

## Appendix

**Supplementary material 1** *Eleven conditions under which assessment supports student learning*  
 (source: Gibbs et al, 2003)

<b>Quantity and distribution of student effort</b>
1. Assessed tasks capture sufficient study time and effort
2. These tasks distribute student effort evenly across topics and weeks
<b>Quality and level of student effort</b>
3. These tasks engage students in productive learning activity
4. Assessment communicates clear and high expectations to students
<b>Quantity and timing of feedback</b>
5. Sufficient feedback is provided, both often enough and in enough detail
6. The feedback is provided quickly enough to be useful to students
<b>Quality of feedback</b>
7. Feedback focuses on learning rather than on marks or students themselves
8. Feedback is linked to the purpose of the assignment and to criteria
9. Feedback is understandable to students, given their sophistication
<b>Student response to feedback</b>
10. Feedback is received by students and attended to
11. Feedback is acted upon by students to improve their work or their learning

Supplementary material 2

Screen shots of a question using randomised numbers to practice computations.

33% done in 7% of time Q9: Simpson's index TRIADS

Question Tutorial Feedback

This question tests your ability to compute a Simpson's index.

The table on the right gives the numbers of invertebrates counted in a sample taken from a stream riffle.

Click on entry box - Type answer then press 'Enter' - click on 'Submit' to finish..

Calculator

Species	Number	P
flatworms	187	<input type="text"/>
leeches	15	<input type="text"/>
hoglouse	13	<input type="text"/>
gammarus	274	<input type="text"/>
mites	13	<input type="text"/>
stoneflies	268	<input type="text"/>
swimming mayfly	34	<input type="text"/>
blackfly	545	<input type="text"/>
brown caddis	26	<input type="text"/>

Round your answers to 2 d.p.

The value of Simpson's index (D) is

Quit Go back Skip Delete

33% done in 21% of time Q9: Simpson's index TRIADS

Question Tutorial Feedback

Numerical measures of diversity

[Click here to jump to the bottom of the page.](#)

Simpson's Index

This index is based upon the probability of two organisms picked at random being different species. The Simpson's index is,

$$\text{Simpson's index} = 1 - \sum(p_i)^2$$

where  $p_i$  is the number of individuals of a particular species/total number of individuals in the sample. This index goes from 0 (low diversity) to nearly 1 (high diversity). Unfortunately, Simpson's index was originally given

Please select 'Continue' to proceed.

Species	Number	P
flatworms	187	<input type="text" value="0.14"/>
leeches	15	<input type="text" value="0.01"/>
hoglouse	13	<input type="text"/>
gammarus	274	<input type="text"/>
mites	13	<input type="text"/>
stoneflies	268	<input type="text"/>
swimming mayfly	34	<input type="text"/>
blackfly	545	<input type="text"/>
brown caddis	26	<input type="text"/>

Round your answers to 2 d.p.

The value of Simpson's index (D) is

Quit Continue

Supplementary material 3

Screen shots of a question with an animation as part of the tutorial material.

0% done in 4% of time Q1:barycentre and tides TRIADS

Question Tutorial Feedback

Which of the following statements correctly describe the effects of centrifugal and gravitational forces on the tidal bulge. You must make 3 selections. There are THREE correct answers.

This question tests your knowledge of the astronomical forces that produce the tides.

[Click here to play the animation.](#)

In the animation the Earth and Moon are rotating around the common centre of mass (barycentre). This point is represented by the yellow dot on the animation. This is 1068 miles below the earth's surface on the side facing the Moon (i.e it does NOT coincide with the centre of the Earth).

The rotation around the barycentre produces a centrifugal (inertial force) directed away from the centre of rotation and of the SAME MAGNITUDE at ANY point on the

Select answer(s) with mouse, click again to deselect.

Quit

at the antipodal point the 'centrifugal' force exceeds the Moon's gravitational force.

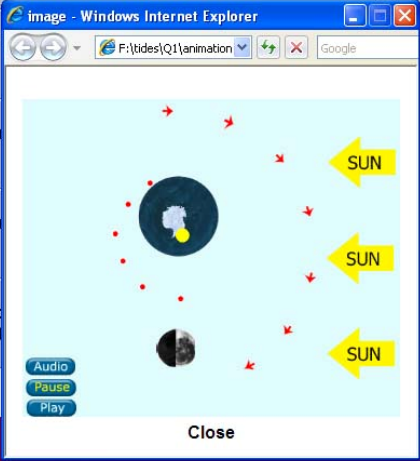
at the sublunar point the 'centrifugal' force exceeds the gravitational force of the Moon.

at the antipodal point

the centrifugal force du

the centrifugal force du

at the sublunar point t



Screen shot of the same question with feedback containing hints for correct completion.

0% done in 5% of time Q1:barycentre and tides TRIADS

Question Tutorial Feedback

Which of the following statements correctly describe the effects of centrifugal and gravitational forces on the tidal bulge. You must make 3 selections. There are THREE correct answers.

You have selected only 2 correct answers.

Do you appreciate that on the side of the Earth facing the Moon the gravitational force is greatest and that the opposite is the case for the side facing away from the Moon?

Please select 'Continue' to proceed.

Quit

at the antipodal point the 'centrifugal' force exceeds the Moon's gravitational force.

at the sublunar point the 'centrifugal' force exceeds the gravitational force of the Moon.

at the antipodal point the Moon's gravitational force exceeds the 'centrifugal' force.

the centrifugal force due to earth's rotation about its axis produces the tides.

the centrifugal force due to earth's rotation about its axis produces no effect on tides.

at the sublunar point the gravitational force of the Moon exceeds the 'centrifugal' force.

Contir

Screen shot of a different question (using randomised numbers) with feedback containing hints for correct completion.

10% done in 15% of time

Q10: leaf energetics

TRIADS

Question Tutorial Feedback

You have made only one correct selection.

You didn't understand that the energy is lost at all stages through the leaf.

First, you should subtract the losses incurred by incident radiation at the leaf surface (lost and reflected). This produces the energy available to the photosynthetic reactions in the chloroplast. There are losses in these chemical reactions also. Finally, the glucose produced by photosynthesis does not all enter NPP as some energy is lost in respiration via the mitochondria.

Labels

74.04  
1326.8  
55.88

Swap area

558.7 1257

Calculator

1 2 3 +  
4 5 6 -  
7 8 9 X  
. 0 = ÷  
+/- Del Clr MS  
MR MC M+

Incident radiation 1,396.6

lost 698.3

reflected 69.8

628.5

Lost in reactions 419

LEAF

glucose

.47

139.7

.53

NPP = 65.66

NPP is Net Primary Production

41.91

Lost through leaf 69.8

Note you must achieve a completely correct answer for this question to finish and move the next on in the assessment!

Quit Continue

**Supplementary material 4** Questionnaire administered after the summative CBA

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Your views about the computer-based examination					
Doing the exam brought things together for me.					
I learnt new things while preparing for the exam					
I understand things better as a result of the exam.					
The electronic tutorials/self-tests helped me prepare for this examination.					
Preparing for the exam was mainly a matter of memorising.					
After the exam I'll probably forget most of what I learnt.					
In exams you can get away with not understanding and still get good marks.					
Your views on the feedback from electronic tests					
The feedback provided by the electronic tutorials/self-tests helped me prepare for this examination					
I read the feedback carefully and tried to understand what the feedback is saying					
The feedback prompted me to go back over material					
I did not use the feedback for revising.					
The feedback helped me to understand things better.					
I don't understand some of the feedback.					
I can seldom see from the feedback what I need to do to					
Your views on the learning resources					
The following learning resources were useful in preparing for this examination					
a) the CD					
b) the booklet					
c) the website and its self-tests					
d) Birkbeck library					
The availability of the electronic tutorials/self-tests on CD was useful to me					
The availability of the electronic tutorials/self tests on the web was useful to me					
What aspects of the electronic tutorials/self tests did you find most useful as a learning resource?	Please write your answer overleaf				
Thank you for completing this form. If you have any other comments on the assessment, electronic tutorials or learning resources please write them on the back of this sheet.					

**Supplementary material 5** Questionnaire administered after return of marked reports and module grade.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Your views about the field reports					
Doing the field reports brought things together for me.					
I learnt new things while preparing for the field reports.					
I understand things better as a result of the field reports.					
In writing field reports you can get away with not understanding and still get good marks.					
Your views on the feedback from field reports					
I read the feedback carefully and try to understand what the feedback is saying					
The feedback prompted me to go back over material					
The feedback helped me to understand things better.					
I don't understand some of the feedback.					
I can seldom see from the feedback what I need to do to					
Your views on the learning resources					
The following learning resources were useful in preparing for field reports					
a) the CD					
b) the booklet					
c) the website and its self-tests					
d) Birkbeck library					
The availability of the electronic tutorials/self-tests on CD was useful to me					
The availability of the electronic tutorials/self tests on the web was useful to me					
Your views on all the assessments					
Feedback from assessments will assist me in writing laboratory reports in the future					
Feedback from assessments will assist me in preparing for examinations in the future					
Feedback from assessments will assist me in writing essays in the future					
Now, after writing field reports and receiving your feedback, what aspects of the electronic tutorials/self tests did you find most useful as a learning resource?	Please write your answer overleaf				
Please answer the question overleaf. For any other comments on the assessments, electronic tutorials or learning resources please write them on the back of this sheet.					