Paper Reference(s)

6664/01

Edexcel GCE

Core Mathematics C2

Silver Level S2

Time: 1 hour 30 minutes

Materials required for examination	Items included with question papers
Mathematical Formulae (Green)	Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulas stored in them.

Instructions to Candidates

Write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Core Mathematics C2), the paper reference (6664), your surname, initials and signature.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
There are 10 questions in this question paper. The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner.
Answers without working may gain no credit.

Suggested grade boundaries for this paper:

A*	A	B	C	D	E
71	64	57	51	44	38

1.

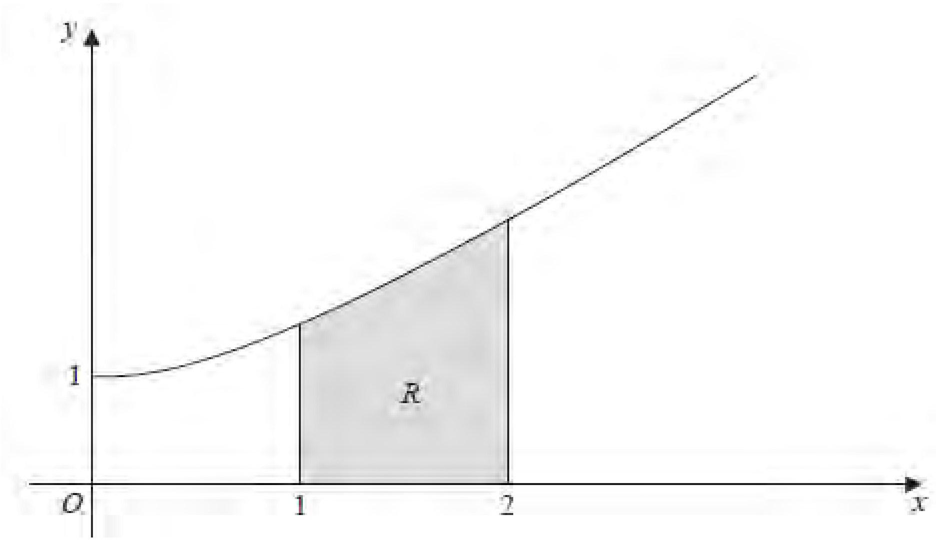

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \sqrt{(x^2 + 1)}$, $x \geq 0$.

The finite region R, shown shaded in Figure 1, is bounded by the curve, the x-axis and the lines $x = 1$ and $x = 2$.

The table below shows corresponding values for x and y for $y = \sqrt{(x^2 + 1)}$.

x	1	1.25	1.5	1.75	2
y	1.414		1.803	2.016	2.236

(*a*) Complete the table above, giving the missing value of y to 3 decimal places.

(1)

(*b*) Use the trapezium rule, with all the values of y in the completed table, to find an approximate value for the area of R, giving your answer to 2 decimal places.

(4)

May 2014

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2. $$f(x) = 3x^3 - 5x^2 - 16x + 12.$$

(*a*) Find the remainder when $f(x)$ is divided by $(x - 2)$.

(2)

Given that $(x + 2)$ is a factor of $f(x)$,

(*b*) factorise $f(x)$ completely.

(4)

May 2007

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3. The second and fifth terms of a geometric series are 750 and –6 respectively.

Find

(*a*) the common ratio of the series,

(3)

(*b*) the first term of the series,

(2)

(*c*) the sum to infinity of the series.

(2)

January 2011

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4. Find, giving your answer to 3 significant figures where appropriate, the value of *x* for which

(*a*) $5^x = 10$,

(2)

(*b*) $\log_3 (x - 2) = -1$.

(2)

May 2011

5.

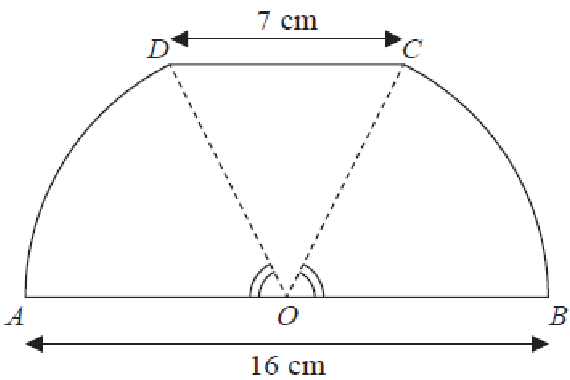

Figure 2

Figure 2 shows a sketch of a design for a scraper blade. The blade *AOBCDA* consists of an isosceles triangle *COD* joined along its equal sides to sectors *OBC* and *ODA* of a circle with centre *O* and radius 8 cm. Angles *AOD* and *BOC* are equal. *AOB* is a straight line and is parallel to the line *DC*. *DC* has length 7 cm.

(*a*) Show that the angle *COD* is 0.906 radians, correct to 3 significant figures.

(2)

(*b*) Find the perimeter of *AOBCDA*, giving your answer to 3 significant figures.

(3)

(*c*) Find the area of *AOBCDA*, giving your answer to 3 significant figures.

(3)

May 2015

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6. The circle C has equation

$$x^2 + y^2 - 20x - 24y + 195 = 0.$$

The centre of C is at the point M.

(*a*) Find

(i) the coordinates of the point M,

(ii) the radius of the circle C.

(5)

N is the point with coordinates (25, 32).

(*b*) Find the length of the line MN.

(2)

The tangent to C at a point P on the circle passes through point N.

(*c*) Find the length of the line NP.

(2)

January 2013

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7. (*a*) Find

$$\int 10x(x^{\frac{1}{2}} - 2) \ \ \mathrm{d}x,$$

giving each term in its simplest form.

(4)

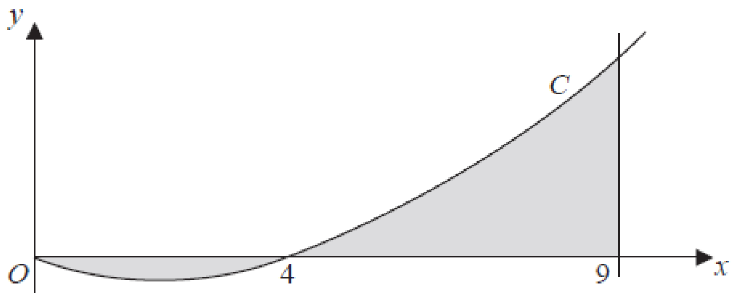

Figure 3

Figure 3 shows a sketch of part of the curve C with equation

$$y = 10x(x^{\frac{1}{2}} - 2), \qquad x \geq 0.$$

The curve C starts at the origin and crosses the x-axis at the point (4, 0).

The area, shown shaded in Figure 3, consists of two finite regions and is bounded by the curve C, the x-axis and the line $x = 9$.

(*b*) Use your answer from part (*a*) to find the total area of the shaded regions.

(5)

May 2015

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8. (i) Solve, for $0 \leq \theta < 180°$, the equation

$$\frac{\sin 2\theta}{(4\sin 2\theta - 1)} = 1$$

giving your answers to 1 decimal place.

(3)

(ii) Solve, for $0 \leq x < 2\pi$, the equation

$$5\sin^2 x - 2\cos x - 5 = 0$$

giving your answers to 2 decimal places.
(*Solutions based entirely on graphical or numerical methods are not acceptable.*)

(5)

May 2014 (R)

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9. The curve C has equation $y = 12\sqrt{(x)} - x^{\frac{3}{2}} - 10, \ x > 0$.

(a) Use calculus to find the coordinates of the turning point on C.

(7)

(b) Find $\dfrac{d^2y}{dx^2}$.

(2)

(c) State the nature of the turning point.

(1)

January 2010

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10. The circle C, with centre A, passes through the point P with coordinates (–9, 8) and the point Q with coordinates (15, –10).

Given that PQ is a diameter of the circle C,

(a) find the coordinates of A,

(2)

(b) find an equation for C.

(3)

A point R also lies on the circle C.
Given that the length of the chord PR is 20 units,

(c) find the length of the shortest distance from A to the chord PR.
Give your answer as a surd in its simplest form.

(2)

(d) Find the size of the angle ARQ, giving your answer to the nearest 0.1 of a degree.

(2)

May 2014 (R)

TOTAL FOR PAPER: 75 MARKS

END

Question number	Scheme	Marks
1 (a)	x: 1, 1.25, 1.5, 1.75, 2; y: 1.414, **1.601**, 1.803, 2.016, 2.236 $\{\text{At } x = 1.25,\}\ y = 1.601$ (only)	B1 cao **(1)**
(b)	$\frac{1}{2} \times 0.25; \times \{1.414 + 2.236 + 2(\text{their } 1.601 + 1.803 + 2.016)\}$ $\{= \frac{1}{8}(14.49)\} = 1.81125$ 1.81 or awrt 1.81	B1; M1 A1ft A1 **(4)** **[5]**
2 (a)	f(2) = 24 – 20 – 32 + 12 = –16 (M: Attempt f(2) or f(–2)) (If continues to say 'remainder = 16', isw) Answer must be seen in part (a), not part (b).	M1 A1 **(2)**
(b)	$(x + 2)(3x^2 - 11x + 6)$ $(x + 2)(3x - 2)(x - 3)$ (If continues to 'solve an equation', isw)	M1 A1 M1 A1 **(4)** **[6]**
3 (a)	$ar = 750$ and $ar^4 = -6$ (could be implied from later working in either (a) or (b)). $r^3 = \frac{-6}{750}$ $r = -\frac{1}{5}$ Correct answer from no working, except for special case below gains all three marks.	B1 M1 A1 **(3)**
(b)	$a(-0.2) = 750$ $a \left\{= \frac{750}{-0.2}\right\} = -3750$	M1 A1 ft **(2)**
(c)	Applies $\frac{a}{1-r}$ correctly using both their a and their $\lvert r \rvert < 1$. Eg. $\frac{-3750}{1--0.2}$ So, $S_\infty = -3125$	M1 A1 **(2)** **[7]**

Question number	Scheme	Marks
4 (a)	$5^x = 10$ and (b) $\log_3(x-2) = -1$	
	$x = \frac{\log 10}{\log 5}$ or $x = \log_5 10$	M1
	$x\{= 1.430676558...\} = 1.43$ (3 sf) 1.43	A1 cao
		(2)
(b)	$(x-2) = 3^{-1}$ $(x-2) = 3^{-1}$ or $\frac{1}{3}$	M1 oe
	$x\left\{= \frac{1}{3} + 2\right\} = 2\frac{1}{3}$ $2\frac{1}{3}$ or $\frac{7}{3}$ or $2.\dot{3}$ or awrt 2.33	A1
		(2)
		[4]
5 (a)	In triangle *OCD* **complete method** used to find angle *COD* so:	
	Either $\cos C\hat{O}D = \frac{8^2 + 8^2 - 7^2}{2 \times 8 \times 8}$ or uses $\angle COD = 2 \times \arcsin \frac{3.5}{8}$ oe **so** $\angle COD =$	M1
	($\angle COD = 0.9056(331894)$) $= 0.906$ (3sf) * accept awrt 0.906	A1 *
		(2)
(b)	Uses $s = 8\theta$ for any θ in radians or $\frac{\theta}{360} \times 2\pi \times 8$ for any θ in degrees	M1
	$\theta = \frac{\pi - "COD"}{2}$ $(= awrt\ 1.12)$ or $2\theta(= awrt\ 2.24)$ and Perimeter = 23+(16 $\times\theta$)	M1
	accept awrt 40.9 (cm)	A1
		(3)
(c)	Either Way 1: (Use of Area of two sectors + area of triangle)	
	Area of triangle = $\frac{1}{2} \times 8 \times 8 \times \sin 0.906$ (or 25.1781155 accept awrt 25.2)or $\frac{1}{2} \times 8 \times 7 \times \sin 1.118$ or $\frac{1}{2} \times 7 \times h$ after *h* calculated from correct Pythagoras or trig.	M1
	Area of sector = $\frac{1}{2} 8^2 \times "1.117979732"$ (or 35.77535142 accept awrt 35.8)	M1
	Total Area = Area of two sectors + area of triangle =awrt 96.7 or 96.8 or 96.9 (cm^2)	A1
		(3)
		[8]

Question number	Scheme		Marks
6 (a)(i)	The centre is at (10, 12)	B1: $x = 10$	B1 B1
(ii)	Uses $(x-10)^2+(y-12)^2=-195+100+144 \Rightarrow r=...$ Completes the square for both x and y in an attempt to find r. $(x\pm"10")^2\pm a$ and $(y\pm"12")^2\pm b$ and $+195=0,(a,b\neq 0)$ Allow errors in obtaining their r^2 but must find square root		M1
	$r=\sqrt{10^2+12^2-195}$	A correct numerical expression for r including the square root and can implied by a correct value for r	A1
	$r=7$	Not $r=\pm 7$ unless -7 is rejected	A1
			(5)
(b)	$MN=\sqrt{(25-"10")^2+(32-"12")^2}$	Correct use of Pythagoras	M1
	$MN\left(=\sqrt{625}\right)=25$		A1
			(2)
(c)	$NP=\sqrt{("25"^2-"7"^2)}$	$NP=\sqrt{(MN^2-r^2)}$	M1
	$NP\left(=\sqrt{576}\right)=24$		A1
			(2)
			[9]
7 (a)	May mark (a) and (b) together		
	Expands to give $10x^{\frac{3}{2}}-20x$		B1
	Integrates to give $\frac{10}{"\frac{5}{2}"}x^{"\frac{5}{2}"}+\frac{-"20"x^2}{2}$ $(+\,c)$		M1 A1ft
	Simplifies to $4x^{\frac{5}{2}}-10x^2(+\,c)$		A1 cao
			(4)
(b)	Use limits 0 and 4 either way round on their integrated function (may only see 4 substituted)		M1
	Use limits 4 and 9 either way round on their integrated function		dM1
	Obtains either ± -32 or $\pm$ 194	needs at least one of the previous M marks for this to be awarded	A1
	(So area = $\left\lvert\int_0^4 y\,dx\right\rvert+\int_4^9 y\,dx$) i.e. 32 + 194		ddM1
	= 226		A1
			(5)
			[9]

Question number	Scheme	Marks
8 (i)	$\dfrac{\sin 2\theta}{(4\sin 2\theta - 1)} = 1;\ 0 \leq \theta < 180^\circ$	
	$\sin 2\theta = \dfrac{1}{3}$	M1
	$\{2\theta = \{19.4712..., 160.5288...\}\}$	
	$\theta = \{9.7356..., 80.2644...\}$	A1 A1
		(3)
(ii)	$5\sin^2 x - 2\cos x - 5 = 0,\ \ 0 \leq x < 2\pi.$	
	$5(1-\cos^2 x) - 2\cos x - 5 = 0$	M1
	$5\cos^2 x + 2\cos x = 0$ $\cos x(5\cos x + 2) = 0$	dM1
	$\Rightarrow \cos x = ...$	
	awrt 1.98 or awrt 4.3(0)	A1
	Both 1.98 and 4.3(0)	A1ft
	awrt 1.57 or $\dfrac{\pi}{2}$ **and** 4.71 or $\dfrac{3\pi}{2}$ **or** 90º and 270º	B1
		(5)
	NB: $x = \text{awrt}\left\{1.98, 4.3(0), 1.57 \text{ or } \dfrac{\pi}{2}, 4.71 \text{ or } \dfrac{3\pi}{2}\right\}$	**[8]**
9 (a)	$\left[y = 12x^{\frac{1}{2}} - x^{\frac{3}{2}} - 10\right]$	
	$[y' =]\qquad 6x^{-\frac{1}{2}} - \dfrac{3}{2}x^{\frac{1}{2}}$	M1 A1
	Puts their $\dfrac{6}{x^{\frac{1}{2}}} - \dfrac{3}{2}x^{\frac{1}{2}} = 0$	M1
	So $x = \ \ ,\dfrac{12}{3} = 4$ (If $x = 0$ appears also as solution then lose A1)	M1, A1
	$x = 4, \Rightarrow y = 12\times 2 - 4^{\frac{3}{2}} - 10$, so $y = 6$	dM1,A1
		(7)
(b)	$y'' = -3x^{-\frac{3}{2}} - \dfrac{3}{4}x^{-\frac{1}{2}}$	M1A1
		(2)
(c)	[Since x >0] It is a maximum	B1
		(1) **[10]**

Question number	Scheme	Marks
10 (a)	$A\left(\frac{-9+15}{2}, \frac{8-10}{2}\right) = A(3, -1)$	M1 A1
		(2)
(b)	$(-9-3)^2 + (8+1)^2$ or $\sqrt{(-9-3)^2 + (8+1)^2}$ or $(15-3)^2 + (-10+1)^2$ or $\sqrt{(15-3)^2 + (-10+1)^2}$ Uses Pythagoras correctly in order to find the **radius**. Must clearly be identified as the **radius** and may be implied by their circle equation. Or $(15+9)^2 + (-10-8)^2$ or $\sqrt{(15+9)^2 + (-10-8)^2}$ Uses Pythagoras correctly in order to find the **diameter**. Must clearly be identified as the **diameter** and may be implied by their circle equation. This mark can be implied by just 30 clearly seen as the **diameter** or 15 clearly seen as the **radius** (may be seen or implied in their circle equation) **Allow this mark if there is a correct statement involving the radius or the diameter but <u>must be seen in (b)</u>**	M1
	$(x-3)^2 + (y+1)^2 = 225$ $\left(\text{or } (15)^2\right)$	M1
	$(x-3)^2 + (y+1)^2 = 225$	A1
		(3)
(c)	Distance $= \sqrt{15^2 - 10^2}$	M1
	$\left\{= \sqrt{125}\right\} = 5\sqrt{5}$	A1
		(2)
(d)	$\sin\left(A\hat{R}Q\right) = \frac{20}{30}$ or $A\hat{R}Q = 90 - \cos^{-1}\left(\frac{10}{15}\right)$	M1
	$A\hat{R}Q = 41.8103...$ awrt 41.8	A1
		(2)
		[9]

Examiner reports

Question 1

This was an accessible first question; the trapezium rule seemed to be well understood by the majority of students and most answered it very well. In part (a) some students lost the mark for giving the missing value as 1.6 or 1.600, although this did not stop them from being able to gain full marks in part (b).

A common error in part (b) was to use 0.2 as the width of each strip, using the number of ordinates rather than the number of strips. Others misinterpreted the strip width from its definition in the formula book. Most students clearly showed the correct structure of the y values but there was omission of brackets. It was common to see expressions such as $\frac{1}{2} \times \frac{1}{4}$ (1.414 + 2.236) + 2(1.601 + 1.803 + 2.016), which led to the wrong answer. If subsequent working indicated that the correct bracketing was intended this lapse was condoned, but this was usually not the case. Occasionally the method mark was lost by including an extra term in the second bracket.

Question 2

In part (a), many candidates unnecessarily used long division rather than the remainder theorem to find the remainder. The correct remainder –16 was often achieved, although mistakes in arithmetic or algebra were common.

There were many good solutions to the factorisation in part (b). Candidates usually found the quadratic factor by long division or by 'inspection' and went on to factorise this quadratic, obtaining the correct linear factors. Sometimes time was wasted in justifying the given fact that $(x + 2)$ was a factor. Some candidates were distracted by part (a) and assumed that $(x - 2)$ was one of the factors, using the quadratic they had obtained from their long division in part (a). A few attempted to use the formula to find the roots of the quadratic but did not always continue to find the factors. It was common for solutions of the equation $\text{f}(x) = 0$ to be given, but this 'additional working' was not penalised here.

Question 3

The vast majority of candidates found this question to be accessible and problems seen were usually concerning signs.

In part (a), a majority candidates were able to write down both $ar = 750$ and $ar^4 = -6$ and proceed to correctly find the value of r. A minority of candidates displayed poor algebraic skills, giving incorrect results such as $ar^3 = -\dfrac{6}{750}$ or $r^4 - r = -\dfrac{6}{750}$ or $r^3 = 756$.

A significant minority of candidates were unhappy with a negative value for r^3 and thus r and this problem with signs would then persist in parts (b) and (c). A very small number of candidates confused geometric series with arithmetic series.

In part (b), most candidates were able to substitute their value for r into a correct equation that they had written down in part (a) in order to find the first term of the series.

In part (c), many candidates were able to write down the correct formula for S_∞. Some candidates who had correctly found r as $-\frac{1}{5}$, incorrectly interpreted the condition of $|r| < 1$ to mean that their r in part (c) should then be $\frac{1}{5}$. Some candidates believed that a sum to infinity can only be positive and so arrived at an incorrect answer of 3125. Some candidates who had earlier found a value of r whose modulus was not less than 1, were happy with substituting this into the correct sum to infinity formula, and did not then deduce or were aware that their value for r found in part (a) must then be incorrect.

Question 4
In part (a), the majority of candidates were able to use logs to correctly obtain 1.43, although some failed to round their answer to 3 significant figures as required by the question. It was common to see either method of $x = \frac{\log 10}{\log 5}$ or $x = \log_5 10$. A few weaker candidates were able to achieve the correct answer by a method of trial and improvement.

About 60% of the candidates were able to answer part (b) correctly, with a small number offering no solution to this part. Although most candidates appreciated the need to remove logs, a number were unable deal with the -1, often rewriting $\log_3(x-2) = -1$ as $\log_3(x-2) = -\log_3(3)$ or $\log_3(x-2) = \log_3(-3)$ and then cancelling the logs from each side to get $x - 2 = -3$.

Another far too common response, showing a clear lack of understanding of the laws of logarithms, was to replace $\log_3(x-2)$ with $\log_3 x - \log_3 2$ and then $\log_3\left(\frac{x}{2}\right)$ or even $\frac{\log_3 x}{\log_3 2}$. Those candidates who correctly removed the logarithm by writing $x - 2 = 3^{-1}$, usually achieved the correct answer.

Question 5
Overall, this question was quite well attempted.

Part (a) was generally tackled accurately by applying the cosine rule. A surprising number of candidates seemed to be reluctant to have their calculators in radian mode and preferred to work with degrees and then transfer back to radians, usually successfully. A small minority used the $2 \times \arcsin \frac{3.5}{8}$ approach, which was much easier to apply. Of those that failed to get full marks, the majority of mistakes were by an incorrect application of the cosine rule often mixing up the sides.

A sizeable minority of candidates started by assuming angle $COD = 0.906$ and substituting it into the cosine formula or sine rule to show LHS = RHS. This was not a complete proof without advanced considerations regarding approximations.

In part (b) most candidates knew the formula for arc length, the majority working directly in radians. Most candidates also managed to find one of the missing angles on the straight line, although a few subtracted 0.906 from 2π rather than π.

Many candidates added both the 7 and 16 to their final answer, with only a small minority forgetting one side. There were some examples of premature approximation which resulted in answers outside the range deemed acceptable. As always, it should be emphasised to candidates that they should work to one figure of accuracy greater than that required in the answer. Some surprising "misunderstandings" occurred, for example assuming the radius was 7, 6 or even 4, though the lengths of the straight lines on the perimeter were kept as on the diagram.

In Part (c), the candidates knew that the areas of two identical sectors plus a triangle needed to be calculated. Most knew the formulae, $\frac{1}{2}r^2\theta$ and $\frac{1}{2}ab\sin\theta$, and applied them accurately, though some mixed up their use of the angles *AOD* and *COD*. Again, a small, but significant, number of candidates preferred to work in degrees rather than in radians. Some candidates used Pythagoras' Theorem to calculate the height of triangle *OCD*, usually correctly, and then proceeded to use $\frac{1}{2}bh$.

A small number of candidates who correctly identified the two correct formulae then incorrectly calculated the areas or failed to use the area of the sector twice, resulting in them losing the accuracy mark.

It must be stated that candidates who prematurely approximated to their answers were often in danger of not achieving the required degree of accuracy. Candidates should be encouraged to maintain as much accuracy as possible throughout these questions and only truncate their result at the final stage of their working to minimise such errors.

Question 6

Many candidates were successful in finding the centre and radius of a circle in Q6(a). Completing the square was often done accurately leading to the correct centre and radius. Errors that were seen involved centres of, (–10, –12) or (20, 24) and some errors in the rearrangement in attempting to find the radius.

Q6(b) was probably equally well answered with the majority of candidates able to use Pythagoras successfully.

Q6(c) was found more challenging by candidates. Candidates who drew a diagram were more successful and spotted the need to use Pythagoras again although many had *NP* as the hypotenuse.

Question 7

This was an accessible question with many fully correct responses, especially for part (a). Errors in expanding the brackets were not uncommon, but it was only a minority of candidates who failed to attempt the expansion. Those who did not, either made no attempt or simply tried to integrate the two terms and multiply the result, yielding results such as $5x^2\left(\frac{2}{3}x^{\frac{3}{2}} - 2x\right)$.

Of those who did expand, most did so correctly, but there were many who made errors, commonly in the first term, occasionally in the second. The result $\frac{20}{3}x^{\frac{3}{2}} - 10x^2$ was common, arising from the expansion $10x(x^{\frac{1}{2}} - 2) = 10x^{\frac{1}{2}} - 20x$.

The integration process was successfully carried out by the majority, even if with an incorrect expansion, and most simplified their answer with very few continuing with an unsimplified version.

There were a few cases of integration by parts attempted, and although generally with some success, it would be worthwhile for the candidates to be aware of the much more straightforward approach intended.

Some candidates attempted to find a value for a constant of integration in (a) by substituting in the value 4 and equating to zero. This was unnecessary and may have cost them time. Very few candidates differentiated rather than integrated.

The general procedure required for find the areas using definite integrals is well known to candidate, but the negative area between 0 and 4 did cause problems for many. The majority of candidates (who attempted part (b)) managed to substitute limits of 4 and 0, and then 9 and 4. Those who obtained full marks in (a) usually went on to earn at least the first 3 marks in (b), but sign errors or failure to use the modulus of "–32" often lost the final 2 marks.

Although candidates realised they needed to do two separate integrals they didn't always realise why they needed to do it separately, a number of them simply adding the results of their two evaluations (so $-32 + 194 = 162$ when part (a) was correct). For those with incorrect part (a) who ended up with a positive value between 0 and 4, none seemed to realise this was in error, but those ending up with negative values did often make them positive. Some did not make any attempt to combine the values at all.

A few candidates tried to deal with the second area as a triangle while a small number of candidates attempted the Trapezium rule to answer (b). Also there were a few attempts, assumed from a calculator, where candidates simply wrote down the answer with no working; sometimes following an incorrect part (a). The latter gained no marks as it did not follow their part (a) as per the instructions in the question.

Question 8
Responses to part (i) were varied. The majority of students could at least reach $\sin 2\theta = \frac{1}{3}$ following a fairly straightforward rearrangement. Occasionally just one value was found for theta but the most common mistake came from premature rounding with 9.8 and 80.3 seen often. Some students obtained the first value correctly (9.7) but then subtracted this value from 180 degrees with 9.7 and 170.3 resulting.

In part (ii) the majority of students recognised the need to apply the appropriate trigonometric identity, $\sin^2 x = 1 - \cos^2 x$, although some incorrect identities were seen including $\cos x = 1 - \sin x$. Those who did obtain a quadratic in $\cos x$ sometimes made errors when rearranging or made mistakes when solving the quadratic. Commonly students dealt with the constant but then 'lost' the negative to give $5\cos^2 x - 2\cos x$ leading incorrectly to $\cos x = 0.4$.

A large number of students chose to work in degrees and although some converted back into radians at the end, most lost the first A1 mark by leaving their answer in degrees. The final B1 mark was also occasionally lost when students gave only one value from $\cos x = 0$ or cancelled their quadratic, losing one factor altogether.

Question 9
(a) A pleasing majority of the candidates were able to differentiate these fractional powers correctly, but a sizeable group left the constant term on the end. They then put the derivative equal to zero. Solving the equation which resulted caused more problems as the equation contained various fractional powers. Some tried squaring to clear away the fractional powers, but often did not deal well with the square roots afterwards. There were many who expressed $6x^{-1/2} = 1/(6x^{1/2})$ and tended to get in a muddle after that. Those who took out a factor $x^{1/2}$ usually ended with $x = 0$ as well as $x = 4$ and if it was not discounted, they lost an accuracy mark. Those who obtained the solution $x = 4$ sometimes neglected to complete their solution by finding the corresponding y value. Some weaker candidates did not differentiate at all in part (a), with some integrating, and others substituting various values into y.

(b) The second derivative was usually correct and those who had made a slip earlier by failing to differentiate 10, usually differentiated it correctly this time!

(c) Candidates needed to have the correct second derivative to gain this mark. As the derivative was clearly negative this mark was for just stating that the turning point was a maximum.

Question 10
Part (a) was generally well done although there were some errors seen.

In part (b) many students were familiar with the equation for a circle but difficulties often occurred with finding the radius. Methods were often muddled and students did not make it clear if they were finding the radius or the diameter.

For part (c) and part (d) a clear labelled diagram was of great benefit, but seen only rarely. A fair proportion of students were successful in part (c) but far fewer scored well in part (d). It was here in particular that the clear diagram came into its own. As it was, many students found the wrong angle with $\angle RAQ$ a common substitute for $\angle ARQ$.

Statistics for C2 Practice Paper Silver Level S2

Qu	Max score	Modal score	Mean %	Mean score for students achieving grade: ALL	A*	A	B	C	D	E	U
1	5		86	4.28	4.95	4.89	4.74	4.56	4.31	3.92	2.76
2	6		82	4.93		5.88	5.67	5.37	5.00	4.33	2.51
3	7		80	5.57	6.92	6.75	6.27	5.40	4.28	2.91	1.89
4	4		76	3.05	3.95	3.83	3.50	3.13	2.74	2.37	1.65
5	8	8	75	6.02	7.67	7.51	7.11	6.62	5.89	4.88	2.36
6	9	9	72	6.52	8.90	8.28	7.15	6.07	5.18	3.94	1.76
7	9	9	78	7.00	8.67	8.41	7.87	7.38	6.84	6.15	3.89
8	8		71.4	5.71	7.76	7.10	6.17	5.54	5.07	3.72	1.89
9	10		64	6.39		8.67	6.90	5.65	4.31	3.41	2.09
10	9		56.1	5.05	7.88	6.55	4.94	4.25	3.63	2.31	1.62
	75		**72.69**	**54.52**	**56.70**	**67.87**	**60.32**	**53.97**	**47.25**	**37.94**	**22.42**