Examiners' Report Summer 2007

GCE

GCE O Level Mathematics A (7360)

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Paper 1 Arithmetic & Trigonometry

Introduction

There were a number of scripts, which were of a high standard, clearly presented and accurate in content. However, there were too many scripts of a poor standard, with about a quarter of the total number of candidates scoring less than 20 %, indicating that the candidates had not been prepared sufficiently for the examination. In a few cases it was difficult to follow or read the solutions. It should not be left to the examiner to search for correct work.

Most of the candidates made attempts at three Section B questions in the allocated time, but weaker candidates often only managed to attempt two full questions from Section B or attempted parts of questions from the five questions available. Candidates should be reminded that if they attempt more than three questions from Section B, only the best three answers would be taken into account. Once again, it was good to see that the majority of candidates obeyed the instructions for rounding their answers, to the required degree of accuracy, in the appropriate questions

Report on Individual Questions

SECTION A

Question 1

This question was answered very well by most candidates and even those scoring less than 20% on the paper tended to get the majority of their marks from this question.

(a) There were only a small number of errors on fractions, often by misreading one of them. The techniques for subtraction of fractions with different denominators and division by a mixed number were well known.

(b) After evaluating both the numerator and denominator of the expression some candidates tried to remove the decimal points by multiplying both numerator and denominator. This often led to error in the decimal point of the answer.

Question 2

(a) This work was well known and few errors were made although a few candidates missed out on some of the prime factors by incorrect division. The main error was in finding the LCM of the three numbers instead of the HCF.

(b) The more able candidates had little problem with this part but some candidates failed to calculate the ratio of the investments in its simplest form and other candidates found the three shares and left the examiner to choose the correct one.

Question 3

(a) Most candidates knew the concept of simple interest and the formula for finding the number of years of investment but a large number of them failed to realize that the simple interest was £305 - £250 and not £305.

(b) This part was not done at all well by the majority of candidates. Many of them did not realize that £13.50 represented 112ψ% of the cash price……most of them found 12ψ% of £13.50 and subtracted it from £13.50.

(c) Only the more able candidates were successful with this question. Most other candidates usually confused the units of length and area , failing to multiply 95 by 60^2 before converting to m^2.

Question 4

(a) This part was well done, generally, with many of the candidates knowing how to calculate the perimeter of the race-track. However, some candidates confused the diameter with the radius and other candidates used the inner diameter + 5 m instead of the inner diameter + 10 m.

(b) Most candidates knew that the average speed = total distance ÷ total time but a lot of candidates had problems with converting time in minutes and seconds to hours and with converting metres to kilometres.

Question 5

(a) Generally, this part was answered successfully by the majority of candidates, usually by using the theorem of Pythagoras.

(b) Again, most candidates successfully used the theorem of Pythagoras to find the length of AD while others used trigonometry in the right-angled isosceles triangle ABD

(c) Most candidates were able to calculate, correctly, the size of $\angle$ADC but some candidates tried to calculate directly it using trigonometry in ΔADC, assuming it to be a right-angle triangle.

Question 6

This question was not popular and many of the weaker candidates made only a token attempt or it was omitted.

(a) There was some confusion about what was meant by the volume of the trough. Some candidates found only the curved surface area; some found the curved surface area and the area of both ends, while some candidates found the volume of the cylinder.

(b) Most candidates knew they had to divide something by 81 but often it was the answer to part (a) which was divided. Only the more able candidates found the volume of water discharged by the pipe of cross-sectional area of 3 cm^2 in 81 seconds and hence the rate of flow of the water.

SECTION B

Question 7

This was a very popular question but not always done well except by the more able candidates.

(a) A common error was to express the profit on 1 tin as a percentage of its selling price.

(b) Some candidates tried, unsuccessfully, to combine the ratio of the costs of the materials and wages in 2004 with their percentage increases in 2005. The popular method was to find the respective costs in 2004 and the increased costs in 2005 and then combine them to find the cost of manufacturing 1 tin of polish in 2005.

(c) Most candidates knew how to find the cost of manufacturing 1 tin after a tax of 15% was introduced.

(d) Although most candidates knew how to find the cost of manufacturing 1 tin after allowing for a profit of 60% many of them failed to round up their answer to 2 decimal places

Question 8

This was attempted by a lot of candidates but not always successfully. Some candidates did not realize that the diagram was a 3-D diagram, often taking ΔATC to be a plane shape. Other candidates thought that $\angle ABC$ was $90°$ instead of $135°$.

Parts (a), (b) and (c) were well done by most of the more able candidates but part (d) caused some problems. Most candidates successfully found $\angle BCA$ but then thought the required bearing was $180° + \angle BCA$ instead of $180° + 45° - \angle BCA$.

Question 9

This was not a popular question and was rarely done well but those candidates who understood stocks and shares usually scored good marks.

(a) The weaker candidates rarely went beyond finding the amount of stock purchased and the dividend from the stock.

(b) Having successfully found the dividend some candidates failed to deduct the income tax at 22%.

(c) Most candidates knew how to find the number of shares even though they were using their incorrect amounts carried forward from previous parts of the question.

(d) This part proved to be difficult for all but the more able candidates.
Having successfully calculated the number of shares bought, many candidates were unable to find the gross dividend from the shares, often finding 22% of £98.28 and then subtracting it from £98.28.
There were only a few fully correct solutions with many candidates getting "lost" on their way.

Question 10

This trigonometry question was popular with a number of candidates and many candidates achieved good marks.

(a) Most candidates used cosine 56° in ∆BFC to calculate the length of CF.

(b) The majority of candidates realized that AE = BF and then found BF using the theorem of Pythagoras or sine 56° in ∆BFC.

(c) Most candidates found the length of DE by subtraction and then used the tangent ratio in ∆ADE to find the size of ∠ADE

(d) Candidates either used sin (∠ADE), found in part (c) or the theorem of Pythagoras in ∆ADE to find the length of AD

(e) There were very few incorrect answers as the majority of candidates knew the correct formula of the area of a trapezium and how to apply it.

Question 11

This was a popular question but was rarely done well, except by the more able candidates..

(a) Most candidates used the given formula for the volume of a pyramid but failed to find its slant height or its base area. Some candidates found the area of the base of the pyramid by multiplying its diagonals.

(b) This part was usually more successful although some candidates only found the volume of the cone forgetting about the volume of the hemisphere.
Some candidates did not know the volume of a cylinder often quoting its total surface area.
Having found the volume of the cylinder full of ice cream most candidates correctly divided this volume by the volume of ice-cream needed to make one "Woppa", found earlier.
Only a few candidates realized that their answer needed to be rounded down.

Mathematics A

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Paper 2 Algebra

Introduction

Presentation of the scripts was usually of a satisfactory standard. When candidates set out their work clearly and in a stepwise fashion then they can easily review it and if necessary correct it. Candidates who present their answers in a haphazard manner rarely arrive at correct solutions.

There was no indication of any time problems, those candidates who had the ability to complete the required number of questions were able to do so. The recommended procedure of completing Section A first was adopted by most candidates.

As in previous reports I have to emphasise that the ability to carry out fundamental algebraic operations and procedures is essential if a candidate is to attempt this paper. What is needed is the ability to carry out basic procedures like simple multiplication and division, removal of brackets, simple factorisation and solving equations accurately and this requires that they are well practiced prior to the examination.

The following comments only apply to candidates who have a reasonable understanding and mastery of the above skills, those who do not have such knowledge cannot tackle the question paper in a satisfactory manner.

Report on Individual Questions

SECTION A

Question 1

Parts (a) and (b) were usually well done but in part (c) although the initial cross multiplication was carried out correctly candidates were unable to correctly isolate the 'a' term frequently having 'a' on both sides of the equation.

Question 2

All parts were well attempted the only common fault was to partially factorise the expression in (a)(iii).

Question 3

In part (a) the solution of simultaneous equations was usually handled correctly as was the solution of the quadratic equation in (b).

Question 4

In (a) the major error was to multiply 50 by 8 and then divide the 800 by 400 to give an answer of 2. Part (b) was better attempted with an appreciation that a fifth root of 243 was required. Part (c) was usually well done.

Question 5

In part (a) many were unable to write an expression such as $s = kt^2$ and hence calculate k those who did usually went on to a correct answer to the question.
Part (b) was very poorly done the best answer that most arrived at was $xy + b = w$ which at least showed some understanding of what was needed.

Question 6

Parts (a) and (b) were usually well attempted but part (c) not so ,frequently special cases were used to verify the statement or the final quadratic was not factorised to show that it was a perfect square.

Section B

In the selection of three questions by candidates questions 10 and 11 seemed to be less popular than the rest.

Question 7

(a) Candidates could usually use $a = 3b$ and correctly substitute to prove the statement; in addition the methods of correct division and factorisation were also used.

In (b) it was pleasing to see correct application of the remainder theorem and the correct solution of the resulting equations.

In (c) any candidate who did not factorise the quadratic expression usually arrived at an incorrect expanded numerator and could not proceed further, those who did factorise usually arrived at the correct answer

Question 8

Part (a) was well done by those who were well versed in dealing with simultaneous quadratic equations.

In part (b)(i) and (ii) most correctly found the two equations the only error which infrequently occurred was to multiply rather than add the p and q terms. The candidates who then wrote two simultaneous equations were usually able to correctly solve them.

Question 9

The major problem in part (a) arose when candidates used the formula for thr sum of a G.P. and arrived at a cubic equation which they could not correctly solve, those who simply added the first three terms usually had no problems.

Both parts of (b) were well done.

Question 10

The key to this question was for candidates to be able to translate the given statements into two distance divided by speed = time expressions, those who correctly did so were usually able to successfully solve the problem.

Part (b) was usually well done but a common mistake was to only deal with the rectangle part and end up with a quadratic equation, candidates who drew a correct sketch usually went on to a completely correct solution of the problem.

Question 11

The majority of candidates who attempted this question were able to construct a correct table of values and draw a reasonable curve although I wish more showed an understanding of how to draw a smooth curve. The two lines for (d) were also usually correctly drawn.
In (b) many did not ralise that they needed to use the quadratic equation and arrive at
y = 7 - 6 = 1 and hence draw the line y = 1. Many simply used their calculator to get a value for the square root of 6 which they then marked on the graph. The majority of candidates were unable to interpret the intersections of the lines and quadratic graph to solve the equations, they reverted to simply calculating the roots which was not what was required.

Mathematics A

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Paper 3 Geometry

Introduction

The majority of scripts were, as in many previous years, well presented with clear explanations of work leading to final answers. There were significant numbers who selected Q7, 10 and Q11 in Section B and who were able to produce accurate proofs of the requested theorems.

Report on Individual Questions

Question 1

There were many candidates who scored full marks for this question. The most common errors occurred in (b) where many failed to halve ($180^\circ - 88^\circ$) and hence offered an incorrect answer of 92°.

Question 2

This question also produced many all-correct solutions. The majority of errors were made in (a)(ii) and (b). There were a number of candidates who, having calculated $\angle$ AOL = 144° in (a)(i), proceeded to divide 360 by 144 in (a)(ii), to obtain an answer of 2.5. This answer is not a sensible answer for the number of sides of a polygon and candidates should be aware of this inconsistency and perhaps they should attempt to seek another solution. In part (b), the most common error was the omission of the factor of ½ in the formula for the area of a trapezium.

Question 3

This question proved to be one of the most difficult questions in Section A. The problem in (a), for most candidates, stemmed from the fact that they failed to draw a suitable diagram which probably would have alerted them to the particular property regarding secants and chords, which was essential in the correct solution. In part (b) many failed to realise that the ratio of the areas could be obtained from the ratio $10^2 : 4^2$ and not $16^2 : 10^2$.

Question 4

Most candidates seem able to assemble the correct elements necessary to prove that two triangles are similar. Hence, parts (a) and (b) were generally well answered. However, in (c) and (d) there were many convoluted attempts to prove the given statements most of which were flawed.

Question 5

The proof of congruent triangles in (a) was correctly presented by many candidates. However, there were some who thought that because two pairs of sides were equal that it followed that the third pair of sides were equal. Whereas this assumption correctly applies to angles in a triangle it does not apply to sides. Furthermore, there were many who thought that the angles ADC and CBE were equal because they were alternate angles. The correct answer to (c) proved elusive for many, 44º being a common incorrect answer.

Question 6

There were many good accurate constructions in evidence, however there are many who seem to think that an angle can be constructed by using a protractor. The main cause of error was in the construction of the perpendicular at B since many constructed the perpendicular bisector of AB instead. This should serve as reminder to all candidates that they must read a question with more care for detail.

Question 7

The correct proof of the theorem was evident in many scripts. There were some who omitted one or both of the *essential references* namely "angles in the same segment" and "similar triangles". Each of these omissions results in the deduction of 1 mark from the maximum score of 6 for the proof. In part (b) there were many all-correct solutions but there were also many candidates who seemed to think that they could obtain the length of QS (and PS) by applying the theorem of Pythagoras.

Question 8

It would appear that many candidates are able to distinguish between congruent and similar triangles. Consequently, it was not uncommon to see all-correct proofs in (a) and (b). However, in (c) there were many who failed to identify the required ratio from the similar triangles in order to prove what was required. In (d) there were some who realised that they needed to use the facts that QS = QP – PS and VR = VP – PR in order to proceed satisfactorily.

Question 9

The construction of the triangle ABC was satisfactorily carried out by many candidates. However, the construction of the inscribed circle of the triangle was less well done. It is not sufficient to bisect two angles of the triangle, in order to find the centre of the circle, and then guess at the radius of the circle. The candidates were required to drop a perpendicular from their circle centre in order to determine the correct radius. In (d) it was clear that many candidates did not read the question, in which it clearly stated that the point P was to be on the opposite side of BC to the point A. This error led to significant loss of marks in parts (d), (e) and (f).

Question 10

The proof of the theorem was generally well produced with occasional omissions of either the *essential construction* (a perpendicular from the vertex of the triangle to the base) or the *essential reference* (<u>either</u> Extension to Pythagoras' Theorem <u>or</u> Pythagoras' Theorem). In part (b) there was some confusion in the selection of the appropriate triangle in some parts but in many cases the statements in the question were proved correctly.

Question 11

There were many all-correct proofs of the theorem. In part (b) the correct answers were often seen, however, the correct answer to (b)(ii) proved elusive for many. In fact, it was clear that some candidates did not understand the definition of a reflex angle since 172º was offered by quite a few candidates.

Statistics

Overall Subject Grade Boundaries

Grade	Max. Mark	A	B	C	D	E	U
Overall subject grade boundaries	100	78	63	48	43	33	0

Paper 1 Arithmetic & Trigonometry

Grade	Max. Mark	A	B	C	D	E	U
Paper 1 grade boundaries	100	81	65	50	42	35	0

Paper 2 Algerbra

Grade	Max. Mark	A	B	C	D	E	U
Paper 2 grade boundaries	100	81	66	51	42	33	0

Paper 2 Geometry

Grade	Max. Mark	A	B	C	D	E	U
Paper 2 grade boundaries	100	73	58	44	38	32	0

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