

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0580 MATHEMATICS

0580/21

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Abbreviations

| | |
|------|----------------------------|
| cao | correct answer only |
| dep | dependent |
| FT | follow through after error |
| isw | ignore subsequent working |
| oe | or equivalent |
| SC | Special Case |
| nfww | not from wrong working |
| soi | seen or implied |

| Question. | Answer | Mark | Part Marks |
|-----------|---|---|---|
| 1 | 9.5 | 1 | |
| 2 | 7.37 or 7.371... | 1 | |
| 3 | 2.7×10^5 | 1 | |
| 4 | $2x^2 + 8x - 35$ final answer | 2 | B1 for 2 correct terms in final answer or M1 for $2x^2 + 3x$ or $5x - 35$ |
| 5 | Sammy and correct reason with 25.7% oe shown | 2 | B1 for 25.7% or 0.257... seen or conversion of 26% to fraction and common denominator |
| 6 | 44 | 2 | B1 for 75.5 or 119.5 seen |
| 7 | $24u^2w^3$ final answer | 2 | B1 for 2 correct elements in final answer |
| 8 | 13.6 or 13.60... | 3 | M2 for $\sqrt{(-4-7)^2 + (6-(-2))^2}$ oe or M1 for $(-4-7)$ oe or $(6-(-2))$ oe |
| 9 | $\frac{9}{5}$ <i>their</i> $\frac{9}{5} \times \frac{7}{3}$ or $\frac{9 \times 7}{5 \times 3}$ $\frac{21}{5}$ or $4\frac{1}{5}$ cao | B1 M1 A1 | or $\frac{63}{35}$ or <i>their</i> $\frac{63}{35} \div \frac{15}{35}$ or equivalent division with fractions with common denominators |
| 10 | 2520 | 3 | M2 for $12 \times (1 + 6) \div 2$ oe or M1 for 1 area correct If zero scored B1 for top speed = 720 m per min or total time = 360 sec |

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| Question. | Answer | Mark | Part Marks |
|------------------|---|--|---|
| 11 (a) | $4n$ oe final answer | 1 | |
| (b) | $3n^2 + 8$ oe final answer | 2 | M1 for a quadratic expression as final answer or $3n^2 + 8$ oe in working |
| 12 | 18 | 3 | M2 for $2(2 + 4)^2 = p(-2 + 4)^2$ oe M1 for $p = \frac{k}{(q + 4)^2}$ A1 for $k = 72$ |
| 13 | 72 | 3 | M2 for $\frac{1280}{64} \times \frac{60 \times 60}{1000}$ M1 for working out distance \div speed e.g. figs $1280 \div 64$ or figs $\frac{1280}{\text{their speed}}$ or for working out km/h to m/s conversion e.g. $64 \times \frac{1000}{60 \times 60}$ oe or <i>their</i> $\left(\frac{1280}{64}\right) \times \frac{60 \times 60}{1000}$ oe |
| 14 (a) | $a + 2b - a$ or $a - (a - 2b)$ oe | 1 | |
| (b) | Parallelogram PM equal and parallel to QR or PM or PS parallel to QR and MR found = a so 2 pairs of parallel sides | 1 1 1 | SC1 for answer trapezium with reason PM parallel to QR |
| 15 | $y < 8$ $y \geq 6 - x$ oe and $y \geq x + 2$ oe | 1 3 | B2 for either $y \geq 6 - x$ oe or $y \geq x + 2$ oe or SC2 for $y = 6 - x$ oe and $y = x + 2$ oe or SC1 for $y > 6 - x$ or $y = 6 - x$ or $y > x + 2$ or $y = x + 2$ |

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| Question. | Answer | Mark | Part Marks |
|-----------|--|---|---|
| 16 | 1597 cao | 4 | <p>B3 for 1597.39.. or 1597.3[9...] or 1597.4 or 6597 or B2 for 6597.3[9...] or 6597.4 or B1 for $5000\left(1 + \frac{2}{100}\right)^{14}$</p> <p>If B1 scored or B0 scored and an attempt at compound interest is shown SC1 for <i>their</i> 6597[...] – 5000 evaluated correctly provided answer positive and SC1 for <i>their</i> final answer rounded correctly to nearest \$ from their more accurate answer</p> |
| 17 (a) | $2 \times 3 \times 5$ | 2 | B1 for 2, 3, 5 as prime factors |
| (b) | 90 | 2 | B1 for $90k$ or for listing multiples of each up to 90 or $2 \times 3^2 \times 5$ |
| 18 | <p>Correctly equating one set of coefficients</p> <p>Correct method to eliminate one variable</p> <p>$x = 0.8$</p> <p>$y = -3$</p> | <p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> | <p>Dependent on the coefficients being the same for one of the variables Correct consistent use of addition or subtraction using their equations</p> <p>If zero scored SC1 for 2 values satisfying one of the original equations or if no working shown, but 2 correct answers given</p> |
| 19 (a) | 7.5 | 2 | M1 for $[10] \times \frac{6}{8}$ oe |
| (b) | 12 cao | 2 | M1 for $9 \times \frac{8}{6}$ oe or $9 \times \frac{10}{\text{their (a)}}$ |
| 20 (a) | $(p+t)(y+2x)$ final answer | 2 | B1 for $y(p+t) + 2x(p+t)$ or $p(y+2x) + t(y+2x)$ |
| (b) | $7(h+k)(h+k-3)$ final answer | 2 | B1 for $7((h+k)^2 - 3(h+k))$ or $(h+k)(7(h+k) - 21)$ |

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| Question. | Answer | Mark | Part Marks |
|-----------|--|------|--|
| 21 | 285 cao | 4 | <p>M1 for $\frac{1}{3} \times \pi \times 4^2 \times 9$, 48π</p> <p>M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4^3$, $\frac{128\pi}{3}$</p> <p>A1 for 284.8 to 284.9, $\frac{272\pi}{3}$</p> <p>If A0 then B1 for <i>their</i> final answer rounded correctly to nearest whole number from their more accurate answer dependent on at least M1</p> |
| 22 (a) | $\begin{pmatrix} 22 & 17 \\ 18 & 7 \end{pmatrix}$ | 2 | M1 for a 2×2 matrix with 2 correct elements |
| (b) | $\frac{1}{2} \begin{pmatrix} 4 & -3 \\ -6 & 5 \end{pmatrix}$ | 2 | <p>M1 for $\frac{1}{2} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or $k \begin{pmatrix} 4 & -3 \\ -6 & 5 \end{pmatrix}$ soi</p> <p>or $\det = 2$ soi</p> |
| 23 (a) | -13 | 1 | |
| (b) | $-3x - 1$ or $5 - 3(x + 2)$ | 1 | |
| (c) | $9x - 10$ cao | 2 | M1 for $5 - 3(5 - 3x)$ |
| (d) | $\frac{5-x}{3}$ final answer oe | 2 | <p>M1 for correct first step e.g.</p> <p>$y + 3x = 5$ or $\frac{y}{3} = \frac{5}{3} - x$ or $y - 5 = -3x$ or</p> <p>better</p> <p>or</p> <p>for interchanging x and y, e.g. $x = 5 - 3y$, this does not need to be the first step</p> |