UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE O Level

MARK SCHEME for the November 2005 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*.

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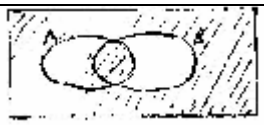
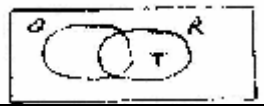
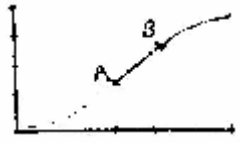
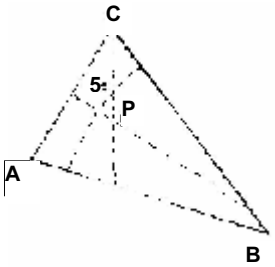
UNIVERSITY of CAMBRIDGE
International Examinations

1	**(a)**	2.44	**1**	
	(b)	(0).021	**1**	
2	**(a)**	$\frac{9}{20}$	**1**	
	(b)	$\frac{2}{15}$ c.a.o.	**1**	
3	**(a)**	$\frac{3}{8}$ or $\frac{6}{16}$ only	**1**	
	(b)	30	**1**	
4	**(a)**	M, S, L	**1**	
	(b)	20	**1**	
5	**(a)**	$\frac{1}{4}$ c.a.o.	**1**	
	(b)	2.4×10^6 c.a.o.	**1**	
6	**(a)**	190	**1**	
	(b)	$\frac{1}{2}(n+1)(n+2)$ o.e. (seen)	**1***	Accept $(n+1+1)$
			[12]	
7		$\frac{90000}{50x60}$ M1		
		30 A1	**2***	
8	**(a)**	73	**1**	
	(b)	31 f.t. their 73 − 42	**f.t. 1**	
	(c)	318	**1**	
9	**(a)**	Fig. 6	**1**	
	(b)	Fig. 4	**1**	
	(c)	Fig. 2	**1**	
10	**(a)**	75	**1**	
	(b)	$\frac{360}{180-165}$ or $(2n-4)\,90 = 165n$ M1	**1**	o.e.
		24 A1	**2***	
			[11]	
11	**(a)**	$5x(x-2)$	**1**	
	(b)	4	**1**	
	(c)	0 or −2	**1**	
12	**(a)**	$A\hat{C}B = C\hat{D}A$ *and* $B\hat{A}C = A\hat{C}D$	**1**	Any irrelevant or wrong information = 0
		$\Rightarrow \Delta$ s similar	**1**	
	(b)	$\frac{7}{AD} = \frac{4}{6}$ *or* $\frac{6}{9}$ M1		
		10½ A1	**2***	

13	**(a)**		**1**	
	(b)	**(i)** Squares	**1**	
		(ii) 	**1**	Any clear indication of a set in R ∩ Q'
14	**(a)**	$y \geq \frac{1}{2}x$ o.e.	**1**	
	(b)	$-4\frac{1}{2} \leq x < -2$ M1 −4 and −3 A1	**2***	Accept as separate statements
			[12]	
15	**(a)**	$\begin{pmatrix} 0 & 1 \\ -1 & 2 \\ 0 & -3 \end{pmatrix}$	**2**	**SC1** for 4 or 5 elements correct
	(b)	$\begin{pmatrix} 1 & -1 \end{pmatrix}$	**2**	**SC1** for a (1 x 2) matrix
16	**(a)**	−17	**1**	
	(b)	5	**1**	
	(c)	$\frac{1}{3}(x+5)$	**1**	Allow y etc.
	(d)	3 f.t.	**f.t. 1**	
17	**(a)**	Idea of 100 ± 2.5 *or* 75 ± 2.5 M1		i.e. any one of 97.5, 102.5, 72.5 or 77.5 seen
		340 A1	**2***	
	(b)	$\frac{22.5 \text{ or } 21.5}{2.5 \text{ or } 3.5}$ M1		
		9 A1	**2***	
18	**(a)**	$x = 0$	**1**	
		$y = -2$	**1**	
	(b)	**(i)** 13200	**1**	
		(ii) 500	**1**	
			[16]	
19	**(a)**	219 → 221 incl.	**1**	
	(b)	13	**1**	
	(c)	All 8 points plotted correctly P1 Smooth curve C1	**2**	
	(d)	A – any comparison using curves	**1**	
20	**(a)**	13 − 14	**1**	
	(b)	$\frac{2}{3}$ or 0.66 − 0.67	**1**	
	(c)	**(i)** 500	**1**	
		(ii) 700 f.t. their 500 + 200	**f.t. 1**	
	(d)	 straight line L1 curve C1	**2**	A B from (30,300) to (40, their 500 f.t.) from (40, their 500 f.t.) to (60, their 700)
			[11]	

21	**(a)**	(4, 4)	**1**	
	(b)	(2½, 2)	**1**	
	(c)	$y = 4$	**1**	
	(d)	$y = ½x - ½$ B1 + B1	**2***	Mark at earliest $ax + by + c = 0$ stage
	(e)	20	**1**	
22	**(a)**	(6, 2)	**1**	
	(b)	**(i)** (− 2, 0)	**1**	
		(ii) 90° AC	**1**	
	(c)	(0, −2), (−4, −2) (−6, −6)	**2**	**SC1** for 2 points plotted correctly or 3 points stated
	(d)	$\begin{pmatrix} -\frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$	**1**	
			[12]	
23	**(a)**	(i) 1:2 000 000	**1**	
		(ii) 235 − 237	**1**	
	(b)	 Constructions I L bisect C1 II I bisect M1 III arc B1 The possible positions clearly indicated P1	**4**	I within 2° II within 2° 2 mm III within 2 mm
			[6]	