To be sure of an answer, you must:
• think where it comes from
• relate it to other things
• justify it

CBM marks each answer according to the student’s degree of certainty that the answer is correct.

<table>
<thead>
<tr>
<th>Degree of Certainty:</th>
<th>C=1 (low)</th>
<th>C=2 (mid)</th>
<th>C=3 (high)</th>
<th>No Reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark if correct:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penalty if wrong:</td>
<td>0</td>
<td>-2</td>
<td>-6</td>
<td>0</td>
</tr>
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</table>

CBM discourages superficial learning and rewards students who can distinguish rigorous and reliable results from uncertain conclusions or guesses.

Our dissemination project will help you trial it – in any situations where answers are either right or wrong.

Sound knowledge needs strong roots. Find them and think about them!
The website: www.ucl.ac.uk/lapt
… for all issues (explanation, practice, publications, advice, tools, help).

With CBM you think about justification … You gain:
EITHER if you find reasons for high confidence
OR if you see reasons for reservation.

Given your confidence, the best C level is the one with the highest graph.

How well do students discriminate reliability?
For both in-course (i-c) and exam data (ex) the % correct at each C level is within the optimal band. (The graph shows means ± 95% confidence limits, cohort: 331 students).

There are no gender differences, but both sexes (F, M) are more cautious in exams.
What is knowledge anyway?

- knowledge
- uncertainty
- ignorance
- misconception
- delusion

decreasing confidence in what is true, increasing confidence in what is false

Knowledge is **justified** true belief. Proper justification requires understanding.

What is understanding?

*To understand = to link correctly the facts that bear on an issue.*

(This is how you tell a student from a parrot!)

![Diagram of knowledge and understanding](image)
Principles that students seem readily to understand :-

• If you don’t know when knowledge is reliable, you will have problems in later learning
• Confident errors are worse than ignorance: a wake-up call (-6!) to attend to explanation
• Expressing uncertainty when you are uncertain is a good thing (t.blair please note!)

Does CBM favour certain personality types?

• Practised students show neither gender or ethnic differences
• Diffident & self-confident people may be attractive – but should not generalise this inappropriately to academic conclusions
• ‘Correct’ calibration is objective, desirable and trainable with experience & feedback from CBM

Practical Issues (see handout for more detail)

• Use software at UCL, or install it yourself. Help is available, e.g. linking to a VLE
• CBM applies to any discipline, and you don’t need any special question types
• Your students will like CBM (if your questions are good!) and want it in exams
• In exams, CBM scores have greater reliability (mean Cronbach $\alpha = 0.975$ vs. 0.873 for % correct, 6 exams, $P<0.001$), giving better discrimination with shorter exams.

We fail if we mark a lucky guess as if it were knowledge.
We fail if we mark delusion as no worse than ignorance.

Good graduates are the ones who know when their work is good.
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<tbody>
<tr>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>(i-c)</td>
<td>(ex)</td>
<td>(i-c)</td>
<td>(ex)</td>
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