



Exams online: tips on choosing question types and modifying/writing questions

Getting started	Points to consider	Steps to follow
Check your unit learning outcomes	<ul style="list-style-type: none"> • What do you want your students to demonstrate in answering the questions? • What type of questions will effectively measure the learning outcomes? • What level of learning is expected? See Blooms Taxonomy. 	<ol style="list-style-type: none"> 1. Identify the levels of learning 2. Use words at the appropriate level in Bloom's Taxonomy or similar to write your question stem/phrase questions.
Determine question types to include in your exam	<p>Multiple Choice and Multiple Answer (MCQ/MA) single and multiple correct answers</p> <ul style="list-style-type: none"> • Note that MCQs typically target lower levels of learning, e.g., remember, know, understand. • Can be open book which reflects workplace contexts. • Design questions so that there are 2-5 correct answers (multiple answers). 	<ol style="list-style-type: none"> 3. Check that the learning material supports students in answering the questions. 4. Clearly identify the purpose of the assessment along with clear criteria for success, sample responses. 5. Consider the number of questions and the time allowed to complete the exam.
	<p>Short answer and essay questions</p> <ul style="list-style-type: none"> • Useful for higher levels of learning e.g. apply, analyse. • Convert existing MCQs by asking for explanations for why a particular response or answer is correct. 	
	<p>Combination of the above</p> <p>Can ensure coverage of the content at different levels of learning, e.g. MCQ for lower levels, short answer & essay for higher levels.</p>	

WRITING QUESTIONS FOR ONLINE EXAMS

Getting started	Points to consider	Steps to follow
Conditions of exam/quiz	<p>Open book timed exam</p> <p>Expect shorter answers compared to traditional exam contexts as students will be spending time locating information, making sense of it & organising their writing.</p> <ul style="list-style-type: none"> • Students need to know how to access, organise and apply information & knowledge. • Broader coverage of content; & multi-step problem solving is possible. • Design questions that involve a problem solving task or where students design a problem. • Students might select from a range of different examples, diagrams, plans or be presented with different contexts. • Case studies useful for examining critical reasoning skills. 	<ol style="list-style-type: none"> 6. For open book exams, consider providing a resource collection from which students find what they need to answer the questions. 7. Write questions that address higher levels of learning, analyse, evaluate, synthesize knowledge, critical thinking. These tend to involve a rich context, scenario with graph, figures, data from which students would develop solutions, hypothesize, plan. 8. Avoid questions with only one correct answer by requiring students to catalogue, critique, plan, justify, reflect, etc. This helps avoid plagiarism.

Open-book exams allow you to take notes, texts or resource materials into an exam situation. They test your ability to find and apply information and knowledge, so are often used in subjects requiring direct reference to written materials, like law statutes, statistics or acts of parliament.

Writing and/or modifying Multiple Choice/Multiple Answer questions

Questions consist of:	Check that your questions are:	Avoid:
Question/stem problem	<ul style="list-style-type: none"> • Meaningful. • Present a problem. • Address the learning outcomes. 	<ul style="list-style-type: none"> • Asking which is correct or incorrect. • Single correct answers.
Answer(s) and detractors	<ul style="list-style-type: none"> • All plausible, same length. • Clear, concisely written. • Mutually exclusive (not overlapping). • Free from clues. • Similar in content. • True statements that don't answer the question. <p>See an overview from Vanderbilt University.</p>	<ul style="list-style-type: none"> • All/none of the above • Complex questions e.g. A & B, B & C, A & C; OR if A & E, then B.
		<ul style="list-style-type: none"> • Negatives e.g. which is not...

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How to convert recall/remember factual type questions to higher level of thinking

Identify questions that ask what/when/who/which/where is X OR are factual statements	Modify the question stem	OR change to a short answer question
Example: 1. What is the strongest & most resilient X? 2. The strongest & most resilient X is: (factual statement)	Why is X...?	Explain how X... and provide an example.
	How is X.../to what extent is	Explain the difference between...
	Select the most appropriate explanation for X	How does X function... provide an example to illustrate your explanation.
	Using the information in the graph and under these conditions..., what kind of X is this?	
	Which finding is the most relevant given the conditions described?	

For **short answer and essay questions** ask students to clarify, explain assumptions, provide reasons and evidence, identify the source of an opinion, to consider implications and consequences, to hypothesize with reasoning, to provide different points of view, and to provide alternative solutions indicating which is preferred and why.

For example:

Level	Question
Analyse	<ul style="list-style-type: none"> • Predict how the Y difference between A and B will change if X is increased. Explain your prediction. • Compare your solution procedure to this problem to how you would solve problems X and Y. Find and describe a common solution procedure for these problems.
Evaluate	<ul style="list-style-type: none"> • Assess the effects of X on this problem - how would X effect this problem?
Create	<ul style="list-style-type: none"> • Invent and describe a practical use for the device shown. • Create your own X problem involving Y in Z. • Compose a 'solution manual' version of your solution, such that a student with little knowledge of the equation could understand your solution.

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Examples of questions at different levels of learning

2. (Carpentry)

A carpenter has available joists of 120 mm depth to do a job. A joist of 200 mm depth is needed to take the load spanning two piles. If all essential equipment is available, which of the following solutions will both do the job and support the greatest load?

- A. Bolt together two joists side by side.
- B. Glue laminate together two joists side by side.
- C. Bolt together two joists one above the other.
- D. Glue laminate together two joists one above the other. *

Requires understanding how to apply a solution within a context.

1. Knowledge _____

Example Topic: Asbestos: What is asbestos?

2. Application _____

Example Topic: Asbestos: Consider the crystal structures of chrysotile and crocidolite. Why should the most common mineral be the less hazardous?

3. Synthesis _____

Example Topic: Asbestos: Design a study to reasonably demonstrate the dangers posed by asbestos to the general populace.

4. Evaluation _____

Example Topic: Asbestos: The "asbestos hazard" is either (1) nothing more than a costly bureaucratic creation or (2) a hazard that accounts for tens of thousands of deaths annually. Which of the two controversial arguments has the best scientific support?

[Is this a trick Question? A short guide to Writing Effective Test Questions](#)
from Kansas State University

Develop a problem-solving task (Owl PurdueU)

Example: Topic areas in Engineering for analysis

Fluid mechanics: provide an estimation of major and minor losses in pipes in X context. Present a detailed solution to your problem explaining the losses you calculated.

Statics: design a playground with 3 different structures OR with these structures. Provide detailed descriptions of what forces the structures can sustain.

Thermodynamics: write an explanation of the conservation of energy for a 10 year old student or in final year of primary school. Use an example that they can relate to e.g. a real-life example.

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Example of short answer questions in relation to an image/file

QUESTION 19 **10 points** [Save Answer](#)

Click and view the [Nikolaas Tinbergen.pdf](#) file.

a. Describe these four questions in relation to proximate and ultimate mechanisms. Use cryptic wing colouration in peppered moths as an example **(4 marks)**.

b. Under what three conditions will behaviours evolve by natural selection? **(3 marks)**

c. From 1987 to 1994, the annual frequency of adoption by breeding pairs of ring-billed gulls, *Larus delawarensis*, at a Lake Erie colony ranged from 3 to 37% (average 8% per year, N=7 years) and, on average, foster parents raised 0.5 fewer of their own chicks to fledging than pairs that did not adopt. In terms of proximate and ultimate explanations, provide 3 hypotheses why ring-billed gills may foster chicks. **(3 marks)**

Rich text editor toolbar with options for Paragraph, Arial, 3 (12pt), bold, italic, underline, strikethrough, text color, background color, link, unlink, list, indent, outdent, link, unlink, insert link, insert image, insert video, insert audio, insert table, insert code, HTML, and CSS.

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Breaking up an essay into short answer questions

(thank you Brendan Kirkland for the example):

The following equation is used regularly in design in many different forms. Discuss the application of this equation in structural design and define each of the three terms with examples of how they are determined. In this case, it's quite easy to break up. Something like:

$$Q_N \leq \Phi R_N$$

1. Define each of the three terms in the equation/what are the key differences between each term?
2. Explain how each of the 3 terms is calculated when evaluating the strength of a beam using specific examples
3. Explain the application of this equation as it relates to structural design.

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Example rubric that could be used for marking all short answer responses (modified from [Generic Learning Rubric, UNSW](#))

	Distinction-High Distinction	Credit-Distinction	Pass-Credit	Fail-Pass
Criteria	Shows performance beyond core expectations that is highly independent, creative, critically reflective, generative and transformative.	A good standard for most students to reach and strongly exhibits independence, translation, integration and application of knowledge and skills.	Reached basic academic standards and capable of limited safe practice. Work is rule based with limited or no translation & interpretation of concepts, skills and procedures and limited adaptations to meet situational factors unless aided.	Not yet to desired standard or unsafe practice.
Knowledge and understanding	Exhibits accurate and elaborated breadth and depth of understanding of concepts in the knowledge domain. Can generate and justify principles, protocols and hypotheses.	Exhibits breadth and depth of understanding of concepts in the knowledge domain. Demonstrates an appreciation of the limits of their own understanding.	Exhibits knowledge and can reproduce accurately required facts and definitions. Has adequate breadth, but limited depth of understanding of basic concepts.	Limited understanding of required concepts and knowledge. Inaccurate reproduction of text and lectures Cannot discuss concepts in their own words.
Use of mathematical principles	Uses principles and theories accurately. Abstracts and applies them in novel situations. Uses concepts to build new knowledge and understanding. Recognises the limitations of current thinking.	Thorough and accurate understanding of concepts and processes and can analyse and apply them in new situations.	Rule based, knows basic concepts and rules and can use them to solve problems and in novel contexts. Requires support for transferring to new situations.	Knows a few mathematical ideas and rules can use them with supervision.
Analysis	Analysis is sophisticated with a balance of theory and personal reflection. Capable of generalising from personal reflection on theoretical ideas or real life experiences to formulate principles and evaluate the efficacy of ideas from a number of standpoints.		Descriptive & anecdotal with limited use of theoretical frameworks. Limited capacity to identify the complex factors within a larger idea or context. Limited capacity to synthesise a number of ideas into a larger argument.	Personal and anecdotal
Information literacy	Can seek out and locate required information. Is selective, effectively discriminating between sources of information.		Can seek out and locate required information with minimal support. Does not always discriminate effectively between sources of information.	Uses immediately available information with little discrimination. Cannot independently seek out and locate required information.

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Resource

A [Good practice guide](#) from Sheffield Hallam University.

Advantages and disadvantages of closed and online open book exams

Closed book exam	Online open book exam
Tests lower order thinking skills. Typically rely on students recalling/remembering information.	Tests higher order thinking. Typically rely on application of knowledge, being able to find information, organise and structure solutions. An example of students solving real world problem; information literacy skills are used – searching, assessing & using information; including an experiential learning question such as a reflection on key learnings or significant experience.
Students use memory to answer questions and don't need to look for information.	Need more time to find information.
Easier to implement security & identity verification.	More difficult to maintain exam security.
Study/prepare more for the exam.	May study/prepare less – assumption that open book is easier. Encouraging students to create a set of study notes may help them prepare.
Have strict time limits.	
Use a pool of questions organised according to learning levels - randomise questions, randomise answers (for MCQs).	

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Exams online: Checklist

Admin - student support

- The timing and/or questions in the online exam have been reviewed to ensure key learning outcomes are addressed, and that students can complete it within a reasonable time frame. Note: students tend to spend more time in open book exams looking for information.
- The exam instructions are clear, concise and specific.
- Students have access to help during the exam time (this information has been provided to students in the instructions), e.g. the UC's email, ITDS (they have been notified), other.
- Students have the opportunity to do a practice exam online 1-2 weeks before the actual exam. (This can help students become familiar with accessing the exam, answering a few questions and submitting while in the process testing devices & technical set up. Adding a couple of questions from the actual exam can encourage students to do the trial one.)
- FAQs and a specific discussion board session on the exam are available for students.

Technical

- The result of the exam will not be available either via the exam tool or the Grade Centre in vUWS until the designated release dates.
- The exam may take longer to load if there are images and/or videos and the timing of the exam takes this into consideration.

Learning effectiveness

- The exam questions have been designed so that they cannot be Googled – e.g. there are no single answer questions, fill in the blanks, definitions or matching questions. (Academic integrity)
- Students are presented with a choice of short answer questions (OR these are randomised, OR different questions are assigned to different students) and the questions ask for reference to specific lecture notes (choice and academic integrity)
- Instead of writing an essay or long response to a question, the question is instead broken up into 5 short answer questions. This tends to make it easier for students to answer and easier to mark.
- There is equity in the randomisation of the questions to ensure students have the same number of questions from the different levels. This avoids some students having only higher level questions while others have lower level ones.
- 3-5 alternatives/distractors are sufficient. Research has found that 3 is just as effective as 4 or 5.