



UNIVERSITY *of* CAMBRIDGE
International Examinations

Item writing workshop

Nicky Rushton



It is important for question writers to be in control of
what is being tested

Do the questions we write measure the knowledge / skills
they are intended to?



Objective testing

Objective test items can take many forms:

- multiple choice
- true / false
- multiple response
- text / numerical input
- sequencing / ordering

Such tests form an important part of the assessment process



Objective testing

Most common are multiple choice tests which

- set a task
- present a number of choices of response.



Objective testing

The four-option simple-completion type contains

- a stem (the question)
- four choices
 - three incorrect options known as *distractors*
 - one correct option --- the *key*



Select the equation which fits this description:

A straight line passing through the origin with a gradient of 3

$y = x - 3$

$y = 3x$

$y = x + 3$

$y = 3x^2$



Select the equation which fits this description:

Stem

A straight line passing through the origin with a gradient of 3

$y = x - 3$

$y = 3x$

$y = x + 3$

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Select the equation which fits this description:

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Distractors



Select the equation which fits this description:

Stem

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$y = 3x$

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Key

Distractors



Objective testing

Options may be

- sentences
- labels on a diagram
- stages in a process
- entries in a table
- etc.



Objective testing

Write **four**

- advantages of using multiple choice items
- disadvantages of using multiple choice items

How do they compare with other methods of assessment?

Discuss in groups.



Advantages of Multiple Choice tests

- A relatively large number of questions: helps reliability
- Provide wide coverage of subject content
- Specific syllabus topics and assessment objectives are targeted.
- Do not offer a choice of items and so are fair to candidates
- Test a number of cognitive skills in predetermined proportions
- Allow a generous amount of time to complete the tests, discourage random guessing and reduce time stress
- Method of answering is straightforward for poor candidates
- Item Banking system enables items to be recycled.
- Marked accurately and quickly



Disadvantages of Multiple Choice Tests

- Possibility of guessing
- No opportunity for candidates to show what they know and can do beyond the scope of the tasks set
- Productive skills such as writing and speaking cannot be tested
- Candidates may need a high level of reading comprehension
- If an item is faulty, it will contribute nothing to the test
- Encourage teachers to spend more time on test preparation
- Preparation of multiple choice tests is time-consuming and expensive



What levels of skill does multiple choice test?

Enabling skills e.g. graph reading

- may be needed to understand the subject, but if these alone are tested they lower the content validity of the test.

Knowledge

- ability to recognise and recall a piece of information. The information may be in a symbolic or a verbal form but must be in a familiar context.



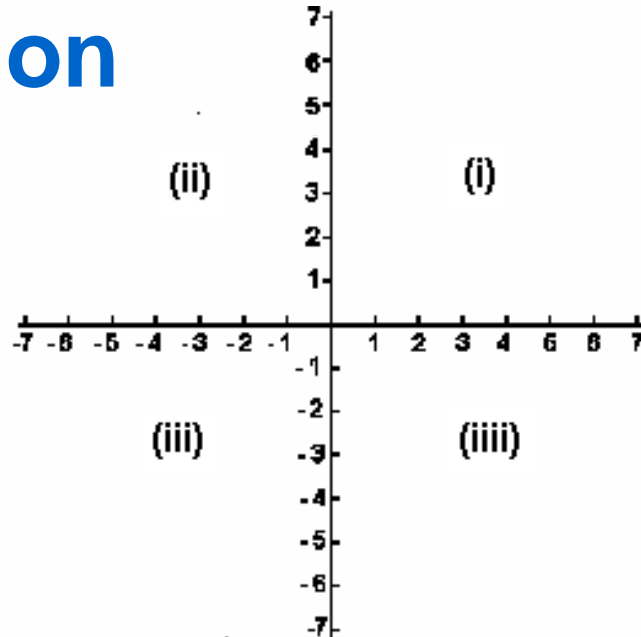
Knowledge

Which shape is a quadrilateral?

- A** hexagon
- B** rhombus
- C** ellipse
- D** pentagon



Comprehension



(i) **(ii)** **(iii)** and **(iiii)** are the four quadrants in a co-ordinate grid

Which point would lie in quadrant **(iii)** ?

- (a) $(-4, 3)$
- (b) $(-4, -3)$
- (c) $(4, -3)$
- (d) $(4, 3)$



Application

The image of a clock face as seen in a plane mirror is shown.

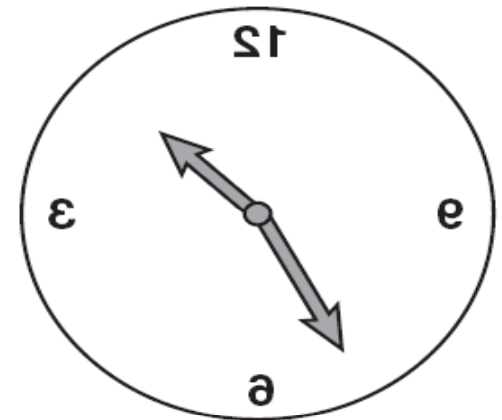
What is the actual time on the clock?

A 1.25

B 1.35

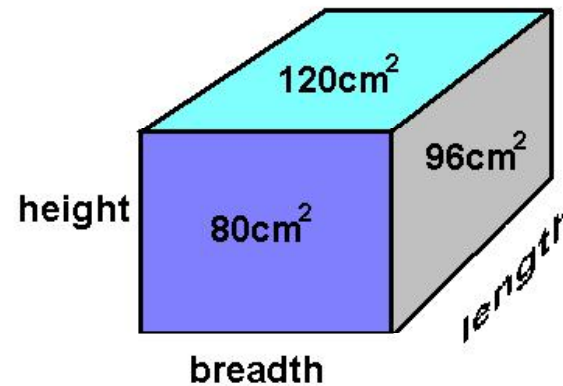
C 10.25

D 10.35





Analysis



Which set of dimensions fits this cuboid ?

	length	breadth	height
A	12cm	10cm	8cm
B	12cm	8cm	10cm
C	10cm	8cm	5cm
D	10cm	6cm	4cm



Item Writing Stages

- Take a specific learning outcome from the syllabus
 - e.g. be able to identify the place value of a digit in a number involving two places of decimal
- Write down the stem and key option as one statement
 - e.g. the digit 2 represents two hundredths in the number 1040.02



Item Writing Stages

- Fix the dividing line between the stem and the key.
 - Find the value of the digit 2 in the number 1040.02 .In 1040.02 the digit 2 represents two hundredths.



Item Writing Stages

- At all stages consider different wordings for stem and key
- Write down the distractors (with the key)
 - the digit two has the value two tenths .
 - the digit two has the value two tens
 - the digit two has the value two hundred



Item Writing Stages

- Decide on the final format of the key and distractors.



Item Writing Stages

- Revise and edit several times

What is the value of the 2 in the number 1040.02 ?

- A 2 hundred
- B 2 hundredths
- C 2 tenths
- D 2 tens

Any improvements?



Suggestions – writing the stem

- Present a single statement to be answered by one of the given choices.



Suggestions – writing the stem

Prime numbers

- a. are numbers with only one factor
- b. are numbers which do not have factors
- c. are numbers with two factors
- d. are numbers with three factors

How many factors do prime numbers have?

- a. 1
- b. 0
- c. 2
- d. 3



Suggestions – writing the stem

- Present a single statement to be answered by one of the given choices.
- Avoid unnecessary material.



The cost of a can of Cola goes up to \$ 1.60.
Seema buys 4 cans. How much does this cost?

- (a) \$1.64
- (b) \$0.80
- (c) \$6.40
- (d) \$1.56

Cola costs \$1.60 a can. What is the cost of 4cans?

- (a) \$1.64
- (b) \$0.80
- (c) \$6.40
- (d) \$1.56



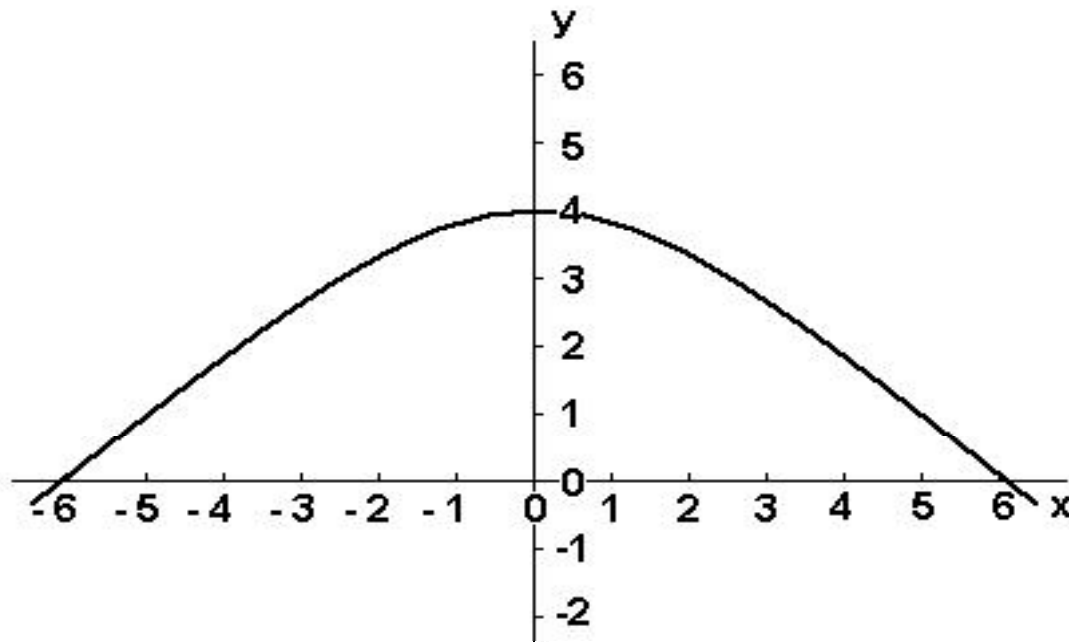
Suggestions – writing the stem

- Present a single statement to be answered by one of the given choices.
- Avoid unnecessary material.
- Use clear language.



The drawing shows the graph of a curve

What are the co-ordinates at it's apogee?



(a) (0,4)

(b) (4,0)

(c) (-6,0)

(d) (6,0)



Suggestions – writing the stem

- Present a single statement to be answered by one of the given choices.
- Avoid unnecessary material.
- Use clear language.
- Avoid negatives if possible.



Which of the following is not a property of a rhombus?

- (a) has four equal angles
- (b) does not have four lines of symmetry
- (c) has four equal sides
- (d) has two lines of symmetry

Which of the following is a property of a rhombus?

- (a) has four equal angles
- (b) has four lines of symmetry
- (c) has four equal sides
- (d) has one line of symmetry



Suggestions – writing the stem

- Present a single statement to be answered by one of the given choices.
- Avoid unnecessary material.
- Use clear language.
- Avoid negatives if possible.
- Put as much of the question in the stem as possible.



Prime numbers are numbers which have:

- (a) factors which are the number itself and an even number
- (b) factors which are the number itself and one
- (c) factors which are the number itself and an odd number
- (d) factors which are the number itself and two

Prime numbers have factors which are the number itself and:

- (a) an even number
- (b) and one
- (c) an odd number
- (d) and two



Suggestions – writing distractors

- For single response M.C.Q. ensure only one correct answer.



Suggestions – writing distractors

- For single response M.C.Q. ensure only one correct answer.
- Use only plausible alternatives.



Suggestions – writing distractors

- For single response M.C.Q. ensure only one correct answer.
- Use only plausible alternatives.
- Avoid giving clues



Suggestions – writing distractors

A regular quadrilateral is called a

- A Octagon.
- B Ellipse.
- C Square.
- D Arrow Head.



Suggestions – writing distractors

- For single response M.C.Q. ensure only one correct answer.
- Use only plausible alternatives.
- Avoid giving clues
- Avoid using “ none of the above” or “all of the above”



Suggestions – writing distractors

- For single response M.C.Q. ensure only one correct answer.
- Use only plausible alternatives.
- Avoid giving clues
- Avoid using “ none of the above” or “all of the above”
- Avoid distractors so close to the answer that they confuse
- Provide sufficient distractors



Objective Item – Primary

Here are some statements about shapes

- A has four equal angles.
- B has four equal sides.
- C has one line of symmetry
- D has two lines of symmetry
- E has one reflex angle .

(i) Which **two** statements are true for a square?

.....

(ii) Which **two** statements are true for an arrow head?

.....



Have a go:-

- 👍 Order a given set of integers
- 👍 Recognise prime numbers to 20
- 👍 Calculate the time interval
between two given times
- 👍 Find the mode of a set of data



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Summary Objective testing



Select the equation which fits this description:

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Distractors



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Subjective Question writing

Nicky Rushton



Subjective Testing

Subject, or non-objective tests, can take many forms:

- from a simple choice

“Which of the numbers: 2.05 or 2.10 is bigger

- to an essay.

“Explain how to find the length of the third side of a right angled triangle if you are given the other two”.



Subjective Testing

Question styles may include:

- Simple response

- Multiple response

- Multiple response matching

- Sequencing

- Hotspot (answering on a graphic)

- Calculation

- Extended writing

- Structured (combination of the above)



Subjective Testing

In groups, identify: -

- five different styles of question (not multiple choice) you've used
- suggest when each might be most or least useful.



Subjective Testing

Write down four:

- advantages of using items other than multiple choice
- disadvantages of using items other than multiple choice
 - How do they compare with other methods of assessment?
 - Discuss in groups



Advantages of Subjective Tests - discuss

Are these true of subjective tests?

- relatively large number of questions help to give reliability
- provide wide coverage of subject content
- specific syllabus topics and assessment objectives are targeted
- may not offer a choice of items and so are fair to candidates
- test a number of cognitive skills in predetermined proportions
- allow generous amount of time to complete the tests
- discourage random guessing and reduce time stress
- method of answering is straightforward for poor candidates
- candidates offered opportunity to show what they know and can do beyond the scope of the tasks set in a test



Advantages of Subjective Tests - discuss

Are these true of subjective tests?

- relatively large number of questions help to give reliability
- provide wide coverage of subject content
- specific syllabus topics and assessment objectives are targeted
- may not offer a choice of items and so are fair to candidates
- test a number of cognitive skills in predetermined proportions
- allow generous amount of time to complete the tests
- **discourage random guessing and reduce time stress**
- method of answering is straightforward for poor candidates
- **candidates offered opportunity to show what they know and can do beyond the scope of the tasks set in a test**



Subjective Tests – marking criteria

- The student
 - need to anticipate acceptable responses
 - context
- The examiner
- The published mark scheme
 - use
 - teacher



Structured question writing stages

- Take an Assessment Objective

e.g. angles and shapes

- Choose a level descriptor

e.g. recognise names of polygons

- Write down the expected pathway through the question

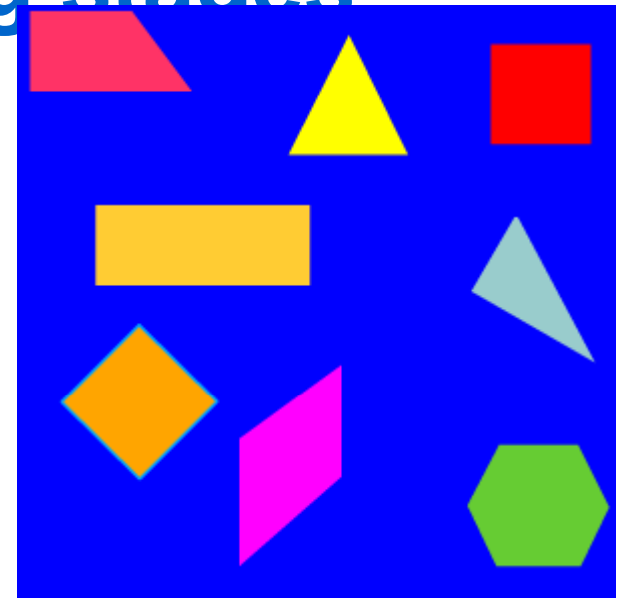
e.g. identify the given shapes

match them to their correct mathematical names



Structured question writing stages

- Provide stimulus in the form of diagram, graph, table of data, picture, etc
e.g. a series of drawings of 2-D shapes



- Begin with a low demand question
 - e.g. (Identify) how many of the shapes are triangles?



Structured question writing stages

- Increase the level of difficulty
 - e.g. How many isosceles / scalene ? etc.
- Increase the skills needed
 - e.g. require students to identify the mathematical properties of each type of triangle
 - e.g. require students to classify triangles according to their properties



Structured question writing stages

- Revise question and build mark scheme
- then
- revise the question again



Question Paper Procedures

Question Paper Evaluation Committee

- conformity with syllabus
- clarity of rubrics
- quality of individual questions
- quality of question paper as a whole

Involved staff

- setter
- reviser
- vetter