

**TIME - 2004**

**École de technologie supérieure**

**PREPARING FOR  
“THE FULL MONTY”**

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# ABSTRACT

In the UK, and probably elsewhere, we are experiencing an increased diversity in the mathematical capabilities of students entering our universities. For example we encounter students who:

- have a minimal mathematical background
- are adult returners and have not studied Mathematics for some time
- have managed to scrape through previous Mathematics courses and lack confidence
- are forced (usually reluctantly) to take Mathematics to support a degree in Engineering or Physical Science
- are reasonably competent in Mathematics but have some gaps
- need to brush up on topics met previously

In addition to these students, we have:

- undergraduates who need extra support whilst taking taught courses in Mathematics (an increasingly large population)
- students who miss classes through illness etc.

At Anglia Polytechnic University (APU), the author has begun a project to address the mathematical needs of the students described above. The aim of the project is to offer students an *on-line learning menu* for topics that have been identified as “troublesome” such as rearranging formulae or algebraic simplification. Currently the menu consists of:

**Self test and feedback**– to establish the extent of knowledge

**Notes** - such as those available for lectures and can be printed out or copied

**Power Point Presentation** – including audio and video features

**Video based tutorial**

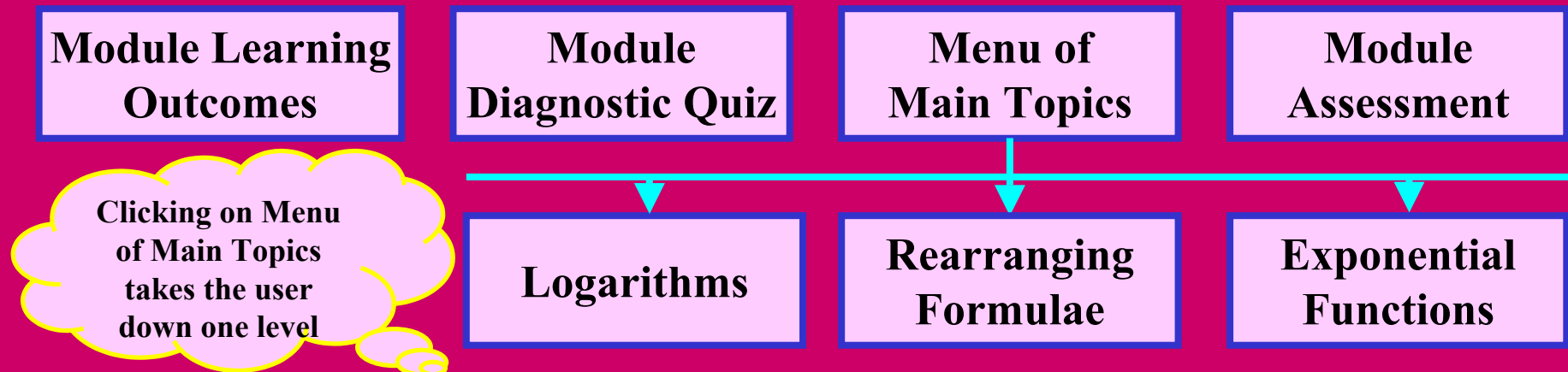
In other words, the student is offered the “*full Monty*” of learning experiences for each topic and, beneath this, for each contributing sub-topic. The student can thus choose the learning option to suit their needs.

The environment chosen in which to mount the above on-line learning activities is webCT.

# The Basic Maths Learning Experience

On entry to the (full Monty) resource, the user can choose to :

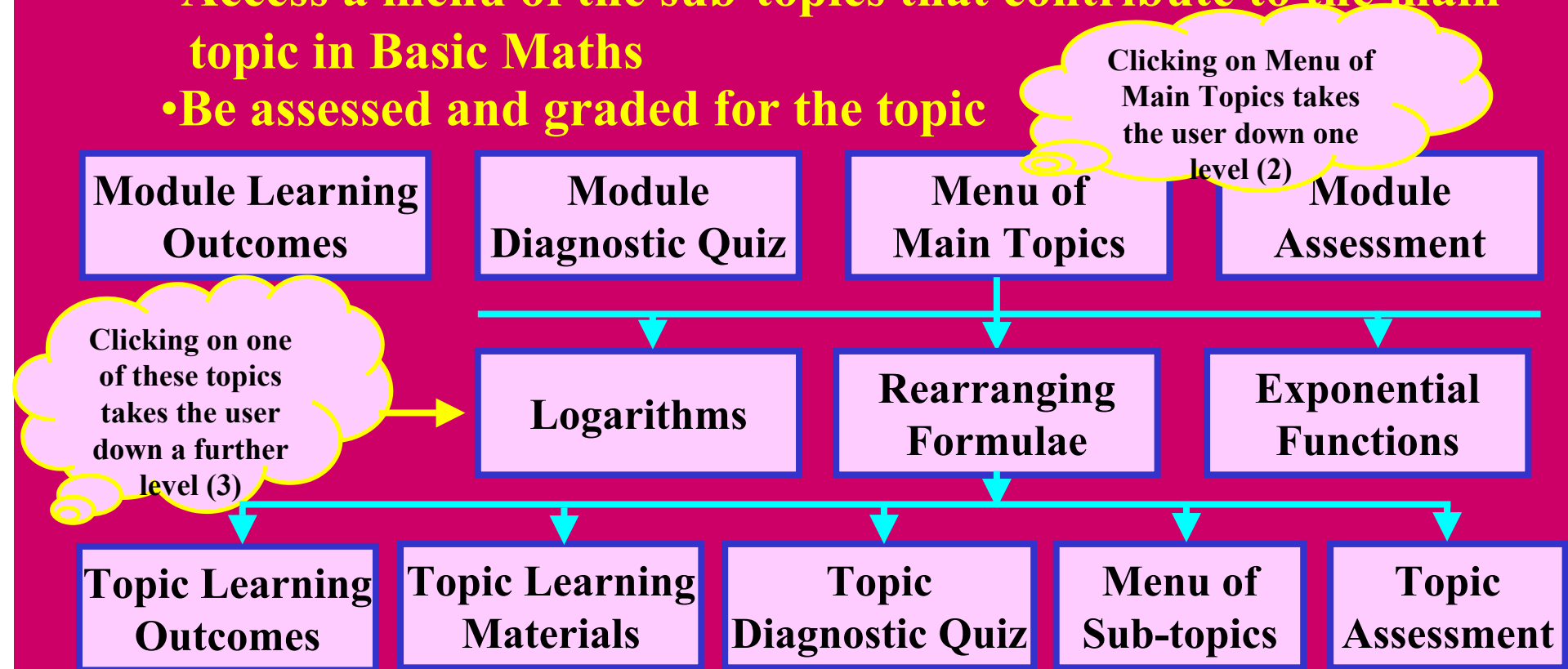
- Access the learning outcomes for a module in Basic Maths
- Take a diagnostic quiz covering all topics in the module
- Access a menu of the main topics that contribute to a module in Basic Maths
- Be assessed and graded for all topics in the module



# The Basic Maths Learning Experience

On selecting any one of the main topics the user can choose to:

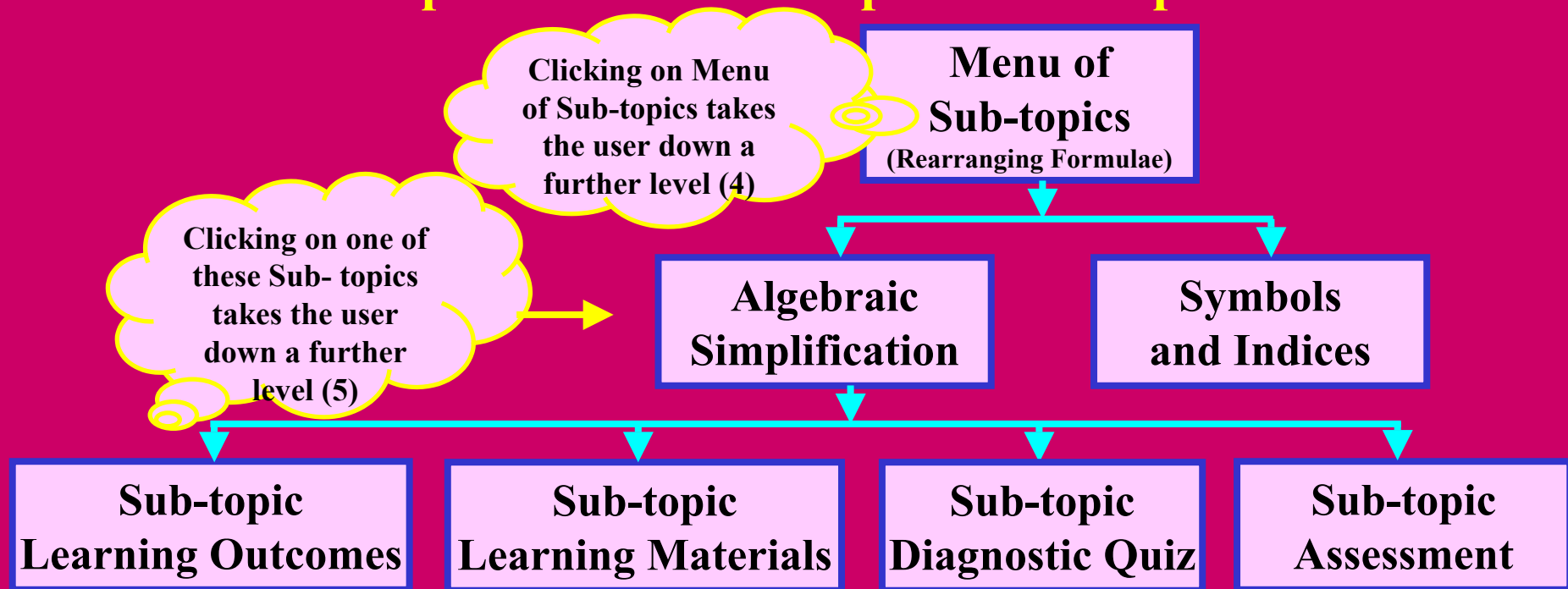
- Access the learning outcomes for the topic in Basic Maths
- Access a learning menu for the topic in Basic Maths
- Take a diagnostic quiz for the topic in Basic Maths
- Access a menu of the sub-topics that contribute to the main topic in Basic Maths
- Be assessed and graded for the topic

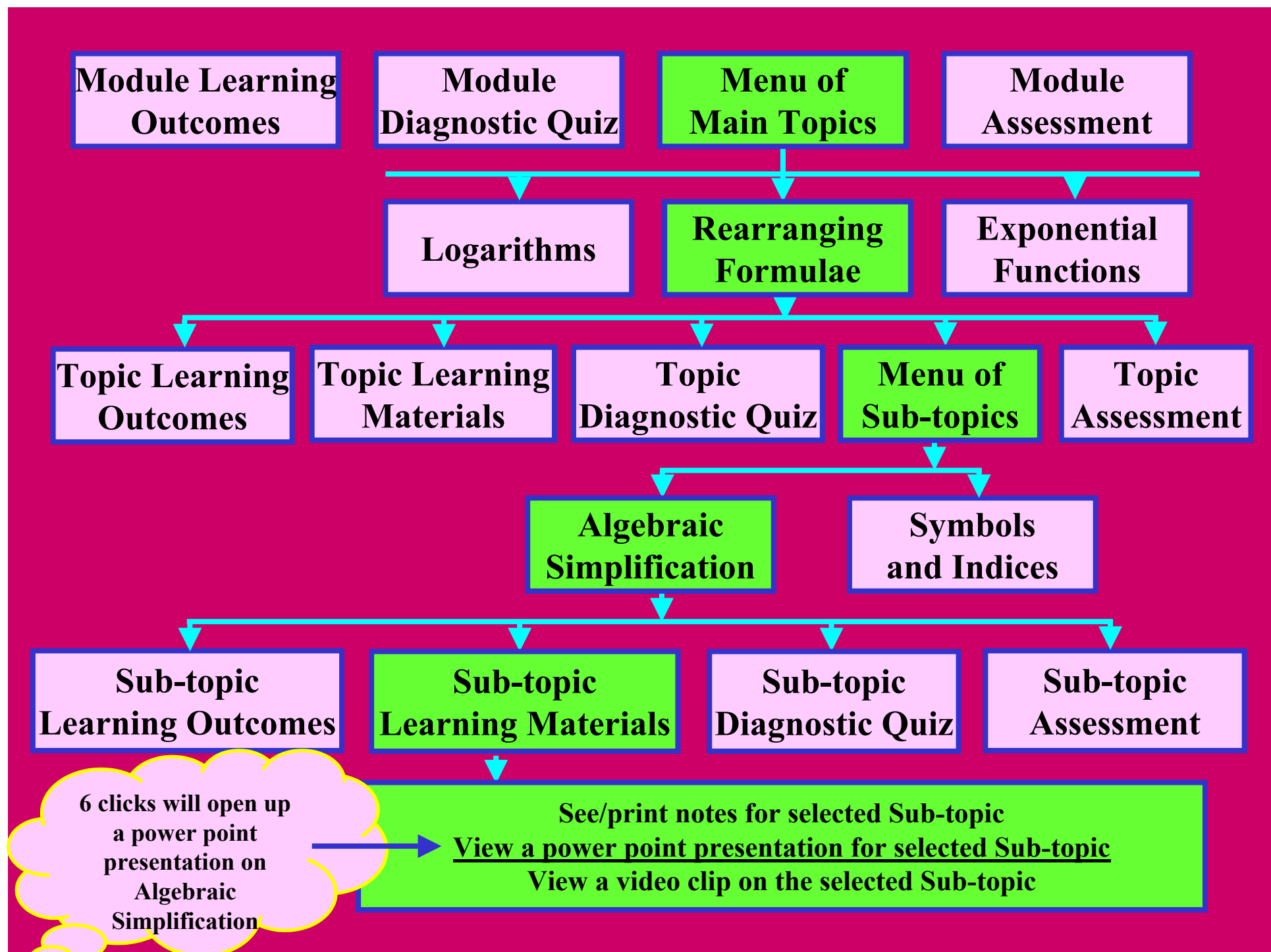


# The Basic Maths Learning Experience

On selecting the Learning Materials for a topic or sub-topic, the user can choose to:

- See/print notes for the selected topic or sub-topic
- View a power point presentation for the selected topic or sub-topic
- View a video clip on the selected topic or sub-topic





# NAVIGATING THROUGH AND USING THE (FULL MONTY) RESOURCE.

On entering the webCT course on Basic Maths, the user is shown the following page:

The screenshot shows the 'Basic Maths learning experience' homepage. The interface includes a top navigation bar with 'APU' logo, 'Boz Kempster', and links like 'myWebCT', 'Check Browser', 'Log Out', 'Help', 'Resume Course', and 'Course Map'. Below this is a 'Control Panel' with 'View' and 'Designer Options' tabs. A 'Course Menu' is visible on the left, listing items like 'Homepage', 'Search', 'Evaluation Tools', 'Self Test', 'Quiz', 'Main topics', 'rearranging formulae', 'Basic MathsMenu of Main Learning Menu', 'How\_am\_I\_doing?', 'Diagnostic Quiz forAlgebr', 'What should I do now?', 'Formal Assessment forRe', and 'Diagnostic Quiz forRearr'. The main content area features a welcome message and a grid of icons with labels: 'What should I do now?' (question mark icon), 'Basic Maths Module Specification' (notepad icon), 'Module Diagnostic Quiz' (person with clipboard icon), 'Basic Maths Menu of Main Topics' (folder icon), 'Formal Assessment for the Whole Module' (pencil holder icon), and 'How\_am\_I\_doing?' (book icon). Three pink callout boxes with arrows point to specific icons: 'Click on ? to read about using this resource.' points to the 'What should I do now?' icon; 'Click here to see a menu of main topics.' points to the 'Basic Maths Menu of Main Topics' icon; and 'Click here to see your scores on assessment.' points to the 'How\_am\_I\_doing?' icon.

**Welcome to the Basic Maths learning experience!**

This course offers you the opportunity to: check out your existing knowledge of Basic Maths, refresh topics that you have studied previously or learn completely new topics from scratch. To find out the best way of using these resources, click on the icon that says "What should I do now?"

**Click on ? to read about using this resource.**

**Click here to see a menu of main topics.**

**Click here to see your scores on assessment.**



As an example, we shall see how to access assessment and the diagnostic quiz on algebraic simplification.

Clicking on the icon “Basic Maths Menu of Main Topics” brings up the following page:

APU Boz Kempski myWebCT Check Browser Log Out Resume Course Course Map

Control Panel View Designer Options

Homepage > Basic Maths Menu of Main Topics

**These are the topics that make up the Basic Maths module**

When you select one of these topics, you will be given the opportunity to:

- Find out how much you know about it already
- Learn about it

Or you may find that you need to brush up or learn about some sub-topics that you should be familiar with beforehand

Rearranging Formulae Logarithms Exponential Functions

Click here to see what is available on Rearranging Formulae

(As the Course is under construction, further topics will be added later)

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**Control Panel** View Designer Options

Homepage > Basic Maths Menu of Main Topics > **Rearranging Formulae**

**Course Menu**

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Learning Outcomes for Rearranging Formulae

Diagnostic Quiz for Rearranging Formulae

Menu of Sub Topics for Rearranging Formulae

Learning Materials for Rearranging Formulae

Formal Assessment for Rearranging Formulae

Click here to see the menu of sub-topics for Rearranging Formulae

**APU** Boz Kempski myWebCT Check Browser Log Out Resume Course Course Map

**Control Panel** View Designer Options

Homepage > Basic Maths Me... > Rearranging Fo... > **Menu of Sub To...**

**Below are the sub topics involved in Rearranging Formulae**

Before you can successfully rearrange formulae, you need to be "up to speed" with working with symbols and indices and with algebraic simplification.

Algebraic Simplification

Symbols and Indices

Click here to see what is available on Algebraic Simplification

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**Control Panel** View Designer Options

Homepage > Basic Maths Me... > Rearranging Fo... > Menu of Sub To... > **Algebraic Simp...**

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Learning Outcomes for Algebraic Simplification

Diagnostic Quiz for Algebraic Simplification

Learning Materials for Algebraic Simplification

Formal Assessment for Algebraic Simplification

Clicking on Formal Assessment opens up the page below:

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**Control Panel** View Designer Options

Homepage > Basic Maths Me... > Rearranging Fo... > Menu of Sub To... > Algebraic Simp... > **Formal Assessm...**

**Quizzes and Surveys**

View class statistics for quizzes View scores for quizzes

You are about to be presented with a 20 question multiple choice quiz.

1 Available 0 Due soon

**Alg\_simp**

Availability: March 17, 2003 1:30pm - Unlimited

Duration: Unlimited Grade: --- / ---

Attempts: 0 completed, unlimited remaining View scores

Clicking on the Quiz title "Alg\_simp" brings up the assessment questions

WebCT Quiz - Microsoft Internet Explorer

**Alg\_simp**

Name: Boz Kempster (Preview)  
 Start time: July 6, 2004 4:36pm  
 Number of questions: 20

Finish Help

Try doing this quiz if you think that your background in algebraic simplification is "up to scratch". If you score 15 out of 20 then it probably means that you are OK.

**Question 1** (2 points)

Simplify  $3p - 4q + 5p - 2q$

a.  $2pq$   
 b.  $4pq$   
 c.  $2(p - q)$   
 d.  $8p - 6q$

The algebraic expression 3 times p minus 4 times q plus 5 times p minus 2 times q

Save answer

**Question 2** (2 points)

Simplify  $2r - 4nr - r + 6nr$

**Question Status**

Unanswered  
 Answered  
 Answer not saved

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

This Quiz was generated off-line using the package “RESPONDUS” and then uploaded onto the webCT course. RESPONDUS is very flexible with options, for example, to create dialogue boxes for the visually impaired via “mouse float over”.

WebCT Quiz - Microsoft Internet Explorer

$2a + 3ab - 2b$

Save answer

**Question 10** (2 points)

Expand the brackets and simplify  $ab\left(\frac{1}{a} + \frac{c}{b}\right)$

☐ a.  $1 + c$   
☐ b.  $b + c$   
☒ c.  $b + ac$   
☐ d.  $\frac{1+c}{2}$

Save answer

**Question 11** (2 points)

Write the following expression as a single fraction  $\frac{x}{5} + \frac{y}{6}$

☐ a.  $xv$

The algebraic expression a times b times by the bracketed expression 1 divided by a plus c divided by b

**Question Status**

- Unanswered
- Answered
- Answer not saved

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

**You can see above that writing/explaining a mathematical expression for a visually impaired reader presents new challenges!**

## Taking a Diagnostic Quiz

This is a useful learning tool that is simple to implement via webCT's Quiz Data Base of questions, or you can create totally new questions. It offers immediate feedback and advice on any learning that may be needed.



Clicking on  
Diagnostic Quiz  
brings up a brief  
self-test

Boz Kempski myWebCT Check Browser Log Out Help  
Resume Course Course Map

View Designer Options

Homepage > Basic MathsMen... > Rearranging Fo... > Menu of Sub To... > Algebraic Simp... > Diagnostic Qui...

**Self Test**  
**Multiple Choice Questions**

1. Simplify\_2  
Simplify  $2r - 4pr - r + 6pr$

☒  $3pr$   
☐  $8p$   
☐  $r + 2pr$   
☐  $2pr^2$

2. Alg\_frac\_2  
Write the following expression as a single fraction  $\frac{7}{z} - \frac{5}{y}$

**Feedback**  
**Incorrect**  
"r" and "pr" are NOT like symbols. You cannot combine a term involving "r" with a term involving "pr".

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Control Panel View Designer Options

Homepage > Basic Maths Me... > Rearranging Fo... > Menu of :

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Learning Outcomes for Algebraic Simplification

Diagnostic Quiz for Algebraic Simplification

Learning Materials for Algebraic Simplification

Formal Assessment for Algebraic Simplification

We complete this excursion through the (full Monty) resource by clicking on “Learning Materials for Algebraic Simplification” to access a list of choices

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Control Panel View Designer Options

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- 1.2. View a Powerpoint presentation on algebraic simplification
- 1.3. View a Powerpoint presentation on algebraic simplification with CD drive D
- 1.4. View a Powerpoint presentation on algebraic simplification with CD drive E
- 1.5. Watch a short video on algebraic simplification

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- ...

Clicking on choice 1.1 brings up a word document which can be read and/or printed.

## BASIC MATHEMATICS

### Simplifying Algebraic Expressions

#### Simplification by addition and subtraction

Algebraic expressions can be simplified by the addition or subtraction of "like terms" only.

**Example 1** Consider the expression  $3x + t - 3t + x$ , the like terms are the pairs  $3x$  and  $x$  and  $t$  and  $-3t$ . Combining the like terms gives  $3x + t - 3t + x = 4x - 2t$ .

**Example 2** Consider the expression  $5x^2 - ab - 2x^2 + 8ab$ , the like terms are the pairs  $5x^2$  and  $-2x^2$  and  $-ab$  and  $8ab$ . Combining the like terms gives  $5x^2 - ab - 2x^2 + 8ab = 3x^2 + 7ab$ .

**Example 3**  $2t - 3xt + x + 5xt - 4x = 2t + 2xt - 3x$  Note that the  $xt$  terms are quite different to the terms containing just  $t$  or  $x$ .



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- 1.5. Watch a short video on algebraic simplification

**Clicking on choice 1.3 or 1.4 starts up a power point presentation. Some extracts follow:**

**Example 1** Consider the expression

$$3x + t - 3t + x$$

$3x$  and  $x$  are like terms

$t$  and  $3t$  are like terms

Combining the like terms gives:

$$3x + t - 3t + x = 4x - 2t$$

The user can select an audio commentary to accompany the presentation.

**Example 1** Consider the expression  $15 + 12t$

This can be written as  $15 + 12t = 3 \times 5 + 3 \times 4t$

*3 gozinta 15 and 3 gozinta 12t*

i.e. we try to find the largest quantity that is common to both terms. Here, that quantity is the number 3. In practice, we write:

$$15 + 12t = 3(5 + 4t)$$

and say that “3 has been taken out as a common factor”.

# CONCLUSIONS

- **Preparing for the Full Monty has been time consuming but very interesting**
- **The webCT environment allows great flexibility for modifications and improvements**
- **The modular nature of the course allows components to be used in other e-learning courses**
- **Students who have had access to some of this resource have been extremely positive about their experience – their engagement with the subject has increased considerably**
- **The author is indebted to Chris Sweeney (C&ITs) for the many hours spent in getting to grips with webCT and to Rod Macdonald (Media Production) for his invaluable assistance in producing audio and video clips**