UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0580, 0581 MATHEMATICS

0580/04, 0581/04 Paper 4 (Extended), maximum raw mark 130

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UNIVERSITY of CAMBRIDGE
International Examinations

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0580, 0581	04

1 (a) (i)	**250**	**B1**	
(ii)	their **(a)(i)** $\div 5 \times 52$ o.e. **2600** ft www2	**M1** **A1 ft**	**SC1** for $12.5 \div 5 \times 52$, implied by 130
(iii)	$\frac{\textit{their (a)(ii)} - 2450}{2450} \times 100$ o.e. **6.1**(22……..) ft www2	**M1** **A1ft**	$\frac{\textit{their (a)(ii)}}{2450} \times 100 - 100$, $\frac{2450}{100} = \frac{150}{x}$ ft M & A only if their **(a)(ii)** > 2450
(b) (i)	$20 \div 5 \times 3$ **12** www2	**M1** **A1**	Accept 12, 8 or 8, 12
(ii)	*their* ***(b)(i)*** $\div 3$ and $(20 -$ *their* ***(b)(i)***$) \div 2.5$ **7 hours 12 mins** cao www2	**M1** **A1**	4 and 3.2 or 7.2 or 7h 20 mins seen imply **M1** Condone poor notation e.g. 7-12
(iii)	**2.78** (2.777–2.778) o.e. cao o.e. in other units	**B1**	o.e. must have units stated e.g. 0.7716..m/s, 46.29 – 46.30 m/min
(iv)	**16 07** o.e. ft	**B1 ft**	ft their **(b)(ii)** + 08 55 iff finishes on same day and **(b)(ii)** has hours **and** mins
(c)	$20 \times 100000 \div 80$ o.e. **25 000 or 2.5** $\times 10^4$ www2	**M1** **A1**	25 000 seen in final ans. After M0, **SC1** for figs 25 or 0.00004 final answer **[13]**

2 (a) (i)	$(x + 4)(x - 5)$	**B2**	If B0, **SC1** if of form $(x \pm 4)(x \pm 5)$,
(ii)	**–4, 5** ft	**B1 ft**	Only ft the SC –4, and 5 **not** from $(x - 4)(x + 5)$.
(b)	$\frac{-(-2) \pm \sqrt{(-2)^2 - 4.3 - 2}}{2.3}$	**B1,B1**	**B1** for $(-2)^2 - 4(3)(-2)$ (or better) seen inside a square root. The expression must be in the form $\frac{p + (\text{or}-)\sqrt{q}}{r}$ then **B1** for $p = -(-2)$ and $r = 2.3$ or better Allow recoveries from incomplete lines
	–0.55, 1.22 cao	**B1,B1**	If B0, **SC1** for –0.5 **and** 1.2 or **both** answers correct to 2 or more decimal places (rounded or truncated). –0.54858, 1.21525…
(c) (i)	$(m - 2n)(m + 2n)$	**B1**	
(ii)	**–12**	**B1**	
(iii)	**20***x* **+ 5** o.e. cao final ans	**B2**	**B1** for $(4x^2 + 6x + 6x + 9)$ **or** $(x^2 - x - x + 1)$ **or** $(2x + 3 - 2(x - 1))(2x + 3 + 2(x - 1))$
(iv)	$4n^2 = m^2 - y$ o.e. $n^2 = \frac{m^2 - y}{4}$ o.e. $(n) = \sqrt{\frac{m^2 - y}{4}}$ o.e. www3 **Mark final answer**	**M1** **M1** **M1**	**M1** for correct re-arrangement for n^2 term (may be $-n^2$) **M1** for correct division by 4 or – 4 **M1** for correctly taking square root of n^2 term **SC2** for $\sqrt{\frac{y \pm m^2}{4}}$ or $\sqrt{\frac{m^2 - y}{4}}$ o.e. ww
(d) (i)	**4 or –4 or** ± 4	**B1**	
(ii)	$n(m^4 - 16n^4)$ or $(m^2n - 4n^3)(m^2 + 4n^2)$ or $(m^2n + 4n^3)(m^2 - 4n^2)$ or $n(m - 2n)(m + 2n)(m^2 + 4n^2)$	**M1** **A1**	**Correctly** taking out *n* or a **correct** factor with *n* still in one bracket Must be final answer **[17]**

3			**Accept all probability answers as fractions (non-reduced or reduced), decimals or percentages.** **–1 once for 2 sf answers or correct words.** **Condone numerical errors in simplifying or converting after correct answers seen.** **Ratio answers score zero throughout.**
(a) (i)	$\frac{1}{3}, \frac{3}{8}, \frac{6}{8}, \frac{2}{8}$ o.e.	**B3**	–1 each error bod if no letters given
(ii)	$\frac{2}{3}\times\frac{5}{8}$ $\frac{5}{12}$ o.e. www2	**M1** **A1**	$\frac{10}{24}$, etc., 0.416(6…)
(iii)	their $\frac{5}{12}+\frac{1}{3}\times\frac{6}{8}$ $\frac{2}{3}$ o.e. cao www2	**M1** **A1**	$\frac{16}{24}, \frac{8}{12}$, etc., 0.666(6….)
(b) (i)	$\frac{3}{10}\times\frac{2}{9}\times\frac{1}{8}$ $\frac{1}{120}$ o.e. www2	**M1** **A1**	$\frac{6}{720}$, etc., 0.00833(3…)
(ii)	$\frac{119}{120}$ o.e.	**B1ft**	$\frac{714}{720}$, etc., 0.991(6…) ft 1 – their **(i) not** for 7/10 Could start again and have a correct answer independently **[10]**

4 (a) (i)	**36** (36.0–36.4)	**B1**	
(ii)	**50** (50.0–50.4)	**B1**	
(iii)	**29** (28.6–29.4)	**B1**	
(iv)	**20**	**B2**	If B0, **SC1** for 19 or 21 or 180 seen
(b) (i)	p **= 16,** q **= 4**	**B1,B1**	If B0, **SC1** if p and q add up to 20
(ii)	$\left(\frac{7220}{200}\right)$ = **36.1** cso www4	**B4**	Answer 36 scores 4 marks after some correct working shown with no incorrect working seen **M1** for using mid-values at least four correct from 5, 15, 25, 35, 45, 55, 65, 75 **M1** (dep on correct mid values or mid-values ±0.5) for $\sum fx$ (at least four correct products) **M1** (dependent on 2nd M1) for dividing sum by 200 or 180 + their p + their q
(c)	**8.2** (8.19–8.20), **11.4**, **5** (5.00–5.01)	**B4**	**B3** for 2 correct or **B2** for 1 correct After B0, **SC2** for fd's 2.7(3…) o.e., 3.8 o.e, 1.6(6...) o.e. or **SC1** for 2 of fd's correct **(15)**
5 (a) (i)	$360\div 8$ or $(8-2)\times 180$	**M1**	allow 6×180

	180 – their $(360 \div 8)$ o.e. $\div 8$	**M1**	dependent
(ii)	45° used or use implied o.e.	**E1**	Accept sketch with values
(b) (i)	$\frac{l}{12} = \cos 45$ o.e. (*PH* =) **8.49** (8.485….) www2	**M1** **A1**	For o.e. allow implicit expression Accept $\sqrt{72}$, $2\sqrt{18}$, $3\sqrt{8}$, $6\sqrt{2}$
(ii)	(*PQ* =) 2 × their *PH* + 12 o.e. (*PQ* =) **29.(0)** (28.96–29.00) ft www2	**M1** **A1 ft**	ft their PH accept surd form
(iii)	their *PH* × their *PH* ÷ 2 o.e. (Area *APH* =) **36** (35.95–36.1) ft www2	**M1** **A1 ft**	ft their *PH*
(iv)	(their *PQ*)^2 – 4 × their area of triangle o.e. (Area octagon =) **695** (694.0–697.1) cao www3	**M2** **A1**	If M0, **M1** for a clear collection of areas leading to the octagon possibly without any calculation shown
(c) (i)	0.5 of their *PQ* o.e. **14.5** (14.47–14.53) cao www2	**M1** **A1**	e.g. 6 + *PH*, 6tan67.5° accept surd form
(ii)	$\pi \times (\textit{their } r)^2$ $\frac{\textit{their circle area}}{\textit{their octagon area}} \times 100$ **94.8** (94.35 to 95.60) cao www3	**M1** **M1** **A1**	(660.5…) Dependent on first M1 and circle smaller than the octagon **[17]**

6 (a) (i)	$\begin{pmatrix} 2 \\ 1 \end{pmatrix}$	**B1**	Allow (2 1), condone omission of brackets
(ii)	$\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ ft	**B1ft**	Allow (2 1), condone omission of brackets ft their (i) if a vector
(b)	Translation $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ o.e.	**B1, B1**	Allow (0 –4), condone omission of brackets, allow in words Any extra transformation spoils both marks
(c)	$y > 0$ o.e. $x < 2$ o.e. $y > \frac{1}{2}x$ o.e. $y < 2x + 4$ o.e.	**B1** **B1** **B1** **B2**	**For all four, condone strict inequalities and only penalise first incorrect sign, which may be = or an inequality sign** If B0, B1 for $2x$ or for 4 if other co-efficient is not zero $y < \frac{1}{2}x + 4$ gets zero **[9]**

7 (a) (i)	**cyclic**	**B1**	Condone concyclic
(ii)	Any one of **40, 45, 50** Any one of **20, 25, 30** Any one of **105, 110, 115**	**B1** **B1** **B1**	**Angle *BCT* = 40° is inconsistent with *ST* parallel to *OB*. So different values of angles *x*, *y*, *z*, *OCT* and *AOC* can be arrived at, depending on route taken.**
(iii)	Any one of **80, 85, 90**	**B1**	
(iv)	Any one of **210, 215, 220, 225, 230**	**B1**	
(b) (i)	**Similar** (or enlargement)	**B1**	
(ii)	$\left(\frac{7}{10}\right)^2$ or $\left(\frac{10}{7}\right)^2$ o.e. seen **9.8** (9.79 to 9.81) www2	**M1** **A1**	(0.49), (2.04) It is possible to do **(iii)** then **(ii)** and full marks can still be scored
(iii)	$\frac{1}{2} \times 10 \times \textit{height} = 20$ **4** www2	**M1** **A1**	**[11]**

8 (a)	**108**(.16) (allow 108.2(0)) www2	**M1** **A1**	**M1** for method of compound interest used
(b)	**148**(.02…) **324**(.3…)	**B1 B1**	
(c)	Correct axes full domains 5 correct pts 100, 148 ft, 219, 324ft, 480 Smooth exponential curve, correct shape through 5 points	**S1** **P3ft** **C1**	Condone absence of labels **P2ft** for 4 correct, **P1ft** for 3 correct Points must be in correct square vertically, including on line Scale error – remove that part and try to mark the rest
(d) (i)	**265 – 270**	**B1ft**	If out of range, then ft their graph at 25 years
(ii)	**17** or **18** cao	**B1**	
(e) (i)	$\frac{(100)\times 7\times 20}{(100)}$ o.e. $100 + 7 \times 20$ or better	**M1** **E1**	 No errors
(ii)	**380**	**B1**	
(iii)	Correct straight ruled line for x – range 0 to 35	**L2**	**P1ft** for 2 of (0,100), (20,240) (40,380)ft correctly plotted
(f)	**27 – 29** cao	**B1**	**[17]**

9 (a) (i)	$\mathbf{p} + \mathbf{r}$	**B1**	**Answers in bracketed column form penalise only once throughout**
(ii)	$-\mathbf{p} + \mathbf{r}$	**B1**	
(iii)	$-\mathbf{p} + \frac{2}{3}\mathbf{r}$	**B1**	
(iv)	$\mathbf{p} + \frac{1}{2}\mathbf{r}$	**B1**	
(b) (i)	$\frac{3}{2} \times (-\mathbf{p} + \frac{2}{3}\mathbf{r})$ or $-\frac{3}{2}\mathbf{p} + \mathbf{r}$ isw after correct answer seen	**B1 ft**	ft only $\frac{3}{2} \times$ their **(a)(iii)**
(ii)	$\overrightarrow{QP} + \overrightarrow{PS}$ o.e. $-\frac{3}{2}\mathbf{p}$ www 2	**M1** **A1 ft**	o.e. is any correct route of at least 2 vectors ft their **(b)(i)** – **r**
(c)	lie on a straight line	**B1**	dependent on their **(b)(ii)** being a multiple of **p** **[8]**

10(a) (i)	**4**	**B1**	
(ii)	**24**	**B1**	
(b) (i)	$x + 12$, $x + 14$ o.e.	**B1,B1**	Any order ignore ref to g and i
(ii)	$(x + 14 – x)$ *and* $(x + 12 – (x + 2))$ $14 – 10$ **or** $14 – 12 + 2$ **or** 4	 **E1**	$x + 12$ **and** $x + 14$ must be seen to be used No errors seen
(iii)	$(x + 2)(x + 12) – x(x + 14)$ **24**	**B1** **E1**	Subtraction can be implied later Dep on B1 and no errors anywhere for the E mark
(c) (i)	**4**	**B1**	
(ii)	**20**	**B1**	
(d) (i)	**4**	**B1**	
(ii)	$x + 2n$ o.e., $x + 2 + 2n$ o.e.	**B1,B1**	
(iii)	$4n$	**B1**	Allow $4\times n$, $n\times 4$, $n4$ **[13]**