Paper Reference(s)

6664/01

Edexcel GCE

Core Mathematics C2

Gold Level G4

Time: 1 hour 30 minutes

Materials required for examination papers	**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 11 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
57	50	42	34	27	20

1. Using calculus, find the coordinates of the stationary point on the curve with equation

$$y = 2x + 3 + \frac{8}{x^2}, \quad x > 0$$

(6)

May 2013 (R)

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2. Find the values of x such that

$$2\log_3 x - \log_3(x - 2) = 2$$

(5)

May 2012

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3. $$\mathrm{f}(x) = (3x - 2)(x - k) - 8$$

where k is a constant.

(a) Write down the value of $\mathrm{f}(k)$.

(1)

When $\mathrm{f}(x)$ is divided by $(x - 2)$ the remainder is 4.

(b) Find the value of k.

(2)

(c) Factorise $\mathrm{f}(x)$ completely.

(3)

June 2009

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4. Given that $y = 3x^2$,

(a) show that $\log_3 y = 1 + 2\log_3 x$.

(3)

(b) Hence, or otherwise, solve the equation

$$1 + 2\log_3 x = \log_3 (28x - 9).$$

(3)

January 2012

5.

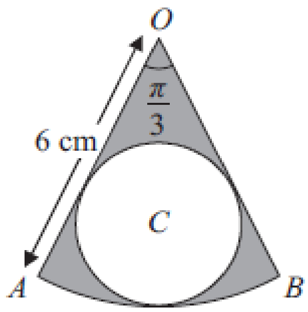

Figure 1

The shape shown in Figure 1 is a pattern for a pendant. It consists of a sector OAB of a circle centre O, of radius 6 cm, and angle $AOB = \frac{\pi}{3}$. The circle C, inside the sector, touches the two straight edges, OA and OB, and the arc AB as shown.

Find

(a) the area of the sector OAB,

(2)

(b) the radius of the circle C.

(3)

The region outside the circle C and inside the sector OAB is shown shaded in Figure 1.

(c) Find the area of the shaded region.

(2)

May 2011

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6. (*a*) Show that the equation

$$\tan 2x = 5 \sin 2x$$

can be written in the form

$$(1 - 5 \cos 2x) \sin 2x = 0.$$

(2)

(*b*) Hence solve, for $0 \leq x \leq 180°$,

$$\tan 2x = 5 \sin 2x,$$

giving your answers to 1 decimal place where appropriate.
You must show clearly how you obtained your answers.

(5)

May 2012

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7. (i) Solve, for $-180° \leq \theta < 180°$,

$$(1 + \tan \theta)(5 \sin \theta - 2) = 0.$$

(4)

(ii) Solve, for $0 \leq x < 360°$,

$$4 \sin x = 3 \tan x.$$

(6)

June 2009

8.

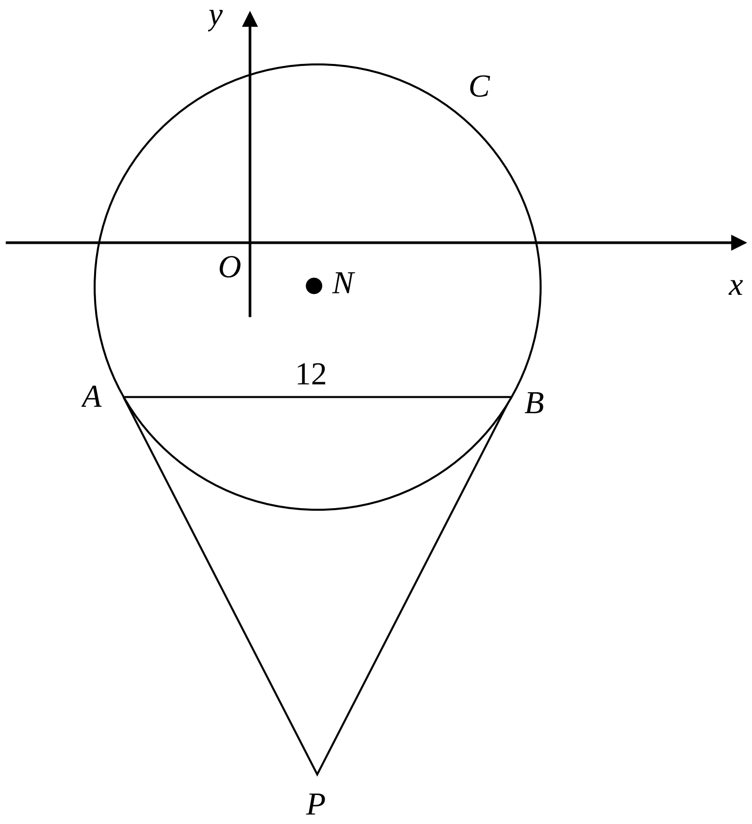

Figure 2

Figure 2 shows a sketch of the circle *C* with centre *N* and equation

$$(x - 2)^2 + (y + 1)^2 = \frac{169}{4}.$$

(*a*) Write down the coordinates of *N*.

(2)

(*b*) Find the radius of *C*.

(1)

The chord *AB* of *C* is parallel to the *x*-axis, lies below the *x*-axis and is of length 12 units as shown in Figure 2.

(*c*) Find the coordinates of *A* and the coordinates of *B*.

(5)

(*d*) Show that angle *ANB* = 134.8°, to the nearest 0.1 of a degree.

(2)

The tangents to *C* at the points *A* and *B* meet at the point *P*.

(*e*) Find the length *AP*, giving your answer to 3 significant figures.

(2)

January 2010

9. (i) Find the solutions of the equation $\sin(3x - 15°) = \frac{1}{2}$, for which $0 \leq x \leq 180°$.

(6)

(ii)

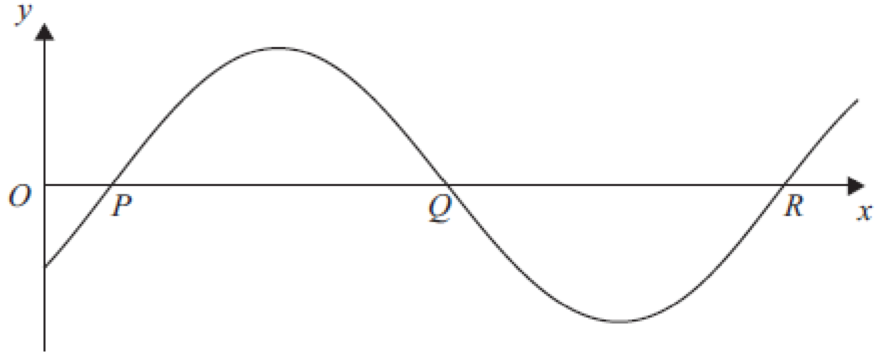

Figure 3

Figure 3 shows part of the curve with equation

$$y = \sin(ax - b), \text{ where } a > 0, \quad 0 < b < \pi.$$

The curve cuts the x-axis at the points P, Q and R as shown.

Given that the coordinates of P, Q and R are $\left(\frac{\pi}{10}, 0\right)$, $\left(\frac{3\pi}{5}, 0\right)$ and $\left(\frac{11\pi}{10}, 0\right)$ respectively, find the values of a and b.

(4)

January 2012

10.

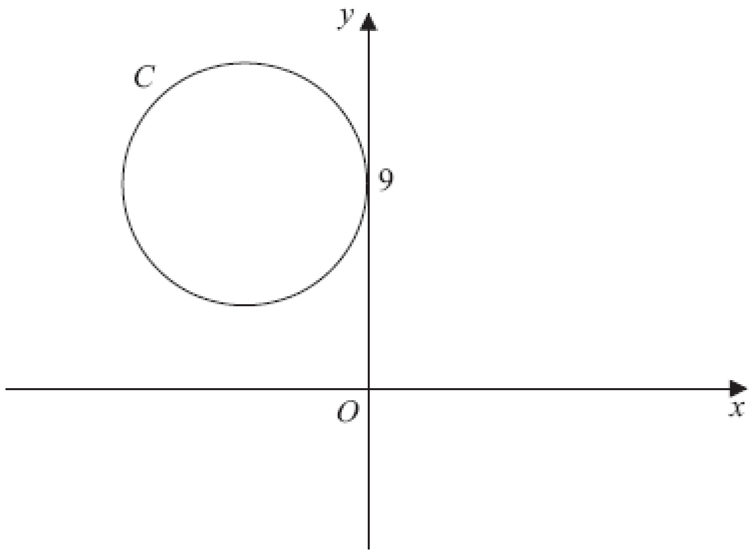

Figure 4

The circle *C* has radius 5 and touches the *y*-axis at the point (0, 9), as shown in Figure 4.

(*a*) Write down an equation for the circle *C*, that is shown in Figure 4.

(3)

A line through the point *P*(8, –7) is a tangent to the circle *C* at the point *T*.

(*b*) Find the length of *PT*.

(3)

May 2013

TOTAL FOR PAPER: 75 MARKS

END

Question Number	Scheme	Marks
1.	$\frac{dy}{dx} = 2 - 16x^{-3}$	M1 A1
	$2 - 16x^{-3} = 0$ so $x^{-3} =$ or $x^3 =$, or $2 - 16x^{-3} = 0$ so $x = 2$	M1
	$x = 2$ only (after correct derivative)	A1
	$y = 2 \times "2" + 3 + \frac{8}{"2^2"}$	M1
	$= 9$	A1 **[6]**
2.	$2\log x = \log x^2$	B1
	$\log_3 x^2 - \log_3(x-2) = \log_3 \frac{x^2}{x-2}$	M1
	$\frac{x^2}{x-2} = 9$	A1 o.e.
	Solves $x^2 - 9x + 18 = 0$ to give $x = ...$	M1
	$x = 3$, $x = 6$	A1 **[5]**
3. (a)	$f(k) = -8$	B1 (1)
(b)	$f(2) = 4 \Rightarrow 4 = (6-2)(2-k) - 8$	M1
	So $k = -1$	A1 (2)
(c)	$f(x) = 3x^2 - (2+3k)x + (2k-8) = 3x^2 + x - 10$	M1
	$= (3x - 5)(x + 2)$	M1A1 (3) **[6]**
4. (a)	$\log_3 3x^2 = \log_3 3 + \log_3 x^2$ or $\log y - \log x^2 = \log 3$ or $\log y - \log 3 = \log x^2$	B1
	$\log_3 x^2 = 2\log_3 x$	B1
	Using $\log_3 3 = 1$	B1 (3)
(b)	$3x^2 = 28x - 9$	M1
	Solves $3x^2 - 28x + 9 = 0$ to give $x = \frac{1}{3}$ or $x = 9$	M1 A1 (3) **[6]**

Question Number	Scheme	Marks
5. (a)	$\frac{1}{2}r^2\theta = \frac{1}{2}(6)^2\left(\frac{\pi}{3}\right) = 6\pi$ or 18.85 or awrt 18.8 (cm)^2	M1 A1
		(2)
(b)	$\sin\left(\frac{\pi}{6}\right) = \frac{r}{6-r}$	M1
	$\frac{1}{2} = \frac{r}{6-r}$	dM1
	$6 - r = 2r \Rightarrow r = 2$	A1 **cso**
		(3)
(c)	Area $= 6\pi - \pi(2)^2 = 2\pi$ or awrt 6.3 (cm)^2	M1 A1 **cao**
		(2) **[7]**
6. (a)	States or uses $\tan 2x = \frac{\sin 2x}{\cos 2x}$	M1
	$\frac{\sin 2x}{\cos 2x} = 5\sin 2x \Rightarrow \sin 2x - 5\sin 2x\cos 2x = 0$	
	$\Rightarrow \sin 2x(1 - 5\cos 2x) = 0$ *	A1
		(2)
(b)	$\sin 2x = 0$ gives $2x = 0, 180, 360$ so $x = 0, 90, 180$	B1 B1
	$\cos 2x = \frac{1}{5}$ gives $2x = 78.46$ (or 78.5 or 78.4) **or** $2x = 281.54$ (or 281.6)	M1
	$x = 39.2$ (or 39.3), 140.8 (or 141)	A1 A1
		(5) **[7]**
7. (i)	$\tan\theta = -1 \Rightarrow \theta = -45, 135$	B1 B1ft
	$\sin\theta = \frac{2}{5} \Rightarrow \theta = 23.6, 156.4$ (awrt: 24, 156)	B1 B1ft
		(4)
(ii)	$4\sin x = \frac{3\sin x}{\cos x}$	M1
	$4\sin x\cos x = 3\sin x \Rightarrow \sin x(4\cos x - 3) = 0$	M1
	Other possibilities (after squaring): $\sin^2 x(16\sin^2 x - 7) = 0$, $(16\cos^2 x - 9)(\cos^2 x - 1) = 0$	
	$x = 0$, 180 <u>seen</u>	B1 B1
	$x = 41.4$, 318.6 (awrt: 41, 319)	B1 B1ft
		(6) **[10]**

Question Number	Scheme	Marks
8. (a)	N (2, -1)	B1 B1 (2)
(b)	$r = \sqrt{\frac{169}{4}} = \frac{13}{2} = 6.5$	B1 (1)
(c)	Find x coordinates, $x_2 - x_1 = 12$ and $\frac{x_1 + x_2}{2} = 2$ then solve	M1
	$x_1 = -4, \quad x_2 = 8$	A1ft A1ft
	Find y coordinates, using equation of circle or Pythagoras let d be the distance below N of A	
	then $d^2 = 6.5^2 - 6^2 \Rightarrow d = 2.5 \Rightarrow y = ..$	M1
	So $y_2 = y_1 = -3.5$	A1 (5)
(d)	Let $A\hat{N}B = 2\theta \Rightarrow \sin\theta = \frac{6}{"6.5"} \Rightarrow \theta = (67.38)...$	M1
	So angle ANB is 134.8 *	A1 (2)
(e)	AP is perpendicular to AN so using triangle ANP $\tan\theta = \frac{AP}{"6.5"}$	M1
	Therefore AP = 15.6	A1cao (2) **[12]**
9. (i)	$\sin(3x - 15) = \frac{1}{2}$ so $3x - 15 = 30$ (α) and x = 15	M1 A1
	Need $3x - 15 = 180 - \alpha$ or $3x - 15 = 540 - \alpha$	M1
	Need $3x - 15 = 180 - \alpha$ and $3x - 15 = 360 + \alpha$ and $3x - 15 = 540 - \alpha$	M1
	x = 55 or 175	A1
	x = 55 , 135 , 175	A1 (6)
(ii)	At least one of $(\frac{a\pi}{10} - b) = 0$ (or $n\pi$) $(\frac{a3\pi}{5} - b) = \pi$ {or $(n+1)\pi$} or in degrees or $(\frac{a11\pi}{10} - b) = 2\pi$ {or $(n+2)\pi$}	M1
	If two of **above equations** used eliminates a or b to find one or both of these or uses period property of curve to find a or uses other valid method to find either a or b	M1
	Obtains a = 2	A1
	Obtains $b = \frac{\pi}{5}$ (must be in radians)	A1 (4) **[10]**

Question Number	Scheme	Marks
10. (a)	Equation of form $(x \pm 5)^2 + (y \pm 9)^2 = k$, $k > 0$	M1
	Equation of form $(x - a)^2 + (y - b)^2 = 5^2$, with values for a and b	M1
	$(x + 5)^2 + (y - 9)^2 = 25 = 5^2$	A1
		(3)
(b)	$P(8, -7)$. Let centre of circle $= X(-5, 9)$	
	$PX^2 = \left(8 - "-5"\right)^2 + \left(-7 - "9"\right)^2$ or $PX = \sqrt{\left(8 - -5\right)^2 + \left(-7 - 9\right)^2}$	M1
	($PX = \sqrt{425}$ or $5\sqrt{17}$) $PT^2 = \left(PX\right)^2 - 5^2$ with numerical PX	dM1
	$PT \left\{= \sqrt{400}\right\} = 20$	A1 **cso**
		(3) **[6]**

Examiner reports

Question 1

The vast majority of candidates could differentiate the given function correctly, though a small number got x^{-1} rather than x^{-3}. Almost all candidates set the derivative equal to zero and found x, but a minority concluded $x = \pm 2$, ignoring the domain $x > 0$.

A small number forgot to find the y coordinate. Some candidates continued to find the second derivative here although this was unnecessary extra work.

Question 2

50% of the candidates achieved full marks on this logarithm question. Most had no difficulty in applying the power rule on 2 log x, followed by the subtraction rule to produce a single log equated to 2. A common error was then to "remove the logs" incorrectly by using 2^3 instead of 3^2, but those candidates who did "remove the logs" correctly usually went on to reach the correct solutions.

Of the candidates who were not able to achieve a fully correct solution, a large proportion were able to apply the power rule, but then made no further progress – a particularly common mistake was to "expand" the brackets wrongly and change log (x – 2) to log x – log 2. There were disappointingly 22% of candidates who scored no marks on this question, showing that the topic of logs remains a problem for many candidates.

Question 3

The style of this question on the remainder theorem was unusual and candidates' performance was generally disappointing. In part (a), finding the value of $\mathrm{f}(k)$ proved surprisingly difficult. Many candidates seemed unable to appreciate that $(3k-2)(k-k)-8$ could be simplified to -8, and $3k-10$ was a popular answer.

Thankfully the majority attempted to use the remainder theorem rather than long division (which was very rarely successful) in part (b), but numerical and algebraic mistakes were very common. Sometimes the expression for the remainder was equated to 0 rather than 4, losing the method mark.

Some candidates had no idea of how to proceed in part (c) and those who made progress were often unable to reach the correct factorised form of the resulting quadratic expression. Some solved a quadratic equation by use of the formula at this stage, never achieving the required factorised form.

Question 4

As in previous examinations, logarithms continue to discriminate between candidates and a relatively small proportion (27.8%) of this paper's entrants emerged with full marks on what appeared to be a fairly standard logarithm question. In fact 24% of candidates gained no credit on this question. Particularly noteworthy was the fact that a substantial number of candidates who scored well in (a) made no progress in part (b).

In part (a) a significant minority made no real attempt at this part and for many candidates the general standard of setting out a proof was not good. The presence of "y" caused some confusion and a number of candidates omitted to mention it in their answer.

$\log_3 y = \log_3 3x^2 = \log_3 3 + \log_3 x^2 = 1 + 2\log_3 x$ was the neatest shortest method seen which could gain full marks. The jump from $\log_3 y = \log_3 3x^2$ to $1 + 2\log_3 x$ was frequently seen, without explanation, and the most common error was to replace $\log_3 3x^2$ by $2\log_3 x$. Beginning with the answer was also common, and explanations leading to a statement such as 1 = 1. Many attempting this approach failed to draw the required conclusion at the end. Less confident candidates tended to write down log laws at random. $\log_3 3 = 1$ was often seen but not used.

Using $\frac{y}{3} = x^2$ or $\frac{y}{x^2} = 3$ resulted in long methods, as did methods which involved changes of base, but candidates using these approaches frequently gained full marks even though their proof was not the most efficient.

Part (b): In some cases candidates who had shown a poor grasp of logarithms in part (a) gained full marks in part (b). A surprisingly small minority saw the connection between parts (a) and (b). Most started again and solved the equation successfully. It was very unusual to see candidates produce $y = 28x - 9$ with little effort. Those with little understanding of logarithms obviously floundered badly here and errors included $\log_3(28x - 9)$ replaced by $\log_3 28x - \log_3 9$ or $\frac{\log_3 28x}{\log_3 9}$.

Once a quadratic equation had been formed it was usually solved correctly, particularly by those who factorised. A significant minority used an incorrect quadratic formula, or did not quote the formula and made algebraic errors.

Question 5

Part (a) was well answered with the vast majority of candidates using the correct sector formula $\frac{1}{2}r^2\theta$ or perhaps finding a fraction of πr^2. Occasionally an incorrect formula was quoted. Often the exact answer 6π was given, but otherwise rounding errors were rare. Only a few candidates attempted to convert θ to degrees.

Surprisingly, for a question which only required knowledge of GCSE work, part (b) proved to be the worst answered question on the paper. Although a good number of candidates realised the question was a combination of circle properties with trigonometry, only a small number of these were able to proceed successfully by writing down a correct equation for a right-angled triangle. It is disappointing at this level to see a number of candidates who used the sine rule, and even the cosine rule, when dealing with right-angled triangles. There were however, neat, succinct solutions from some good candidates, and a few correct solutions using more complicated strategies. There were occasional correct solutions using the ratios of the edges of a 30°, 60°, 90° triangle but many complicated, incorrect methods were often seen. While many candidates left this part blank, some resorted to guessing the value of *r*. A number of candidates correctly guessed that *r* was 2 and other common wrong guesses were 1.5 and 3. There were many wrong answers for *r*, some of which gave the area of the circle greater than the sector area found in part (a); a problem when it came to answering part (c).

After failing to answer part (b), many candidates ignored part (c), but others were able to gain a mark by using an incorrect value for *r* or by indicating their intended method of "their sector area $- \pi r^2$". Premature rounding sometimes led to the loss of the final mark.

Question 6

Many candidates showed little or no skill in trigonometry. 48.4% of candidates achieved zero or only one mark on this question.

In part (a) some appeared to lack the basic knowledge that tan 2x = $\frac{\sin 2x}{\cos 2x}$ (or even that tan x = $\frac{\sin x}{\cos x}$ or equivalent). There was also badly devised notation such as $\tan = \frac{\sin}{\cos} 2x$, as if the trig "words" were separate variables unconnected to the (2x). Some gained the first mark and multiplied throughout by cos 2x to obtain sin 2x = 5 sin 2x cos 2x, but couldn't make the link from there to the required answer.

In part (b) candidates demonstrated an inability to recognize that two expressions multiplied together to equal zero mean that either or both must be zero. There were many instances of trying to draw trig curves without knowing how to interpret them into solving the equations. Very few candidates gained any B marks as they failed to solve sin2x = 0, and of those who did this even fewer obtained all 3 solutions. More candidates did achieve cos 2x = $\frac{1}{5}$, and those who then reached 2x = 78.5 usually proceeded to obtain one or both required solutions for x. Overall performance on this question was extremely disappointing with only 11% achieving full marks.

Question 7

The style of this question was unfamiliar to many candidates and this produced a generally poor performance, with weaker candidates often scoring no marks at all and many good candidates struggling to achieve more than half marks overall. Much time was wasted on multiple solutions, especially for part (i).

In part (i), where values of $\tan\theta$ and $\sin\theta$ could have been written down directly from the given equation, the most common strategy was to multiply out the brackets. This often led to protracted manipulations involving trigonometric identities and, more often than not, no answers.

Most candidates did a little better in part (ii), starting off correctly by expressing $\tan\theta$ as $\frac{\sin\theta}{\cos\theta}$ and often proceeding to divide by $\sin\theta$ and find a value for $\cos\theta$. What very few realised, however, was that $\sin\theta = 0$ was a possibility, giving further solutions 0 and $180°$. Those who tried squaring both sides of the equation were often let down by poor algebraic skills. Just a few candidates resorted to graphical methods, which were rarely successful.

In both parts of the questions, candidates who were able to obtain one solution often showed competence in being able to find a corresponding second solution in the required range. Familiarity with trigonometric identities varied and it was disappointing to see $\sin\theta = 1 - \cos\theta$ so often.

Question 8

Parts (a) and (b) Most candidates obtained the first three marks for giving the centre and the radius of the circle, but some gave the centre as (–2, 1) and a few failed to find the square root of 169/4 and gave 42.25 as the radius.

Part (c) Diagrams and use of geometry helped some candidates to find the coordinates of *A* and *B* quickly and easily. Others used algebraic methods and frequently made sign errors. A common mistake was to put $y = 0$ in the equation of the circle. This was not relevant to this question.

Part (d) Use of the cosine rule on triangle *ANB* was a neat method to show this result. Others divided triangle *ANB* into two right angled triangles and obtained an angle from which *ANB* could be calculated.

Part (e) This part was frequently omitted and there were some long methods of solution produced by candidates. It was quite common to see candidates obtain equations of lines, coordinates of *P* and use coordinate geometry to solve this part even though there were only two marks available for this. Simple trigonometry was quicker and less likely to lead to error. $6.5 \times \tan ANP$ gave the answer directly.

Question 9

Part (i) was attempted by most candidates and many scored full marks. Most correctly used inverse sine before addition and division, although a significant number manipulated the algebra incorrectly, solving $3x - 15 = 30$ as $x = \frac{30}{3} + 15 = 25$ or as $x = (30 - 15)/3 = 5$.

Many found 30 and 150 from their inverse sine leading to $x = 15$ and 55 but missed the later 390 and 510, thus failing to obtain the other two solutions in the range.

A large number did not keep to the order of operations required, applying $\sin(180 - \theta) = \sin\theta$ to some angle they had obtained in the process of trying to solve $3x - 15 = 30$. Regrettably a few candidates began with $\sin 3x - \sin 15 =$, which gained them no marks.

In Part (ii) successful solutions were rare and were evenly split between the simultaneous equation and the translation and stretches approach. There were some excellent full mark solutions. Most, however, were unable to formulate the equations required to solve for *a* and *b*. Some began correctly with $\sin\left(\frac{a\pi}{10} - b\right) = 0$, but proceeded no further. Those who continued frequently wrote $\left(\frac{a\pi}{10} - b\right) = 0$ (worth the first method mark) but followed it by $\left(\frac{3a\pi}{5} - b\right) = 0$ from which they could only get $a = 0$ and $b = 0$ from correct algebra applied to their equations. The second equation should have been $\left(\frac{3a\pi}{5} - b\right) = \pi$. Some other candidates mixed degrees and radians, for example with $\frac{a\pi}{10} - b = 0$ and $\frac{a3\pi}{5} - b = 180$ producing $a = \frac{360}{\pi}$. Some converted all angles into degrees, which could produce a correct value for *a*, but of course $b = 36$ was not acceptable.

There were some who apparently confused the value of x with that of $(ax-b)$, producing equations such as $a.0-b=n/10$, and $a\pi-b=\frac{3\pi}{5}$. In some cases, it was unclear, e.g. $\frac{\pi}{a}+b=108$ or similar, seen occasionally. This last expression (usually appearing with no explanation) might have been due to incorrect algebra, as $\frac{\pi+b}{a}=\frac{3\pi}{5}$ is correct.

Using the period of the graph was often a successful starting point, and many found $a=2$ quite easily, though some mistakenly gave $a=\frac{1}{2}$. The most common answer using this approach was $a=2$ and $b=\frac{n}{10}$ rather than the correct $a=2$ and $b=\frac{\pi}{5}$. Few appeared to have the time to check that their solution crossed the x-axis at the correct places.

Question 10

Part (a) was answered well by the majority of candidates. The x-coordinate of the centre proved an issue for some with –4, 0 or 5 frequently used and 5 or √5 were occasionally seen for the right hand side. Many lost marks in (a) for not carefully checking the form of their equation, $(x + 5)^2 + (y – 9) = 25$, and $(x + 5)^2 + (y – 9)^2 = 25$, being examples.

Fully correct solutions to part (b) were fairly uncommon and many students did not attempt this part. A common incorrect method was to find the distance from the point (0, 9) to P.

Those scoring here tended to find the distance between (–5, 9) and (8, –7) and then used Pythagoras' theorem to find the required length (although marks were sometimes lost with the wrong side being used as the hypotenuse). Some calculated the distance between the centre and P, but then did not seem to know how to use this. Some students thought this distance was the length PT (which caused them to lose marks).

Most candidates did not use annotation or diagrams to help with part (b) of the question, to understand what the question was asking. Those who did use a diagram often drew it inaccurately and labelled the points with different letters, confusing the centre with the points (0, 9) and the point P (6, –7) with the point T. But on the whole, students who successfully answered part (b) used a diagram, drawing a triangle and marking on the side they needed to find.

A significant number "found" the coordinates of one point of contact T, (–8, 5), often just stating it. A number then tried to explain the solution with 3 4 5 triangles, to which the points concerned lent themselves. It was noticeable that the coordinates of the other point of contact $(-\frac{8}{17}, 11\frac{2}{17})$ were never found in this way!

Statistics for C2 Practice Paper Gold Level G4

				Mean score for students achieving grade:							
Qu	**Max score**	**Modal score**	**Mean %**	**ALL**	**A***	**A**	**B**	**C**	**D**	**E**	**U**
1	6		86	5.17	5.93	5.84	5.56	5.04	4.44	3.96	2.24
2	5		62	3.09	4.96	4.70	3.99	3.17	2.39	1.57	0.63
3	6		56	3.34		5.10	4.13	3.40	2.65	1.87	0.73
4	6		54	3.23	5.93	5.01	3.60	2.62	1.66	1.34	0.57
5	7		37	2.56	4.83	3.61	2.87	2.49	2.11	1.74	0.90
6	7		41	2.85	6.67	5.27	3.56	2.39	1.61	1.02	0.42
7	10		29	2.93		5.65	3.50	2.48	1.66	1.02	0.36
8	12		46	5.47		7.95	5.20	3.91	3.19	2.52	1.41
9	10		44	4.43	9.18	6.67	4.66	3.73	2.57	1.85	0.74
10	6		41	2.48	5.24	4.36	3.07	2.37	1.83	1.29	0.53
	75		**47**	**35.55**		**54.16**	**40.14**	**31.60**	**24.11**	**18.18**	**8.53**