**Location Entry Codes**

UNIVERSITY of CAMBRIDGE
International Examinations

As part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

| Question Paper | Mark Scheme | Principal Examiner's Report |
|---|---|---|
| Introduction | Introduction | Introduction |
| First variant Question Paper | First variant Mark Scheme | First variant Principal Examiner's Report |
| Second variant Question Paper | Second variant Mark Scheme | Second variant Principal Examiner's Report |

**Who can I contact for further information on these changes?**
Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2009 question paper

# for the guidance of teachers

## 0580, 0581 MATHEMATICS

**0580/21, 0581/21** Paper 2 (Extended), maximum raw mark 70

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

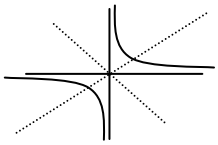
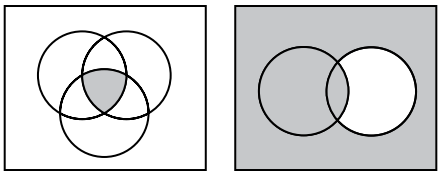
- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

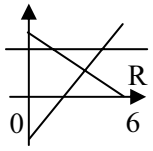
UNIVERSITY of CAMBRIDGE
International Examinations

**Abbreviations**

cao correct answer only
ft follow through after an error
oe or equivalent
SC Special Case
www without wrong working

| | | | |
|---|---|---|---|
| **1 (a)** | 2 | 1 | Any length, can be freehand lines |
| **(b)** |  | 1 | solid or dotted<br>Mark lost if additional lines drawn or axes extended |
| **2** | $\frac{5}{7}$ 72% $\sqrt{\frac{9}{17}}$ $\left(\frac{4}{3}\right)^{-1}$ | 2 | **M1** correct decimals<br>0.727(6… ) 0.71(4… ) 0.72 0.75 |
| **3 (a)** | 06 41 | 1 | Allow 6.41(am). 6:41 and 06:41<br>Not 6h41m or 641h or 6.41pm |
| **(b)** | \$204 | 1 | |
| **4** |  | 1, 1 | |
| **5** | $\frac{1}{2}\begin{pmatrix}5 & -3\\ 4 & -2\end{pmatrix}$ or $\begin{pmatrix}2.5 & -1.5\\ 2 & -1\end{pmatrix}$ | 2 | **M1** det **A** or $\lvert\mathbf{A}\rvert$ or $5\times-2-4\times-3=2$ or<br>$\begin{pmatrix}5 & -3\\ 4 & -2\end{pmatrix}$ or $\frac{1}{2}\begin{pmatrix}a & b\\ c & d\end{pmatrix}$ seen<br>Allow 5/2, –3/2, 4/2, –2/2 in matrix |
| **6** | 62225000 or $6.2225\times10^7$ or 62.225 million cao | 2 | **M1** 9.5(million) **and** 6.55 seen<br>3sf **not** appropriate for UB and **not** allowed for 2 marks |
| **7** | (4, 2) | 2 | **M1** $\frac{2+6}{2}$ and $\frac{-5+9}{2}$ oe<br>or a drawing used correctly |

| | | | |
|---|---|---|---|
| **8 (a)** | $2\mathbf{a} - \mathbf{g}$ cao | 1 | $-\mathbf{g} + 2\mathbf{a}$ |
| **(b)** | $2\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{g}$ oe cao | 1 | Allow 2.5 or $\frac{5}{2}$ and 0.5 |
| **9** | $(9(1-x))^2$ oe | 3 | **M1** 1 move completed correctly<br>**M1** 1 more move completed correctly<br>Mark 3rd move in answer space |
| **10** | $\frac{2}{c}$ | 3 | **M1** $d + c - c + d$ or better<br>**M1** common denominator $cd$ used |
| **11** | £3000 | 3 | **M1** $1.96 \times 25000$<br>**M1** "49000" / 1.75 |
| **12** | $x = 4$ $y = -3$ | 3 | **M1** consistent multiplication and subtraction of **their** rearranged eqns.<br>Any other answers must first score M1 to gain an A mark<br>Substitution, matrix and equating methods also permitted |
| **13** | 0.128 | 3 | **M1** $t = k/d^2$<br>$k$ is any letter except $t$, $d$ or α<br>**A1** $k = 12.8$<br>or **M1** $0.2 \times 8^2 = 12.8$ |
| **14 (a)** | $3 \times 10^{11}$ | 2 | **M1** $60 \times 5 \times 10^9$ or better |
| **(b)** | 5 000 000 or $5 \times 10^6$ or 5 million | 2 | **M1** $0.8 \times 10^7 - 3 \times 10^6$ oe<br>or **M1** $5x = 4 \times 10^7 - 15 \times 10^6$ oe<br>If m is used for a million it must be used consistently |
| **15 (a)** | 24.7 | 2 | **M1** $\sin 18 = AB/80$ or $\cos 72 = AB/80$<br>Allow $AB/\sin 18 = 80/\sin 90$ |
| **(b)** | 11.5 | 2 | **M1** $\tan 25 = h/$**(a)** or $h/\sin 25 =$ **(a)**$/\sin 65$ |
| **16** | Angle bisector of angle in the middle<br><br>Second angle bisector drawn | 4 | **W1** correct bisector drawn<br>**W1** at least two arcs drawn on the arms and one pair of correct crossing arcs<br>**W1** as above<br>**W1** as above<br><br>Accuracy ±1° but line must go from edge to edge. |

| | | | |
|---|---|---|---|
| **17 (a)** | Reflection in $y = x$ | 2 | **M1** Reflection<br>**A1** correct description of the line |
| **(b)** | Triangle at (4,6), (4, 7), (7, 7) | 2 | **M1** Rotation 90° clockwise **A1** position |
| **18 (a)** | 320 | 2 | **M1** $1080 \times 8/27$ or $(2/3)^3$ or<br>$1080 \div 27/8$ or $(3/2)^3$ |
| **(b)** | 567 | 2 | **M1** $252 \times 9/4$ or $(3/2)^2$ or<br>$252 \div 4/9$ or $(2/3)^2$ |
| **19** | 314 | 4 | **M1** $\pi . 18^2 . 40/360$ or $OAD = 113$ identified<br>**M1** $\pi . 6^2$ (or $\pi . 6^2 .$ **40**/360) or $OBC$ …"…….<br>**M1** $2 \times (OAD - OBC) +$ circle oe<br>**OR**<br>**M1** $\pi . 18^2 . 40/360$<br>**M1** $\pi . 6^2 .$ **140**/360<br>**M1** $2 \times OAD + 2 \times BOE$ oe |
| **20** | draw $2x - y = 4$<br>draw $x + y = 6$<br>draw $y = 4$<br>correct region identified by R | 2<br>1<br>1<br>1 | **W1** Line through (2,0) or (0,–4)<br>  <br> |
| **21 (a)** | $\begin{pmatrix} 2x+12 & 3x+6 \\ 14 & 15 \end{pmatrix}$ | 2 | **M1** for any correct row or column<br>Allow $2(x + 6)$, $3(x + 2)$ |
| **(b)** | 5 | 3 | **M1** $\begin{pmatrix} 2x+12 & 21 \\ 2x+4 & 15 \end{pmatrix}$ one row (or column) correct<br>**M1** $2x + 4 = 14$ or $3x + 6 = 21$ |
| **22 (a)** | 58 | 1 | |
| **(b)** | 32 | 1 | |
| **(c)** | 58 | 1 ft | = **(a)** |
| **(d)** | 24 | 2 | |

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2009 question paper

# for the guidance of teachers

## 0580, 0581 MATHEMATICS

**0580/22, 0581/22** Paper 2 (Extended), maximum raw mark 70

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

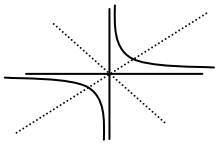
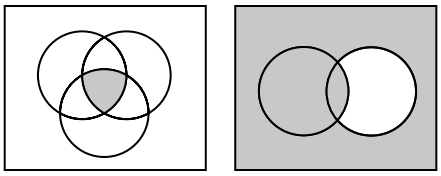
- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

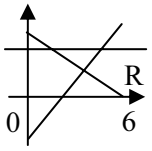
UNIVERSITY of CAMBRIDGE
International Examinations

**Abbreviations**

cao correct answer only
ft follow through after an error
oe or equivalent
SC Special Case
www without wrong working

| | | | |
|---|---|---|---|
| **1 (a)** | 2 | 1 | Any length, can be freehand lines |
| **(b)** |  | 1 | solid or dotted<br>Mark lost if additional lines drawn or axes extended |
| **2** | $\frac{18}{25}$ $\sqrt{\frac{8}{15}}$ 74% $\left(\frac{27}{20}\right)^{-1}$ | 2 | **M1** correct decimals<br>0.74 0.730(2… ) 0.72 0.740(7…) |
| **3 (a)** | 06 43 | 1 | Allow 6.43(am)<br>Not 6h43m or 643h or 6.43pm |
| **(b)** | \$247 | 1 | |
| **4** |  | 1, 1 | |
| **5** | $\frac{1}{10}\begin{pmatrix} 3 & -7 \\ 4 & -6 \end{pmatrix}$ oe | 2 | **M1** det **A** or \|**A**\| or $-6\times3 - 7\times-4 = 10$ or $\begin{pmatrix} 3 & -7 \\ 4 & -6 \end{pmatrix}$ or $\frac{1}{10}\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ seen |
| **6** | 62225000 or $6.2225 \times 10^7$ or 62.225 million cao | 2 | **M1** 9.5(million) **and** 6.55 seen<br>3sf **not** appropriate for UB and **not** allowed for 2 marks |
| **7** | (6, 3) | 2 | **M1** $\frac{4+8}{2}$ and $\frac{-7+13}{2}$ oe<br>or a drawing used correctly |

| | | | |
|---|---|---|---|
| **8 (a)** | $2\mathbf{a} - \mathbf{g}$ cao | 1 | $-\mathbf{g} + 2\mathbf{a}$ |
| **(b)** | $2\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{g}$ oe cao | 1 | Allow 2.5 or $\frac{5}{2}$ and 0.5 |
| **9** | $(8(1-x))^2$ oe | 3 | **M1** 1 move completed correctly<br>**M1** 1 more move completed correctly<br>Mark 3rd move in answer space |
| **10** | $\frac{2}{c}$ | 3 | **M1** $d + c - c + d$ or better<br>**M1** common denominator $cd$ used |
| **11** | £2400 | 3 | **M1** $3.92 \times 20000$<br>**M1** "78400" / 3.50 |
| **12** | $x = 5$ $y = -2$ | 3 | **M1** consistent multiplication and subtraction of **their** rearranged eqns.<br>Any other answers must first score M1 to gain an A mark<br>Substitution, matrix and equating methods also permitted |
| **13** | 0.625 or $\frac{5}{8}$ | 3 | **M1** $t = k/d^2$ or $td^2 = k$ or **M1** $0.4 \times 5^2 = 10$<br>**A1** $k = 10$<br>$k$ is any letter except $t$, $d$ or α |
| **14 (a)** | $4.8 \times 10^{11}$ | 2 | **M1** $60 \times 8 \times 10^9$ or better |
| **(b)** | 5 000 000 or $5 \times 10^6$ or 5 million | 2 | **M1** $0.8 \times 10^7 - 3 \times 10^6$ oe<br>or **M1** $5x = 4 \times 10^7 - 15 \times 10^6$ oe<br>If m is used for a million it must be used consistently |
| **15 (a)** | 24.7 | 2 | **M1** $\sin 18 = AB/80$ or $\cos 72 = AB/80$<br>Allow $AB/\sin 18 = 80/\sin 90$ |
| **(b)** | 11.5 | 2 | **M1** $\tan 25 = h/$**(a)** or $h/\sin 25 =$ **(a)**$/\sin 65$ |
| **16** | Angle bisector of angle in the middle | 2 | **W1** correct bisector drawn<br>**W1** at least two arcs drawn on the arms and one pair of correct crossing arcs |
| | Second angle bisector drawn | 2 | **W1** as above<br>**W1** as above<br>Accuracy ±1° but line must go from edge to edge. |

| | | | |
|---|---|---|---|
| **17 (a)** | Reflection in $y = x$ | 2 | **M1** Reflection<br>**A1** correct description of the line |
| **(b)** | Triangle at (4,6), (4, 7), (7, 7) | 2 | **M1** Rotation 90° clockwise **A1** position |
| **18 (a)** | 320 | 2 | **M1** $1080 \times 8/27$ or $(2/3)^3$ or<br>$1080 \div 27/8$ or $(3/2)^3$ |
| **(b)** | 567 | 2 | **M1** $252 \times 9/4$ or $(3/2)^2$ or<br>$252 \div 4/9$ or $(2/3)^2$ |
| **19** | 314 | 4 | **M1** $\pi . 18^2 . 40/360$ or $OAD = 113$ identified<br>**M1** $\pi . 6^2$ (or $\pi . 6^2 .$ **40**/360) or $OBC$ …"…….<br>**M1** $2 \times (OAD - OBC) +$ circle oe<br>**OR**<br>**M1** $\pi . 18^2 . 40/360$ (=113.10)<br>**M1** $\pi . 6^2 .$ **140**/360 (=43.98)<br>**M1** $2 \times OAD + 2 \times BOE$ oe |
| **20 (a)** | draw $2x - y = 4$<br>draw $x + y = 6$<br>draw $y = 4$ | 2<br>1<br>1 | **W1** Line through (2,0) or (0,-4) |
| **(b)** | correct region identified by R | 1 |  |
| **21 (a)** | $\begin{pmatrix} 2x+12 & 3x+6 \\ 14 & 15 \end{pmatrix}$ | 2 | **M1** for any correct row or column<br>Allow $2(x + 6)$, $3(x + 2)$ |
| **(b)** | 5 | 3 | **M1** $\begin{pmatrix} 2x+12 & 21 \\ 2x+4 & 15 \end{pmatrix}$ one row (or column) correct<br>**M1** $2x + 4 = 14$ or $3x + 6 = 21$ |
| **22 (a)** | 58 | 1 | |
| **(b)** | 32 | 1 | |
| **(c)** | 58 | 1 ft | = **(a)** |
| **(d)** | 24 | 2 | |