Paper Reference(s)

6664/01

Edexcel GCE

Core Mathematics C2

Bronze Level B5

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
72	66	60	54	47	41

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1. $$y = 3^x + 2x.$$

(*a*) Complete the table below, giving the values of y to 2 decimal places.

x	0	0.2	0.4	0.6	0.8	1
y	1	1.65				5

(2)

(*b*) Use the trapezium rule, with all the values of y from your table, to find an approximate value for $\int_0^1 (3^x + 2x)\ \mathrm{d}x$.

(4)

June 2010

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2. Find the first 3 terms, in ascending powers of x, in the binomial expansion of

$$(2 - 5x)^6.$$

Give each term in its simplest form.

(4)

January 2013

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3. A geometric series has first term a, where $a \neq 0$, and common ratio r.
The sum to infinity of this series is 6 times the first term of the series.

(*a*) Show that $r = \frac{5}{6}$.

(2)

Given that the fourth term of this series is 62.5,

(*b*) find the value of a,

(2)

(*c*) find the difference between the sum to infinity and the sum of the first 30 terms, giving your answer to 3 significant figures.

(4)

May 2014 (R)

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4. $$f(x) = ax^3 + bx^2 - 4x - 3, \text{ where } a \text{ and } b \text{ are constants.}$$

Given that $(x - 1)$ is a factor of $f(x)$,

(*a*) show that $a + b = 7$.

(2)

Given also that, when $f(x)$ is divided by $(x + 2)$, the remainder is 9,

(*b*) find the value of a and the value of b, showing each step in your working.

(4)

January 2013

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5. A circle C has centre $(-1, 7)$ and passes through the point $(0, 0)$. Find an equation for C.

(4)

January 2012

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6. (*a*) Find the first 3 terms, in ascending powers of x, of the binomial expansion of $(2 - 3x)^6$, giving each term in its simplest form.

(4)

(*b*) Hence, or otherwise, find the first 3 terms, in ascending powers of x, of the expansion of

$$\left(1 + \frac{x}{2}\right)(2 - 3x)^6.$$

(3)

May 2014

7.

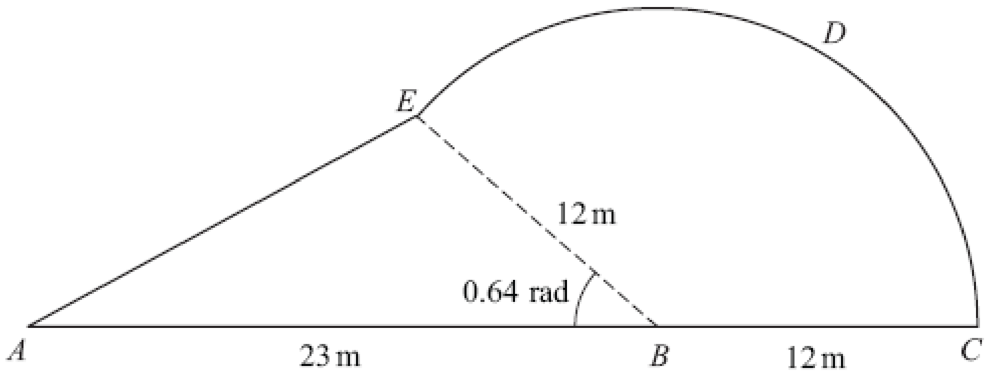

Figure 1

Figure 1 shows a plan view of a garden.

The plan of the garden *ABCDEA* consists of a triangle *ABE* joined to a sector *BCDE* of a circle with radius 12 m and centre *B*.

The points *A*, *B* and *C* lie on a straight line with $AB = 23$ m and $BC = 12$ m.

Given that the size of angle *ABE* is exactly 0.64 radians, find

(*a*) the area of the garden, giving your answer in m^2, to 1 decimal place,

(4)

(*b*) the perimeter of the garden, giving your answer in metres, to 1 decimal place.

(5)

May 2013

8.

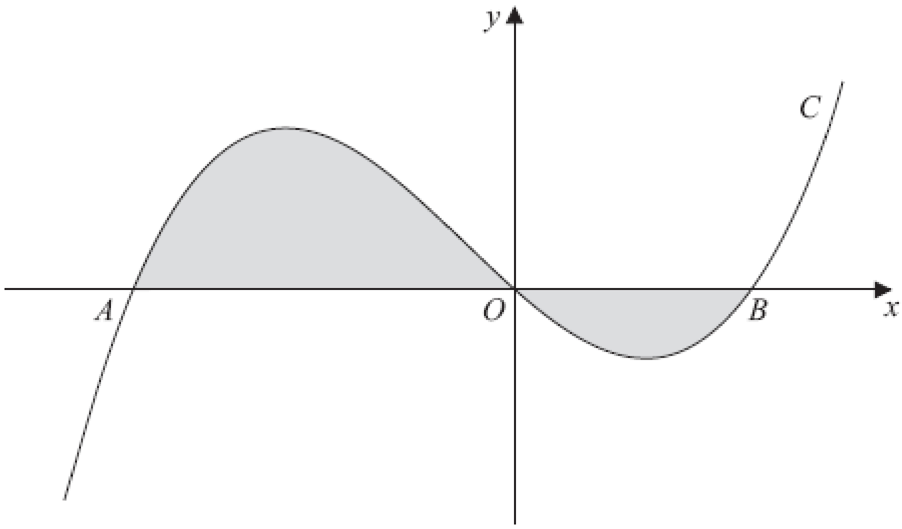

Figure 2

Figure 2 shows a sketch of part of the curve C with equation

$$y = x(x + 4)(x - 2).$$

The curve C crosses the x-axis at the origin O and at the points A and B.

(a) Write down the x-coordinates of the points A and B.

(1)

The finite region, shown shaded in Figure 2, is bounded by the curve C and the x-axis.

(b) Use integration to find the total area of the finite region shown shaded in Figure 3.

(7)

May 2013

9. A circle C has centre $M(6, 4)$ and radius 3.

(*a*) Write down the equation of the circle in the form

$$(x - a)^2 + (y - b)^2 = r^2.$$

(2)

Figure 3

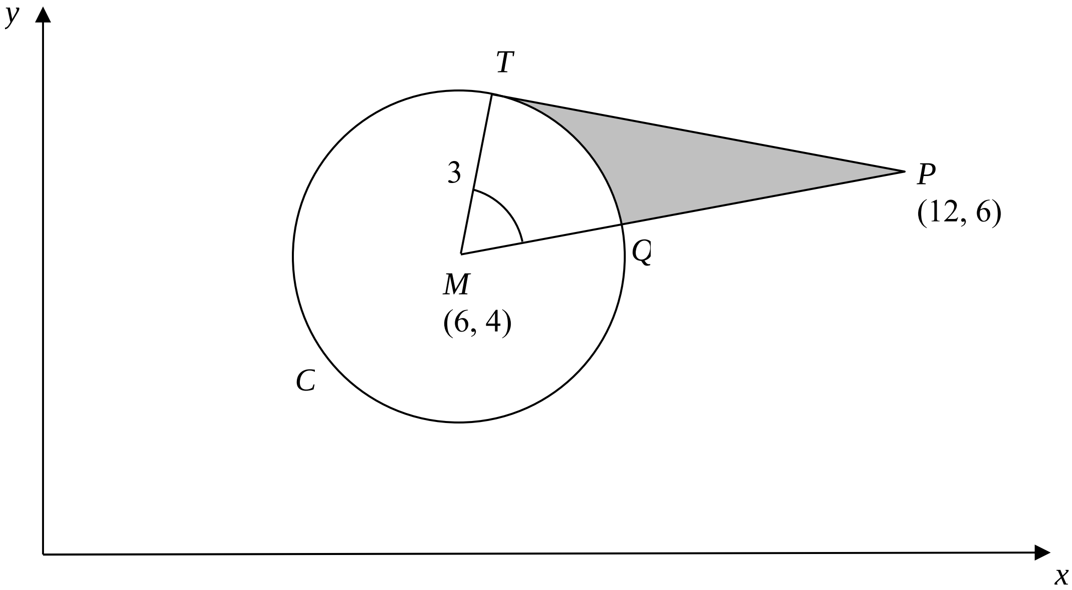

Figure 3 shows the circle C. The point T lies on the circle and the tangent at T passes through the point $P(12, 6)$. The line MP cuts the circle at Q.

(*b*) Show that the angle TMQ is 1.0766 radians to 4 decimal places.

(4)

The shaded region TPQ is bounded by the straight lines TP, QP and the arc TQ, as shown in Figure 3.

(*c*) Find the area of the shaded region TPQ. Give your answer to 3 decimal places.

(5)

January 2008

10. **Figure 4**

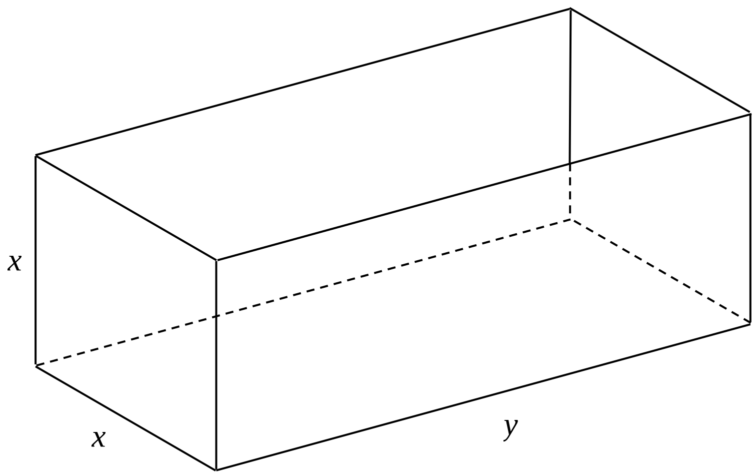

Figure 4 shows an open-topped water tank, in the shape of a cuboid, which is made of sheet metal. The base of the tank is a rectangle x metres by y metres. The height of the tank is x metres.

The capacity of the tank is 100 m^3.

(*a*) Show that the area A m^2 of the sheet metal used to make the tank is given by

$$A = \frac{300}{x} + 2x^2.$$

(4)

(*b*) Use calculus to find the value of x for which A is stationary.

(4)

(*c*) Prove that this value of x gives a minimum value of A.

(2)

(*d*) Calculate the minimum area of sheet metal needed to make the tank.

(2)

January 2008

TOTAL FOR PAPER: 75 MARKS

END

<table>
<tr><th>Question number</th><th colspan="2">Scheme</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td colspan="2">2.35, 3.13, 4.01 (One or two correct B1 B0, all correct B1 B1)</td><td>B1 B1
(2)</td></tr>
<tr><td>(b)</td><td colspan="2">$\frac{1}{2}\times 0.2$ ...... (or equivalent numerical value)
$k\{(1+5)+2(1.65+p+q+r)\}$, k constant, $k\neq 0$
= 2.828 (awrt 2.83, allowed even after minor slips in values)
The fractional answer $\frac{707}{250}$ (or other fraction wrt 2.83) is also acceptable.
Answers with no working score no marks.</td><td>B1
M1 A1

A1

(4)
[6]</td></tr>
<tr><td>2</td><td>$(2-5x)^6$
$(2^6=)\ 64$

$+6\times(2)^5(-5x)+\frac{6\times 5}{2}(2)^4(-5x)^2$

$-960x$
$(+)6000x^2$</td><td>Award this when first seen (not $64x^0$)
Attempt binomial expansion with correct structure for at least one of these terms.
E.g. a term of the form:
$\binom{6}{p}\times(2)^{6-p}(-5x)^p$ with $p=1$ or $p=2$ consistently. Condone sign errors. Condone missing brackets if later work implies correct structure and allow alternative forms for binomial coefficients
e.g. ${}^6C_1$ or $\binom{6}{1}$ or even $\left(\frac{6}{1}\right)$
Not $+-960x$</td><td>B1

M1

A1 (first)
A1 (Second)
[4]</td></tr>
</table>

Question number	Scheme		Marks
3 (a)	$S_\infty = 6a$		
	$\frac{a}{1-r} = 6a$		M1
	$\{\Rightarrow 1 = 6(1-r) \Rightarrow\}\ r = \frac{5}{6}$ *		A1*
			(2)
(b)	$\{T_4 = ar^3 = 62.5 \Rightarrow\}\ a\left(\frac{5}{6}\right)^3 = 62.5$		M1
	$\Rightarrow a = 108$		A1
			(2)
(c)	$S_\infty = 6(\text{their } a)$ or $\frac{\text{their } a}{1-\frac{5}{6}}\{= 648\}$		M1
	$\{S_{30} =\}\ \frac{108\left(1-(\frac{5}{6})^{30}\right)}{1-\frac{5}{6}}\ \{= 645.2701573...\}$		M1 A1ft
	$\{S_\infty - S_{30}\} = 2.72984...$ **awrt** 2.73		A1
			(4)
			[8]
4 (a)	$f(1) = a + b - 4 - 3 = 0$ **or** $a + b - 7 = 0$	Attempt f(±1)	M1
	$a + b = 7$ *	Must be f(1) and = **0** needs to be seen	A1
			(2)
(b)	$f(-2) = a(-2)^3 + b(-2)^2 - 4(-2) - 3 = 9$	Attempt f(±2) **<u>and uses</u>** f(±2) = 9	M1
	$-8a + 4b + 8 - 3 = 9$	Correct equation with exponents of (–2) removed	A1
	$(-8a + 4b = 4)$		
	Solves the **given equation from part (a)** and their equation in a and b from part (b) as far as a =... or b = ...		M1
	$a = 2$ **and** $b = 5$	**Both** correct	A1
			(4)
			[6]

Question number	Scheme	Marks
5	The equation of the circle is $(x+1)^2+(y-7)^2=(r^2)$	M1 A1
	The radius of the circle is $\sqrt{(-1)^2+7^2}=\sqrt{50}$ or $5\sqrt{2}$ or $r^2=50$	M1
	So $(x+1)^2+(y-7)^2=50$ or equivalent	A1
		(4)
6 (a)	$(2-3x)^6 = 64+....$	B1
	$\{(2-3x)^6\} = (2)^6 + \underline{{}^6C_1}(2)^5(-3\underline{x}) + \underline{{}^6C_2}(2)^4\underline{(-3x)^2} + ...$	<u>M1</u>
	$= 64-576x+2160x^2+...$	A1A1
		(4)
(b)	$\left(1+\frac{x}{2}\right)(64-576x+...)$ or $\left(1+\frac{x}{2}\right)(64-576x+2160x^2+...)$ or	
	$\left(1+\frac{x}{2}\right)64-\left(1+\frac{x}{2}\right)576x$ or $\left(1+\frac{x}{2}\right)64-\left(1+\frac{x}{2}\right)576x+\left(1+\frac{x}{2}\right)2160x^2$	M1
	or $64+32x, -576x-288x^2,\ 2160x^2+1080x^3$ are fine.	
	$= 64-544x+1872x^2+...$	A1A1
		(3)
		[7]
	Mark (a) and (b) together.	
7 (a)	**Usually answered in radians: Uses** either $\frac{1}{2}ab\sin(\text{angle})$ **or** $\frac{1}{2}(12)^2(\text{angle})$ or both	M1
	Area $=\frac{1}{2}(23)(12)\sin 0.64$ **or** $\frac{1}{2}(12)^2(\pi-0.64)$ $\{=$ 82.41297091... **or** 180.1146711...$\}$	A1
	Area $=\frac{1}{2}(23)(12)\sin 0.64+\frac{1}{2}(12)^2(\pi-0.64)$ $\{=$ 82.41297091... + 180.1146711...$\}$	A1
	$\{\text{Area} = 262.527642...\}$ = awrt 262.5 (m^2) or 262.4(m^2) or 262.6 (m^2)	A1
		(4)
(b)	$CDE = 12\times(\textit{angle}),\ =12(\pi-0.64)\{\Rightarrow CDE = 30.01911...\}$	M1, A1
	$AE^2 = 23^2+12^2-2(23)(12)\cos(0.64) \Rightarrow AE^2=$ or $AE=$ $\{AE = 15.17376...\}$	M1
	Perimeter = 23 + 12 + 15.17376... + 30.01911...	M1
	= 80.19287... = awrt 80.2 (m)	A1
		(5)
		[9]

Question number	Scheme	Marks
8 (a)	Seeing -4 and 2.	B1 **(1)**
(b)	$x(x+4)(x-2) = \underline{x^3 + 2x^2 - 8x}$ or $\underline{x^3 - 2x^2 + 4x^2 - 8x}$ (without simplifying)	B1
	$\int (x^3 + 2x^2 - 8x)\,dx = \frac{x^4}{4} + \frac{2x^3}{3} - \frac{8x^2}{2} \{+c\}$ or $\frac{x^4}{4} - \frac{2x^3}{3} + \frac{4x^3}{3} - \frac{8x^2}{2} \{+c\}$	M1A1ft
	$\left[\frac{x^4}{4} + \frac{2x^3}{3} - \frac{8x^2}{2}\right]_{-4}^{0} = (0) - \left(64 - \frac{128}{3} - 64\right)$ **or**	dM1
	$\left[\frac{x^4}{4} + \frac{2x^3}{3} - \frac{8x^2}{2}\right]_{0}^{2} = \left(4 + \frac{16}{3} - 16\right) - (0)$	A1
	One integral $= \pm 42\frac{2}{3}$ (42.6 or awrt 42.7) **or** other integral $= \pm 6\frac{2}{3}$ (6.6 or awrt 6.7)	
	Hence Area $= \text{"}their\,42\frac{2}{3}\text{"} + \text{"}their\,6\frac{2}{3}\text{"}$ or	
	Area $= \text{"}their\,42\frac{2}{3}\text{"} - \text{"}-their\,6\frac{2}{3}\text{"}$	dM1
	$= 49\frac{1}{3}$ or 49.3 or $\frac{148}{3}$ (NOT $-\frac{148}{3}$)	A1
	(An answer of $= 49\frac{1}{3}$ may not get the final two marks – check solution carefully)	
		(7)
		[8]

Question number	Scheme	Marks
9 (a)	$(x - 6)^2 + (y - 4)^2 =$; 3^2	B1; B1
		(2)
(b)	Complete method for MP: $= \sqrt{(12-6)^2 + (6-4)^2}$	M1
	$= \sqrt{40}$ or awrt 6.325	A1
	[These first two marks can be scored if seen as part of solution for (c)]	
	Complete method for $\cos\theta$, $\sin\theta$ or $\tan\theta$	M1
	e.g. $\cos\theta = \frac{MT}{MP} = \frac{3}{candidate's\sqrt{40}}$ $(= 0.4743)$ $(\theta = 61.6835°)$	
	[If TP = 6 is used, then M0]	
	$\theta = 1.0766$ rad **AG**	A1
		(4)
(c)	Complete method for area TMP; e.g. $= \frac{1}{2} \times 3 \times \sqrt{40}\sin\theta$	M1
	$= \frac{3}{2}\sqrt{31}$ $(= 8.3516..)$ allow awrt 8.35	A1
	Area (sector)$MTQ = 0.5 \times 3^2 \times 1.0766$ $(= 4.8446\ldots)$	M1
	Area TPQ = candidate's $(8.3516.. - 4.8446..)$	M1
	= 3.507 awrt	A1
	[Note: 3.51 is A0]	**(5)**
		[11]

Question number	Scheme	Marks
10 (a)	(Total area) = $3xy + 2x^2$	B1
	(Vol:) $x^2y = 100$ $\quad (y = \frac{100}{x^2}, xy = \frac{100}{x})$	B1
	Deriving expression for area in terms of x only	M1
	(Substitution, or clear use of, y or xy into expression for area)	
	(Area =) $\frac{300}{x} + 2x^2$ **AG**	A1cso
		(4)
(b)	$\frac{dA}{dx} = -\frac{300}{x^2} + 4x$	M1 A1
	Setting $\frac{dA}{dx} = 0$ and finding a value for correct power of x, for cand. M1	
	[$x^3 = 75$]	
	$x = 4.2172$ awrt 4.22 (allow exact $\sqrt[3]{75}$)	A1
		(4)
(c)	$\frac{d^2A}{dx^2} = \frac{600}{x^3} + 4$ = positive , > 0; therefore minimum	M1;A1
		(2)
(d)	Substituting found value of x into (a)	
	(Or finding y for found x and substituting both in $3xy + 2x^2$)	
	$[y = \frac{100}{4.2172^2} = 5.6228]$	
	Area = 106.707 awrt 107	A1
		(2)
		[12]

Examiner reports

Question 1

Part (a) was answered correctly by the majority of candidates, although 4.00 (or 4) was sometimes given instead of 4.01 as the third missing value in the table.

The trapezium rule was often accurately used in part (b), although using n in $\left(\dfrac{b-a}{n}\right)$ as the number of ordinates instead of the number of intervals was again a common mistake. Some candidates left out the main brackets and multiplied only the first two terms by $0.5h$. Others wrongly included 1 and/or 5 in the bracket to be doubled. Just a few ignored the demand for the trapezium rule and attempted the integration by ‘calculus’.

Question 2

This question was well done by the vast majority of candidates. The most common method was to use the general expansion for $(a + b)^n$ and this was largely successful although there were some common errors. The most frequent error was the failure to square the –5 in the third term resulting in an expansion of $64 - 960x + 1200x^2$. It was also common to see an answer of $64 + 960x + 6\text{-}00x^2$. A minority of candidates attempted to take out a factor of 2 before using the expansion for $(1 + x)^n$. Some candidates took out the factor of 2, without realising that it needed to become 2^6.

Question 3

Part (a) was well answered by the majority, though a few seemed unaware of the sum to infinity formula. Those with a correct solution used appropriate algebra rather than verification.

Students had few difficulties with part (b) with only a handful using $\left(\dfrac{5}{6}\right)^4$ instead of the correct $\left(\dfrac{5}{6}\right)^3$.

Part (c) was well done by most although premature rounding cost a significant number the final accuracy mark, with “3” given as the final answer. A small number found S_{29} instead of S_{30}.

Question 4

Candidates found this question accessible. In Q2(a) most candidates attempted f(1) and proceeded to establish the given equation. However it is worth pointing out that a significant number of candidates presented work along the lines of $f(1) = a + b - 7$ and concluded that $a + b = 7$ with no reference to $f(1) = 0$ thereby losing a mark in this “show that” question.

In Q2(b) the majority of candidates correctly attempted f(-2) with a minority using $f(-2) = 0$ rather than $f(-2) = 9$. Although many candidates with correct work so far could then go on to find a and b, there were many examples of errors in solving the simultaneous equations. Very few candidates used long division.

Question 5

This question was also well answered (71% with full marks). For those who did not obtain a completely correct solution, most began with $(x+1)^2 + (y-7)^2 = r^2$. However, errors were common, with incorrect signs within and between the brackets, missing indices, or 1 and −7 in the wrong bracket. Most were able to find the radius although a significant minority appeared to be confused between radius and diameter. Some candidates had difficulty with $(-1)^2$ and made $r = \sqrt{48}$ whilst others made $r^2 = \frac{d^2}{2}$. Others substituted the correct radius into their equation without squaring it. Although not penalised, many candidates did not simplify their r^2 leaving it as $(\sqrt{50})^2$ or $(2\sqrt{5})^2$. Only very few candidates expanded the brackets to give the answer in the form $x^2 + 2x + y^2 - 14y = 0$. (This expanded answer was not required by the question). There were a number of weaker candidates who did not use the circle formula at all and instead attempted some form of straight line equation, gaining no marks.

Question 6

The majority of students scored well in part (a), with many scoring all four marks. The most successful approach was to use the formula for expanding $(a + b)^n$. With this method the most common mistakes were forgetting to include the negative sign when using $3x$ (yielding $+576x$) and forgetting to square the coefficient of x in the third term (producing $720x^2$). Some students lost the final A mark due to leaving, for example, an unsimplified $\pm 576x$. Pascal's triangle was not used very often. A smaller number of students tried taking out a factor of 2 from the bracket, however it was quite common for these students to forget to raise this to the power of 6. Those making this error could score a maximum of 1 mark for part (a). Those who took this approach, then had problems dealing with $\left(1-\frac{3x}{2}\right)^6$ and made errors in squaring $\left(-\frac{3x}{2}\right)$.

Students generally found part (b) more challenging and many students were let down by weak algebra. Many appreciated that they had to multiply their answer to part (a) by $\left(1+\frac{x}{2}\right)$ and earned the method mark, although they then sometimes did not try to simplify their answers. For those who did multiply $\left(1+\frac{x}{2}\right)$ by their expansion from part (a), the majority were accurate in multiplying out the brackets but a lack of proficiency in algebra let some down in this part. Loss of accuracy marks here also resulted from an incorrect expansion from part (a). A significant number of students did not collect up their like terms after expanding. Interestingly, those who listed their expansion in part (a) were far more likely to leave their new expansion un-simplified. Good presentation aided students to collect like terms effectively after the multiplication. A few students tried to expand $\left(1+\frac{x}{2}\right)^6$ and multiply this by their answer to part (a). Another error that was seen occasionally was to expand $\left(1+\frac{x}{2}\right)(2 - 3x)$ and then to raise the answer to the power 6.

Question 7

This question proved quite difficult for some candidates, although those who were familiar with the required formulae and comfortable in the use of radians often achieved full marks. It was noticed that some candidates persisted in applying formulae including π, for example sector area = $\frac{1}{2}\pi r^2\theta$, despite using angles in radians.

Although most knew how to approach part (a) correctly, the area of a triangle formula and the area of a sector formula were sometimes incorrectly quoted. Also, many candidates used a wrong calculation to find the obtuse angle, for example (2π – 0.64) or (1 – 0.64). In spite of this many candidates did obtain one numerically correct area, scoring at least 2 marks out of 4. Those who worked in radians were far more successful than those who converted unnecessarily to degrees.

A few candidates treated triangle *ABE* as 'right-angled' and consequently used an incorrect formula. Others complicated the problem by splitting triangle *ABE* into two right-angled triangles. Some used this method successfully but others either miscalculated or used a wrong angle or side in their final calculation. A few candidates found the area of the semicircle then subtracted that of the small sector *EBA*.

Many candidates achieved more marks in part (b) than they did in part (a). The formula for arc length was generally quoted correctly but in many cases the wrong angle was used. The majority of candidates used the cosine rule successfully to determine the length of *AE*, but occasionally the rule was misquoted or there were errors in calculation.

A surprisingly common mistake was a misunderstanding of what was meant by the perimeter so that, for example, an additional 12m radius from inside the shape was added.

Question 8

Most candidates achieved the first 4 marks comfortably with just the rare wrong expansion of brackets, the most common wrong answer being $x^3 + 2x^2 - 8$ (i.e. they "lost" the x from $8x$). There were occasional integration errors. Thereafter, there was a widespread failure to recognise the need for two separate integrals and many candidates reached the consequential answer of $-6\frac{2}{3} - (-42\frac{2}{3}) = 36$. Others obtained the correct final answer by altering the signs: $-6\frac{2}{3} + (-42\frac{2}{3}) = -49\frac{1}{3}$ ... etc.

Some of those that found two integrals did not evaluate these correctly, changing the limits around and ignoring the zeros fairly indiscriminately. Another fairly common error was to substitute the limits the wrong way round and some students changed –4 to 4, which fortuitously produced the same value as the integral from –4 to 0, but did not receive credit. A few scripts showed very limited working from which it was difficult to tell whether one or two integrals had been attempted. A number of candidates gave the correct x-values where the curve crossed the axis, but then proceeded to use different values for the limits in their integrals, 3 being quite often used instead of 2.

The best answers showed clearly the substitution and evaluation of the limits, and explained the negative answer for the integral between 0 and 2. The two areas were then combined to get the final answer. A surprising number, having obtained $42\frac{2}{3}$ and $-6\frac{2}{3}$ correctly then added them without changing the sign of the second definite integral.

Many calculations were compromised by a failure to deal correctly with the sign of the powers of –4. Some students had solutions which showed correct method throughout but premature rounding resulted in the loss of the final accuracy mark.

There were several instances of students simply using graphical calculators to find the area with no evidence of any integration (or indeed, in some cases, of any expansion!). Such answers scored no marks as the question made it clear that integration should be used.

Question 9

Part (a) provided 2 marks for the majority of candidates but it was surprising, as the form was given, to see such "slips" as $(x-6)+(y-4)=9$ or $(x-6)^2-(y-4)^2=9$. There were some good solutions to part (b) but this did prove to be quite discriminating: Many candidates did not really attempt it; some actually used the given answer to calculate TP or PM, and then used these results to show that angle TMQ = 1.0766; and a large number of candidates made the serious error of taking TP = 6. It was disappointingly to see even some of the successful candidates using the cosine rule in triangle TMP, having clearly recognised that it was right-angled.

Part (c) was answered much better, with most candidates having a correct strategy. However, there were some common errors: use of the wrong sides in ½absinC; careless use of Pythagoras to give TP = 7 ($\sqrt{40+9}$); mixing up the formulae for arc length and sector area; and through inaccuracy or premature approximation, giving answers like 3.51 or 3.505.

Question 10

For the better candidates this was a very good source of marks, but it proved quite taxing for many of the candidates who were able to spend time on the question. In part (a) the $2x^2$ term in the given answer was usually produced but the work to produce $\frac{300}{x}$ was often unconvincing, and it was clear that the given answer, which was an aid for subsequent parts, enabled many candidates to gain marks that otherwise would have been lost. It was common to see steps retraced to correct an initial wrong statement, such as $A = 2x^2+4xy$, but sometimes the resulting presentation was not very satisfactory and often incomplete, and the ability to translate "the capacity of the tank is 100m^3" into an algebraic equation was quite often lacking.

In part (b) the two most common errors were in differentiating $\frac{300}{x}$, often seen as 300 or –300, and in solving the correct equation $-\frac{300}{x^2}+4x=0$. It was surprising, too, to see so many candidates who, having successfully reached the stage $4x^3=300$, gave the answer $x = 8.66$, i.e. $\sqrt{75}$.

In part (c) the most common approach, by far, was to consider $\frac{d^2A}{dx^2}$, and although the mark scheme was kind in some respects, it was expected that the sign, rather than just the value, of $\frac{d^2A}{dx^2}$ was commented upon.

The method mark in the final part was usually gained although there was a significant minority of candidates who substituted their value of $\frac{d^2A}{dx^2}$, rather than their answer to part (b), into the expression for A.

Statistics for C2 Practice Paper Bronze Level B5

Qu	Max score	Modal score	Mean %	Mean score for students achieving grade: ALL	A*	A	B	C	D	E	U
1	6		80	4.81	5.89	5.75	5.48	5.11	4.72	4.09	2.81
2	4	4	85	3.39	3.93	3.82	3.59	3.40	3.20	2.75	1.93
3	8		88.1	7.05	7.76	7.76	7.35	7.06	6.74	6.08	4.47
4	6	6	86	5.17	5.92	5.75	5.44	5.09	4.82	4.30	3.34
5	4		79	3.17	3.96	3.83	3.49	3.19	2.61	2.10	0.94
6	7		74	5.18	6.86	6.47	5.94	5.47	4.96	4.31	2.79
7	9	9	73	6.56	8.72	8.57	8.05	7.38	6.43	5.08	2.35
8	8	8	75	6.01	7.37	7.24	6.71	6.36	5.92	5.39	3.73
9	11		66	7.23		10.17	8.24	6.57	5.12	4.07	2.32
10	12		63	7.57		11.29	9.21	6.64	4.33	3.09	1.20
	75		**74.85**	**56.14**	**50.41**	**70.65**	**63.50**	**56.27**	**48.85**	**41.26**	**25.88**