Fractions and Decimals

Online Interview (FDOI)

# Information Guide

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# Introduction

## What is the Fractions and Decimals Online Interview?

The Fractions and Decimals Online Interview (FDOI) is an online assessment tool developed to measure student understanding of fractions and decimals. Its primary use is for formative assessment and to inform responsive teaching, but it can also be used for summative assessment.

The assessment is conducted as a one-to-one task-based interview between the teacher and student. It is typically used in Years 5 to 8. It assesses a student’s knowledge at a point in time, and their methods for thinking mathematically.

The FDOI tool can generate reports of student achievement and diagnostic information to inform curriculum program planning and adaptive teacher practice. The tool can also compare individual student results within a school to understand student cohort achievement and monitor year level cohort or whole school progress.

The tool provides the department with valuable data indicators of student numeracy performance system-wide, which inform decisions such as targeting of supports at the local, network, area, region and system levels.

The FDOI complements the [Mathematics Online Interview (MOI).](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx)

## FDOI background

The FDOI was developed following the successful uptake of the MOI tool. The department developed and launched MOI on the basis of findings and outputs of the [*Early Numeracy Research Project (ENRP, 1999-2001)*](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/enrpreport.pdf). The ENRP had developed a framework of growth (a learning trajectory) in mathematics understanding to provide a means of both measuring and tracking student learning. Feedback from teachers using MOI across Victorian government primary schools indicated that a similar assessment tool could support teaching and learning of students in Years 5 and 6. However, MOI did not include some core upper primary mathematics curriculum areas, i.e. fractions and decimals.

Accordingly, the department developed a similar style interview, largely focusing on fractions and decimals, to be administered to students beyond Year 4. Note: this is flexible depending on the students’ mathematical understanding of fractions and decimals at any given year level.

## Assessment sections

The FDOI comprises 21 questions arranged in three sections:

* **Fractions**: 9 questions, testing fraction identification using shapes, patterns, number lines, and scenario settings
* **Decimals**: 7 questions, including determining a decimal by using a number line, putting decimals in sequential order, converting fractions to decimals (and vice versa) and comparing the size of decimals
* **Contextual Problems**: 5 questions, including a variety of scenarios testing students’ ability to apply appropriate proportional reasoning to determine the best value, solve two-part ratio problems in a practical context, and interpret fractions of a percentage. This section has a particular focus on *proportional reasoning*, which is one of the most important ideas in mathematics.

### Key mathematical concepts

The original developers trialled a range of items before selecting the questions integrated into the FDOI. Most of the questions relate to fraction and decimal *size*, as it was identified that:

* many students do not conceive of fractions as having a size but instead, as a number over a number (i.e. numerator above the denominator, e.g. ) as opposed to being a number i.e. that which can be located on a number line
* studies have shown that understanding fraction magnitude and size, particularly early on in school, is foundational for overall mathematics achievement throughout the remaining school years and beyond (Fazio, DeWolf, and Siegler, 2016)
* partitioning is another important idea which underpins strong understanding of fraction and decimal ideas (Lamon, 1999).

FDOI also includes some references to percentages.

### Overarching Ideas linked to the FDOI

When assessing a student’s capability, teachers should consider the knowledge, skills and understandings that students need in order to achieve mastery of fractions. This includes the awareness of multiple fraction constructs, which are the concepts or methods used to represent and understand fractions, focusing on how parts relate to a whole (e.g. a pie chart provides a representation of the part-whole construct) and understanding fractions in various formats.

These knowledge, skills and understandings, also known as ‘Overarching Ideas’ include:

*Abilities*

* Articulate rational number thinking using appropriate language [FDOI Questions 1-21]
* Form and manipulate a variety of physical and mental models (areas and regions, sets, number lines, ratio tables, etc), in continuous and discrete situations [Questions 1-21]
* Understand the subconstructs of rational number (part/whole [Questions 1-4, 6], division [Question 6], measure [Questions 8-11], ratio, and operator [Question 4]) as well as their interrelationships
* Understand that rational numbers are largely about relationships [Questions 1-3, 6, 7, 9, 12-15, 21]
* Think multiplicatively rather than additively when appropriate (relative Vs absolute thinking) [Question 17]

*“Part-whole” capabilities*

* Understand that fractions have a size with respect to some area, length or set
* Understand that if *‘a’* is a certain fraction of *‘b’*, we can determine what fraction ‘*b*’ is of ‘*a*’, through the reciprocal relationship
* Understand that fractions are equal shares that are not necessarily congruent, and that the subdivision of the whole must be exhaustive [Question 1]
* Recognise that a given fraction size (continuous/discrete) of Q19 (i.e. 125% of 2.5mL) may not be the same size as that fraction of Q20 (i.e. 1:4 of 200mL) [Question 19 and 20]
* Move from the whole to a given part, from the part to the whole, and from the part to the part flexibly [Questions 2, 3, 6, 7]

*Connecting concepts with symbols/equivalences*

* Use appropriate symbols to represent rational numbers (e.g. fractions, decimals and percentages) and can flexibly move between these as appropriate
* Understand the meaning attached to each part of a fraction (e.g. the denominator shows what 'denomination' is being counted, the numerator 'enumerates' how many of these parts) [Questions 9, 12, 14, 18]
* Understand that fractions (including whole numbers, mixed numbers and improper fractions) are entities that can be counted (e.g. represents four things called "fifths") and can recognise and use counting patterns and equivalences [Questions 3, 5, 9, 12, 14]

*Understanding fractions as a number (or measure)*

* Understand that fractions are numbers that have a place on a number line or can represent some distance along a number line (e.g. can equal 0.5)
* Identify a rational number on a number line with consideration to the calibrations and the intervals specified (e.g. 1.7 mL of medicine in a 2 mL size syringe) [Question 10]
* Understand and operate with the 'density' of rational numbers (meaning that between any two rational numbers there is an infinite number of rational numbers), relating them appropriately to whole numbers [Question 11]

*Understanding fractions as division*

* Understand a fraction can be the result of a division (e.g. 2 ÷ 3 = )
* Recognise  as ‘*a*’ divided by ‘*b*’ [Questions 6, 16]
* Can solve whole number division problems understanding the significance of the size of the quotient (e.g. 4 ÷ 5 will result in an answer less than one) and/or treating remainders appropriately [Questions 6, 17]
* Has appropriate strategies in sharing-type problems (e.g. If 3 pizzas are shared equally between 5 friends, what fraction of a pizza does each friend get?) [Question 6]

*Understanding relative size/benchmarking*

* Readily compare and order rational numbers, using efficient and understood strategies [Questions 5, 9-11, 13, 15]
* Relate a given rational number to key benchmarks (e.g. 0, , 1), using place value as appropriate [Questions 5, 8-11, 13, 15]
* Understand the inverse relationship between the denominator and the size of the parts [Questions 7, 9]

*Understanding operators and operations*

* Understand that fractions can operate by either ‘shrinking’ it (e.g. of 8 = 4) or ‘stretching’ it   
  (e.g. of 6 = 9)
* Combine and partition rational numbers using appropriate physical or mental tools, renaming as appropriate [Questions 4, 6, 10-12, 14, 16, 18]
* Estimate the answer appropriately in a rational number calculation [Questions 8, 16, 17, 19, 20, 21]
* Can nominate a problem situation to which a particular rational number operation might apply, and conversely can represent a relevant rational number operation given the problem situation [Questions 17, 19, 20, 21]

*Understanding ratios and rates*

* Understand that a ratio is a comparison of any two quantities. Rates can be thought of as descriptions of the way quantities change over time

## Insight Assessment Platform

The FDOI is hosted on the Victorian Curriculum and Assessment Authority’s (VCAA’s) Insight Assessment Platform.

Teachers can access the FDOI via school log-in here: [Accessing the Insight Assessment Platform (Login) (vcaa.vic.edu.au)](https://www.vcaa.vic.edu.au/assessment/f-10assessment/insight/Pages/login.aspx)

All supportive documentation, such as the *FDOI Equipment Checklist* and the *FDOI Mapping to the Victorian Curriculum F-10: Mathematics Version 2.0*, are located on the department’s website: [Mathematics Online Interview and Fractions and Decimals Online Interview](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx).

## Differences between the FDOI and the MOI

### Content

The FDOI is one of two mathematics assessment tools accessible via the Insight Assessment Platform. The FDOI assessment tool is used to measure a student’s understanding of fractions and decimals, whereas the MOI assessment tool is used to measure a student’s mathematical knowledge of counting, place value, addition and subtraction, multiplication and division, time, length measurement, properties of shape, and visualisation. Further information about the MOI tool can be found on the [Mathematics Online Interview and Fractions and Decimals Online Interview](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx) web page.

### Target year levels

The FDOI is typically used with upper primary and secondary school students in Years 5-8, whereas the MOI is generally used to assess students from Prep to Year 4.

Regular assessment to monitor learning progression and inform teachers’ decisions to accelerate, slow down or direct targeted interventions is a key practice within the Victorian Teaching and Learning Model (VTLM) 2.0.

As a minimum, it is recommended that the FDOI is used:

* at least once for all students in either Year 5 or 6
* at least once for all students in either Year 7 or 8.

Teachers may decide to administer the FDOI for some students outside these year levels, for example, where a student is indicating readiness for acceleration, or difficulties in understanding mathematical concepts.

Some items may pose a high level of difficulty for Years 5 to 8 students, as they focus on content, skills and understandings that extend beyond the typical focus of upper primary teaching of fractions and decimals. It is therefore recommended to use the ‘Fractions’ section of the interview with students who are confident and capable with respect to mathematics more generally.

Even with the ‘Part-Whole’ construct, teaching may be limited to certain aspects of ‘Part-Whole’ thinking. For example, upper primary students seldom encounter wholes that are partitioned into sections that are equal areas but are not congruent, or into unequal parts. Working with tasks such as these support students to develop *proportional reasoning*: moving from the part to the whole (e.g. “If this is , draw me what the whole might be”) and moving from the part to the part (e.g. “If this is , show me what might look like”).

Using the tasks with more resilient students also alerts teachers about what to look for during classroom interactions with other students.

### Linear questioning

The FDOI is a linear assessment tool, whereby students need to answer all questions from start to finish, in any of the three sections (fractions, decimals and contextual problems). It is structured in a way so that all its questions can be attempted by the student regardless of their level of understanding on the given topic.

The pilot of the FDOI demonstrated that a students’ success on a particular fraction construct did not predict their success on another fraction construct. For example, a student’s ability or inability to place a fraction on a number line (*Fractions as measure*) did not necessarily predict their ability or inability to find of 9 (*Fractions as an operator*). Consequently, it is open to teachers to administer and complete the entire FDOI in one sitting.

# Overarching Ideas and Misconceptions

## The purpose of Overarching Ideas and Misconceptions

The FDOI utilises the concepts of ‘Overarching Ideas’ and ‘Misconceptions’ to describe a student’s understanding of specific constructs relating to fractions and decimals.

Teachers can record student responses directly into the online tool and generate a profile of the student’s mathematical understanding based on the Overarching Ideas and Misconceptions.

An Overarching Ideas and Misconceptions profile provides valuable information for teachers in planning to meet ongoing student learning needs.

**Overarching Ideas**

These are statements of what a student understands and/or can do within the three sections of Fractions (F), Decimals (D), and Conceptual Problems (CP). These may link to one item (e.g. one question), part of an item (e.g. sub-question), or several parts of items (multiple sub-questions). An example of an Overarching Idea is that a student can correctly locate a proper fraction on a number line.

**Misconceptions**

Misconceptions (M) are ideas which are not accurately understood. An example of a misconception is where a student is unable to visualise of in any way other than “seeing” the numbers.

Overarching Ideas and Misconceptions are further detailed in the [Overarching Ideas and Misconceptions](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-overarching-ideas-misconceptions.docx) document, each labelled with a unique identifier code.

## Student strategies for Overarching Ideas

This information will assist teachers in developing their understanding in relation to the types of strategies that students use to demonstrate their understanding of fractions.

*Benchmarking:*

* Correct benchmarking is evidence that a student understands the relative size of fractions. It is also useful for comparing decimals. When benchmarking, a student will compare a fraction to another well-known fraction, usually a half, or to a whole number such as zero or one. For example, when comparing and ; is greater than a half, and is less than a half, therefore is bigger.

*Residual thinking:*

* The term residual refers to the amount which is required to build up to the whole. For example, has a residual of . This thinking is useful for comparing the size of fractions such as and . has a residual of and has a residual of . Therefore is a larger fraction because it has the smaller residual – the smaller amount to make the whole. Sometimes, however, residual thinking alone is not an efficient strategy. When comparing & , measuring up the residuals of & is not a helpful strategy as you are left with two residuals that are no easier to compare than the original pair. In this case, the residuals then need to be benchmarked to and 1 to prove which is larger. If students use residual thinking alone with this pair, it should be classified as an unsatisfactory explanation.

*Residual thinking with equivalence:*

* In order to use residual thinking effectively, creating an equivalent residual sometimes makes the justification clearer. For example, when comparing and a student may state that has a residual of or. Therefore, the residual for () is smaller than the residual for (). The fraction with the smaller residual is the larger fraction.

*Residual thinking with some other proof*

* Sometimes residual thinking alone is not the most appropriate strategy. For example, if a student uses residual thinking alone to compare and, they must then convince the interviewer that they can justify which of the residuals is bigger (or ). An example of residual with proof might be, “I know one quarter of nine is more than 2 because 2 is a quarter of eight, so must be less than therefore is the bigger fraction”. Please note: an explanation of residual thinking without proof, should be recorded as “other (unsatisfactory explanation for either a correct or incorrect solution)”.

*Other (satisfactory explanation with a correct solution)*

* There are very few correct solutions with appropriate strategies that do not already fall into the provided categories, but it is possible for this to occur. For example: a student may be able to mentally convert a fraction to a decimal and then compare or use some other mathematically correct strategy. This option is only for correct solution and appropriate explanation.

## Identifying student Misconceptions

This information will support teachers to identify ways in which students can incorrectly interpret fractions, leading to Misconceptions.

*Top of Form*

*Gap thinking*

* This strategy is a form of whole number thinking, where the student compares the whole number difference between the numerator and denominator. For example, and both have a difference of “one” between the numerator and denominator. A student using “gap thinking” might claim therefore that these fractions are the same size. When comparing and , a student using gap thinking would choose as larger because it has a smaller “gap”, thereby choosing incorrectly. There are some instances where “gap thinking” will lead students to a correct choice. For example, comparing &. This is an inappropriate strategy for comparing the size of fractions.

*“Higher” or “larger” numbers*

* With this strategy, fractions are deemed to be bigger if they contain larger digits. For example, when comparing and students may incorrectly claim that is larger because it has a “larger number”. Also, in comparing and , a student would choose as it has “higher numbers”. Sometimes students will directly compare the numerators or denominators and conclude a larger digit at the top or bottom of a fraction means that it is a larger fraction. This is an inappropriate strategy for comparing the size of fractions.

*Other (unsatisfactory explanation with either a correct or incorrect explanation)*

* There are many explanations that may fall into this category. It is a “catch-all” for any strategy that cannot be placed in the other categories. Typically, it will include any explanation that is mathematically incorrect, partially correct or vague. Sometimes students relate fractions to an image of an area model. Their justification might be is larger than because if I imagined a picture of them, would look more”. This reasoning is not evidence of understanding the size of the fractions. In a situation where the student provides a partially correct or vague explanation, it is appropriate to ask for further information in a non-leading way. For example, “can you tell me more about how you know? So you think it seems larger, but how can you be sure?”

## How Overarching Ideas and Misconceptions are assigned

The ‘Overarching Ideas and Misconceptions’ document demonstrates the decision-making process of how Overarching Ideas and Misconceptions are assigned based on student responses throughout the FDOI. Whether the student responds correctly or incorrectly to a whole question (or parts of the same question) determines if they have correctly understood the Overarching Idea (e.g. ‘Understands the relative size of decimals’), or rather, if they are unable to grasp the mathematical construct, which leads to a misconception (e.g. ‘Has difficulty ordering decimals’).

The Interview questions are required to interpret this document. To view the ‘Overarching Ideas and Misconceptions’ document, go to: [Overarching Ideas and Misconceptions](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-overarching-ideas-misconceptions.docx).

## Mapping FDOI Overarching Ideas and Misconceptions to the Victorian Curriculum F-10: Mathematics Version 2.0

The Victorian Curriculum F-10: Mathematics Version 2.0 lists the content that is to be covered in each year level, with a description of the expected standard to be reached by the end of that year.

Though the FDOI was developed before Version 2.0 of the Curriculum, there are some full and partial matches that align the achievement of Overarching Ideas to the level of understanding that the Curriculum requires for various year levels.

The [*Mapping the Fractions and Decimals Online Interview (FDOI) to the Victorian Curriculum F-10: Mathematics Version 2.0*](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-mapping-to-victorian-curriculum.docx) document provides details.

# Preparing for the assessment

## Recommended use of FDOI

### Who should run the assessment

The FDOI is designed to be administered by the students’ regular classroom teacher. This is because:

1) the classroom teacher is the main person who needs to gain an understanding of what individual students know and can do mathematically, as they will be the ones acting on this information

2) the interview is a great opportunity for the teacher and student to get to know each other in a one-on-one environment and for the student to demonstratewhat they know and can do independently.

For the above reasons, it is not recommended for the interviews to be conducted by someone other than the student’s classroom teacher, such as a school mathematics leader or mathematics specialist.

### When to assess certain sections with a student

The FDOI is best administered at the beginning of the school year. This is because start of year assessments provide insight into students’ consolidated knowledge and understanding, rather than content from a recently completed unit of work, which may not yet be fully embedded in their long-term memory.

Administration of the interview can be separated into three sessions (i.e. one for each of the three FDOI sections), corresponding to the time in which Fractions are Decimals are to be taught. For example:

* Items 1-9 (the ‘Fraction items’): before Fractions is to be taught in a given year
* Items 10-16 (the ‘Decimal items’): before Decimals is to be taught in a given year
* Items 17-21: can be administered with a group or class of students at a time that aligns with when the teacher is providing the related teaching. (These ‘Contextual Problems’ are practical applications of the content, but are quite challenging for most students, even those in Years 9 and 10).

A teacher should stop the interview if a student appears increasingly discouraged, and move onto (where appropriate) some of the less difficult sections of the interview.

## Advice for English as an Additional Language (EAL) and Culturally and Linguistically Diverse (CALD) students

The FDOI is generally accessible to EAL students due to the ‘hands-on’ nature of the questions, the wording of each question, and its direct instruction. However, students with limited English language acquisition may face linguistic barriers to demonstrating their mathematical knowledge.

The interview is conducted verbally with some questions requiring a student to provide a justification for their answer. This can be challenging for students with limited English oral skills, as they may be unable to clearly or confidently articulate their answer. Students may also find the complexity in the mathematical language challenging to understand and use, particularly in the ‘Contextual Problems’ section (Q17-21) of the FDOI.

To ensure a positive experience for the student, the teacher should determine whether a student has an appropriate baseline level of English prior to commencing the assessment. Before conducting the interview, the teacher should:

* explicitly teach the mathematical vocabulary students will encounter
* identify and teach the language students will need to understand questions and to describe and explain as they answer, for example, the language of sequencing and location to describe pattern and order, or conditional clauses to explain alternative solutions
* provide multiple opportunities for practice through classroom activities using worded questions similar to those in the interview.

If the teacher becomes aware during the interview of specific topics or themes that are unknown to the student, or observes the student experiencing difficulty articulating their answers, the teacher is encouraged to:

* consider alternatives to reduce barriers such as providing visual aids/drawings to support the student to respond
* engage with the school’s Multicultural Education Aid (if applicable), to assist with translating the student’s justification
* administer a different section of the interview (noting not all sections of the assessment need to be submitted at one time, and can be re-visited)
* pause the interview and return to the challenging section at a later date after providing further targeted teaching and practice.

# Administering the FDOI

## Interview kit requirements

The FDOI requires the teacher to be prepared for and familiar with the interview tasks.

Equipment is required when conducting the interview. This equipment needs to be sourced, sorted and stored for easy access throughout the interview. It is recommended that the equipment is sorted into the interview sections.

A list of equipment required for each section of the FDOI can be download here: [FDOI Equipment.](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-equipment-checklist.docx)

Known as the ‘interview kit’, this can be accessed via the department’s [MOI and FDOI webpage](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx).

Teachers are encouraged to print, assemble, and laminate the materials using the required colour of paper for easier identification. Teachers should be alert to potential barriers for students with colour blindness and amend colours as required. Some material may also need to be printed for specific questions where the student is required to draw on for working out a solution.

## Duration of the assessment

Administration of the full FDOI takes approximately 45 minutes (approximately 15 minutes per section), depending on:

* the number of questions students are asked (some questions are skipped when a student has answered a previous question correctly)
* the interviewer’s experience in both administering the interview and understanding the mathematics underpinning it, in order to record the responses efficiently
* the length of time the student takes to respond to each question.

## Assigning students for interview

Users will need a test code to assign students for interview. Detailed step-by-step guidance on creating test codes on the Insight Assessment Platform can be found in the [FDOI User Guide](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-user-guide.docx).

You **do not** need to assign a different test code to each student in your class. You can assign FDOI to multiple students from a class at the same time and when you click on the test code you created, all the students you selected will appear in the *Test Taker* screen.

If an assessment with a student needs to be placed on hold, it can be saved. To return to the same incomplete assessment, the user can search and select the test code used with the student from the *Test Taker* screen to continue the same assessment (refer to Figure 3).

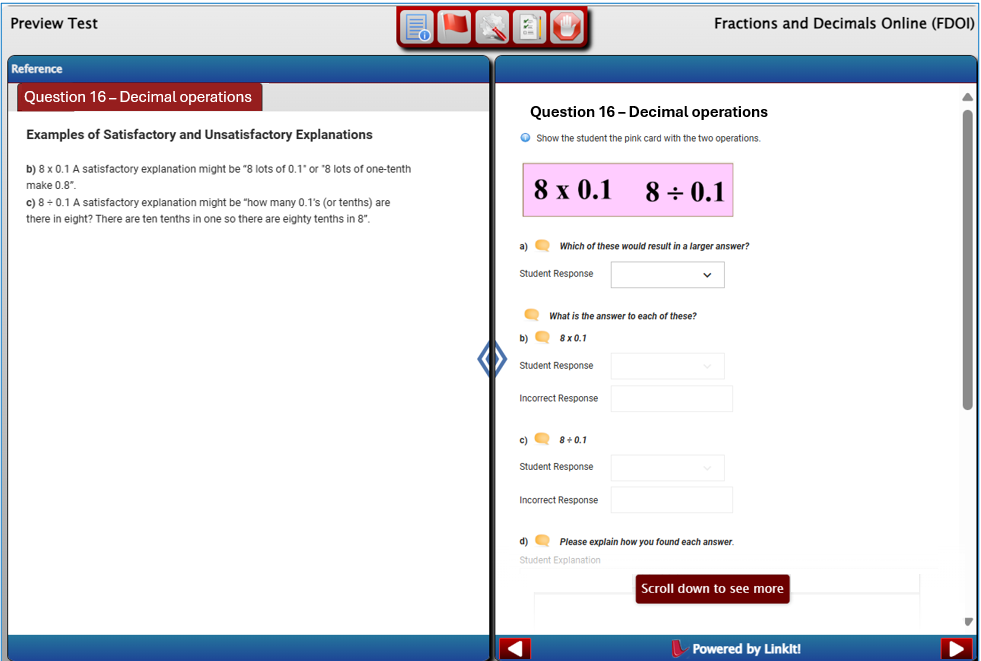
## Left-hand and right-hand panes

Figure 1 shows how the FDOI assessment screen is split into two panes. This only applies to questions where further user guidance is needed to support the user in how to administer the question, or select the appropriate response based on the student’s demonstration of their answer.

**The left-handpane** provides helpful information, such as the types of strategies, Misconceptions, further explanations, and other possible student responses.

**The right-hand pane** displays the question(s) and speaking points. This guides the teacher through the interview and includes all instructions needed.

Figure 1: FDOI Left- and right-hand pane



## Recording teacher comments

Figure 2 shows the general comments box that appears at the bottom of every question for users to enter general comments regarding their observations of the student’s response and reasoning.

All comments that are entered into these comment boxes are captured when the FDOI reports are generated.

Figure 2: Question comments box

A screenshot of a math test

Description automatically generated

## Exiting and continuing the interview

If users are unable to complete the assessment in full, due to time constraints or if the student struggling to continue with particular questions, a teacher can submit the assessment at any point to *save* the student’s progress. To continue the assessment, the teacher can access the same test code used for the student’s initial assessment, select the relevant student marked as ‘In Progress’ and continue the assessment.

Figure 3 below illustrates how to return to a student or class test code to continue or complete their FDOI assessment. Users can view the assessment status of their student or class, such as Not Started (NS), In Progress (IP), Pending Review (PR), and Finished/Completed (Fini).

Figure 3: How to continue an assessment interview

A screenshot of a computer

Description automatically generated

## Tips for an efficient interview process

Teachers may practise using the FDOI with teaching colleagues and/or family members prior to interviewing any students. By practising, teachers familiarise themselves with the administration processes (e.g. how to manage the interview kit equipment) and online platform, supporting a more efficient and relaxed assessment environment.

It is also important that teachers are familiar with: (i) the mathematics being assessed by each item; (ii) common strategies used by students; and (iii) common Misconceptions. This will enable quick and efficient analysis and interpretation of the students’ responses. For example, there is a subtle difference between residual thinking (a very powerful strategy) and gap thinking (a common misconception).

The wording of each question is intentional and research based. For example, it is important to follow the script and resist the temptation to re-word a question or to prompt students for an answer. Understanding mathematics vocabulary is as important for students’ ongoing learning of mathematics as being able to calculate the response to a specific question.

If in doubt, it is better to err on the side of caution and provide a student with further learning experiences for consolidation than to risk assuming understanding that has not been fully constructed and embedded.

## Subsequent administrations of the FDOI

When administering the FDOI to a student for the second or third time, it recommended that the student is tested from the beginning of each section. When students are presented with the same questions for a second or third time, it provides both the teacher and student the opportunity to test if they have retained the knowledge and/or require further learning. Teachers can also use their judgement to skip a question they feel is well within the student’s capability. Re-administering the FDOI to students can help to gain a sense of student improvement over time, and the strengths and weaknesses of the unit of work.

# Reports

## Types of reports

The FDOI Overarching Ideas and Misconceptions data is only effective and useful if it is analysed and interpreted appropriately. Classroom teachers can analyse the data at both an individual student level and at a class level. The data can also be analysed at a whole-school level by the mathematics coordinator and/or school administration.

A range of reports for the FDOI can be generated to view student and class data. School Assessment Administrators can generate reports for any class as well as for the whole school. Reports can only be generated for students whose assessment/s have been submitted.

Currently, results of the reports generally reflect whether students have achieved Overarching Ideas or demonstrated Misconceptions. The department is updating FDOI to generate question-based reports at a class, group and school level.

This section provides a summary of recommended reports available through the Insight Assessment Platform. For a more detailed step-by-step guide on how to access each report, refer to the [FDOI User Guide](https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/maths/continuum/FDOI-user-guide.docx) located on the [MOI and FDOI web page](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx).

### Class profile

##### Overarching Ideas and Misconceptions class data

Figure 4 is a report that displays the class profile in more detail. Users can see a comparison of how students ‘scored’ within their class in terms of their achievement of Overarching Ideas (green), and assignment of Misconceptions (red).

Figure 4: Overarching Ideas and Misconceptions – detailed class profile view

A screenshot of a computer screen

Description automatically generated

### Individual student profile

*Student profile data*

Figure 5 shows that reports can be generated where users can filter further to view specific students’ progress by clicking on ‘Student Profile’. Users can then see the descriptions of the Overarching Ideas and Misconceptions, and the student’s learning progression over time.

Figure 5: Student profile data - Overarching Ideas and Misconceptions

A screenshot of a computer

Description automatically generated

##### Overall FDOI student scoring

Figure 6 illustrates where users can view a student’s overall ‘scoring’ of their assessment, based on how many Overarching Ideas or Misconceptions they had acquired when their assessment/s were submitted.

Figure 6: Overall FDOI student scoring

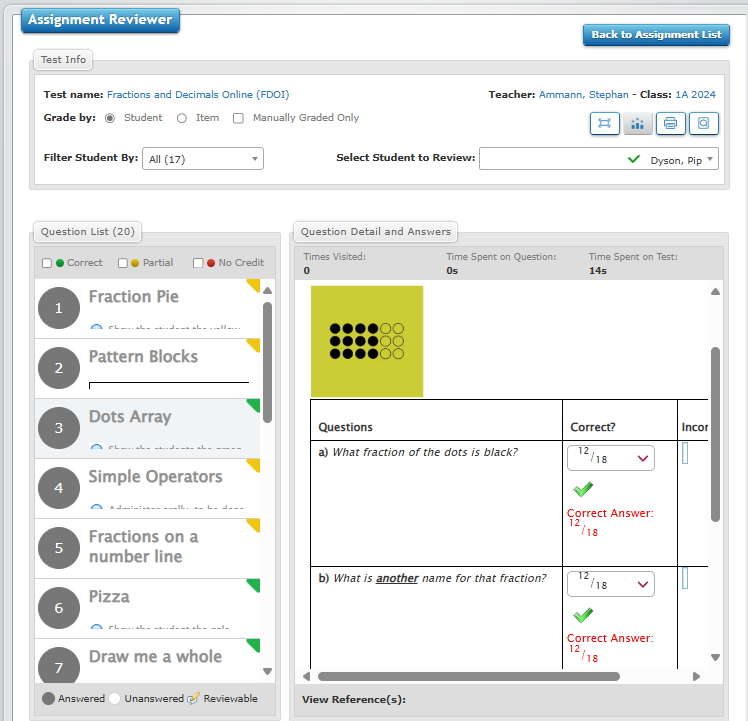
A screenshot of a computer

Description automatically generated

##### Student responses to questions

Figure 7 shows that users can view student responses to individual questions, colour-coded to indicate whether students answered successfully or not. Currently this can only be viewed at the individual student level. The department is updating FDOI to generate question-based reports at a class, group and school level.

Figure 7: Student responses to questions - individual student view



School profile

*Overarching Ideas and Misconceptions school summary*

Figure 8 shows that users can view achievement of Overarching Ideas and Misconceptions at a school level (noting this level of detail may be restricted to those with administrative access only i.e. Principals).

Figure 8: Overarching Ideas and Misconceptions - school view

A screenshot of a graph

Description automatically generated

# Professional Learning

Teachers can access a range of professional learning to support their use of the FDOI.

## Department resources

### On-demand webinar

Teachers can access an on-demand webinar via the Arc Learning Platform:

[Fractions and Decimals Online Interview (FDOI) Webinar: Preparing for and making the most of the FDOI.](https://arc.educationapps.vic.gov.au/event/8399)

### Videos

A series of short guidance videos are available to support teachers in using and interpreting the FDOI reports at: [Mathematics Online Interview and Fractions and Decimals Online Interview (education.vic.gov.au)](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/mathsassess.aspx)

### Arc Learning resource pack

Having completed the interviews, teachers may take the opportunity to meet and plan appropriate learning sequences. A range of tasks linked to the Fractions and Decimals online interview can be downloaded from Arc Learning. The pack comprises thirty activity ideas, including the Ordering Decimals and Decimal Comparison Test. For further information see:

<https://arc.educationapps.vic.gov.au/learning/resource/71215a8e-f63d-4fd5-8625-2dde17151d06?fuse=1>

## Articles and books

**Key research underpinning the FDOI (and task-based one-on-one assessment interviews generally) include:**

Clarke, D., Clarke, B., & Roche, A. (2011). [Building teachers’ expertise in understanding, assessing and developing children’s mathematical thinking: The power of task-based, one-to-one interviews.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Farc.educationapps.vic.gov.au%2F1673.efm&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485922612%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=MB%2FZgWyzbG%2BPUU5dupH84y9gwWxgs2b5lL%2F7SdLgZ3c%3D&reserved=0) *ZDM Mathematics Education,* 43(6), 901-913.

Clements, M. A. & Ellerton, N. (1995). Assessing the effectiveness of pencil-and-paper tests for school mathematics. In B. Atweh & S. Flavel (Eds.), *GALTHA: Proceedings of the 18th annual conference* *of the Mathematics Education Research Group of Australasia* (pp. 184–188). MERGA.

Kieren, T. (1976[). On mathematical, cognitive, and instructional foundations of rational numbers](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fd1wqtxts1xzle7.cloudfront.net%2F72825074%2FED120027-libre.pdf%3F1634976526%3D%26response-content-disposition%3Dinline%253B%2Bfilename%253DNumber_and_Measurement_Papers_from_a_Res.pdf%26Expires%3D1740362554%26Signature%3DR-hJjin5D6yzDs6QVUHXAfzyP-T9uGXnXjXxrnPgt1bps~y91Kc~6B43eic2wzp8eJJHi84c7vI-ecZYLWpIIGz12P2yRw1ViKGoNuMeB-5pfj6VBONVIZN0fFW8nXDbfNyEQAfwirdeuIxvJcRZq7JnP~4QwhBlQwEOpf-kx0PNqJn0nHpYjBv~vJf0ekncBdK1gssU0tixtjiVmIUUEo6UHljkHyUAYeFOx8j6JugpC65rAAE7k7wnj6xHjEv~IGjMiSKEx5ELAiCmj5g0nNF9UBX33QHH7mMrGCbqaYgXATxpBfL6od-CwhwqpPoK6fD2tFqO2ctt~fvIn7jLcA__%26Key-Pair-Id%3DAPKAJLOHF5GGSLRBV4ZA%23page%3D108&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485772169%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=FOtxfRbEqK8zX80Ye9NdQp%2Bra%2FaG1gxMmxz5iu9dcso%3D&reserved=0). In R. Lesh & D. Bradbard (Eds.), *Number and measurement: Papers for a research workshop* (pp. 101-144). ERIC.

Lamon, S. J. (1999). *Teaching fractions and ratios for understanding: Essential content knowledge and instructional strategies for teachers*. Lawrence Erlbaum.

Fazio, L. K., DeWolf, M., & Siegler, R. S. (2016). [*Strategy use and strategy choice in fraction magnitude comparison. Journal of Experimental Psychology: Learning, Memory, and Cognition*](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscholar.google.com.au%2Fscholar_url%3Furl%3Dhttps%3A%2F%2Fpsycnet.apa.org%2Fmanuscript%2F2015-30195-001.pdf%26hl%3Den%26sa%3DX%26ei%3D7FvaZvOIL82G6rQP2taY2A8%26scisig%3DAFWwaeYiV465iv1fBTV5Vdh95Vxh%26oi%3Dscholarr&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485759529%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=ShDYKeekL%2FNf%2BIRQdTLiddGaFE1i30wESlyqXtVWhFQ%3D&reserved=0). American Psychological Association.

**Written by the original developers of the interview, the following papers outline useful teaching activities relating to fractions, decimals, percentages, and proportional reasoning:**

Roche, A., & Clarke, D. M. (2004). [When does successful comparison of decimals reflect conceptual understanding?](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.researchgate.net%2Fprofile%2FDoug-Clarke%2Fpublication%2F255616741_When_Does_Successful_Comparison_of_Decimals_Reflect_Conceptual_Understanding%2Flinks%2F553960430cf2239f4e7d9180%2FWhen-Does-Successful-Comparison-of-Decimals-Reflect-Conceptual-Understanding.pdf%3Forigin%3Dpublication_detail%26_tp%3DeyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6Il9kaXJlY3QiLCJwYWdlIjoicHVibGljYXRpb25Eb3dubG9hZCIsInByZXZpb3VzUGFnZSI6InB1YmxpY2F0aW9uIn19%26__cf_chl_tk%3DlPoPQIFc5PTlEZHAbMQW3la1EuQANY4hjjSgGA.5gYE-1740366693-1.0.1.1-BKe_DurJoHhABYJmvGRuGp6fZpahwaUu9XdJFyeRVVo&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485786421%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=mhTbqtJ%2FaiKyNeeroRNRHYAd77zhiipWap6LaKEQk7M%3D&reserved=0) In I. Putt, R. Farragher, & M. McLean (Eds.), *Mathematics education for the third millennium: Towards 2010* (Proceedings of the 27th annual conference of the Mathematics Education Research Group of Australasia, pp. 486-493). MERGA.

Clarke, D. M., Roche, A., Mitchell, A., & Sukenik, M. (2006). Assessing student understanding of fractions using task-based interviews. In J. Novotna, H. Moraova, M. Kratka, & N. Stehlikova (Eds.), *Proceedings of the 30th Conference of the International Group of Psychology of Mathematics Education* (Vol. 2, pp. 337-344). Prague: PME.

Clarke, D., Roche, A., & Mitchell, A. (2008). [Ten practical tips for making fractions come alive and make sense.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.uab.edu%2Famsti%2Fimages%2FMath_resources%2F10-tips-to-make-fractions-come-alive.pdf&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485801292%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=l2565BoiOzs5s%2F5dxvy5hc3sbJ8KdHYhfFcpbAZNmfE%3D&reserved=0) *Mathematics Teaching in the Middle School,* 13(7), 373 – 380.

Clarke, D. M., & Roche, A. (2009). [Students’ fraction comparison strategies as a window into robust understanding and possible pointers for instruction.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.researchgate.net%2Fprofile%2FAnne-Roche-4%2Fpublication%2F225675322_Students%2527_fraction_comparison_strategies_as_a_window_into_robust_understanding_and_possible_pointers_for_instruction%2Flinks%2F00b7d52635e722b0b9000000%2FStudents-fraction-comparison-strategies-as-a-window-into-robust-understanding-and-possible-pointers-for-instruction.pdf%3Forigin%3Dpublication_detail%26_tp%3DeyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6Il9kaXJlY3QiLCJwYWdlIjoicHVibGljYXRpb25Eb3dubG9hZCIsInByZXZpb3VzUGFnZSI6InB1YmxpY2F0aW9uIn19&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485814732%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=%2F4S12GeHwh7yTFGTnzYt9zgPm9%2BM2KldrbCowuKQRd8%3D&reserved=0) *Educational Studies in Mathematics, 72*, 127-138.

Roche, A. (2019). *Colour in Decimats!* Prime Number, *34*(3), 15-17.

Clarke, D., & Roche, A. (2010). [The power of a single game to address a range of important ideas in fraction learning.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Ffiles.eric.ed.gov%2Ffulltext%2FEJ898705.pdf&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485828456%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=oTuE55UfDvVHTJXj%2B77aHDgH1mJfUgZzcXvXh1ZSeyM%3D&reserved=0) *Australian Primary Mathematics Classroom*, *15*(3), 18-24.

Roche, A. (2010). [Decimats: Helping students to make sense of decimal place value.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Ffiles.eric.ed.gov%2Ffulltext%2FEJ891799.pdf&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485842171%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=%2BLt3e%2FxjLu9R%2Bz60z2gTLknVsNmtEJj9iFBXqprzU2c%3D&reserved=0) *Australian Primary Mathematics Classroom*, *15*(2), 4-10.

Roche, A. (2010).Longer is larger. Or is it? *Australian Primary Mathematics Classroom*, *10*(3), 11-16.

Clarke, D., Clarke, B., & Roche, A. (2011). [Building teachers’ expertise in understanding, assessing and developing children’s mathematical thinking: The power of task-based, one-to-one interviews.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Farc.educationapps.vic.gov.au%2F1673.efm&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485855187%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=Y%2FTbwtrIaFYXxe01oyiprvQgiiY4rSn2p9bCKCusSDQ%3D&reserved=0) *ZDM Mathematics Education,* *43*(6), 901-913.

Clarke, D., Roche, A., & Mitchell, A. (2011). [One-to-one student interviews provide powerful insights and clear focus for the teaching of fractions in the middle years](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3D%26esrc%3Ds%26source%3Dweb%26cd%3D%26ved%3D2ahUKEwikrpKOjNuLAxVvUGwGHWfQJBAQFnoECBMQAQ%26url%3Dhttps%253A%252F%252Fprimarystandards.aamt.edu.au%252Fcontent%252Fdownload%252F19922%252F272983%252Ffile%252Ftdt_F_clarke1.pdf%26usg%3DAOvVaw3O30MDRopcEOEI8urKl_8U%26opi%3D89978449&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485868199%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=vyk8wV5YAXWSq5xVqxbzi04mpRh4VJSE2VCol4hK3YI%3D&reserved=0). In J. Way & J. Bobis (Eds.), Fractions: Teaching for understanding (pp. 23-32). Australian Association of Mathematics Teachers.

Clarke, D., & Roche, A. (2014). *Engaging maths: 25 favourite lessons.* Melbourne: Mathematics Teaching and Learning Centre, Australian Catholic University.

Clarke, D., & Roche, A. (2019). [Colour in fractions: Why it is one of our favourite games.](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.mav.vic.edu.au%2FTenant%2FC0000019%2F00000001%2Fdownloads%2FResources%2Fjournal-resources%2FPrime%2520Number%252020190630_high%2520res.pdf&data=05%7C02%7CDoug.Clarke%40acu.edu.au%7C3dfb8a0894ab4c08a04008dd57a7bc38%7C429af009f196448fae7958c212a0f2ce%7C0%7C0%7C638763100485881495%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=NxReLYgOf0H0I67HmdVwGuxt5x3OA8NNRR2Qzl7qst0%3D&reserved=0) *Prime Number*, *34*(3), 11-12.

# Help and Support

## FDOI Technical Support

### What to do in the first instance when experiencing technical difficulties

Teachers can:

* speak with their School Assessment Administrator if they experience any technical difficulties when administering the MOI
* refer to the Support documentation on the [Insight Assessment Platform](https://www.vcaa.vic.edu.au/assessment/f-10assessment/insight/Pages/login.aspx).

### Contacting the department’s IT Service Desk

Technical assistance is available for schools via the Services Portal, at:

Self-service: [Services Portal](https://services.educationapps.vic.gov.au/dp) (staff login required)  
Phone: [1800 641 943](tel:1800641943)  
Email: [servicedesk@education.vic.gov.au](mailto:servicedesk@education.vic.gov.au)

When lodging a Services Request, provide as much information about the issue as possible, including name, school name and campus number. Screenshots displaying error messages should also be provided where possible.

## Further Support

For more information or further support on the FDOI assessment tool, contact the Curriculum, Assessment and Reporting Unit at [studentlearning@education.vic.gov.au](mailto:studentlearning@education.vic.gov.au).