



GCSE Mathematics

- a lesson using www.MathsNetGCSE.com

Suitable for OFSTED inspection

Version 0.1

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The following 6 pages outline a suggested plan for a 1 hour lesson which is likely to be observed by an OFSTED (or similar) inspector. Clearly a successful observation depends not just on the lesson plan and associated paperwork but more importantly on the actual positive learning dynamics of the classroom. However, these notes are intended to help the teacher achieve such a lesson. The lesson described here is assumed to be one element within a sequence of events.

Before the lesson...

students have been using the website as an integral part of their learning. This may include use of the forum and conferencing facilities, but will certainly include on line assessment. Students will be building up a profile of achievement on the site.

The lesson...

will consist of review of previous achievement, with consequent follow-up action, targetted both at the class as a whole and individuals within it, followed if appropriate by an element of moving forward onto new work.

After the lesson...

students will return to previous tasks where appropriate to improve their performance and move on to new work that follows on from it

Differentiation is the matching of work to the differing capabilities of individuals or groups of students in order to extend their learning.

- OFSTED

[See the appendix for more background information]

Clearly there will be a wide variation in classrooms, students and teachers and this document cannot cater all such variations, so if you have any helpful suggestions on how this document could be improved please get in contact via the website. This document is a first draft and will develop in the light of feedback and criticism as the website becomes fully established.

The perfect lesson plan

The plan assumes access to a computer suite for a 1 hour lesson.

Class are working on a specific module and topic. All class have previously tackled a "student task" consisting of at least 8 o-tests - see Table 1 for an example based on arithmetic tasks from Number. The purpose of the lesson is to review this work, look at and study any areas of concern (suggested either by the teacher or the class), then continue with individually focussed or small group tasks.

A Prior work

B Preparation

Assessment for learning: using prior information to inform teaching	1	Computer suite with internet access to be booked. Access to interactive whiteboard assumed.
	2	Print out summary sheet of student task results - see Table 2 for an example - and identify strengths and weaknesses. Note student effort levels and whether they have repeated tasks, particularly where they scored low, say 25% or less. View class profile and some individual profiles - see Table 3 for an example.
	3	For individual o-tests print or display a table of individual marks - see Table 4 for an example - and identify strengths and weaknesses
	4	Choose individual questions or parts of questions where a large number of students have had problems
	5	Use the website to request "Redo" where appropriate
	6	Organise class work for individual students. This could take the form of a class list of o-tests - for an example see Table 5. For some students this will involve "extension" tasks; for others repetitions of previous tasks. Some students may work together in small groups.
	7	Overall a combination of consolidation and new work based on current topic.
		Organise follow-up homework task by creating a new "student task". This may also include the "Redo" requests in B5

C The lesson

Starter

Revision or consolidation of previous work	Must be challenging	
	On-line glossary quiz covering same area as tasks in current topic or Vocabulary o-test for whole class	
	or	o-tests (preferably 30-second timed o-tests) on prior work
		3 min

Main part

The teacher is primarily a coordinator of time, space, and activities rather than a provider of information. The aim is to help students become self-reliant learners.	1	Review progress on set tasks. Use either printed copies or, preferably, the displays from the website. Take note of whether students have repeated tasks to try to improve their scores and their effort ratings. Show and discuss the profile for the class.	5 min
	2	Select a question generally done well and ask for volunteer to explain to the class how it should be done.	5 min
	3	Drill down: look at weak areas - teach something identified in B3 or B4 or identified by student. If appropriate introduce new topic.	10 min
	4	Students to work on individual tasks set in B5 and B6 or arising from class discussion - see Table 5	25 min

Plenary

The teacher is primarily a coordinator of time, space, and activities rather than a provider of information. The aim is to help students become self-reliant learners.	1	Brief review of progress this lesson: identification of areas for further work	5 min
	2	Mind map on topic area to show links with other topics.	3 min
	3	Remind class to check for a homework task and deadlines	

Table 1 A typical "student task"

ID	Module	Section	Topic
2152	Number	Arithmetic	Magic square 1
2153	Number	Arithmetic	Magic square 2
2158	Number	Arithmetic	Magic square 3
2167	Number	Arithmetic	Arithmagon 1
2159	Number	Arithmetic	Arithmagon 2
2166	Number	Arithmetic	Arithmagon 3
1523	Number	Arithmetic	Timed test 1
2034	Number	Arithmetic	Timed test 2

Generally it is recommended to try to select a group of o-tests that include a variety of modes of testing, ie., multiple choice, drag and drop, user input and timed tests, and a variety of levels of difficulty.

In setting a task, the class should be made aware of the deadline and that they can repeat tasks as often as they like in order to improve their performance.

Table 2 Marks from a typical "student task"

probability 15/02/2010 (finish date = 5 Mar, 2010)											
Category	S1										
Student	Class	2399	6614	6622	7751	6619	6729	7710	7694	6725	7709
A	12/4	100%	80%	100%	60%	100%	100%	100%	60%	100%	100%
B	12/4	66%	80%	100%	100%	66%	83%	83%	66%	66%	83%
C	12/4	66%	80%	100%	100%	66%	100%	83%	66%	66%	100%
D	12/4	16%	16%	100%	100%	16%	100%	100%	33%	16%	100%
E	12/4	66%	0%	33%	0%	66%	0%	33%	66%	66%	0%
F	12/4	66%	0%	100%	60%	66%	66%	100%	66%	66%	66%
G	12/4	66%	75%	66%	100%	66%	66%	66%	66%	66%	66%
H	12/4	33%	75%	100%	83%	100%	33%	100%	100%	100%	33%
I	12/4	33%	33%	100%	100%	100%	66%	100%	100%	100%	66%
J	12/4	33%	66%	100%	80%	100%	66%	100%	80%	100%	66%
K	12/4	66%	66%	66%	100%	66%	66%	66%	100%	66%	66%
L	12/4	100%	66%	100%	83%	100%	100%	100%	100%	100%	100%

The scores are colour coded using the familiar "traffic light" system from red up to green. Clearly ID 2399 and 6614 caused problems, whereas ID 6622 and 7710 were done well. Student E, and to a lesser extent students F, G and K had numerous difficulties with the task, whereas students A and L did well.

Table 3 A typical class profile

Section	Topic	Progress
Algebra and Functions	Equating coefficients	
	Factor Theorem	
	Long division	
	Remainder theorem	
Coordinate geometry	Circles - geometry	
Differentiation	Higher derivatives	
	Increasing and decreasing	
	Stationary points	
Exponentials and logs	Exponentials	
	Logarithms	
	Logarithms & exponentials	
Integration	Definite integration	
Sequences and series	Binomial expansion	
Summary	Overview	
Trigonometry	Radians	
	Sine and cosine rules	
	Trig equations	
	Trig functions	

The profile shows as a coloured bar the average mark for the class on each topic. In addition the purple box indicates the degree of variation in marks. Thus for "Definite integration" the class performed reasonable well and with little variation, whereas for "Sine and cosine rules" about the same average mark was obtained but with far wider variation.

Please note: the above tables are actually from our A-Level site. Once the GCSE site has built up enough data, we will replace this diagram with one relevant to GCSE.

Table 4 Marks for a specific o-test

Page ID: XXXX

Module: Number

Type: UserInput

Level: E

Student	Date	Score %	Questions
A	13-Dec-09	<u>100</u>	✓✓✓✓✓✓✓✓
B	13-Jan-10	<u>100</u>	✓✓✓✓✓✓✓✓
C	29-Mar-10	<u>25</u>	✗✗✗✗✓✓✗-
D	16-Dec-09	<u>62</u>	✓✗✓✓✓✓✗✗
E	15-Dec-09	<u>62</u>	✓✓✓✓✓✓- -
F	05-Jan-10	<u>62</u>	✓✓✓✓✓✓✗✗✗
G	13-Dec-09	<u>75</u>	✓✓✓✓✓✓✗✗
H	15-Apr-10	<u>75</u>	✓✓✓✓✓✓✗✗
I	10-Dec-09	<u>87</u>	✓✓✓✓✓✓✓-
J	13-Dec-09	<u>75</u>	✓✓✓✓✓✓✗✗
K	15-Apr-10	<u>75</u>	✓✓✓✓✓✓✗✗
L	10-Dec-09	<u>87</u>	✓✓✓✓✓✓✓-

The data for the o-test ID XXXX show that:

marks ranged from 25% to 100%

one student, C, has found this assessment difficult

student C did not repeat the task despite the low mark*

two students, A and B, achieved 100%

the class were successful on questions 1 to 6

questions 7 and 8 caused most problems

students A and B could be asked how they did 7 and 8

some students (A, B, E, F, I, L) improved their mark by repeating the task*

*this information is viewable on the live site by moving the mouse over the mark in the **Score** column. A pop-up reveals all previous marks and dates.

Table 5 Set work for the observed lesson.

Against each person's name enter at least one ID number of an o-test on the site

Name	O-tests
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	

Appendix

Differentiation is:

...the recognition of and commitment to plan for student differences. A differentiated classroom provides different avenues to acquire content, to process or make sense of information and ideas, and to develop products. The goals of a differentiated classroom are to maximize student growth and to promote individual student success.

The characteristics of differentiated instruction

- Teachers and students accept and respect one another's similarities and differences.
- Assessment is an ongoing diagnostic activity that guides instruction. Learning tasks are planned and adjusted based on assessment data.
- All students participate in respectful activities - activities that are challenging, meaningful, interesting, and engaging.
- The teacher is primarily a coordinator of time, space, and activities rather than a provider of information. The aim is to help students become self-reliant learners.
- Students and teachers collaborate in setting class and individual goals.
- Students work in a variety of group configurations, as well as independently. Flexible grouping is evident.
- Time is used flexibly in the sense that pacing is varied based on student needs.
- Students often have choices about topics they wish to study, ways they want to work, and how they want to demonstrate their learning.
- The teacher uses a variety of instructional strategies to help target instruction to student needs.
- Students are assessed in multiple ways, and each student's progress is measured at least in part from where that student begins.

From OFSTED documentation:

Differentiation by Content

The students study different materials within the same topic area but do the same activities.

Differentiation by Activities

The students study the same content but do different activities.

Differentiation by Negotiation

The students study different materials within the same topic area and also do different activities. Teachers help students to select appropriate materials.

Differentiation by Support

The students study the same materials, do the same activities, but receive different amounts of support from the teacher or from extra printed information.

Differentiation by Extension

The students study the same materials and do the same activities. Extension work is given to the most able after they have finished the basic activities.

Differentiation by Group Work

The students work in mixed ability groups. Students help each other by working together and interpreting the tasks at different levels. Alternatively students are grouped according to ability and tackle differentiated activities.

Differentiation by Time

Students are given similar activities but different amounts of time to complete them. This may be a shorter time period for more able students to allow them to progress onto extension work or a longer period to allow them to study the topic in more depth / breadth.

Differentiation by Gradation

The students are given the same information and activities. The activities become progressively more difficult. The students work through the activities at different rates and therefore only the more able do the more difficult tasks.