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Examiners' Report/ Principal Examiner Feedback

Summer 2010

GCE O Level

Mathematics Syllabus B (7361/01) Paper 1

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Mathematics Syllabus B
Specification 7361

Paper 1

Introduction

There was no general indication that the examination paper was too long, with most candidates making reasonable attempts at nearly all of the questions and with a significant number of these scoring high marks. Overall, the standard of presentation and clarity of work was high. However, it should be emphasized that candidates should be encouraged to include their working on the paper to show how they obtained their answers since if an incorrect answer was given without any working shown, all of the associated marks would be lost.

Whenever possible, candidates should write their answers in the spaces provided in the booklet, rather than on extra paper. If extra paper **must** be used, candidates should indicate that this has been done in the answer area of the relevant question in the examination booklet.

Once again, it was pleasing to observe that many candidates showed that they have a good understanding of the basic techniques of arithmetic, algebra and geometry and were able to apply them competently. Centres should emphasize to candidates that they should give their answers to the required degree of accuracy as often marks are lost.

The question paper did however highlight the following problem areas, followed by their corresponding question numbers, which should receive special attention:

- Factorisation of a quadratic (Q4)
- Probability (Q5 and Q24b)
- The connection between expressing time as a decimal and in hours and minutes (Q6)
- Algebraic manipulation of signs (Q9, Q13 and Q17)
- Manipulation of fractional indices (Q15a)
- Geometry (Q19 and Q26)
- Histograms (Q24a)

Report on individual questions

Question 1

As expected, most candidates answered this question correctly. However, a number of candidates gave their answer as 0.375 and did not attempt to express this as a fraction as the question required.

Question 2

There were many correct attempts at this question. A number of candidates did not realize that a factor of -3 was involved and instead gave their answers as -972, 2916 which did, at least, gain the B1 follow through for 2916.

Question 3

Many candidates collected full marks for this question. A common incorrect method was $\frac{7}{12} \times 360$, in the incorrect belief that a triangle has 360^o, and thus collected no marks.

Question 4

Many candidates successfully factorised $3x^2 - 12y^2$. A number of candidates thought that the correct factorisation was $3(x^2 - 4y^2)$ or $(3x+12y)(3x-12y)$ gaining the method mark for the former case and nothing for the latter.

Question 5

A number of candidates did not attempt this probability question and so it was a minor discriminator of the paper. Common incorrect methods seen were 0.6 + 0.4 + 0.6 (thus producing a probability which is greater than 1), $0.6 \times 0.4 \times 0.4$ and $\frac{0.6}{7} \times \frac{0.4}{7} \times \frac{0.6}{7}$, none of which collected any marks.

Question 6

There were a number of successful attempts at this question. Many candidates realised that the journey took 1.25 hours and then incorrectly interpreted 1.25 hours as 1 hour 25 minutes thus leading to an incorrect answer of 14 45.

An alternative incorrect approach was to interpret 13 20 as 13.2 and then adding 1.25 hours to this producing an answer of 14.45.

Question 7

This question was correctly answered by nearly all of the candidates.

Question 8

The stronger candidates here used 0.8 = $\frac{84}{AB}$ and gained 105 but many used cos 0.8 = $\frac{84}{AB}$ or $AB = \frac{84}{\cos 0.8}$, losing both marks. Many unnecessarily converted cos $\angle$ ABC = 0.8 to an angle only to reconvert it later to a decimal. Some thought that *AB* was $\frac{84}{\sin 36.9}$ and thus 140 was often seen.

Question 9

This question proved popular with most candidates collecting both of the marks. Some candidates had problems with manipulating signs. A common error seen was that after having correctly obtained 2*3 = -1, the candidates went on and made a sign error such as (2*3)*4 = -1 +4 – 4 thus producing the incorrect answer of -1.

Question 10

Whilst there were some worthwhile attempts at this question, some candidates forgot that 1 and 12 were also factors of 12 and some insisted that zero was a factor of B'. Many of the answers seen were inaccurate or contained one or several omissions. Also, those that lost marks in (a) and/or (b) usually managed to collect the B1 ft in (c).

Question 11

Many candidates collected full marks for this question. Common incorrect methods were £150 – "£26.25" (gaining the method mark for £26.25), $\frac{15000}{82.5}$ or $\frac{100 \times 150}{117.5}$ (both of which gained no marks).

A number stopped at obtaining £26.25 and went no further with the question.

Question 12

There were some good solutions producing the correct answer but many candidates do not understand the meaning of '3 significant figures'. It was not uncommon to see 946 080 000 rounded simply to 946, believing that 3 significant figures meant that 3 and only 3 figures were allowed in the final answer. Some otherwise good solutions were spoilt by the absence of one or more of the factors 60, 24 and 365.

Question 13

Many candidates successfully answered this question, only occasionally marred by some candidates who cancelled the *x*'s in the correct version of $\frac{13 - x}{x^2 - x - 6}$ to write $\frac{13}{x^2 - 6}$ as their final answer. A number of candidates made a sign error or an arithmetic error when evaluating the numerator, $2x + 4 - 3x + 9$.

Question 14

There was a mixed response to this question. Many candidates had no trouble in reaching the required answer of 9, however, many fell at the first hurdle by either using the formula for the volume of a cone or a sphere or failing to deal with h = 4r correctly.

Some spoilt otherwise good solutions by taking the square root of 729 instead of the cube root.

Question 15

Many candidates answered this question successfully. A number thought that $25^{3/2} = 7812.5$ in the belief that $25^{3/2}$ was $25^3 \div 2$. A significant number of candidates were careless in writing 125 in standard form with 1.25×10^{-2} being a common incorrect answer.

Question 16

The method in part (a) was invariably correct except for those who took the hint from part (b) and equated only 2 of the opposite angles to 180^0. Many of the explanations in part (b) were sound but a number of candidates used the word 'sides' when clearly they meant 'angles'. A number thought that the necessary condition for a cyclic quadrilateral was that the sum of the interior angles had to be 360^0 instead of the opposite angles being supplementary.

Question 17

Many candidates collected full marks for this question. Of those that did not, usually expanded the first bracket correctly but then made an error in expanding the second bracket usually writing $+ y^2 - yz$ instead of $- y^2 + yz$.

Question 18

Many candidates scored full marks for this question. Very few candidates failed to gain some credit in this re-arrangement of a common formula. A few did an incomplete rearrangement leaving it as $u = \frac{fv - fu}{v}$. Also some thought that $\frac{1}{u} = \frac{1}{f} + \frac{1}{v}$ was equivalent to $u = f + v$. Occasionally there were errors in cross multiplying eg $\frac{1}{u} = \frac{1}{f} + \frac{1}{v}$ became $1 = \frac{u}{f} + \frac{1}{v}$.

Question 19

This question was one of the discriminators of the paper. Some candidates were unable to make any sensible headway. Some left their answer to $\angle CBD$ as $180 - (180 - 2x)$ or even as $-2x$. The conclusions in part (b) often lacked any rigour with many solutions drifting into assuming that $x = 45^o$. Many thought incorrectly that $\angle BDC$ and $\angle BCD$ were x^o instead of the correct $\frac{180 - 2x}{2}$ and then for ΔDBC writing $x + x + 2x = 180$ thus leading to $x^o = 45^o$.

Question 20

The candidates who recognised this as a calculus question were often successful in gaining $t = 4$ seconds. Some fell short by not solving the equation $30t - 120 = 0$ or writing $t = 40$ instead of $t = 4$. Others thought they had to solve the given quadratic without differentiating.

Question 21

Many candidates got to the stage of $9x^2 - 12x = 0$ or $9x^2 + 12x = 0$ and then stopped – not realising that they had an equation to solve. Those candidates that did attempt to solve the equation often omitted $x = 0$ as a solution or wrote $3x = 0$, $x = 1/3$. Weaker candidates tried to multiply f by g and soon got into a mess. A surprising number of candidates tried to factorise $3x^2 - 4x$ as $3x(x - 4)$ instead of $x(3x - 4)$.

Question 22

Part (a) received very good responses with many reaching $x + y = 45.6$ successfully. The simultaneous equations in part (b) were well answered and many scored high marks in this question. In part (b), a common error was to misread the given equation $y - x = 17.2$ as $x - y = 17.2$. Many of these candidates did manage to collect the method mark.

Question 23

Many candidates reached the stage $2x^2 - 6x - 7 = 0$. Some did not progress any further but of those that did some invariably left their final answers as either 3.89, - 0.89 or 3.9, - 0.9 instead of the correct 3.90, - 0.90.

Question 24

Part (a): As in previous examinations, a mixed response was seen to this histogram question. Whilst there were many correct solutions observed, a significant number of candidates had little idea about frequency density. Often the 3rd and 4th blocks were of heights 12 squares and 20 squares respectively (from $22 \div 1.5$ and $30 \div 1.5$) instead of the correct 44 squares and 60 squares.

Some drew the first block from 0 to 30 instead of from 15 to 30.

Part (b): Generally, the candidates who scored in part (a) usually answered part (b) correctly.

Question 25

A good number of candidates collected full or nearly full marks usually using the first method in the mark scheme. Some candidates tried to find all of the angles with a view to use the $\frac{1}{2}ab\sin C$ formula. Some succeeded whilst others calculated the area of just one of the triangles.

Question 26

This question was a discriminator of the paper and there were many misconceptions in part (a). Many did not state the reason, 'the angle at the centre of a circle is twice the angle at the circumference' , and thus lost the opening mark. Whilst many did have $\angle FOE = 100^o$, many others thought incorrectly that $\angle FOE$ was 25^o (from half of 50^o) or that $\angle FOE$ = 130^o (from thinking that *OEFD* was a cyclic quadrilateral).

In part (b) a sizeable majority incorrectly thought that $\angle CAD$ was 35^o. Some gained credit for realising that $\angle BFD$ was 95^o but the majority had $\angle AED$ as 95^o (usually because they had incorrectly thought that $\angle CAD$ was 35^o) instead of the correct 115^o.

Question 27

Candidates were able to make some headway in this vector question. Most picked up at least the first mark for 3**b** – 3**a** and many made progress in part (b) with only a few omitting the 3**a** term. A common error in part (c) was to write 2/3 **b** rather than 2**b**. Whilst there were some excellent attempts at part (d), it did, however, turn out to be one of the discriminators of the paper. Some candidates tried to find λ in terms of μ instead of equating the coefficients of **a** and **b**, and collected no marks for this part. As in previous questions of this kind, many candidates demonstrated that they did not know what is meant by a coefficient and included **a**'s and **b**'s in their answers.

Question 28

Many candidates found this question challenging with only the more able making any real progress. Many had difficulty trying to find $\angle AOB$. So many candidates resorted to equating 16 to $\frac{\theta}{360} \times 2 \times \pi \times 15$ in a attempt to find $\angle AOB$, thinking that 16 was the length of the arc *AB*, which it was not. Of these candidates, a generous follow through of their $\angle AOB$ allowed such candidates to gain some marks in the latter part of the question.

Statistics

Overall Subject Grade Boundaries

Grade	Max. Mark	A	B	C	D	E	U
Overall subject grade boundaries	100	82	64	46	41	28	0

Paper 1

Grade	Max. Mark	A	B	C	D	E	U
Paper 1 grade boundaries	100	86	68	51	41	31	0

Paper 2

Grade	Max. Mark	A	B	C	D	E	U
Paper 2 grade boundaries	100	80	62	44	35	26	0

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