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GCSE

# Mathematics A

General Certificate of Secondary Education **J562**

# OCR Report to Centres

# November 2011

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Oxford Cambridge and RSA Examinations

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## OCR REPORT TO CENTRES

# Overview

### General Comments

A pleasing improvement has been recorded at all tiers. Candidates showed a good knowledge of the specification content and a sound understanding of how to apply their knowledge, even in unfamiliar situations. The tier of entry was, in general, appropriate to the candidate's ability and allowed them to have a positive examination experience.

It is pleasing to see that many candidates showed full working with their answers, allowing them to earn credit even when the final answer was wrong. Whilst interpretive and descriptive answers are getting better, there were still many candidates who found this difficult. With more problem solving (AO3) questions and marks awarded for 'quality of written communication' (starred questions), schools must encourage students to present work in a clear, structured way at all times.

It was evident that some candidates did not have the required equipment. The lack of a calculator and geometrical equipment can have a serious effect on a candidate's score and ultimately their final grade. Drawing in pen and overwriting answers, at Foundation Tier, have been highlighted as causes for concern. At Higher Tier, concern is for the ongoing problem of candidates and their understanding of functions.

Candidates' best work, once again, was on Handling Data and Geometry and Measures questions. Drawing and construction continued to be done carefully and accurately. Though Algebra work is improving, there was evidence that some candidates do not understand the correct processes and procedures. Arithmetic is variable at both tiers with many making errors in even basic calculations.

# A501/01 Mathematics Unit A (Foundation Tier)

### General Comments

Overall, most candidates appeared to find the paper accessible, and there were many good attempts across the whole range of questions.

Candidates who showed their working did benefit, and there appeared to be a reduction in the number of questions not attempted compared with previous papers.

The overlap questions with the Higher Tier paper did provide more of a challenge, as would be expected. As in July, although there were marks in the 50s, there were few very high marks suggesting that able candidates are being entered for the more appropriate Higher level paper.

Unlike in July, it seems that most candidates did have a calculator, but as noted previously, candidates did not appear to have all the necessary geometrical instruments.

### Comments on Individual Questions

1 Most candidates got off to a reasonable start with this question. The least successful part was (d) where 20 was often given as the square number.
Also in parts (b), (d) and (e), answers that were not on the given list were often seen.

2 Parts (a), (b) and (c) were very well done but very few candidates recognised the sequence as being the even numbers. Many gave the term to term rule ‘add 2’ or the general term ‘2*n*’.

It was also common in part (d) to see answers which apparently had nothing to do with the question being asked, e.g. “pattern”, “dot sequence” and “ratio”.

3 This question was well answered overall. The common error in part (a) was to mark 5.8. Some candidates did not give clear intentions of their answers.

In part (b) there were many fully correct responses.

4 In part (a), there were very few correct answers seen. The common wrong answer was 90°. Some earned the method mark for 240, often then followed by a final answer of 0.66.

Part (b) was generally well answered, as was part (c)(i), although NW was a common wrong answer.

The estimate in part (c)(ii) proved challenging. The common wrong answer of 35 presumably came from measuring ‘as the crow flies’, (14 cm). Most failed to show their measurement but those who did often earned the method mark.

5 Good candidates answered part (a) well and most managed to earn at least some of the method marks. A common error was to use just the times in the table. Hence the table times 1, 2, 4 and 5 earned 3 marks in total which was generous but did show some understanding of the restrictions. The final A mark was the most difficult to achieve as many omitted the 90 minute crossing time. The final method mark for leaving home 2 hours before arriving at Dover was most commonly earned although not all candidates appreciated the 06:00 earliest start time. Some candidates wrote times in an inappropriate form, e.g. 09.65.

In part (b), a common answer was 290 × 1.6 = 464 despite the word formula being given in the question. 18.125 was also often seen.

Part (c) was well answered by most candidates.

6 Part (a) was generally well answered. A common error was to write $12a - 8a$ or $4a$ as the answer.

Part (b)(i) proved to be the part of this question that was done best. Some candidates still insist on giving their answer in embedded form; this should be avoided.

Part (b)(ii) was only answered correctly by the better candidates. Common answers were 7 or $7 - 6 = 1$. Some tried the flow chart method but were rarely successful.

7 Both parts were generally well done with part (b) more often correct than part (a). The common error was to divide 12 by 7.56 and divide 5 by 3.85 rather than the correct way round.

8 Good candidates found this straightforward but once again a lack of clear working penalised many. Those who showed working, generally subtracted each length separately (often subtracting the metres first but then struggling with the centimetres), rather than adding the 3 cuts together first. Many showed laborious paper calculations rather than changing to one unit and then using their calculator. Consequently, arithmetical errors were common. Weak candidates showed a poor understanding of conversion and metric units. A common error was to have 1 metre equivalent to 1000 cm.

9 Most candidates found this question difficult and there were few fully correct solutions. The common error in part (a)(i) was to find $420 \div 2$ giving 210 as the answer, while in part (a)(ii) $360 \times 2$ or $360 \div 3$ leading to answers of 720 and 120 respectively were often seen.

Few candidates reached the simplified ratio in part (b) with the answer often left as 260 : 160. Others approximated to 2 : 1 or similar.

10 It was clear that some candidates did not have compasses. Many earned the marks for a correct circle though sometimes circles had the wrong radius. Attempts at the perpendicular bisector were seen less often. Those who did get that far failed to shade the correct segment. There was much random shading of regions apparently unconnected to any circles or lines drawn.

11 In part (a), very few candidates scored the full 3 marks. Common errors were to plot at the upper class boundary (and less frequently at the lower class boundary), or to draw the bar chart or to join the plots freehand or carelessly. However, many earned at least one of the marks for the correct heights.

In part (b), very few scored full marks. Errors were numerous and varied. The most common error seen was $50 \div 7 = 7.1$. Those who appreciated that the mid-points were needed often just summed them and divided by 7. Those who remembered 'multiplication by frequency' was needed often used the upper class boundaries rather than the mid-points.

# A501/02 Mathematics Unit A (Higher Tier)

### General Comments

There was a wide range of responses from candidates, with the marks gained ranging from 0 to full marks (60). There was no evidence of shortage of time. In cases where the later questions were not attempted, it appeared to be through lack of knowledge rather than lack of time. The better candidates on this paper often did very well on the first few questions, and many of them coped well with question 8, with its need to decide the strategy of approach.

Calculations for the more involved questions were often jumbled and difficult to follow. Explanations proved very difficult for many.

With much data content in the specification for this unit, some candidates appear to be struggling to cope. Many seem to have confused topics, with histogram ideas of using interval width coming into mean calculations, bar charts appearing as frequency polygons and even cumulative frequency work appearing occasionally.

Work on function notation continues to be weak.

### Comments on Individual Questions

1 Part (a)(i) of this ratio question was usually correct. A few candidates started from 420 ÷ 2 instead of 420 ÷ 3; this was a common error for those who did not score full marks. A few gave the answer as a ratio (280 : 140). The second part was often well done, but here the need was to divide by 2 and, as expected, the common error was to divide by 3. This was seen slightly more frequently than in the first part.

Simplifying the ratios in part (b) was usually done well. Nearly all candidates know what to do, though there were occasional arithmetic errors. A few gave a partial simplification as their final answer.

2 Multiplying out the bracket was done well, with $5a - 15$ and $6a - 5$ being the usual wrong answers seen.

Factorising in part (b) was often done well, although some gave an answer such as $b(b + 7b)$. A few had no idea what to do, giving an answer such as $7b^3$.

3 The calculation in part (a) caused difficulty and seemed to discriminate well between abilities. Many did not use the correct order of operations, with the most common wrong answer being 18.26... (from $(6.4^2 - 4) \times 9.03$). Some used the correct order but forgot to take the square root as the final step.

In expressing 540 as a product of its prime factors, factor trees were very common and usually successful. Fully correct answers were often written as a line of correct products rather than using index notation; both versions gained full marks. Some had the correct values but had commas or addition signs between them on the answer line. A common error was to leave 9 or 27 unfactorised with other values correct. Badly organised working sometimes led to a missing factor after a correct tree.

In the last part, a Venn diagram approach was common; listing was rare. The HCF, 10, was seen about as often as the required LCM. Many scored 1 for finding the prime factors of 50.

4 In this locus question, the marks for a correct circle or arc with centre A were more usually gained than the marks for the perpendicular bisector. The most common approach was to have two intersecting circles of radius 6 cm, sometimes with the bisector put in (in which case they usually completed the question correctly). The great majority appeared to have the necessary equipment. The most common error was to simply draw two intersecting circles of radius 6 cm and shade all the overlap.

5 In drawing a frequency polygon most candidates managed to gain the height mark, sometimes from a bar graph, but plotting at the end of the intervals was common. The majority joined their points with ruled lines but a few joined the last point back to the first, thereby losing the mark for joining points. It was rare to give 0.

Calculating an estimate of the mean was done well by many, but weaker candidates often were unsure what to do. A few used the class width, 50, instead of midpoints while others used the upper end points of intervals. The most common error from weak candidates was to divide by 7 instead of 50 and many simply found 50/7.

6 Many solved the equation in part (a) correctly, with full formal setting out seen. A surprising number reached $8x = 10$ but followed this with $x = 0.8$. Most candidates scored at least 1 mark in part (a) for collecting either $x$ or number terms correctly, and many followed through to gain a second mark.

In the second equation, most picked up a mark for expanding the brackets to $35 – 14x$ but errors frequently followed, such as $14x = -35$ or dividing 14 by 35. Perhaps surprisingly, even amongst the most able, few recognised that dividing by 7 first, rather than expanding, was a sensible strategy.

7 Most attempted the triangle height, occasionally with an arithmetic error. Good candidates completed the question well, whilst weaker candidates made little worthwhile further progress, so the question discriminated well. A small number of candidates used Pythagoras in an effort to work out the adjacent side. Some of them went on to use cosine to find the angle. This method was usually done well by those attempting it. The best candidates demonstrated good notation in their use of trigonometry.

8 This functional question, testing Assessment Objective 3, was well answered by the better candidates. Weaker candidates often assumed that all the sides/ heights were 12 or 6, giving answers such as 72 or 48, often without much working; these gained no credit. However, there were some excellent answers, and some very varied correct approaches, though hardly any used the left-hand diagram with an angle of 22.5°. Most seemed to use Pythagoras either on the *a*, *a*, 12 triangle or (rather neatly in most cases) on the 12 by 12 square. A few scored the first 4 marks, by one method or another, and then did not quite know how to finish the problem off.

9 Throughout this question there seemed to be two distinct groups: those who could handle function notation and those who appeared to have no idea what it was. The latter group was the great majority, although generally attempts were better than on the June paper. In part (a), which was the most successful, some left their answer as 7 – 12.

Very few solved f($x$) = 0 correctly. Many substituted the value of 0 for $x$ and gave an answer of 7. Others gave an answer of 0 without working.

Very few had the last part correct. Some thought this was simply a case of multiplying out the brackets and gave $f3 + fx$. When $7 - 2(3 + x)$ was reached this was often followed by $7 - 6 + 2x$ and then $1 + 2x$, so gaining only partial credit. About a quarter of the candidates did not attempt this last part.

10 Most gained the mark for having correct widths on their histogram, but only better candidates found frequency densities. The final frequency density was sometimes found to be 0.02, from dividing by 50 instead of 100. Some weak candidates seemed to confuse this question with question 5(b) and worked out mid-points and multiplied by frequencies etc.

Part (b)(i) was not well answered; many did not seem to understand what the question was asking for. Some thought that the fat content would be at the top end of the 200 – 250 group and only gave the 250 value. Some made a general statement about fat in recipes e.g. 'there's a lot of fat in a lot of recipes'. Many chose the 100 – 150 group as it had the highest bar.

The last part was more accessible, and many candidates did have answers suggesting they had some idea, with 90 and 0.9 being seen quite often as well as the correct answer of 9.

11 In this question, on changing the subject of a formula with the subject appearing twice, some excellent solutions were seen. However, the sustained use of algebra was a step too far for many. Multiplying out the brackets at the start was often done well and was the source of a single mark.

12 In the comment, very many candidates concentrated on the method that Jay used, rather than looking at the physical situation. Candidates often resorted to a discussion about rounding or about how to work out the length of the diagonal exactly.

Calculating the length of the diagonal was often done well, with the stronger candidates often 'at home' with the direct calculation whilst some others did it in two stages by first finding the diagonal of a face. Many moderate candidates were able to gain one mark for one successful use of Pythagoras in 2-dimensions. Those who had no idea often still made some attempt, such as a volume calculation.

# A502/01 Mathematics Unit B (Foundation Tier)

### General Comments

The paper appeared accessible to most candidates and many attempted all of the questions. A reasonably full range of marks was seen although few candidates scored above 50 marks.

Some candidates appeared to have the use of a ruler and a pencil. It was not, however, uncommon to see a line drawn for a graph (in pen) scribbled out and a replacement attempted.

Candidates still try and over-write a number, which is very difficult to mark. Some candidates would benefit from clearly forming their digits. 4 and 9 often caused difficulty along with some poorly written 5's.

Questions on fractions and algebra caused problems to many candidates.

Candidates across the ability range did not appreciate the meaning of "**Not to scale**" against drawings and attempted to use measurements to achieve answers.

Candidates do not appear to be prepared for QWC and AO3 questions and find difficulty in organising and presenting their reasoning.

Many candidates scored well on the time series and scatter graph questions and generally interpreted the representations well.

Candidates need to read questions carefully and check that they have answered the question they were asked.

Some candidates would benefit from further work with multiplication and division skills.

### Comments on Individual Questions

1 Many good answers were seen but a number of candidates shaded **one** quarter of the shape. In part (b), candidates scored one mark for $\frac{6}{16}$ but common errors were to state $\frac{6}{10}$ or incorrectly cancel $\frac{6}{16}$.

Most answered £24 for the first part of (c) but a few wrote $6 \times 4$ and gave the wrong answer of £21. However, in the final part, some correct answers were seen but £8 and £12 were common wrong answers. Candidates who did not achieve £24 but correctly found $\frac{2}{3}$ of their amount of money from part (i) gained full marks. A method mark was awarded when division by 3 and multiplication of the result by 2 was clearly shown.

2 Candidates did quite well on this question and many scored 3 marks for correct evaluations, even if the order was wrong. The biggest problems were with attempting $1.5 \times 6$ (often seen as 5.15) and not making appropriate use of the working space to set out their calculations. Some candidates found $\frac{56.6}{10}$ difficult, often giving answers of 5.6 or 5.6.6.

3 Many candidates drew a correct line of symmetry although the common error was to draw a horizontal line.

When asked to add triangles, many good answers were seen and wobbly lines were condoned. Some candidates misread the questions and shaded a triangle to preserve or destroy symmetry. This was condoned.

A common error in both parts was to attach triangles by a vertex. This was not accepted. Some used a large triangle with 4 smaller ones within it, overlapping with the existing shape or inserted in the void at the top of the shape. Where this was done correctly it was condoned for a mark.

4 In the first part, many correct answers of 32 were seen although poor table skills often marred a correct stated calculation. However, the follow up question saw few candidates give the correct answer. Many subtracted 2.3 from 10.1 with mixed levels of success. Some subtracted $4 \times 2.3$ from 10.1 with equal imprecision. Most seemed bemused by the 10 cm and either ignored it or added it to one of the numbers 2.3 or 10.1. This often resulted in 3.3, 2.13, 2.31 or 11.1. Some candidates reached 0.5 or 50 but failed to state any units. Some candidates gained a mark for finding 2.4 m or 40 cm somewhere in their working.

In the QWC part of the question, candidates struggled. A common wrong answer that gained some credit was "13 rolls" (when it should have been 13 strips). Candidates attempted to use all the numbers on the diagram, often to work out perimeter or area but then stopped. Some candidates realised that $3 \div 0.5$ was sensible and then resorted to listing to find 6 (strips). $3 \times 0.5 = 6$ was sometimes seen. Very few candidates presented well-organised solutions.

In the final part of the question, many candidates gained a mark for correctly agreeing or disagreeing with the statement, based on their results in part (c). Some appreciated that a room had to have four walls, and not two, and used this in their justification. Few appreciated that doors or windows did not require papering and that this would have an effect on the number of rolls required.

5 Most candidates gained the mark for $20^{\circ}$ but answers of 160 and 47 were common. However, very few candidates were awarded a mark in the next part. Most tried to complete the drawing of the polygon and concluded that the shape had 6, 5 or 8 sides. Only a few method marks were awarded, either for correctly using the angle 20 or for using their wrong answer to part 5(a).

**Not to scale** is clearly not understood, or was ignored, by most candidates.

6 This was well answered. A few candidates lost the mark through not reading the question carefully and stated the time, 0915, rather than the number passing. 45 and 45.2 were common errors.

The graph was well interpreted. The fairly common practice of stating only one time was condoned, so long as it indicated the start of the decline.

Candidates need to practise reading questions carefully and checking that they have answered the question they were asked.

7 Many candidates answered 2*a* + 2*b* to the first part. Weaker candidates measured and gave a number. A common error was to write $a^2 + b^2$. Other answers were $a + b$, *a*2 + *b*2, 2*ab* and $a \times b$. Some strange answers of $^2a$ and $2^a$ (combined with variants of 2*b*) were also seen.

Quite a number of correct answers were given to the second part but $a^2 + b^2 + c^2$ was a common wrong answer as well as other combinations of *a, b* and *c*. One error that gained some credit was (3*a* or 4*a*) + 2*b* + 2*c* for including the adjoining sides.

Weaker candidates struggled to answer the final part of the question. Some drew hexagons with *a* and *c* marked to gain some credit.

Candidates found difficulty in understanding the role of the letter symbols.

8 Few candidates could correctly identify a square number between 110 and 150. Some worked out, for example, $11 \times 11 = 121$ but gave the answer as 11. Many simply wrote down a number in the range. 121 or 144 were rarely seen. Answers of $11^2$ or $12^2$ were given the mark but these were also rarely seen.

In part (b)(i), a surprisingly large number gained the mark for $5^4$ although 20, $4^5$ and $5^5$ were also often seen. Some candidates worked out $5 \times 5 \times 5 \times 5 = 625$.

Part (b)(ii) was also well answered, even by weaker candidates. A very common error was to write $4^2+7^4$ or $2^4$ and $4^7$. Similar errors were also made to those in part (a) and errors such as $16 \times 28$ and other numerical attempts were seen.

The final part of the question, part (c), saw few correct answers given. Some candidates attempted huge multiplications, some listed long products of 4. The most common error was to write $68 \div 56$ and make no further progress. A few candidates scored one mark for $4^3$.

9 Surprisingly few candidates gave the answer 128. Many worked out 180 – 128 and wrote 52, others tried to subtract from 360 and others measured the angle. The simple fact of vertically opposite angles being equal seems to have eluded many.

Many recognised the second diagram as “angles at a point” and gave the correct answer. Some candidates made a calculation error but often showed little or no method, so no mark could be awarded.

Many correctly recognised that the key fact in part (c)(i) was that “angles on a straight line sum to 180°”. This sometimes had to be extracted from very poorly expressed reasons. Alternate angles or corresponding angles were often, wrongly, given as the reason. However, the question was well answered compared to previous sessions.

In part (c)(ii), some found the angle to be 90°, often with little working. Others thought it to be 45° through subtracting 45 from 180 three times, or 135.

Many candidates scored one or two marks on the QWC question, part (c)(iii), for recognising that all the sides were equal and that all the angles were 90°. Many thought it to be a rectangle (from its appearance) others concluded it was an equilateral quadrilateral or a rhombus. Few coherent explanations pulling all the key facts together were seen. Candidates need to be able to appreciate a proof.

10 Candidates scored quite well on this question that was common with the Higher Tier paper. Many gave the correct rate although a few wildly inaccurate and unrealistic answers were seen. The second rate was not so well found with a common error being £90.

Some drew the graph well; others plotted points but did not connect them. Some lines were extremely inaccurate and many were drawn without any obvious points being plotted. Drawings in ink that were then adapted were difficult to credit.

Many candidates scored one mark for correctly finding the cost of the job from one of the plumbers. Candidates who drew the graph accurately in the previous part scored well here.

Many candidates were able to interpret the intersection point of their graphs although some misread the scale.

11 Again, candidates scored well in this question that was common to both Higher and Foundation Tier papers. Most candidates scored at least one mark for plotting two of the five points correctly.

Positive was the almost universal answer for the type of correlation which some also described as strong (or weak). A few candidates just wrote “strong” and failed to score.

Many candidates identified the point representing Guillaume’s results. Very few chose two or more points.

Candidates do need to practise accurate plotting of points instead of thick crosses or smudges.

# A502/02 Mathematics Unit B (Higher Tier)

### General Comments

The paper was generally accessible with most candidates scoring between 25 and 45 marks. There were a few who were able to obtain over 50 marks and thus the paper differentiated between the good students and the most able students. Most of the candidates seemed to have been well prepared for the exam and were able to make attempts at the majority of the questions on the paper although weaker candidates tended to leave out the problem solving questions that address Assessment Objective 3. It was noticeable that only the most able candidates were able to give solutions to the questions involving surds. There were a few candidates who would have benefited from entering the Foundation Tier rather than the Higher Tier paper as they struggled to score into double figures.

Generally, candidates were showing the working used to obtain their answers and so were able to obtain part marks for questions even when their answer was incorrect. The question relating to the quality of the candidates written communication showed the full range of quality and many candidates could have improved their solutions by giving all the relevant reasons. It was encouraging to see that those candidates who wrote reasons, normally did so with the correct spelling. Giving reasons also proved to be a problem in Q11 though it could be that 'tangents from a point' and 'alternate segment' are two of the less well-known circle theorems. Most candidates used rulers in questions 5 and 6.

Questions that were well answered include Q1 (fractions), Q2 (transformations), Q5 (scatter graphs) and Q6 (straight-line graphs). Candidates seem to be finding it easier to tackle questions posed in context that address Assessment Objective 2.

### Comments on Individual Questions

1 In part (a), many candidates found the smallest common denominator of 48 and successfully converted all four fractions. Most then put their fractions in the correct order and gained full marks. Those using a smaller denominator (such as 12 or 24) were often able to compare only two or three terms and so could not get a complete comparison. Some chose to use decimals to get the comparison but 3/16 and 5/24 were often wrongly evaluated. A few candidates used diagrams or unit fractions and these methods proved less reliable.

Those who used 48$^{th}$s in part (a) found part (b) the easier to handle; otherwise the addition of fractions and the correction of the error often proved difficult. Those using decimals, or a denominator that was not common to all the fractions, were usually unable to give a correct increase. Weaker candidates added the numerators and denominators of the fractions giving a total of 10/47.

2 Part (a) was attempted very well by many of the candidates. The main errors were rotating around the wrong centre, either (0, 0) or (1, 1), though these candidates often got the correct orientation of the triangle.

In part (b), the main error was reflecting in the wrong line. The most common incorrect mirror lines used were $x = -1$ or the $y$-axis.

In part (c) many candidates were familiar with negative scale factors and could give the centre correctly. Weaker candidates gave one or the other. Some rotated 180° and then enlarged by scale factor 2, thus using two transformations rather than just the one asked for by the question, though they did receive some credit for this.

3 Part (a) was answered well. The most common error seen was $x = 4$.

Part (b) proved more challenging with only the strongest candidates scoring all 3 marks. The most effective responses were to either substitute −1 and 5 into the inequality or to build the inequality from $-1 < x \leq 5$ step by step. An erroneous approach seen occasionally led to the answers $p = -4$ and $q = -1$ from solving $-1 < 2x + 7$ and $2x + 7 \leq 5$. Many candidates just 'described' the inequality shown giving 5 and −1 as answers.

4 Many correct answers were seen; weaker candidates could often earn the first two marks even if their division was inaccurate. Some candidates ignored the structure that was there and attempted a decimal long division; this was rarely successful.

5 This question was well answered by most candidates.

In part (a), plots were usually sufficiently accurate to score both marks and at least 1 mark was nearly always scored. Only the very weakest showed either no attempt to plot or reversed the axes.

In part (b), a ruled straight line was nearly always within tolerance.

Part (c) was well answered, with some qualifying positive with weak etc.

In part (d), nearly all were able to circle the point on their graph which was the greatest vertical distance above $y = x$.

6 This question was well answered by most candidates.

In part (a)(i), very few failed to give the correct value.

In part (ii), a few gave the value at 1 hour (90), but the vast majority were correct.

It was pleasing to notice that most candidates used a ruler in part (b) and most drew a correct line. There were some inaccuracies in plotting that led to the line straying out of tolerance at the upper end.

In part (c), very few failed to give A1 plumbing services as their answer and many were in range with the value. Those with inaccurate graphs were often out of range for this mark scoring one mark for reading off a correct value. Stronger candidates realised they could calculate the price difference from the given information, not having to rely on their graph being correct.

Part (d) was usually correct although it was sometimes uncertain whether candidates' answers referred to decimals of hours or minutes.

7 In part (a)(i), the mark for $4^3$ was often scored but this was frequently left as the answer even though the question asked for a whole number. A common misunderstanding was to divide the 4s and give an answer of $1^3$. Generally, the correct answer was given in part (a)(ii) but common errors were answers of 12 and 0. Only the strongest candidates scored full marks in part (a)(iii). Many candidates got some of the way getting $\frac{1}{8}$ or 16. Some got as far as $2^4$ but evaluated this as 32 or 64. Some correctly combined the indices to get $8^{\frac{1}{3}}$ but this was often left as the answer. Some read the fractional index as a fourth root of eight cubed rather than vice versa.

Many correctly substituted 5 for $x$ in part (b) and, although some made errors in the calculation, the answer 10 was often seen. Some candidates went on to spoil their answer by dividing by 5, presumably because they misunderstood $f(5)$ as $f$ multiplied by 5. A number of candidates left their answers in algebraic form or failed to fully evaluate their numerical expressions after substitution.

8 This question assessed 'Quality of Written Communication' and differentiated well across the ability range with many fully correct, well-reasoned solutions and even the weakest candidates able to earn some marks, provided they felt able to make a start.

The two main successful approaches were to evaluate the exterior angles of the two polygons and add, or to use the interior angles and the angle at a point property.

To earn full marks the solution had to be clear and reasons had to be given to support the calculations. When it comes to angles, candidates should be encouraged to indicate, by suitable labels on the diagram, the angle to which their calculation is relating. For example $\frac{360}{8} = 45$ could be relating to the angles at the centre of the octagon or to the exterior angles. The best candidates realised that a proof has to have reasons and stated, eg, 'angles round a point = 360°'.

In a 5 mark question like this, examiners will award the first couple of marks quite readily and candidates should be encouraged to make an attempt even if they cannot follow their method right through to the correct conclusion. Some candidates who knew the correct method were let down by poor arithmetic when working out either the interior or exterior angles. A few candidates mistook the octagon for a hexagon.

9 There were many fully correct solutions, and virtually all attempts were by the elimination method. Most candidates knew they needed to equalise coefficients and eliminate one of the unknowns but only the stronger candidates completed this successfully, struggling with the subtraction of negative $y$ values.
Some candidates correctly reached $14x = 21$ and then could not cope with the division, or started again presuming they had made a mistake. The best candidates expected to see fractional and/or negative solutions to simultaneous equations.

10 Surds proved to be one of the most challenging topics on this paper, with many candidates failing to score on these questions. The best solutions gave full simplifications but part credit was earned for partly simplified surds such as the common $\frac{12\sqrt{3}}{3}$ in part (b). A number of candidates attempted to use prime factors to simplify in part (a) but very often $80 = 2\times2\times2\times2\times5$ was seen with nothing further.

11 Few candidates scored full marks for this question.

The isosceles triangle, PQS, was usually recognised and $\angle$PQS given as 75°. However, a valid reason involving equal tangents was rarely given. ‘PQS is isosceles’ is not a sufficient reason.

Going on to find $\angle$QRS as 75° proved difficult and those who did give an answer of 75° rarely gave the alternate segment theorem as their reason. More often they quoted ‘alternate angles’ or ‘windsurfer angles’. However, examiners do recognise standard mathematical abbreviations such as ‘Alt Seg’.

Weaker candidates took triangle QRS as isosceles or PS as parallel to QR.

12 The vast majority of candidates preferred to attempt a geometric solution to this question rather than an algebraic one. Whilst a minority of candidates managed to obtain the correct vector for AD, there were many who scored a mark for correctly marking both B and C on the grid and a substantial number of these also scored a second mark for indicating D as being on the same horizontal level as A.

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