion. Answers should state the decision clearly and provide justification.

Evaluate: To appraise a situation or list of options by considering strengths, limitations and implications, and make judgements based on specific criteria. Answers should be written in sentences and can include calculations, tables, graphs or lists to support findings.

Compare: To identify and consider the strengths and limitations of options. Answer statements can include a list.

Reasoning Tasks

Reasoning tasks can be completed in one of three ways:

- online with the help of the *Reasoning Wizard*
- online independently
- using a printed worksheet.

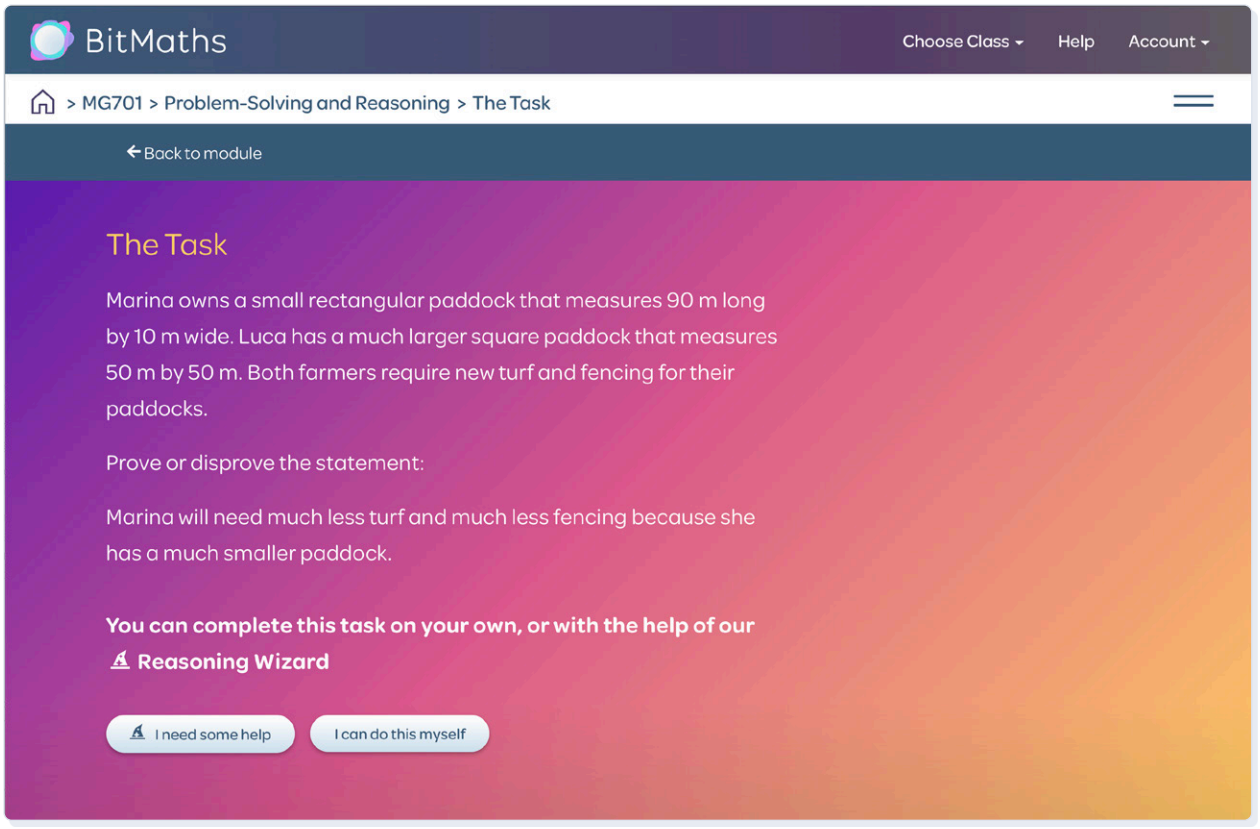


Fig 18: Example reasoning task for MG701 Formulas for Areas

Reasoning Wizard

The *Reasoning Wizard* is designed to scaffold and model good practice and articulation for high-level, multi-step, reasoning-based tasks.

Although there are many ways to solve any given problem, the *Reasoning Wizard* provides scaffolding to guide students through each step of the task in an efficient and logical way. It breaks large problems into manageable chunks and allows students to follow a path of deductive reasoning, leading to the correct solution.

By using the *Reasoning Wizard*, students will gain the confidence and skills to not only solve a variety of mathematical problems but also articulate a well-reasoned answer.

To use the *Reasoning Wizard*, students select *I need some help* from the *Reasoning Task* page.

The *Reasoning Wizard* has two main parts:

- *Reasoning Wizard* steps
- Solution

Reasoning Wizard Steps

The *Reasoning Wizard* includes a scaffolded series of questions that work through the problem-solving and deductive reasoning required to reach the solution. Students get unlimited attempts to answer these questions correctly.

The *Reasoning Wizard* always begins by ensuring students understand the reasoning question. Students are asked to clarify what the question is asking, what maths they will use and what their answers should include.

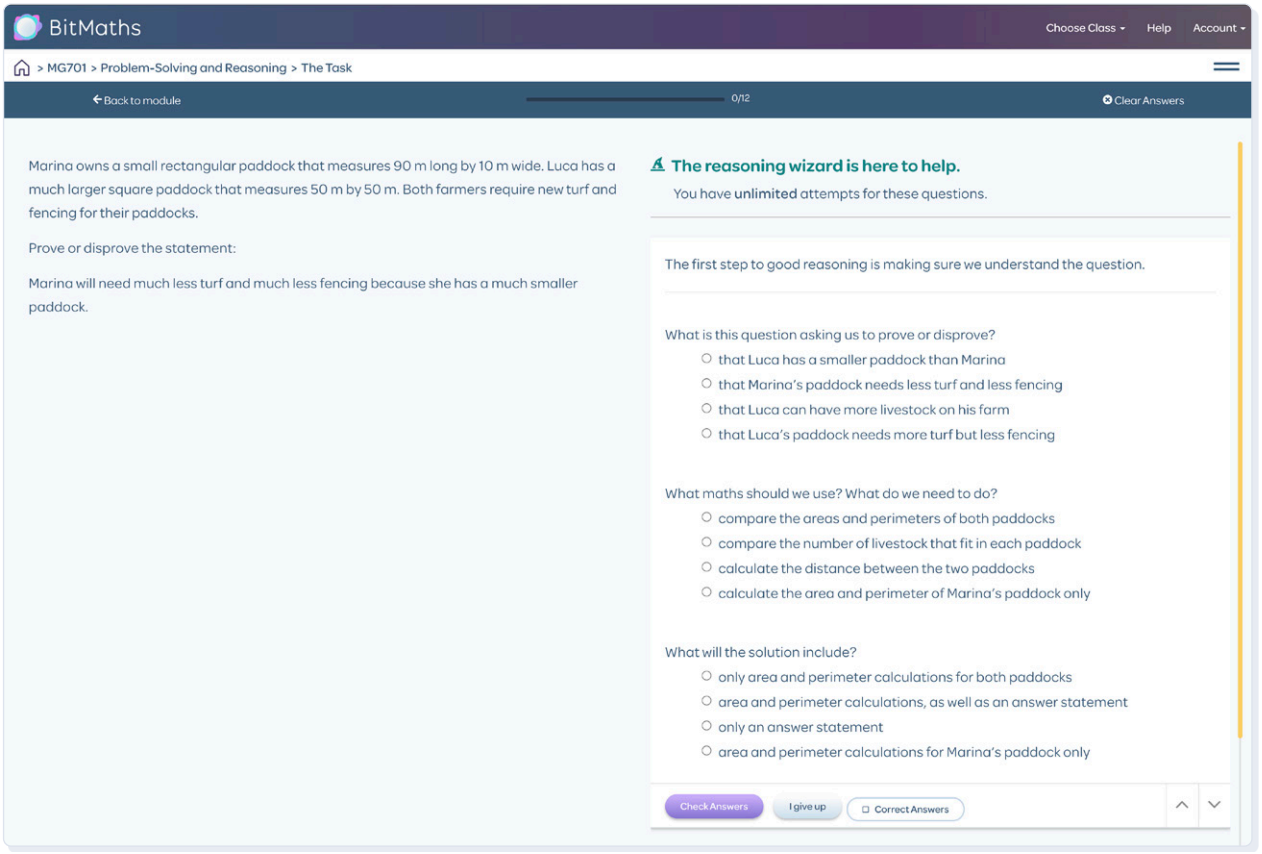


Fig 19.1: Step 1 of *Reasoning Wizard* for MG701 Formulas for Areas

Students cannot proceed to the next step until they answer correctly. However, students who continually have difficulty answering are given the opportunity to see the correct response and continue.

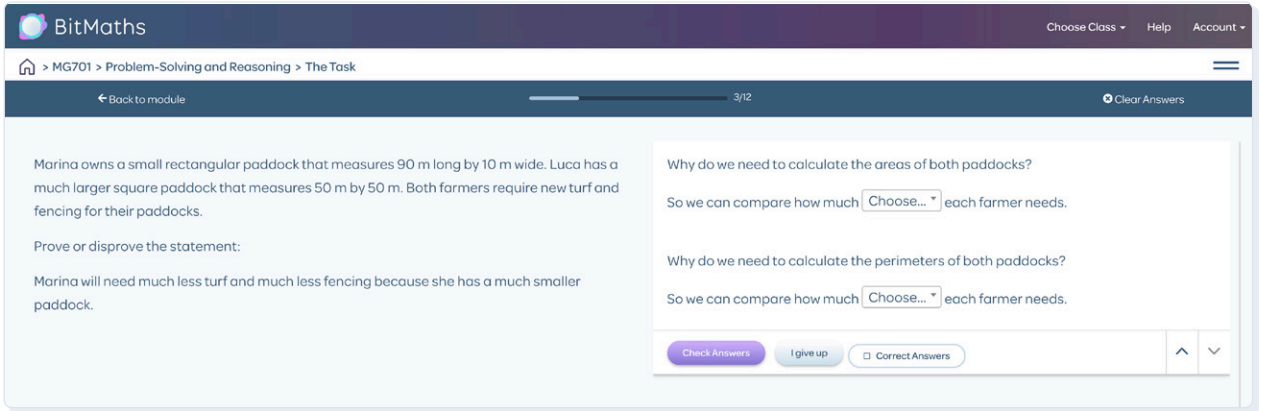


Fig 19.2: Step 2 of *Reasoning Wizard* for MG701 Formulas for Areas

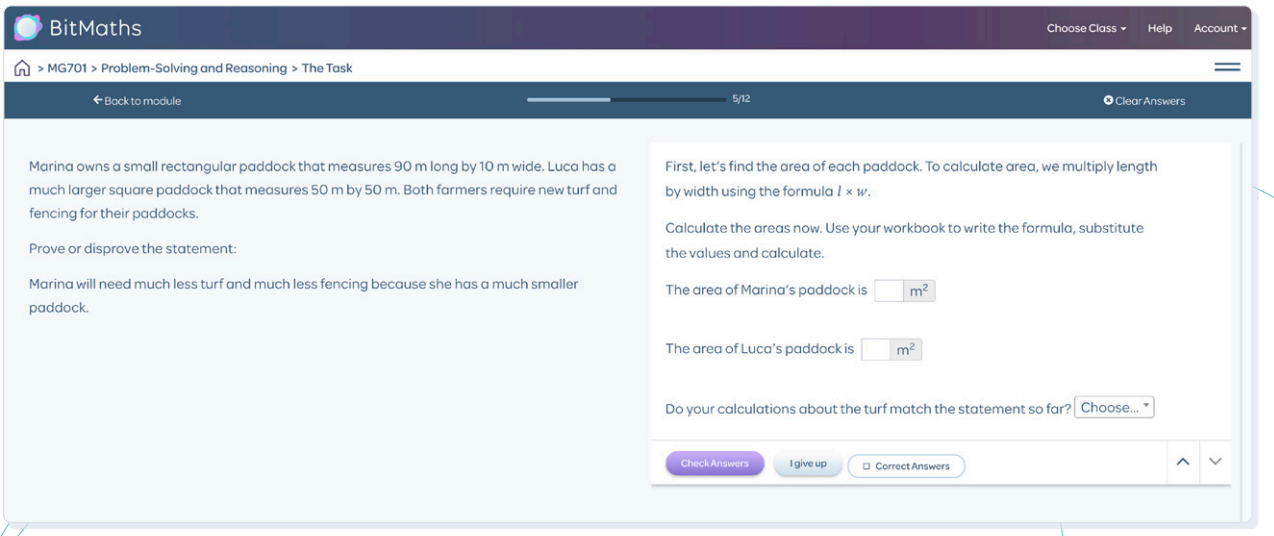


Fig 19.3: Step 3 of *Reasoning Wizard* for MG701 Formulas for Areas

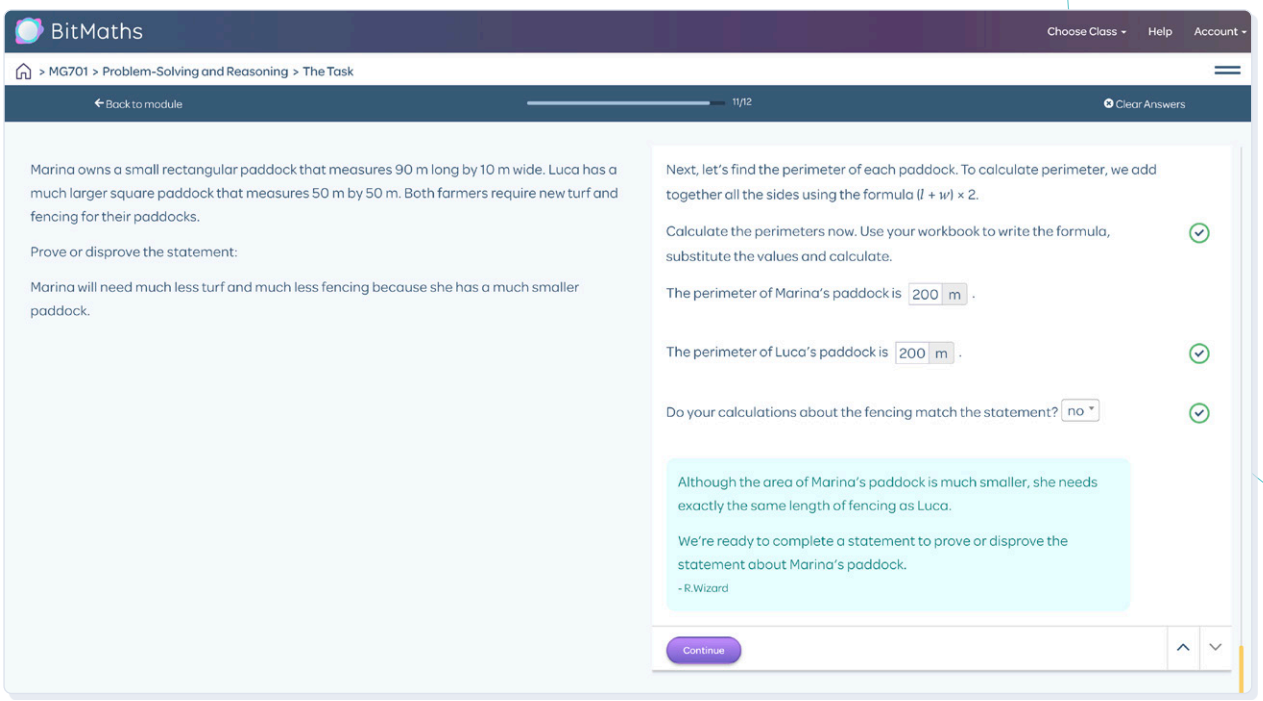


Fig 19.4: Step 4 of *Reasoning Wizard* for MG701 Formulas for Areas, including answer elaboration

Reasoning Solution

Once all the steps required to solve the problem are completed, students are presented with a solution form. Students complete statements with input and multiple choice elements. Each statement provides students with a model for appropriate articulation of the relevant reasoning skill.

Students are given a single attempt to complete the solution in the form of a cloze activity.

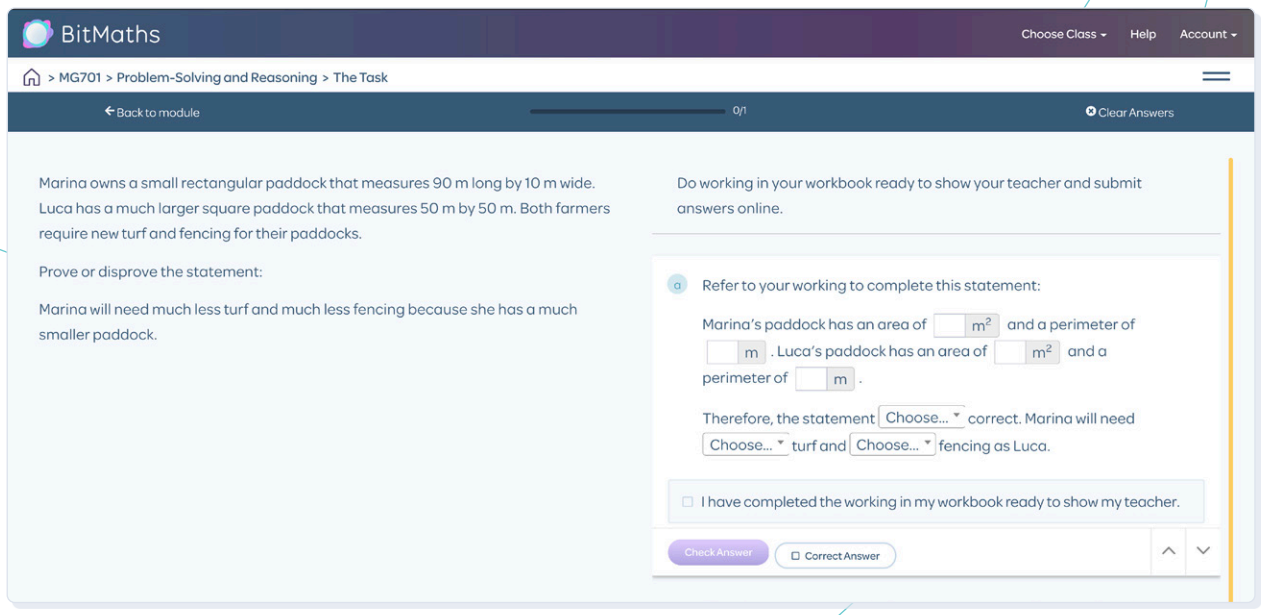


Fig 20.1: Solution form for MG701 Formulas for Areas reasoning activity

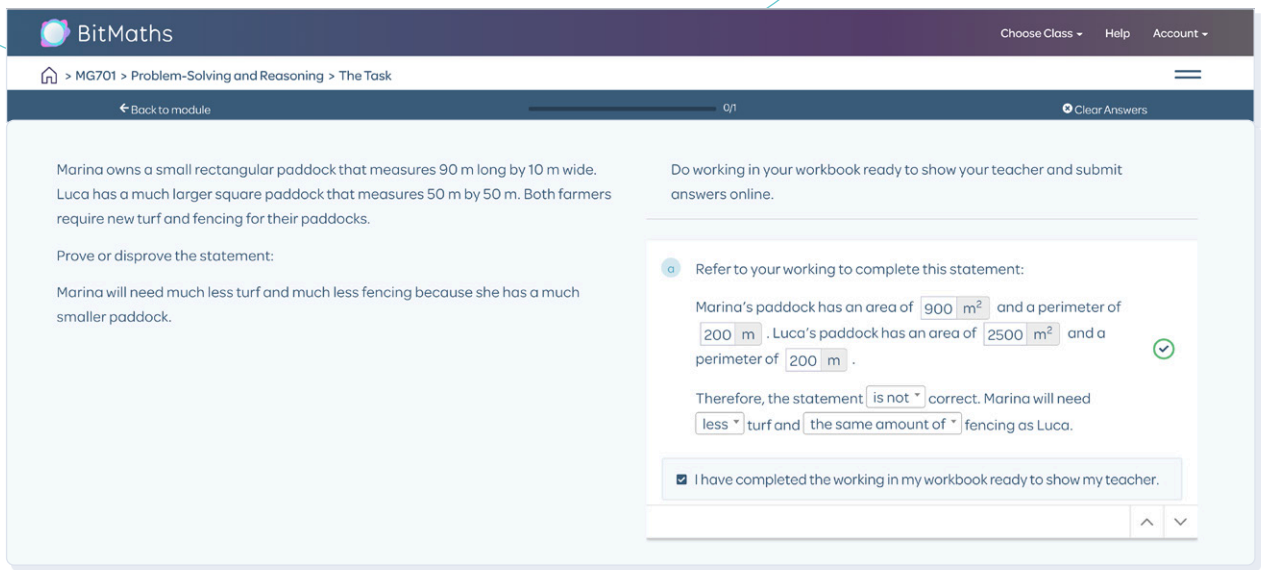


Fig 20.2: Solution form for MG701 Formulas for Areas reasoning activity, with solution submitted

Note: The same solution cloze activity is used by students who opted to solve the task independently without the use of the *Reasoning Wizard*.

The Big Question

Another way BitMaths provides higher-order thinking opportunities!

Included at the end of every module is a challenging maths problem or brainteaser. Each question comes with a worked solution that students can view to check against their answer.

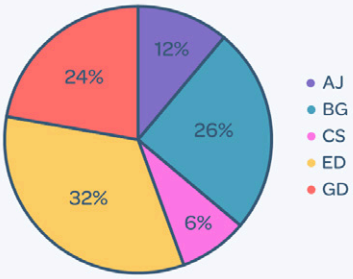
The Big Question

I entered data into a spreadsheet showing the total votes five candidates received for School Captain. I selected the five cells and created a sector graph. Unfortunately, I deleted the number of votes for AJ and ED.

How many more votes did ED receive than AJ?

Votes for School Captain candidates

Candidate	Number of votes
AJ	
BG	65
CS	15
ED	
GD	60



Enlarge Image

Show Solution

Fig 21: *The Big Question* for SP703 Primary and Secondary Data, with solution hidden

Here's one way to find the answer:

We can see that:

ED (x votes)	= 32% of the total votes
BG (65 votes)	= 26% of the total votes
GD (60 votes)	= 24% of the total votes
AJ (y votes)	= 12% of the total votes
CS (15 votes)	= 6% of the total votes

Total votes

65 votes	= 26% of votes
Total votes	= 65 ÷ 26 × 100
	= 250

AJ votes

12% × 250	= 30

ED votes

32% × 250	= 80
Difference	= 80 – 30
	= 50

ED received 50 more votes than AJ.

Fig 22: *The Big Question* for SP703 Primary and Secondary Data, with solution shown

Student Portfolios

When activities are completed online, results are aggregated into student portfolios so you can see a snapshot of student performance at any given time. To access a student's portfolio, select their name on the *My Classroom* page or in any *Activity Tracker*.

Results Overview

The *Results Overview* section includes graphs that aggregate all activity results for students across concept, problem-solving and reasoning activities.

The overview graphs show:

- how many questions have been answered altogether
- how many questions have been answered correctly, which are broken down into:
  - answered correctly on first attempt
  - answered correctly on second attempt
- how many questions have been answered incorrectly.

Select the *View Details* button to view a more detailed breakdown of activity results.

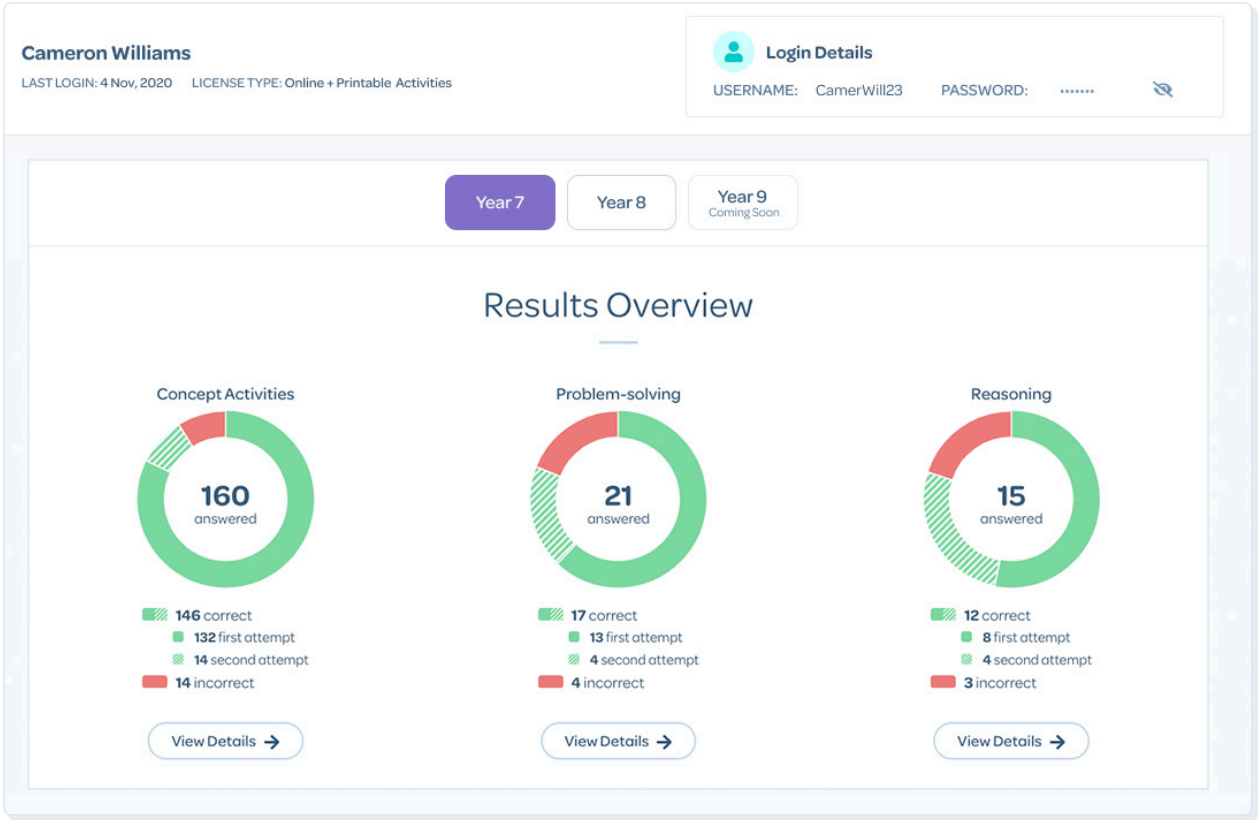


Fig 23: Example student portfolio *Results Overview*

Detailed Results Pages

These are more detailed pages within a student's portfolio that allow you to see granular data of results across the concept, problem-solving and reasoning activities.

For concept activities, you can view detailed results by:

- activity type (understanding, support, consolidation, extension)
- sub-strand

For problem-solving activities, you can view detailed results by:

- activity type (support, consolidation, extension)
- sub-strand

For reasoning activities, you can view detailed results by:

- use of the *Reasoning Wizard*
- sub-strand

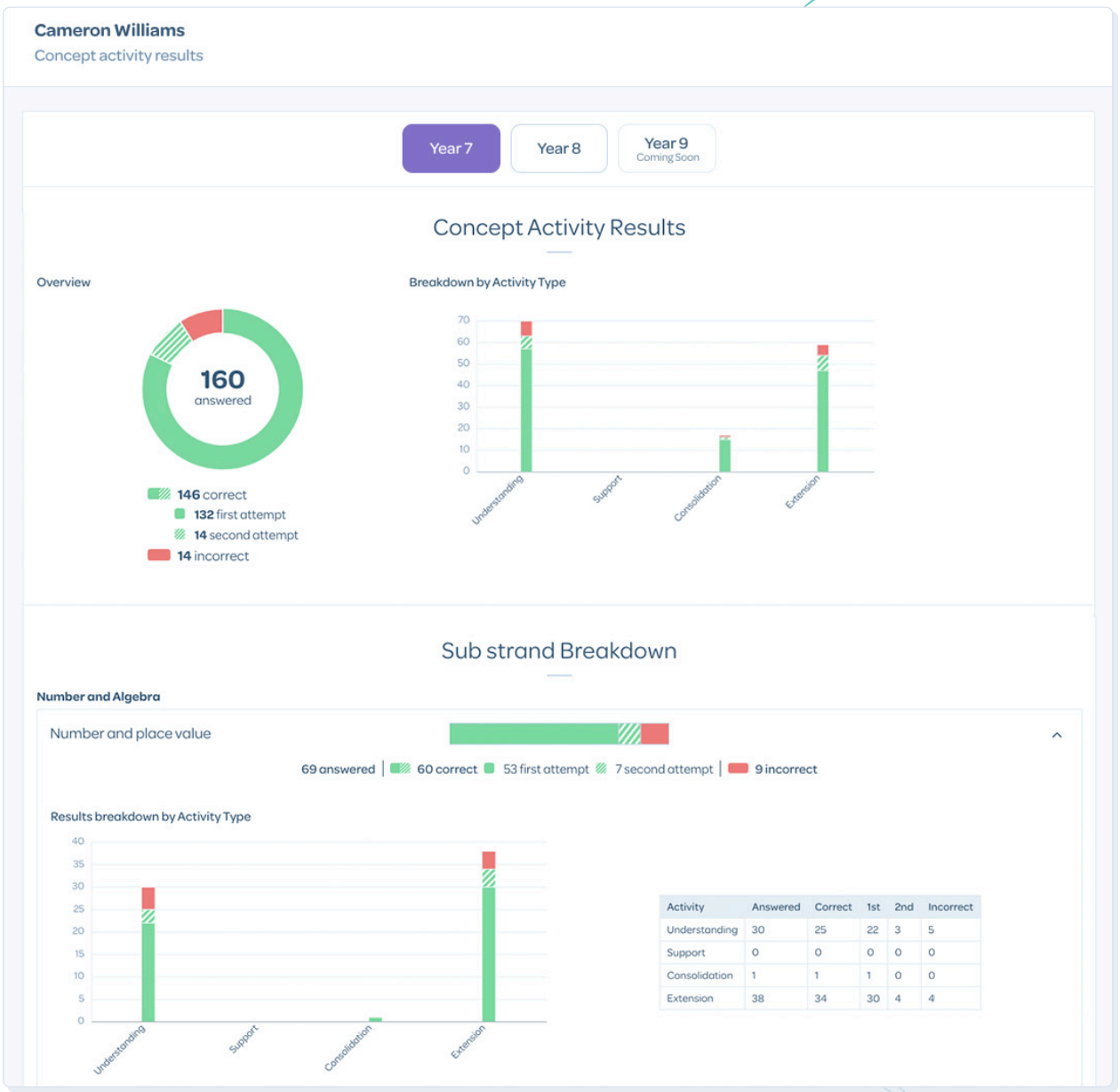


Fig 24: Example student portfolio Concept Activity Results

Extra Features

With cutting-edge technology embedded throughout the program, here are just a few extra features that make BitMaths the ultimate digital classroom experience.

Classroom Management Tools

BitMaths includes Eyes Up Front and activity locks to help you manage your students' workflow.

Eyes Up Front

Eyes Up Front allows you to temporarily pause students' access to BitMaths and instructs them to 'pay attention to the teacher'. Find the Eyes Up Front tool in the menu bar of any page within BitMaths. You can deactivate Eyes Up Front when you're ready to let your students continue.

Teacher view **Student view**

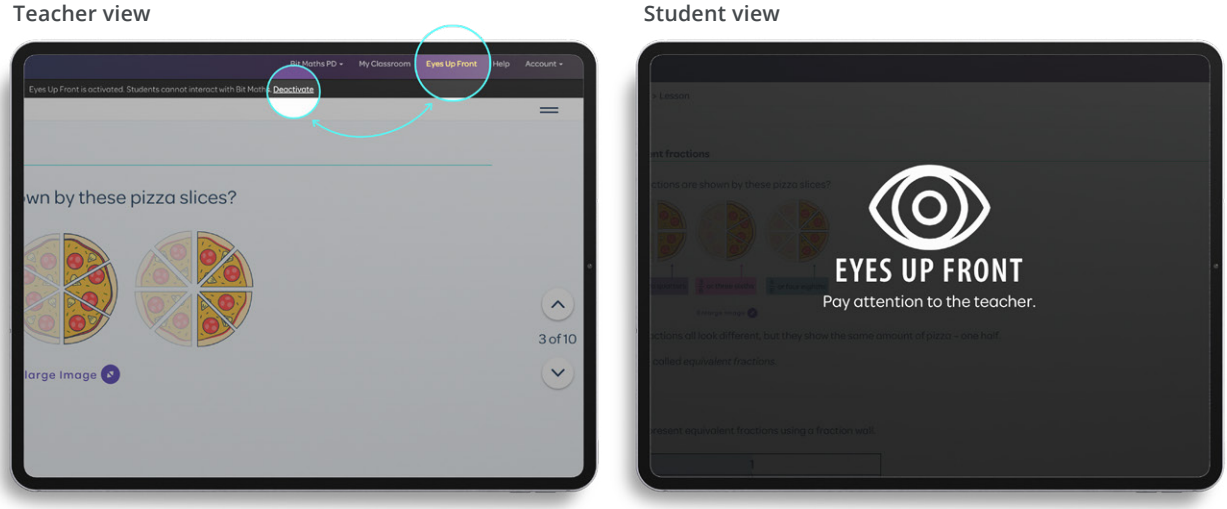


Fig 25: Eyes Up Front screens

Activity Locks

Activity locks are included in all concept activity sets as well as problem-solving and reasoning activity sets. By default, activity sets are locked to students, so they're not tempted to skip ahead. You can lock and unlock activities from a module homepage.

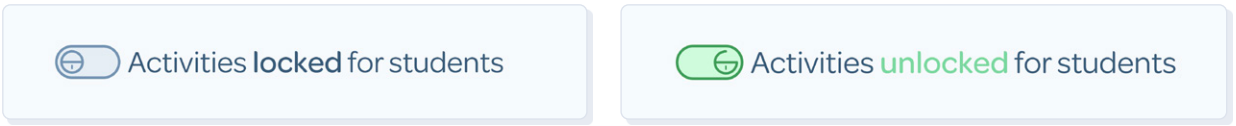


Fig 26: Activity lock buttons

Mathematical Input Toolbar

Every activity includes quick access to a mathematical toolbar. Within any answer field, simply select the keyboard icon to open the toolbar.

Students use this toolbar to input more complex solutions where the answer includes a mathematical notation that is not easily accessible via a standard keyboard. For example, fractions, exponents and square roots.

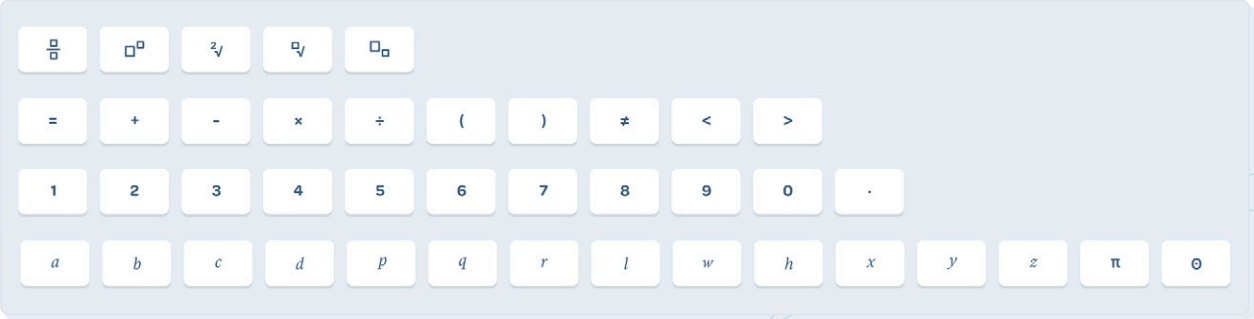


Fig 27: Mathematical input toolbar

Works on any device

Alongside a range of handy digital features, BitMaths has been created to work on any device connected to the internet. The responsive design means every slideshow, video and activity has been curated for optimal viewing across a range of devices from smartphones to tablets, laptops and desktops.

BitMaths

Have any questions?

Contact your local education consultant. With teaching experience and in-depth knowledge of the program – we're here to help all year round.

Try BitMaths for free

Explore what BitMaths has to offer firsthand with a free trial.

We can set up teaching access just for you, or set up access for all teachers and students at your school for the ultimate BitMaths trial experience.

Request a demo

You can request a demo just for your executive team or for all your junior mathematics teaching staff.

We provide in-school or virtual demonstrations of BitMaths across Australia.

Visit **bitmaths.com.au**