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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the June 2004 question papers

0580/0581 MATHEMATICS

0580/01, 0581/01	Paper 1 (Core), maximum raw mark 56
0580/02, 0581/02	Paper 2 (Extended), maximum raw mark 70
0580/03, 0581/03	Paper 3 (Core), maximum raw mark 104
0580/04, 0581/04	Paper 4 (Extended), maximum raw mark 130

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do 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 June 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

Grade thresholds taken for Syllabus 0580/0581 (Mathematics) in the June 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	56	-	41	28	23
Component 2	70	58	38	26	-
Component 3	104	-	77	50	39
Component 4	130	93	57	37	-

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
 The threshold (minimum mark) for D is set halfway between those for Grades C and E.
 The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
 Grade A* does not exist at the level of an individual component.

TYPES OF MARK

Most of the marks (those without prefixes, and 'B' marks) are given for accurate results, drawings or statements.

- **M** marks are given for a correct method.
- **B** marks are given for a correct statement or step.
- **A** marks are given for an accurate answer following a correct method.

ABBREVIATIONS

a.r.t.	Anything rounding to
b.o.d.	Benefit of the doubt has been given to the candidate
c.a.o.	Correct answer only (i.e. no 'follow through')
e.e.o.	Each error or omission
f.t.	Follow through
o.e.	Or equivalent
SC	Special case
s.o.i.	Seen or implied
ww	Without working
www	Without wrong working
	Work followed through after an error: no further error made
—	Work followed through and another error found
*	Indicates that it is necessary to look in the working following a wrong answer

June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 56

SYLLABUS/COMPONENT: 0580/01, 0581/01

MATHEMATICS

Paper 1 (Core)



Page 1	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	1

1		39	1	
2		842	1	Ignore any or no units after answer. Allow 84200cm.
3	(a)	$\frac{3}{4}$ final answer	1	
	(b)	$\frac{7}{100}$ final answer	1	
4	(a)	49	1	
	(b)	31	1	
5		4.5(0)	2	M1 for 18 x 25 or 450 or 4m 50cm seen (18:450 and 18:4.5 also indicate M1)
6		$4\frac{1}{2}$ or $\frac{9}{2}$ or $\frac{18}{4}$ or $4\frac{2}{4}$	2	M1 for $\frac{9}{4} \times \frac{2}{(1)}$ seen. Allow SC1 for 4.5 or $4\frac{1}{2}$ oe seen with incomplete or decimal working. ($\frac{9}{4}$ or $\times \frac{2}{(1)}$ oe or $2.25 \div 0.5$) Answer only, no working, is 0.
7		141.5, 142.5	2	1 for each answer SC1 for both values correct but wrong way round.
8		$2x(2y - 3z)$	2	M1 for $2(2xy - 3xz)$ or $x(4y - 6z)$ or $2x$ (wrong expression) Allow omitted last bracket.
9		190.48 or 190.47 or 190	2	M1 for $200 \div 1.05$, implied by 190.(....) Not allow 190.5 or 190.4 or 190.00 for 2 marks
10	(a)	0	1	(a) and (b) reversed–no marks
	(b)	2	1	

18

11	(a)	110°	2	B1 for $Q = 35^\circ$ s.o.i.(can be on diagram) 70 seen implies B1.
12	(a)	3	1	
	(b)	0	1	
13	(a)(i)	200 40	1	
	(a)(ii)	5f.t.	1	Only f.t. for simple mental calculation. E.g. $220 \div 40 = 5.5$ or $200 \div 30 = 6$ or 7 or $6\frac{2}{3}$ or 6.6 or 6.66 etc
	(b)	5.6	1	
14		B or 2 nd – dependent on M1, M1	3	M1 for a correct method for 1 bottle, implied by figs 615 or 652 seen or figs 1625 or 153... seen. M1(dep) for a complete correct method with consistent units. (Implied by a correct pair of values seen. Alt. Method completely correct is M2
15		2.65 or 2.649(....)	3	M1 for $\sin 32^\circ = \frac{h}{5}$ M1 (dep) for $h = 5\sin 32^\circ$ (2.6....implies M2 provided no obvious scale drawing, which is zero) Other methods can be split similarly. From grads 2.409 or radians 2.757 implies M2

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Page 2	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	1

16	(a)	13	2	M1 for $-3 + 16$ seen
	(b)	$\frac{y-a}{b}$ or $\frac{y-a}{b}$ oe Allow $\frac{a-y}{-b}$	2	M1 for a correct step, for clearly dividing by b or $y - a$ seen.
17		Bar Chart	4	S1 correct scale and equal width bars. (Lost for vertical lines drawn) B2 all bars correct height or B1 for any 2 bars correct height. Dots or line graph is B0. L1 correct labels.
18	(a)	\$4.5(0)	2	M1 for $50 \times (0.25 \text{ or } 25)$ or $\$12.5(0)$ or 1250 seen, or $0.25 - 8 \div 50 = (0.09)$ or $25 - 800 \div 50 = (9)$
	(b) *	56.25 or 56 or 56.3 or 56.2	2f.t.	M1 for their (a)/8 x 100 or <u>their profit for 1 orange</u> x 100 their cost for 1 orange
19	(a)	2826 to 2828 or 2830	2	M1 for $\pi \times 30^2$ or $\pi \times 0.3^2$ and method not spoilt.
	(b) *	226.(080) to 226.(240) or 226.(4...)	2f.t.	M1 for his (a) x 80 s.o.i. or correct f.t. answer seen in cubic centimetres.

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20	(a)	9	2	M1 for $31 + 5$ or $\frac{31-5}{4}$ or $x - 1.25 = 7.75$
	(b)	14	2	M1 for $4y - 20 = 36$ or $y - 5 = 9$ or better.
21	(a)	00 15 or 12 15am Ignore am added to 00 15	1	Allow a clear time in words. E.g. 15 minutes after midnight. Not 12 15 or 24 15
	(b)(i) *	7 h 30min Allow $7\frac{1}{2}$ or 7.5 hours	1f.t.	f.t. their (a)
	(b)(ii) *	749.(33....) f.t.	3f.t.	B1 for their 7.5 or $7\frac{1}{2}$ or their 450 minutes and (finally) multiplied by 60 used . M1 for 5620/their time (independent of B1) (f.t. dependent on B1 and M1) [Watch for $5620 \div 7.3 = 769.(86...)$ implies B0 M1.]

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MARK SCHEME

MAXIMUM MARK: 70

SYLLABUS/COMPONENT: 0580/02, 0581/02

MATHEMATICS

Paper 2 (Extended)



Page 1	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	2

Question Number	Mark Scheme		Notes
1	3h 20m	1	
2	10.9	1	
3	$0.5^3 < 0.5^2 < \sqrt{0.5}$	2*	M1 for 0.25, 0.7.... and 0.125 seen matched
4	$\frac{1}{2}p^{20}$	2	B1 $\frac{1}{2}$ or p^{20}
5	24	2*	M1 $x/4 = 6$ or $x - 32 = -8$ seen
6	6375 6385	1, 1	B1 correct but reversed
7	7	2*	B1 for one of -7/8, -1/8, -14/16, -2/16, -0.875, -0.125
8 (a)	4	1	
(b)	4	1	Not 90 or $\frac{1}{4}$ turn
9	450	2*	M1 for $3000 \times 7.5 \times 2/100$
10 (a)	80000	1	8×10^4
(b)	8×10^4	1 $\checkmark$	
11	$x = 8 \quad y = 1$	3*	M1 double and add/subtract consistently A1 A1 or M1 rearrange and substitute correctly
12	50, 5, 3	1, 1, 1	
13	$\sqrt{\left(\frac{c-e}{k}\right)}$	3*	R1, R1 for any 2 correct steps moving e, k or $\sqrt{\quad}$ Allow $d^2 = (c-e)/k$ to score R2 as a single step
14 (a)		1	Arc must not continue outside rectangle. Radius of arc 4 cm $\pm$ 1 mm. Ignore shading
(b)	12.6	2*	M1 for $\frac{1}{4} \times \pi \times 4^2$
15	4	3*	M1 Area factor or ratio 9 M1 LSF 3
16 (a)	$a + c$	1	
(b)	$a - c$ or $-c + a$	1	
(c)	$-\frac{1}{2}a - \frac{1}{2}c$ or $-\frac{1}{2}(a + c)$	2*	M1 A0 for answers simplifying to these seen
17		2* 2* 1	M1 2 arcs centre B and D, line drawn A1 M1 construction arcs on AD and CD and centre these for the bisector, line drawn A1 Dependent on at least 1 + 1 in part (a) SC1, SC1 If accurate and no construction arcs
18 (a)	114	2*	M1 $78^2 + 83^2$
(b)	(0)47 cao	3*	M1 for finding one angle by trigonometry correctly M1 for clearly identifying bearing angle Scale drawing and answers with no working score zero
19 (a)	11	1	
(b)	$x + 2$	2*	M1 $\frac{2(x+1)}{2} + 1$
(c)	3	2*	M1 for explicit $g(1)$ or $g^{-1}(x) = \frac{x-1}{2}$
20 (a)	$3(2x - y)(2x + y)$	2	B1 $(6x - 3y)(2x + y)$ o.e.
(b)	(i) $x^2 - 6x + 9$	2*	M1 correct method
(ii)	$p = 3 \quad q = 1$	2	B1, B1

Page 2	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	2

21	(a)	1.8	2	M1 convincing gradient calculation or use of $a = (v - u)/t$
	(b)	450	2*	M1 for $20 \times 18 + \frac{1}{2} \times 10 \times 18$
	(c)	13	3*	M1 for finding total area under graph ((b) + 135) dep M1 for $\div 45$ If the vertical scale is consistently misread then M4 A0 is available
22	(a)	BA or (iii)	2*	M1 checking order of all 4 matrices correctly
	(b)	$\begin{pmatrix} 38 & 0 \\ 0 & 38 \end{pmatrix}$	2	M1 either column or row correct
	(c)	$\frac{1}{38} \begin{pmatrix} 4 & 6 \\ 5 & -2 \end{pmatrix}$ or $\begin{pmatrix} 4/38 & 6/38 \\ 5/38 & -2/38 \end{pmatrix}$	1	$\begin{pmatrix} 2/19 & 3/19 \\ 5/38 & -1/19 \end{pmatrix}$ or $\begin{pmatrix} 0.105 & 0.158 \\ 0.132 & -0.0526 \end{pmatrix}$
TOTAL			70	

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INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 103

SYLLABUS/COMPONENT: 0580/03, 0581/03

MATHEMATICS

Paper 3 (Core)



Page 1	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	3

FINAL MARK SCHEME

0580/3

June 2004

Question Number	Answer	Marks	Comments	Total
1 a i	51	1		
ii	49	2	M1 for clear evidence of ranking	
iii	46	2	M1 for total/10, allowing errors in addition	
b i	20 60 160 80 40 (360)	2	M1 for evidence of $\times 4$ oe seen or SC1 for 3 or 4 correct	
ii	correct pie chart ($\pm 2^\circ$) correct labels	2 L1	5 sectors only. Any order. Or SC1 for 3 or 4 correct or ft correct 4 or 5 correct or ft correct	
iii a	4/9 oe	1	allow (0).44..., 44'....%, but not 0.4	
iii b	1/3 oe	2	M1 for <i>their</i> $((D+E)/T)$ from their table. Can be implied. For both parts –1 once for incorrect notation eg 4 out of 9, 1:3, 4 in 9 etc 0.3 ww is zero	
				13 13
2 a	9	1		
b i	6	1		
ii	18	1✓	ft for $3 \times$ <i>their</i> bi (not strict ft)	
c i	(0).6	2	M1 for 3×0.2	
ii	30	2✓	M1 for <i>their</i> bii/ci (not strict ft) or $2 \times 3/0.2$	
d	(0).02	2	M1 for $2 \times 0.1 \times 0.1$ oe SC1 for <i>fig</i> 2	
e	4.8(0) 9(.00) 14.4(0) 2.1(0) 30.3(0)	4 1✓	B1 for each ft from 4 total costs	
				14 14
3 a	7 8 4 –1	3	B2 for 3 correct or B1 for 2 correct	

Page 2	Downloaded from eduresourceza.com Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	3

b	13 correct or ft correct points ($\pm 1/2$ a square) Correct curve cao	P3✓ C1	P2✓ for 11 or 12 correct or P1✓ for 7 to 10 correct reasonable parabola shape, no straight line segments, pointed maximum etc	
c	- 2.7 to -2.9 2.7 to 2.9	1 1		
d	-1 5	1 1		
e	correct line drawn $-3 \leq x \leq 3$	2	M1 for incomplete line or freehand line or both their (in)correct points correctly plotted	
f	2	2	M1 for attempt at $\Delta y / \Delta x$ from their straight line graph	
g	-3 1	1 1	-1 if y values given as well	
				17 17
4 a	120	1		
b	70	2	M1 for $t+2t+75+75=360$ oe $3t$ and 210 implies M1	
c i	130 oe (eg 180-50)	2	M1 for angle sum of triangle(=180) used	
ii	100 oe (eg 360-100-160)	2	M1 for angle sum of quadrilateral(=360) used	
iii	$x=70$ and $y=30$	3	✓M1 for attempted elimination of one variable (be generous) A1 for each answer. no ft. correct answers reversed implies M1A1	
				10 10
5 a	(0).2	1		
b i	Tangent and radius mentioned	1	or described.	

Page 3	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	3

ii	8 cao	1		
iii	art 1.78	3	M1 for $(their) 8^2 - 7.8^2$ oe M1(indep) for square root indicated or used 1.77 ww implies M2. 1.8 ww is zero	
iv	6.9 (2 sig figs only)	3√	ft for answer correct to 2 sig figs (not strict ft) ($3.9 \times their biii$) or M1 for $0.5 \times 7.8 \times their biii$ + A1 for answer to more than 2 sig figs	
				9
6 a i	translation cao 10 -2	B1 B1 B1	or translated -1 for incorrect notation or a description SC1 for both answers correct but inverted	
ii	rotation or turn centre the origin oe (+) 90 (anticlockwise)	M1 A1 A1	 allow quarter turn for M1A1	
b i	correct reflection drawn	2	SC1 for reflection in x -axis	
ii	correct enlargement drawn	2	SC1 for scale factor 2, wrong centre	
				10 19
7 a i	pentagon	1		
ii	540	2	M1 for 3×180 , or $5 \times 180 - 360$ or $(180 - 360/5) \times 5$ or 6×90	
iii	108 cao	1		
b i	110 or $x=70$ or $y=20$ completion	M1 A1	may be on diagram Beware of circular arguments	
ii	art 50.2	2	M1 for $\tan(^{-1})$ and 120/100	
iii	120(.2)	1√	ft for $70 + their bii$	

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iv	300	1√	ft for 180+ <i>their</i> biii –1 for answers reversed	
				10 10
8 a i	6 (±0.1)	1		
ii	10	2√	√SC1 for 10^n where n is an integer. (ft 60/ <i>their</i> ai)	
iii	73 to 76	1		
b	both lines drawn (±0.1 cm)	2	B1 for each line. Ignore any curves at ends, lines must be at least 5 cm long. Allow dotted etc	
c	mediator drawn (±0.1 cm and 1°) with two pairs of arcs	2	B1 for correct line with no arcs or correct arcs with no line	
d	complete circle, radius 4 (±0.1) cm drawn, centre C	2	SC1 for incomplete circle	
e	L marked correctly	1	be convinced	
				11
9 a i	12	1		
ii	20	1		
iii	$2n+2$ oe	2	M1 for $2n+k$ where k is an integer	
b i a	20	1		
b i b	25	1		
ii	48	2	M1 for 12 seen (as diagram no.)	
iii	100	2	M1 for 10 seen	
				10 21

TOTAL MARKS 104

June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

Paper 4 (Extended)



Page 1	Mark Scheme	Syllabus	Paper
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Q1(a)(i)	$\frac{60}{100} \times 120$	o.e.	M1	Implied by 72 seen and not spoilt.
	(S) 132	c.a.o.	A1	ww2
	(ii) $\frac{\text{their(a)(i)} \times 100}{120}$	o.e.	M1	$\sqrt{\text{ft } \frac{\text{their(a)(i)} \times 100}{120}}$
	110(%) Final answer, but may be explained using 10.		A1 $\sqrt{}$	Sc1 for 10 <u>or</u> their extra % <u>or</u> $\frac{\text{their(a)(i)} - 120}{x100}$
	(b) $\frac{159.10}{\text{their } 86} (x100)$	o.e.	M1	120 Allow any statement that equates 159.10 with 86% provided it is not contradicted later.
	(S) 185	c.a.o.	A1	
	(c) $\frac{156}{169} \times 52$	o.e.	M1	ww2 Alt. Method $\frac{156}{156+169} = \frac{x}{x+52}$ o.e.
	48(cm)	c.a.o.	A1	
	(d)(i) $\frac{11}{20} \times 36$	o.e.	M1	ww2 Method not spoilt by also doing $\frac{9}{20} \times 36$
	19.8(km)	c.a.o.	A1	
	(ii) $36 \times \frac{23}{2}$	o.e.	M1	ww2 Condone 19.8:16.2 16.2:19.8 is M1A0
	414(km)	c.a.o.	A1	ww2
				12
Q2(a)(i)	p = 9 q = -3 r = 9		1+1+1	Must be seen. No feedback from graph.
	(ii) Scales correct		S1 $\sqrt{}$	x from -3 to 4. y to accommodate their values.
	Their 8 points plotted correctly (1mm)		P2 $\sqrt{}$	P1 $\sqrt{}$ for 6 or 7 of their points correct.
	Reasonable curve through all 8 of their points (1mm tolerance)		C1 $\sqrt{}$	Condone ruled line for x = 3 to 4 or -3 to -2.
	(iii) Tangent drawn at x = -1 on curve -3.5 to -2.5 Condone fractions		T1	ft provided correct shape maintained.
			B2	Or a parallel line drawn.
				If B2 not scored, give B1 for 2.5 to 3.5 after M1.
	(b)(i) u = 6.33 or better v = 6		1+1	Allow u = 19/3
	(ii) Their 6 points plotted correctly (1mm)		P3 $\sqrt{}$	P2 for 5 correct ($\sqrt{}$). P1 for 4 correct ($\sqrt{}$).
	Reasonable curve through all 6 of their points (1mm tolerance)		C1 $\sqrt{}$	Condone ruled line for x = 2 to 3.
	(c)(i) $x^2 - x - 3 = 6 - x^3/3$	o.e.		ft provided correct shape maintained
	(ii) to $x^3 + 3x^2 - 3x - 27 = 0$		E1	At least 1 intermediate step and no errors seen.
	2.3 to 2.7	c.a.o.	B1	Not coordinates
				18
Q3(a)(i)	Median 36 to 37 (cm)		B1	
	(ii) IQR 19 to 21 (cm)		B2	Sc1 for 45.5 to 46.5 <u>or</u> 25.5 to 26.5 seen.
	(iii) Evidence of using 146 (approx)		M1	
	32 to 33 (cm)		A1	ww2
	(iv) 275 to 281		B2	Sc1 for 84 to 90 seen
	(b)(i) 350 - 303		B1	
	365 - 350		B1	
	(ii) Midpoints 5,15,25,35,45,55,65		M1	At least 6 correct s.o.i.
	$\sum fx$ attempted (13065)		M1*	Dep. on first M1 <u>or</u> using midpoints ± 0.5
	$\sum fx / 365$		M1	Dep. on second M1*
	35.8 or 36 or 35.79 www		A1	www4 [35.79452055]
	(c) 2.9 (cm)	c.a.o	B1	ISW subsequent rounding to 3 or 5 once seen.
	Evidence of dividing by 30	o.e	M1	eg a factor of 1.5 used constructively.
	4.9 (cm)	c.a.o	A1	
				16

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Q4(a)	$(AC^2 =) 9.5^2 + 11.1^2 - 2 \times 9.5 \times 11.1 \cos 70$ square root of correct combination (141.3279...) or 11.888... 11.9 (cm)	M2	Allow M1 for $\frac{9.5^2 + 11.1^2 - AC^2}{2 \times 9.5 \times 11.1} = \cos 70$
(b)	(Opp. angles of) cyclic quadrilateral (add to 180)	M1	Dep. on previous M2. Must be convinced that errors are due to slips <u>not</u> incorrect combination.
(c)	70 – 37 attempted s.o.i. $\frac{AD}{\sin 33} = \frac{\text{their}(a)}{\sin 110}$ o.e. (AD =) $\frac{\text{their}(a) \times \sin 33}{\sin 110}$ art 6.89 or 6.90 (cm)	A1	www4 Scale drawing gets M0A0.
(d)(i)	70	B1	Condone $180 - 70 = 110$ o.e. (not spoilt)
(ii)	(h =) $\frac{\text{their}(a) \times \tan 55}{2}$ or $\frac{\text{their}(a)}{2 \tan 35}$ (8.497..) o.e. (area =) $0.5 \times \text{their}(a) \times \text{their}(h)$ o.e. 50.4 to 50.8 (cm²)	M1	e.g. 32 or 34 or 43, but be convinced. Dep. on first M1
		M1	Dep. on M2 Would imply M3 if nothing incorrect seen earlier.
		A1	Condone 6.9 www4 Scale drawing gets M0A0
		B1	If not 70, ft for method in (ii), but not from 90 or 60
		M1	(EC or EA =) $\frac{\text{their}(a)}{2 \sin 35}$ or $\frac{\text{their}(a)}{2 \cos 55}$ (10.37...) o.e.
		M1	Dep. on first M1 (area =) $0.5 \times EC \times EA \times \sin 70$ <u>or</u> Hero's Method
		A1	www3 13
Q5(a)	10/x or 10 ÷ x o.e.	B1	Ignore all units in answers to Question 5. Not $x = 10/x$
(b)	$\frac{10}{x} - \frac{10}{x+1} = \frac{1}{2}$ o.e. $20(x+1) - 20x = x(x+1)$ o.e. $x^2 + x - 20 = 0$	M2	Condone 30 for $\frac{1}{2}$ If M0 give Sc1 for $\frac{10}{x+1}$ s.o.i.
		MA1	Dep on M2. No longer condoning 30 o.e. Sc1 for $20x - 20(x+1) = x(x+1)$ o.e. after B1Sc1
		E1	No error of any kind at any stage <u>and</u> sufficient working to convince you (at least 1 extra step)
(c)	$(x+5)(x-4) (= 0)$ -5 and 4 c.a.o.	M1	$\frac{-1 \pm \sqrt{1^2 - 4.1.(-20)}}{2}$ No errors or ambiguities
		A1	www2
(d)	Rejects negative solution 2.5 (hours) c.a.o.	R1 B1	May be explicit or implicit and could be in (c) Condone 2 hrs 30 (mins) or 150 mins

Q6(a)(i) (ii) (b) (c)	$\frac{2 \times \pi \times 7^3}{3} + \frac{\pi \times 7^2 \times 13}{3}$ 1384.7 to 1386 or 1380 or 1390 (cm³) their(a)(i) x 0.94 1.3 (kg) (L =) $\sqrt{(13^2 + 7^2)}$ $\pi \times 7 \times \text{theirL}$ 324 to 326 (cm²) CSA of hemisphere = $2 \times \pi \times 7^2$ s.o.i. their(b) + their CSA 631.7 to 634 $\frac{411.58}{\text{their total}}$ s.o.i. (\$)<u>0.649 to 0.652 or 64.9 to 65.2 cents</u>	M1 A1 M1 A2✓ M1 M1 A1 M1 M1 A1 M1 M1 A1 M1 A1	www2 ✓ ft $\frac{\text{their(a)(i)} \times 0.94}{1000}$ www3 If A2 not scored, allow A1 ✓ for 1.30... Implied by $\sqrt{218}$ or 14.7..... or 14.8 Dep. on first M1. www3 307.7 to 308 if no working Dep. on first M1 Seen or implied by subsequent working. Dep. on a total www5 13 NB M1M1A0M1A1 is not possible.
Q7(a)(i) (ii) (iii) (iv) (b)(i) (ii) (iii) (iv)	Venn Diagram with 12, 8, 7, 3 or with 20 – x, x, 15 – x, 3 8 $\frac{12}{30}$ o.e. $\frac{12}{20}$ o.e. $\frac{3}{9} \times \frac{4}{10}$ $\frac{12}{90}$ o.e. c.a.o. 1 – their(b)(i) $\frac{78}{90}$ o.e. c.a.o. $\frac{5}{8}$ or $\frac{5}{9}$ seen $\frac{6}{9} \times \frac{5}{8} \times \frac{6}{10} \times \frac{5}{9}$ seen $\frac{900}{6480}$ o.e. c.a.o. p(4 blacks) $\frac{3}{9} \times \frac{2}{8} \times \frac{4}{10} \times \frac{3}{9}$ (=1/90) 1 – their(b)(iii) – their p(4 blacks) $\frac{5508}{6480}$ o.e. c.a.o.	B2 B1✓ B2✓ B2✓ M1 A1 M1 A1✓ M1 M1 A1 M1 M1 A1	-1 each error/omission. Condone lack of labels. ✓ ft their 8 on diagram, but not x ✓ ft (their 12)/30 from (i) or (ii) Sc1 for $k/30$ where $k < 30$ ✓ ft (their 12)/20 from (i) or (ii) if their 12 < 20 Sc1 for $m/20$ where $m < 20$ In all of Q7, accept fractions, decimals or %. Mark as ISW for wrong cancelling. Dec. or % need to be exact or accurate to 3 sf. No ratios. Other inappropriate notation is –1 once. or $\frac{6}{9} \times \frac{6}{10} + \frac{6}{9} \times \frac{4}{10} + \frac{3}{9} \times \frac{6}{10}$ ✓ ft 1 – their (b)(i) Allow a slip in 1 digit, but must use 4 fractions multiplied. Simplest $\frac{5}{36}$ Alt. method. Must see all 14 combinations. Dep. on first M1. Must add them Simplest $\frac{17}{20}$ 17

Q8(a)	(i) Rotation (only) 90 (anticlockwise)(about O) or $\frac{1}{4}$ turn	B1 B1	“only” --- no other transformation mentioned. Ignore all matrices, except in (v). Do not allow “turn” for rotation Accept 270 <u>clockwise</u> or -270
	(ii) Translation (only) $\begin{pmatrix} -2 \\ -5 \end{pmatrix}$ o.e.	B1 B1	<u>Not</u> translocation, transformation, transportation. eg 2 to left and 5 down. Condone $\begin{pmatrix} -2 & -5 \end{pmatrix}$ and lack of brackets.
	(iii) Reflection (only) $y = -x$ o.e.	B1 B1	
	(iv) 180 (or $\frac{1}{2}$ turn) Rotation (only) Centre (1, -1)	B1 B1	Enlargement sf = -1 earns B2 Sc1 for “Point Symmetry”
	(v) Enlargement (only) Scale Factor 2 (centre O)	B1 B1	Accept $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ for scale factor 2
	(vi) Shear (only) y axis invariant <u>or</u> parallel to y axis	B1 B1	Ignore any mention of scale factor.
	(b) B	B2	
	(c)(i) $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	B2	Sc1 for a correct column
	(ii) $\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$	B2	Sc1 for a correct column
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Q9	(a) $15x + 25y \leq 2000$ seen	B1	Allow $0.15x + 0.25y \leq 20$ but no others.
	(b) $y \leq x$ o.e. c.a.o.	B2	Sc1 for any other sign between x and y
	(c) $y \geq 35$ o.e. c.a.o.	B1	
	(d)(i) Scales correct and full length.	S1	Reversed scales S0
	(ii) $3x + 5y = 400$ correct (1mm) at (0,80) and (100,20) <u>and</u> long enough. $y = x$ correct $y = 35$ correct	B2 L1 L1	Sc1 for either point correct.
	Shading correct (in or out)	B1 ✓	✓ ft from slips in lines that do not compromise the idea of the triangle.
	(e) 38 c.a.o.	B1	
	(f) Identifying any point(s) in their area (enclosed by 3 lines or 3 lines and 1 axis). (75, 35) s.o.i. c.a.o. (\$ 6.2(0) <u>or</u> 620 (cents)	M1 A1 B1 ✓	Implies M1 ✓ ft their (75, 35) evaluated for whole numbers only. Condone lack of units but not wrong units. www3
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