GCSE Maths

Recurring Decimals

Instructions and answers for teachers

These instructions should accompany the OCR resource 'Recurring Decimals' *which supports OCR GCSE Maths.*

The Activity:

This activity offers an opportunity for maths skills development.

Conversion of recurring decimals to fractions (or vice versa) is Higher tier content on both GCSE Mathematics specifications - Unit A502 statement HB3.4e on GCSE Mathematics A (J562) and statement HGN3 on GCSE Mathematics B (J567). This Lesson Element may additionally assist teachers in covering several other topics of the GCSE Maths specifications; for GCSE Mathematics A (J562), these include Unit A502 statements FB3.4b, FB3.4c, HB3.4b and HB3.4c on fractions and recurring decimals and Unit A503 statements FC2.2b, FC2.2c, HC2.2b and HC2.2c on calculator use; for GCSE Mathematics B (J567), these include statements FGN3 and HBN3 on fractions and recurring decimals and statements FSN6 and HIN6 on calculator use.

Associated materials:

'Recurring Decimals' Lesson Element learner activity sheet

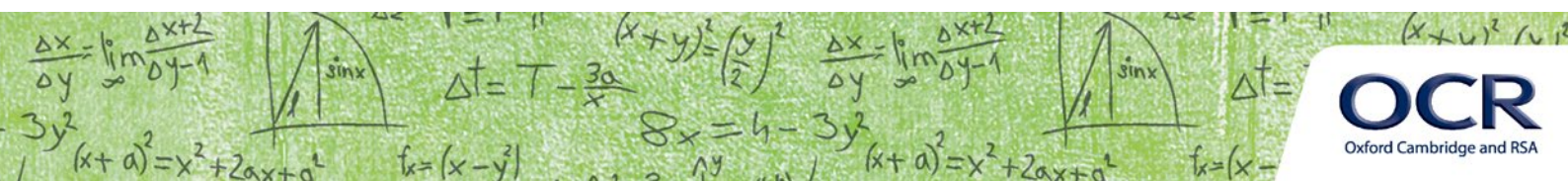'Recurring Decimals' Lesson Element PowerPoint slide

Introduction

Please note that this Lesson Element has an accompanying PowerPoint file that you can use to support this activity.

Converting recurring decimals to fractions is a process usually taught in a very algorithmic way, since the steps are easy to lay out and explain to students before setting them the task of practising the method through multiple repetitions. While on the surface this appears effective, many students fail to understand how the method works, or how it links back to the normal rules of algebra they are familiar with. While students are often able to follow the method under specific circumstances (such as if the first two decimal places recur), they often cannot extend this to more advanced situations, for instance where the first decimal place does not recur or the first three decimal places recur.

With a greater emphasis on proofs required in the new GCSE maths from 2015, recurring decimals provide a good opportunity to explore the mechanics of proof in a very structured way and discussion in class can be expanded to highlight this.

For this Lesson Element it is assumed that students have a clear concept of how recurring decimals are notated, but if required a starter activity could be used to recap this knowledge by getting students to use the notation on mini whiteboards, by setting each other questions or led by the teacher. Students should be encouraged to use a calculator to check their work AFTER they have come up with an answer by entering the fraction as a division and checking it becomes the correct recurring decimal; this additionally allows students to practice using their calculator to present numbers in equivalent forms, along with being a reminder of the simple fact that a fraction is equivalent to the division of the numerator by the denominator.

Task Instructions

Students should be divided into small groups of two or three and given a copy of the 'Recurring Decimals' Lesson Element learner activity sheet. They should be given a short time to put the statements in a correct order and write a clear explanation of their reason for each step; this could take the form of an explanation of the algebraic rules they are using and helps develop the skills in written communication necessary in many exam questions (the activity sheets could be cut up into statements and rearranged, or the correct order of statements copied directly into books from the activity sheets or the accompanying PowerPoint). During this time the teacher should provide hints and ask questions to encourage students to make changes to their order where necessary. It is not important for groups to get a correct solution at this point, so teachers should refrain from giving too much explanation.

The class should then be brought back together and as a group, establish a correct solution using the student responses. Use this opportunity to discuss why each stage is important and answer any questions students may have; where possible, try to encourage other students to answer the questions for you.

Once the correct order has been established, a second recurring decimal can be provided to students for them to convert into a fraction by applying the same method (if you have projected the accompanying PowerPoint, some may have already got past this point). Once students are able to apply the method, either provide them with a set of questions from a text book or ask them to create their own questions and check the answers on a calculator as they go (while marking of work has to be managed in this case, student created questions can be very motivating, and often students will challenge themselves considerably more than they would from a text book).