# IGCSE 4400 Mathematics Examinations Notice to Centres, Spring 2008

The following information is an update for teachers of IGCSE Mathematics on changes to question style in forthcoming examinations, and teaching points on some topics in the specification.

## Calculators and Proposed Changes to Question Style

The range of functions on calculators is increasing all the time. Current models can be used to answer questions on a number of topics including fractions, surds, standard form, recurring decimals and equations. Although, at present, only a small minority of candidates use their calculators for such questions, it is a growing minority and, for two reasons, the Edexcel team responsible for the assessment of IGCSE Mathematics feel that this issue should be addressed.

Firstly, candidates should not have an advantage in the examination simply because of their calculators. Secondly, we believe that part of our role as examiners is to encourage good classroom practice. So, while appropriate and efficient use of calculators is desirable, reliance on them at the expense of understanding and learning mathematical techniques is not. We believe that teachers of IGCSE Mathematics will agree.

From the **May 2008** examination, therefore, there will be changes in the style of some questions on certain topics. On others, there will be new types of question in addition to those currently being set. These changes will not make the papers harder.

Examples of these changes are given below and, while the changes are insufficient to necessitate the production of new specimen papers, the examples will enable teachers preparing students for the examination to make their candidates aware of the changes. Model solutions, which are not unique, are also provided.

## Fractions

Example 1 (Foundation/Higher)

Show that $\frac{2}{3}+\frac{3}{4}=1\frac{5}{12}$

**(2 marks)**

Solution
$$\left(\frac{2}{3}+\frac{3}{4}\right)=\frac{8}{12}+\frac{9}{12}$$
$$=\frac{17}{12}$$
$$\left(=1\frac{5}{12}\right)$$

Comment

The marks would be awarded for the unbracketed steps of the solution. Obviously, when the answer is given, candidates must give every necessary step in the working and it is better for them to err on the side of giving too much working rather than too little.

## Surds

Example 2 (Higher)

Show that $(2+\sqrt{3})^2=7+4\sqrt{3}$

**(2 marks)**

Solution
$$\left((2+\sqrt{3})^2\right) = 4+2\sqrt{3}+2\sqrt{3}+\left(\sqrt{3}\right)^2$$
$$=4+4\sqrt{3}+3$$
$$\left(=7+4\sqrt{3}\right)$$

## Standard form

The types of question on standard form which have been set since May 2004 will still be set in future. These include conversion between numbers in standard form and ordinary numbers and problems involving standard form.

Example 3 (Higher)

$x=4\times10^n$ where $n$ is an integer.

Find an expression, in standard form, for $x^2$

Give your expression as simply as possible.

**(3 marks)**

Solution
$$x^2 = (4\times10^n)^2$$
$$=16\times(10^n)^2$$
$$=16\times10^{2n}$$
$$=1.6\times10\times10^{2n}$$
$$=1.6\times10^{2n+1}$$

**Equations**

"Spotting" a solution and showing, by substitution, that it satisfies an equation will not, in general, qualify as "sufficient working". The example below shows two possible methods and there will often be more than one acceptable method. We advise teachers to consult past mark schemes for more examples of different methods.

Example 4 (Higher)

Solve $\frac{7-2y}{4} = 2y + 3$

**(4 marks)**

Solution 1

| Step | Notes |
|---|---|
| $4 \times \frac{7-2y}{4} = 4(2y+3)$ or $7 - 2y = 4(2y+3)$ | Demonstrates clear intention to multiply both sides by 4 or a multiple of 4 For example, $4 \times \frac{7-2y}{4}$ or $7 - 2y$ $= 4 \times 2y + 3$ or $8y + 3$ or $2y + 3 \times 4$ or $2y + 12$ |
| $7 - 2y = 8y + 12$ or simpler | Correct expansion of brackets (usually $8y + 12$) or correct rearrangement of correct terms e.g. $8y + 2y = 7 - 12$ |
| $10y = -5$ or $-10y = 5$ | Reduction to correct equation of form $ay = b$ |
| $y = -\frac{1}{2}$ | $-\frac{5}{10}$ and $-0.5$ are acceptable equivalents but not $-5 \div 10$ etc |

Solution 2

| Step | Notes |
|---|---|
| $\frac{7}{4} - \frac{2y}{4} = 2y + 3$ | Division of both terms on LHS by $4$ |
| $\frac{7}{4} - 3 = 2y + \frac{2y}{4}$ | Correct rearrangement of correct terms |
| $\frac{10y}{4} = -\frac{5}{4}$ or equivalent | Reduction to correct equation of form $ay = b$ |
| $y = -\frac{1}{2}$ | $-\frac{5}{10}$ and $-0.5$ are acceptable equivalents but not $-5 \div 10$ etc |

In the May 2008 and November 2008 examinations, where appropriate, questions on solving equations will have the additional instruction "You must show sufficient working." From May 2009 onwards, this instruction will not be included.

## Geometrical Reasoning

Centres should ensure that candidates are aware that the terms F angles, Z angles and C angles will receive no credit when given in geometrical reasons. The terms accepted are corresponding angles, alternate angles and allied (or co-interior) angles respectively, although knowledge of only the first two of these is required by the specifications.

## Set Language and Notation

Centres should also ensure that candidates are aware that, in lists of the members of the union of sets, the repetition of members is penalised.