

# A-Level Mathematics

## - a lesson using [www.MathsNetAlevel.com](http://www.MathsNetAlevel.com)

*Suitable for OFSTED inspection*

*Version 1.0*

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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.

# 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 probability from S1. 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 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
2399	S1	Probability	Simple probability
6614	S1	Probability	Theoretical
6622	S1	Probability	Theoretical
7751	S1	Probability	Theoretical
6619	S1	Probability	Tree diagrams
6729	S1	Probability	Tree diagrams
7710	S1	Probability	Tree diagrams
7694	S1	Probability	Venn diagrams
6725	S1	Probability	Venn diagrams
7709	S1	Probability	Venn diagrams

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
<b>Algebra and Functions</b>	Equating coefficients	
	Factor Theorem	
	Long division	
	Remainder theorem	
<b>Coordinate geometry</b>	Circles - geometry	
<b>Differentiation</b>	Higher derivatives	
	Increasing and decreasing	
	Stationary points	
<b>Exponentials and logs</b>	Exponentials	
	Logarithms	
	Logarithms & exponentials	
<b>Integration</b>	Definite integration	
<b>Sequences and series</b>	Binomial expansion	
<b>Summary</b>	Overview	
<b>Trigonometry</b>	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.

## Table 4 Marks for a specific o-test

Page ID: 6574

Module: C1

Type: UserInput

Level: 3

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 6574 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 8 and 9 caused most problems

students A and B could be asked how they did 8 and 9

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:

### The quality of provision in the sixth form: Teaching

<sup>1</sup> Ofsted does not prescribe the teaching methodology for the sixth form. However, sixth-form teaching should provide a bridge between the more structured context of school work pre-16 and the wider demands and expectations of independent work in higher education, training and employment. Teachers should demonstrate good subject knowledge and up-to-date expertise at a level consistent with effective teaching and assessment of the course. For more vocational courses this will include current understanding and/or experience of the relevant vocational area.

<sup>2</sup> The relationships between teachers and students in the sixth form may be different from those in the rest of the school, and sometimes less formal. Inspectors should establish whether teachers challenge students sufficiently, have high expectations of them and make use of individual learning plans or 'stretching' targets, for example, using value-added data to raise students' aspirations. Target setting can provide a powerful incentive for students when related to the grades they needed to access the higher education courses of their choice. Inspectors should consider whether targets:

are based on overall GCSE prior attainment with an element of challenge added which helped students' motivation, but is not so challenging as to be demotivating

produced centrally by the institution are adjusted by individual subject teachers according to students' prior attainment and aptitude in specific subjects

are reviewed and adjusted regularly in discussion with individual students in the light of their progress.