MARK SCHEME for the May/June 2006 question paper

4024 MATHEMATICS

4024/01   **Paper 1**   **maximum raw mark 80**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

* CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2006 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

Mark Scheme Notes

Marks are of the following three types:

> M Method mark, awarded for a valid method applied to the problem. Method marks are not lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, e.g. by substituting the relevant quantities into the formula. Correct application of a formula without the formula being quoted obviously earns the M mark and in some cases an M mark can be implied from a correct answer.

> C Consolation mark, sometimes awarded for an incorrect answer. In some places it may be earned in the working.

- When a part of a question has two or more "method" steps, the M marks are generally independent unless the scheme specifically says otherwise.

- FT implies that the candidate has continued correctly after an error.

The following abbreviations may be used in a mark scheme or used on the scripts:

AG   Answer Given on the question paper (so extra checking is needed to ensure that the detailed working leading to the result is valid)

BOD   Benefit of Doubt (allowed when the validity of a solution may not be absolutely clear)

CAO   Correct Answer Only (emphasising that no "follow through" from a previous error is allowed)

CWO   Correct Working Only – often written by a 'fortuitous' answer

FT   Follow through

ISW   Ignore Subsequent Working

MR   Misread

PA   Premature Approximation (resulting in basically correct work that is insufficiently accurate)

SOI   Seen or implied

SOS   See Other Solution (the candidate makes a better attempt at the same question)

1	**(a)**	52.7 (%)	1					
	(b)	70	1	2				
2	**(a)**	$\dfrac{11}{21}$	1					
	(b)	$\dfrac{8}{45}$	1	2				
3	**(a)**	($) 336	1					
	(b)	(£) 80	1	2				
4	**(a)**	5000	1					
	(b)	3	1	2				
5	**(a)**	40 (km/h)	1					
	(b)	1.6 (kg)	1	2				
6	**(a)**	Inversely	1					
	(b)	9	1	2				
				12				**12**
7		($) 640	2	2	$\dfrac{(100 \text{ or } 25) \times 800}{125}$ oe	M1		
8	**(a)**	20 30 or 8 30 pm	1					
	(b)	4 (hours)	1	2				
9	**(a)**	4×10^{-6}	1					
	(b)	(0).8 cm^3	2	3	Answer fig 8 or Fig 4 x 2 seen	M1		
10	**(a)** **(i)**	6	1					
	(ii)	8	1					
	(b)	($x =$) 2, ($y =$) 2	1	3				
11		($x =$) –7, ($y =$) –3	3	3	One correct, with supporting working	C2		
				13	or correct method to eliminate x or y	M1	**13**	

12	(a)		9	2		$\dfrac{360}{180-140}$ or $(2n-4)90$ = $140n$ oe	M1	
	(b)		$80^{(°)}$	1	3			
13	(a)		26	1				
	(b)	(i)	x^2 cao	1				
		(ii)	x^3 cao	1	3			
14	(a)		75	1				
	(b)		8	2	3	3 x 5 = 2x – 1 or 3y = 2x – 1 oe seen or 3 x 5 = 2y – 1 or 3x = 2y – 1	M1	
15	(a)		500 (m)	2		Correct method to find area under line	M1	
	(b)		$\dfrac{k}{2k}$ or (0).5	1	3	Accept $-\dfrac{1}{2}$ etc.		
16	(a)		7	1				
	(b)	(i)	50.5 (cm)	1				
		(ii)	128 (cm)	1	3			
				15				15
17	(a)		–12	1				
	(b)		$2, -\dfrac{1}{2}$ oe	2	3	One correct or $(2y+1)(y-2)$ seen	C1 M1	
18	(a)		$54^{(°)}$	1				
	(b)		$36^{(°)}$ or 90 – their **(a)** f.t.	1		O < B < 90 required		
	(c)		$36^{(°)}$ or their **(b)** f.t.	1	3	O < C < 90 required		
19	(a)		–20	1				
	(b)		$\dfrac{9C+160}{5}$ oe	2	3	9C = 5F – 5 x 32 or $\dfrac{9C}{5}=F-32$	M1	
20	(a)		2.6 (m) cao	1				
	(b)		–(0).5 (m)	1				
	(c)		–(0).8 (m)	2	4	$\dfrac{\text{Sum of readings}}{7}$ seen	M1	
				13				13

21	(a)	(i)	$\begin{array}{ccccc} - & - & 7 & 9 & 13 \\ 5 & 6 & 8 & 10 & 14 \\ 7 & 8 & - & - & 16 \\ 9 & 10 & - & 14 & 18 \\ 13 & 14 & 16 & 18 & 22 \end{array}$	1				
		(ii) (a)	6/25 oe f.t.	1		Follow through from their table		
		(b)	5/25 oe f.t.	1		Follow through from their table		
	(b)		0	1	4			
22	(a)		NAB = 90° ± 2°, AB = 14.0 ± 0.4 cm	1				
	(b)	(i)	BAC = 40° ± 2°	1				
			Perp bisector, 90° ± 2°	1		Cuts AB up to 0.2 cm from centre		
		(ii)	45(.0) to 46.5 (m)	1				
		(iii)	320°	1	5			
					9			9
23	(a)	(i)	$3x^2 - 4$	1				
		(ii)	x with no wrong working seen	2		Correct factorisation of numerator or denominator	M1	
	(b)		Condone missing outside brackets, "=0", and use of wrong letter if clear			If only solutions (even incorrect) in answer give mark(s) if factors seen		
			$7(x - 3)(x + 3)$	2	5	Incomplete factorisation seen e.g. $7(x^2 - 9)$ or $(7x - 21)(x + 3)$ etc.	M1	
24	(a)	(i)	$\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$	1				
		(ii)	Enlargement, with centre (0, 0), or factor 2	1				
	(b)	(i)	C drawn with vertices at (7, 3), (7, 4), (6, 6) and (6, 7) Accept reasonable freehand sides	2		At least 2 correct vertices or no sides or wrong centre or wrong direction	C1	
		(ii)	Shear	1				
			Factor 3 and/or x-axis invariant dep	1	6			
					11			11

25	(a)	$\left(2\frac{1}{2},4\right)$ oe	1			
	(b)	5	1			
	(c)	4/3 oe	1		Accept 1.33 or better	
	(d)	$3y = 4x + 2$ oe	2		Line of gradient their **(c)** or which passes through (1, 2) or (4, 6)	C1
	(e)	(7, 2)	1			
	(f)	$-\dfrac{3}{5}$ oe f.t.	1	7	Accept - $\dfrac{3}{\text{their (b)}}$ f.t.	
				7		**7**