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Group IV

Mathematics

MATHEMATICS

Paper 0581/01

Paper 1

General comments

The Paper was generally well received by candidates and they were able to show a positive understanding of the mathematics covered in the syllabus. Candidates demonstrated good time management with the vast majority able to complete the Paper in the allotted time. The amount of working shown again was an improvement but there were still candidates who disadvantaged themselves by simply stating incorrect answers. Working was considered essential in **Questions 7**, **13 (b)**, **14**, **17 (b)**, **20 (b)**, and useful in **Questions 3**, **4**, **8**, **12 (b)**, **16**, **18**, and **19 (b)**. The rounding and accuracy of answers continues to cause problems for some candidates. Answers should be given to the degree of accuracy specified in the question or to three significant figures if not exact, or to one decimal place if answers are in degrees.

Comments on specific questions

Question 1

This was generally well answered although a common error was to round to $26.5.

Answer: $26.54.

Question 2

This was generally well answered although a significant error was to use base 10 giving rise to an answer of 87 minutes.

Answer: 47 minutes.

Question 3

Few candidates showed the intermediate working of (50653+2197)/50 = 52850/50 and a significant number of answers showed incorrect use of calculators or lack of knowledge of "cubed".

Answer: 1057.

Question 4

This was generally well done with 24/100 often seen in the working, although a small number of candidates were unable to write this fraction in its lowest terms. A few candidates gave the answer as a decimal.

Answer: 6/25.

Question 5

Generally well answered although common errors included the omission of –3, the inclusion of 3, and more surprisingly the omission of 0.

Answer: 3, -2, -1, 0, 1, 2.

Question 6

This proved to be a poorly answered question with many candidates unable to apply the correct geometric properties.

Answers: **(a)** 90°; **(b)** 126°.

Question 7

The majority of candidates were able to find 15% correctly although a small number failed to increas amount. A significant number appeared confused by the "3 months" and multiplied by 3 or 12 at some in their calculation.

Answer: $92.

Question 8

Although the majority of candidates correctly identified the required division the full range of errors was seen: addition, subtraction, multiplication and the incorrect division.

Answer: 11.3.

Question 9

Although generally well answered the scale in part **(a)** was often mis-read as –80 cm.

Answers: **(a)** – 20; **(b)** +80.

Question 10

Many candidates found the concept of "rotational symmetry" difficult with a lot of attempted 3D shapes, particularly a cube, drawn. Those who appeared to have the right idea found it difficult to draw or construct the figure accurately. A significant number omitted this question.

Answer: Diagram.

Question 11

This question was poorly answered with a lack of understanding of the difference between significant figures and decimal places. Common errors were 437.8 in part **(a)(i)** and 40.0 in part **(a)(ii)**. Part **(b)** was more successful with follow-through applied.

Answers: **(a)(i)** 43.8, **(ii)** 40; **(b)** 43.8 > 43.78 > 40.

Question 12

This was generally well answered although the two common errors in part **(b)** were to use 360° not 180° and to forget to divide by 2.

Answers: **(a)** isosceles; **(b)** 26°.

Question 13

(a) This involved numerical substitution into a given formula and was generally well answered.

(b) This involved algebraic rearrangement to make *n* the subject and was less successful. The correct division by 2 was often applied but the use of "square" as the inverse operation to "square root" was frequently not recognised, incorrectly applied or ignored. Common incorrect answers were $T^2/2$, $\sqrt{T}/2$, $\sqrt{(T/2)}$, and $2\sqrt{T}$. A small number attempted to use the values from part **(a)**.

Answers: **(a)** 10; **(b)** $T^2/4$ or $(T/2)^2$.

Question 14

Although the majority of candidates recognised the use of trigonometry in this question, a small number attempted the single use of Pythagoras or a numerical method, with a significant number omitting the entire question. A number were thrown by the use of "bearing" and either found the wrong angle or adjusted their answer in some way. Method marks could obviously be given if working was shown. A surprising number failed to give their answer correct to the nearest degree as asked for in the question.

Answer: 32°.

Question 15

This was generally well answered although common errors were $2^0 = 0$ and $2^3 = 6$ in part **(a)**. Par less successful with many candidates unable to compare the 2 previous answers.

Answers: **(a)** 1, 2, 4, 8, 16; **(b)** 0.102040816; **(c)** the same sequence (or equivalent).

Question 16

Few candidates appeared to use the symmetry of the given curve to answer the question. Those who made a table of values in the working space were able to draw more accurate graphs. Often however the graphs were poorly drawn with straight lines , "thick" curves , and plotted points ignored. Many candidates did not understand the terminology used in the second part of the question.

Answer: Graph.

Question 17

This was generally well answered although a number of candidates failed to give the answer to part **(b)** to the requested degree of accuracy.

Answers: **(a)** 200; **(b)** 693.

Question 18

This was generally well answered although a number of candidates transposed their answers indicating the use of an incorrect method to each part. A common error in part **(a)** was in not putting the given values in rank order and simply giving 144 as the answer.

Answers: **(a)** 173; **(b)** 183.

Question 19

This algebra question was generally well answered.

(a) A common error was to factorise the expression only partially.

(b)(ii) The equation was less well answered although the correct method was usually seen when working was shown. The problems were caused by the negatives involved in the solution, often resulting in incorrect answers of –7, 7/5, 1/7, and –3.

Answers: **(a)** $8 (5a - b + 4c)$; **(b)(i)** 16, **(ii)** 7.

Question 20

This question met with a very variable response.

(a) This was generally answered well although the point *A* (0,2) was sometimes plotted at (2,0) and similarly the point *D* (-2,-1) at (-2,1) or (-1,-2).

(b) A number of candidates incorrectly assumed the quadrilateral *ABCD* was a trapezium and were then unable to find the area correctly. A number were able to split the shape internally into triangles and then find the area but few appreciated that the area could be found by forming a rectangle and then subtracting 3 triangles.

(c) This was more successful although omitted by a significant number.

Answers: **(a)** Diagram; **(b)** 8; **(c)** $x = 2$, $y = -1$.

Paper 0581/02

Paper 2

General comments

The level of the Paper was such that most candidates were able to demonstrate their knowledge and ability. There were very few candidates scoring under 10 marks but concern was expressed at the continuing number of candidates who are entered at the wrong level and who clearly should have taken the Core Paper. The Paper was sufficiently challenging for the more able with a limited number scoring over 65 marks. There was no evidence at all that candidates were short of time. The general level of performance showed a slight improvement on the very good standard attained last year. Some Examiners were reporting that there seemed to be an improvement in the amount of working shown; however, this is by no means a general improvement on last year. Other general problems, encountered in the marking, were mostly algebraic or in misquoted formulae.

Comments on specific questions

Question 1

Generally well answered but 1° was a common error in part **(a)**.

Answers: **(a)** 4°; **(b)** 4.5°.

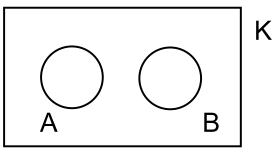
Question 2

Reasonably well answered but a substantial number of candidates used 46 as the denominator instead of 62.

Answer: 25.8%.

Question 3

Candidates did not cope well with this question. Many seemed unable to interpret all the information supplied. Three diagrams were quite common and only the empty set symbol seemed to be fully understood.



Question 4

This was generally well answered but many candidates multiplied the given numbers. Large numbers did not notice the accuracy required for the answer.

Answer: 512.82.

Question 5

Generally most candidates did attempt to change all the quantities into decimals but 0.11% seemed to confuse many candidates.

Answers: 1/1000, 0.11%, 0.0108, 11/1000.

Question 6

Most candidates knew how to do this question but were unable to handle the algebra involved. more able candidates were able to achieve a correct solution. Some candidates tried to convert the qu into an equation.

Answer: $\frac{-2x^2}{5-x}$.

Question 7

This question was badly answered even by the more able candidates. Most answers seemed to have been obtained from a calculator rather than from index work and were not *exact*.

Answers: **(a)** $\frac{1}{9}$; **(b)** $1\frac{1}{3}$.

Question 8

This topic continues to be a source of difficulty for most candidates. There were very few correct answers to this question. Most candidates knew how to calculate a time from the data given but very few were able to find or use the correct limits.

Answer: 100.

Question 9

This was generally not understood, with many candidates giving a parallelogram or a rhombus. Some candidates missed the word quadrilateral and drew other shapes. Most were able to name the shape that they had drawn.

Answer: Rectangle.

Question 10

This question was generally very well answered with many candidates scoring all three marks. There was some confusion between the averages and 7, 8 was a common error for the median with candidates not knowing what to do with the two central values.

Answers: **(a)** 8; **(b)** 7.5; **(c)** 6.5.

Question 11

This question was well answered by nearly half of the candidates although very few candidates managed to find the circumference, write the answer in standard form and correct it to 2 significant figures. The use of the *area* of a circle was the most common incorrect method.

Answer: 4.0×10^7.

Question 12

Most candidates were able to answer part **(a)** but only about half of these were able to complete the question because they did not recognise the shape as a hexagon, or else assumed that the total internal angle was either 360° or 540°.

Answers: **(a)** 71°; **(b)** 168°.

Question 13

Part **(a)** was very well done but **(b)** was not so well done as many of the candidates decided to, in[...] use equations of motion instead of area under the graph. Quite a large number of candidates misre[...] scale as either 3 or 4 instead of 3.5 at the start of the deceleration phase.

Answers: **(a)** 1.6; **(b)** 19.

Question 14

Responses to this question varied considerably between Centres but were usually incorrect. Generally there were very few completely correct solutions. Some candidates assumed that angle *QRS* was a right angle and others assumed that *X* was the centre of the circle.

Answers: **(a)** 80°; **(b)** 67°; **(c)** 12°.

Question 15

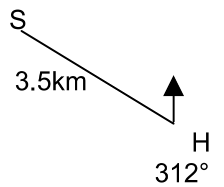
One of the best answered questions on the Paper. Almost all of the candidates knew what to do but many of them failed to carry out the operation correctly, usually due to directed number problems. There were large numbers of completely correct solutions and a wide variety of methods.

Answers: $x = \frac{1}{4}$, $y = -\frac{1}{5}$.

Question 16

Most candidates had the general idea of what was required but were unable to draw sketches that were useful in **(b)** due to a failure to interpret the 312° angle correctly. Most candidates then incorrectly used 48° instead of 42° for their following calculations in the trigonometry.

Answers: **(a)**

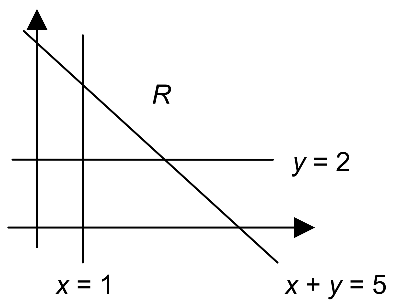


(b) 2.34.

Question 17

This was generally well answered with very few candidates confusing $x = 1$ and $y = 2$ with $y = 1$ and $x = 2$. However, only the most able were able to identify the correct region. It was very common to see no label for the region or else the small triangle labelled as *R*.

Answer:



Question 18

Generally the arc was correctly drawn but less than a quarter of the candidates were able to construct the second locus and shade the region correctly. Many candidates drew an arc for the second locus.

Answers: arc radius 5 cm, perpendicular bisector of line *GH*. Region required is below the bisector and to the left of the arc.

Question 19

Most candidates treated this question as an equation and large numbers reached 4.91 but almos without any inequality being present. This made the second part impossible. Those candidates try clear all the denominators generally made more mistakes than those collecting like terms.

Answers: **(a)** $x < 4.91$; **(b)** 1, 2, 3, 4.

Question 20

All but the least able candidates scored well on this question although many had difficulty in reaching the simplest form in **(b)**.

Answers: **(a)** $\frac{x+1}{2}$; **(b)** $4x^2 - 4x$.

Question 21

Many candidates seemed not to understand this topic at all and the working was often meaningless. Those that did know what they were doing made frequent sign errors in both **(a)** and **(b)**, particularly in the determinant. A large number of able candidates were using the much longer simultaneous equation method than the adjoint matrix approach.

Answers: **(a)** $\begin{pmatrix} -2 & 1 \\ -1 & -1 \end{pmatrix}$; **(b)** $\frac{1}{3}\begin{pmatrix} 1 & 1 \\ -1 & 2 \end{pmatrix}$.

Question 22

Part **(a)** was very well done but most candidates chose to use the cosine rule in **(b)** rather than recognising that triangle ORM was isosceles. The cosine rule was generally badly quoted, incorrectly substituted into or incorrectly manipulated. Less than a quarter of the candidates reached anywhere near a correct solution.

Answers: **(a)** 5; **(b)** 133°.

Paper 0581/03

Paper 3

General comments

The overall performance of the candidates was reasonably encouraging, with most questions being attempted by most candidates. The syllabus had been well covered in most Centres.

In general, there was good evidence of working being shown. However, a few candidates failed to show any working, which probably led to a number of marks being lost. There was an increase in the number of candidates giving answers to only two significant figures and this did mean marks lost.

There were adequate marks available for the weaker candidates to show positive achievement, while there were sufficient more demanding questions to differentiate between the higher-grade candidates. Time did not appear to have been a problem as there was little evidence of candidates not finishing the Paper.

Comments on specific questions

Question 1

(a) The first two parts were poorly answered, with much confusion between dividing and multiplying 10 and 100. In part **(iii)**, 470 and 490 were very common incorrect answers. Part **(iv)** was answered more successfully by most candidates.

(b) Part **(i)** was usually correctly answered by the majority of candidates but in part **(ii)** the vast majority gave an incorrect answer of 3.5. Some candidates attempted to calculate the volumes in both parts instead of estimating.

Answers: **(a)(i)** 750 ml, **(ii)** 0.75 l, **(iii)** 475 g $\leqslant$ mass < 485 g, **(iv)** 0.48 kg; **(b)(i)** 400 (±20) ml, **(ii)** any value in range 2.5 $\leqslant$ volume < 3.5.

Question 2

(a) Completing the table and displaying the information on the pie chart proved to be easy for nearly all of the candidates. Part **(ii)** was usually corrected answered, though a few candidates gave an answer of 9/25.

(b) This part was more demanding and 0.45 – 0.35 = 0.1 was often seen. A few candidates demonstrated their lack of understanding of probability by giving answers greater than 1.

Answers: **(a)(i)** W8 L13 D3; 120, 195, 45; 3 sectors drawn (±2°); correct labels, **(ii)** $\frac{1}{3}$; **(b)** 0.2.

Question 3

(a) This part was usually well answered, though a number of candidates lost marks by working to only two significant figures.

(b) $\pi \times 10^2$, $2 \times \pi \times 10$ and $\pi \times (LN)^2$ were common errors in part **(i)**. Most understood how to calculate percentages and ‘follow through’ marks were awarded extensively in part **(ii)**. Part **(iii)** was rarely answered correctly, with the word ‘tangent’ often appearing.

Answers: **(a)(i)** 4.69, **(ii)** 8.83, **(iii)** 20.7; **(b)(i)** 78.5 to 78.6, **(ii)** 26.3 to 26.4, **(iii)** Angle in a semicircle = 90°.

Question 4

(a) While most candidates knew the terms ‘reflection’ and ‘rotation’, they often were unable to complete the description of the transformation.

(b) This part was badly answered. Many translations did not produce identical shapes and some confused the directions of the vector components. In the enlargement, most attempted a scale factor of $1\frac{1}{2}$ or $-\frac{1}{2}$ instead of $\frac{1}{2}$. Of those who drew a scale factor of $\frac{1}{2}$, some failed to centre it at the origin.

Answers: **(a)(i)** Reflection in *x* axis, **(ii)** Rotation of 90° about *O*; **(b)(i)** Correct translation (±1 small square), **(ii)** Correct enlargement (±1 small square).

Question 5

(a) There was some confusion between volume and surface area of a cuboid but many managed part **(i)** correctly. However, the surface area was badly answered, with a fairly common incorrect answer from using four equal sides of 4 x 6 (or 3 x 6).

(b) Part **(i)** was well answered, though a few failed to realise that the prism was half of the cuboid. Part **(ii)** was badly answered, however, with many candidates failing to find the length of *AF*.

Answers: **(a)(i)** 72 cm³; **(ii)** 108 cm²; **(b)(i)** 36 cm³; **(ii)** 30cm².

Question 6

This proved to be a difficult question and produced many incorrect answers. Part **(a)** was usually g $\frac{1}{2}$ followed by an answer of $\frac{1}{3}$ in part **(b)(i)**. Many realised that in part **(b)(ii)** the two previous ans needed adding and picked up a method mark. However, a very large number of these candidates calculated $\frac{1}{2} + \frac{1}{3}$ to be equal to $\frac{2}{5}$. Part **(c)** proved to be too difficult for most candidates, with 10 20 being a common incorrect answer.

Answers: **(a)** $\frac{1}{4}$; **(b)(i)** $\frac{1}{6}$, **(ii)** $\frac{5}{12}$; **(c)** 10 40.

Question 7

(a) This was well answered and only a few failed to draw a straight line.

(b) Many failed to realise that the point of intersection on the graph represented the solution of the simultaneous equations. There were many attempts at calculation in this part.

(c) Those familiar with the substitution method were the most successful in this part. The majority attempted the elimination method but often made sign errors in the re-arrangement of the second equation. This was another part in which marks were lost by giving answers to two significant answers only. A considerable number of candidates failed to realise that there was any connection between the answers to parts **(b)** and **(c)**.

Answers: **(a)(i)** –1, 5, **(ii)** Correct straight line, complete for $0 \leqslant x \leqslant 2$; **(b)** x = 1.4 to 1.7; y = 3.5 to 3.8; **(c)** x = 1.55 to 1.56; y = 3.66 to 3.68.

Question 8

(a) Nearly all candidates answered this part correctly.

(b) A common error was that the arcs failed to cover the island. *T* was usually correctly marked.

(c) Again, many candidates failed to cover the island with their arc.

(d) This was well answered, with correct constructions, though a few failed to show the point *X* inside the correct region.

Answers: **(a)** 237 (±6) km; **(b)(i)** Arc of circle, centre *A*, radius 5 cm, **(ii)** arc of circle, centre *B*, radius 5 cm; (arcs must be complete within island); *T* labelled at intersection of arcs; **(c)** Arc of circle, centre *T*, radius 5 cm; **(d)** *X* labelled in correct position, dependent on 3 arcs, radii 4 cm, centre *C*, *D*, *E* or 2 perpendicular bisectors seen.

Question 9

(a) This part was well answered, with most candidates scoring full marks. A few candidates failed to identify correctly the mid-way numbers on the graph for the prices of 40 and 80 cents.

(b) This part was not well answered. There was a lack of understanding of ‘profit’, while some mixed dollars and cents to produce 3500 – 20. Division rather than subtraction was often seen in part **(i)**. In part **(ii)**, most candidates gave an answer of 40 or 50 cents, without realising that 45 cents would give a greater profit.

Answers: **(a)(i)** 90 cents, **(ii)** 30 cents, **(iii)** 150, 125, 100, 50, 0; 4500, 5000, 5000, 3500, 2000, 0; **(b)(i)** \$15, **(ii)** 45 cents.

Question 10

(a) This part was generally well answered, though some candidates failed to give 2 and 1 semi-prime 34.

(b) Few could find the smallest semi-prime and evidence of experimentation was rarely seen.

(c)(d) Many candidates did not understand the word 'consecutive' and few scored marks on these two parts. As in part **(b)**, many lost method marks by not showing any working.

Answers: **(a)** 3, 11; 2, 17; 5, 7 seen; **(b)** 6; **(c)** 14, 15; **(d)** 85, 86, 87.

Question 11

There was a clear division between the numerical parts **(a)**, **(b)** and **(d)** and the algebraic part **(c)**. Most candidates answered the first two parts correctly. Translating into algebraic formula for part **(c)** defeated most of the candidates. Answers containing *n*, *x* and/or *y* were often seen or the part was not attempted. Many recovered, though, to give the correct answer for part **(d)**.

Answers: **(a)** 6, 8 12; 5, 7, 11; 17, 23, 35; **(b)** 20, 19, 59; **(c)(i)** $2L$, **(ii)** $2L - 1$, **(iii)** $6L - 1$; **(d)** 14.

Paper 0581/04

Paper 4

General comments

There was as usual a complete range of marks seen on this Paper from the maximum of 130 right down to 0. Those scoring very low marks would surely have been able to achieve more on the Core Paper. Most candidates do show their working but there are still those who offer only their answers. There are many marks for correct method which a wrong answer with no working cannot earn. Accuracy proved a source of mark loss for those who did not comply with specific requests within a question. Others who worked with too little accuracy within a calculation could not expect to achieve enough accuracy in their answer.

Overall the Paper seemed to be slightly easier for candidates this year - probably because most do well drawing graphs which was not required in November 2001. Almost everyone appeared to have enough time to attempt all the questions and only the very weakest were unable to find some topic where they could demonstrate their ability.

Comments on specific questions

Question 1

24 hour clock times were not always understood. Some inevitably thought there were 100 minutes in an hour, producing a starting time for the race of either 14 84 or 15 24, i.e. seven minutes after the race finished! Ben's speed was sometimes left in the wrong units and again 33 minutes was occasionally thought to be 0.33 hours or 0.5 hours. A variety of correct answers were acceptable for the winner's time, as no specific accuracy or time unit had been requested in the question. However the units had to be stated and the accuracy correct. Thus an answer given in minutes correct to two decimal places had to be 32.15 minutes.

Very few had any problem finding the distance for Otto. However many went on to use the same method for the length of Mona's jump which did not work. The winning 6.16 m had to be treated as 110%, not as 100% or 90%.

Answers: **(a)(i)** 14 44, **(ii)** 18.2 km/h, **(iii)** 32 min 8.8 sec; **(b)** 76 m; **(c)** 5.6 m.

Question 2

As the answer for *BE* was given, the $6^2 + 5^2$ which produced it had to be explicit. The length of *DB* more trouble than expected with suggestions of 8 or 11 or $\sqrt{89}$ appearing. The explanation *DA* = $\sqrt{89}$ had to contain two parts - an appreciation that *DA* = *AF*, however worded, and the Pythagoras formula for *AF* with $8^2 + 5^2$ seen.

Most knew to use the Cosine Rule to find angle *DBA* and method marks were available for those starting with their own wrong lengths for *DA* or *DB*. The easiest way to find the triangle area was to use $\frac{1}{2}$. *DB*.*BA*.sin $\angle DBA$ but *any* correct method was acceptable. Full marks were available for adding 59 cm^2 correctly to the candidate's triangle *DBA* area to find the surface area of the solid. The volume formula had to contain the product of the dimensions 8 cm, 6 cm and 5 cm to be correct.

Answers: **(a)(ii)** *DB* = $\sqrt{61}$ o.e.; **(b)** 62.5° to 62.6°; **(c)** 34.6 cm^2 to 34.7 cm^2; **(d)** 93.6 cm^2 to 93.7 cm^2; **(e)** 40 cm^3.

Question 3

Almost everyone managed to use the correct scale and copy EXAM in the correct position. Partial credit was given to those who reflected E correctly in the wrong axis, mispositioned a correct sized X or M, or rotated A by 90° in the wrong direction. Common errors with the vectors included reversing the *x* and *y* components or ignoring the point *P* and using the origin instead. Some of those who knew that the vector magnitude was $\sqrt{13}$ did not give their answer to 2 decimal places as the question demanded. Many of those with *Q* and *S* correct placed their *R* so that the parallelogram was *PQSR* rather than *PQRS*.

Answers: **(b)(i)** E reversed with corners at (–4, 2), (–2, 2), (–2, 4) and (–4, 4), **(ii)** X with corners at (0,0), (6,0), (0, –6) and (6, –6), **(iii)** A with corners at (–2, 6), (–4, 7) and (–2, 8), **(iv)** M with corners at (8, 4), (8, 8), (9, 6), (10, 8) and (10, 4); **(c)(i)** *Q* at (3, 8), **(ii)** 3.61, **(iii)** *S* at (2 ,5), **(iv)** *R* at (–1 , 7).

Question 4

The first two probabilities rarely caused any problem but the next two proved surprisingly difficult. The candidate who looked at the diagram and saw that 1, 2, 3 and 4 were shaded with 6, 8 and 10 unshaded but even, making 7 of the sectors suitable for part **(iii)** was correct. Those who, without thought of any overlap, simply added 4 shaded sectors to 5 even numbers were wrong. Only the numbers 1 and 3 were odd and shaded to satisfy part **(iv)**.

When the wheel was spun twice, those who added rather than multiplied the probabilities could not score. Many correctly squared 0.4 for the probability that both sectors were shaded. Far fewer knew to double their probability for the first sector shaded and the second one not shaded and thus lost a mark.

Those who had the right idea that it was impossible to have a sum greater than 20 but failed to give a numerical answer earned one of the two marks. The combinations (1, 1), (1, 2) and (2, 1) were the only 3 of the 100 which produced a sum less than 4. The combinations producing a square product included (2, 8), (1, 4), (1, 9) and (4, 9) and their reverses as well as the obvious ten (1, 1), (2, 2) etc. Partial credit was available when correct but incomplete method was shown.

Answers: **(a)(i)** 0.5, **(ii)** 0.4, **(iii)** 0.7, **(iv)** 0.2; **(b)(i)** 0.16, **(ii)** 0.48, **(iii)** 0, **(iv)** 0.03, **(v)** 0.18.

Question 5

Most candidates scored well on this question. The values of *l*, *m* and *n* rarely caused a problem. T[illegible] was usually correct but the plotting of points caused some problems with the *y*-values where 0.4 mm [illegible] than 0.2 mm represented one unit. Not everyone understood how to draw a tangent, with chords or vertical lines being the usual errors. Those who had a tangent usually knew how to use the change in *y* ÷ change in *x* to find the gradient but a sizeable number lost the necessary negative sign. The required straight line sometimes went through (6, 31) instead of (6, 32). The line equation was usually correct or omitted. The *x*-values for the intersection points needed to be stated explicitly rather than given in coordinate form to score full marks here. The parallel tangent should touch the curve somewhere near $x = 2.5$. Again some drew chords and others confused "parallel" with "perpendicular".

Answers: **(a)** $l = 14.2$, $m = 17.5$, $n = 21.4$; **(c)** gradient of correct tangent between –7 and –15; **(d)(ii)** $y = 2x + 20$, **(iii)** $x = 1.05$ to 1.1 and $x = 5.5$, **(v)** $y = 2x + 5$ or similar.

Question 6

Most found at least some part of this question which they could answer. Common errors for the original ages were $5x$ and x^2. The two year difference between the first two parts was not always noticed, or else the original ages were sometimes multiplied by 2 instead of increased by 2. The initial equation for part **(a)(iii)** had to be $(x + 2)(2x + 2) = (x + 5)^2$ in order to proceed to earn full marks but credit was available for a correct bracket expansion. Careful "fiddling" of wrong work to produce the quoted answer did not earn anything! The quickest way to solve the equation in *x* was to factorise, but any correct method was acceptable. Most knew the quadratic formula or how to complete the square to solve the quadratic in *h*. Sign errors or premature approximation in the working were the main sources of mark loss. Claude's height, when given in metres, had to be correct to 2 decimal places.

Answers: **(a)(i)** $x + 5$, $2x$, **(ii)** $x + 2$, $x + 7$, $2x + 2$, **(iv)** $x = 7$ or $x = –3$, **(v)** 16 years old; **(b)(i)** $h = 1.74$ or $– 9.74$, **(ii)** 174 cm.

Question 7

Only the final part of this question presented any problem and most candidates earned high marks. Many were able to find the correct number of students and knew how to use the ratios correctly. The quickest method was usually to equate one student with 3° at the beginning. One error was to use the given ratio on the total number of students rather than for those who did not get grade A. The histogram presented a far greater problem. Those who simply compared heights and thought the missing values were therefore 40, 20 and 10 earned no marks. Most of those who had the right answers had found that the area of one small square represented 1.25 children and then had the simple task of multiplying 16, 8 and 12 by 1.25 for the correct answers.

Answers: **(a)(i)** 120, **(ii)** 84, **(iii)** 28, 35, 21, **(iv)** 84°, 105°, 63°, **(v)** 9:7; **(b)** $p = 20$, $q = 10$, $r = 15$.

Question 8

This was one of the least well answered questions on the Paper. Omission of brackets caused marks to be lost for the volumes of *A* and *C* because $3r^2$ is not the same as $(3r)^2$. The ratio had to be numerical only to score but partial credit was available for those who followed through correctly from their previous error. A surprising number of candidates thought *A* rather than *C* was similar to the standard pot. Any explanation of *C* being similar to the standard pot was acceptable provided it showed an understanding that the ratio of heights **and** radii was the same. Many who did this and knew that the scale factor was 3 either forgot to square it for the area scale or else squared the *S*. The area to be painted often either lacked the base or included a top, despite the hint in the question. Many thought a factor of 100 or 1000 rather than 10 000 would make the m^2 and cm^2 compatible. Frequently answers to the effect that the tin of paint would cover one pot or less caused no surprise and did not prompt a check on the working. The final mark was earned by rounding 115.7 .. **down** for the number of pots which could be painted completely.

Answers: **(a)(i)** $9\pi r^2h$ cm^3, $3\pi r^2h$ cm^3, $27\pi r^2h$ cm^3 or equivalent, **(ii)** 3 : 1: 9, **(iii)** C, **(iv)** $9S$ cm^2; **(b)(i)** 2590 cm^2, **(ii)** 115 pots.

Question 9

Those who knew what was meant by the n^{th} term found this very straightforward. Unfortunately candidates think that an expression for the n^{th} term means some sort of expression for how to find the term from the previous one. Thus in the sequences 1, 2, 3, 4, 5 ... and 7, 8, 9, 10, 11 ... the n^{th} terms were thought to be $n + 1$. Because the difference between the terms was 2 in the third sequence, the n^{th} term was thought to be $n + 2$. Most candidates were at least correct with the numerical answers. Those who attempted the final n^{th} term often omitted vital brackets so that instead of $n(2n + 6 – (n + 6))$, the expression $n(2n + 6 – n + 6)$ became $n(n + 12)$.

Answers: **(a)(i)** 10 and n, **(ii)** 16 and $n + 6$, **(iii)** 26 and $2n + 6$; **(b)(i)** 5(16 – 11), 10(26 – 16), **(ii)** n^2.

Papers 0581/05 and 0581/06

Coursework

General comments

Few Centres chose to submit coursework for this session and therefore the comments below are drawn from a relatively small sample of work. No Centre submitted coursework at the Core Level.

A variety of tasks were seen, most giving adequate scope for candidates to demonstrate their understanding and knowledge of particular topics. Many candidates took advantage of the mathematical richness of their task and developed the work beyond the plan they had initially thought of. Careful description as this extension work progressed, together with clear analysis and consideration of limitations brought high marks.

As in previous years the use of computers has aided candidates in the analysis of data. Whilst this is to be encouraged, it should be noted that high marks cannot be awarded unless the candidate demonstrates an understanding of what he or she has presented. For example, graphical representation of a set of data, whether computer drawn or not, will attract high marks if the candidate explains why a particular type of graph has been chosen and the subsequent analysis enables the candidate to make further progress in the task.

The quality of work seen was of a comparable standard to that submitted in previous years.