



GCSE MATHEMATICS

New Specimen Papers published June 2015
Paper 2 Higher - Mark Scheme

8300/2H

Version 1.0

Principal Examiners have prepared these mark schemes for specimen papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

Further copies of this Mark Scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

| | |
|------------------------|--|
| M | Method marks are awarded for a correct method which could lead to a correct answer. |
| A | Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied. |
| B | Marks awarded independent of method. |
| ft | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| SC | Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth. |
| M dep | A method mark dependent on a previous method mark being awarded. |
| B dep | A mark that can only be awarded if a previous independent mark has been awarded. |
| oe | Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$ |
| [a, b] | Accept values between <i>a</i> and <i>b</i> inclusive. |
| 3.14 ... | Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416 |
| Use of brackets | It is not necessary to see the bracketed work to award the marks. |

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

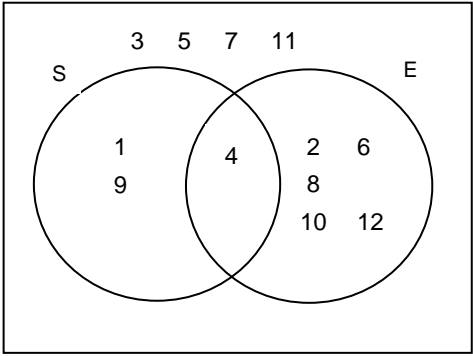
Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

| Q | Answer | Mark | Comments |
|------|---|------|---|
| 1 | 1 2 4 8 | B1 | |
| 2 | AAA | B1 | |
| 3 | $a + 20a^2$ | B1 | |
| 4 | $y = 5x + 2$ | B1 | |
| 5 | $\frac{4}{5}$ or 80% seen or used | M1 | oe May be implied |
| | 29.4(0) \times 5 \div 4 or 147 \div 4 or 29.4(0) \div 4 (\times 5) or 7.35 (\times 5) or 29.4(0) \div 0.8 | M1 | oe |
| | 36.75 | A1 | |
| | | | |
| 6(a) |  | B3 | B2 Any 2 or 3 of the 4 sections correct B1 Any 1 of the 4 sections correct |
| 6(b) | $\frac{1}{12}$ | B1ft | oe ft their Venn diagram |

| Q | Answer | Mark | Comments |
|------|--|------|--|
| 7(a) | Two of $\frac{6}{50}$ $\frac{28}{100}$ $\frac{34}{150}$ | B2 | oe fraction, decimal, percentage B1 One of $\frac{6}{50}$ $\frac{28}{100}$ $\frac{34}{150}$ with at most one incorrect answer |
| 7(b) | Chooses their probability from the larger number of trials and reason given that more trials are involved | B1ft | Must have two probabilities in (a) |
| 8 | Draws $3x + 2y = 6$ | B2 | B1 Works out or plots at least two points satisfying $3x + 2y = 6$ eg (2, 0) and (0, 3) |
| | $x = 2.5$ and $y = -0.7$ | B1ft | ft their graph $\pm \frac{1}{2}$ square |
| 9(a) | Correct product using at least one prime factor | M1 | For example 2 (×) 126 or 3 (×) 84 or 7 (×) 36 or 2 (×) 2 (×) 63 or 2 (×) 3 (×) 42 May be implied eg in a factor tree or repeated division |
| | $2 \times 2 \times 3 \times 3 \times 7$ or $2^2 \times 3^2 \times 7$ | A1 | |
| 9(b) | 84 | B1 | |

| Q | Answer | Mark | Comments |
|----|---|------|--|
| 10 | Alternative method 1 | | |
| | 2 parts → 116 | M1 | oe |
| | 116 ÷ 2 × 16 | M1 | oe |
| | 928 | A1 | |
| | Alternative method 2 | | |
| | Writes at least 3 ratios or numbers of boys and girls equivalent to 9 : 7 | M1 | eg 18 : 14 and 180 : 140 and 360 : 280 |
| | 522 and 406 | M1 | |
| | 928 | A1 | |
| 11 | $(x - 4)(x + 8) = 0$ | B1 | |
| 12 | 1.7×10^6 or 2×10^6 | B3 | B2 $1.72(8) \times 10^6$ or 1.73×10^6 or 1 700 000 or 2 000 000 B1 1 728 000 or 1 730 000 |
| 13 | 125 : 27 | B1 | |

| Q | Answer | Mark | Comments |
|--------------|--|-------|-----------------------------------|
| 14(a) | Alternative method 1 | | |
| | 10 ÷ 4 or 2.5 or 4 ÷ 10 or 0.4 or $\frac{1}{2} \times (18 + 10) \times 25$ or 350 | M1 | oe |
| | 18 ÷ their 2.5 or 18 × their 0.4 or 7.2 or 25 ÷ their 2.5 or 25 × their 0.4 or 10 | M1dep | oe |
| | $\frac{1}{2} \times (18 + 10) \times 25$ or 350 and $\frac{1}{2} \times (\text{their } 7.2 + 4) \times \text{their } 10$ or 56 | M1dep | Must see working |
| | 350 – 56 = 294 | A1 | Do not award without working seen |
| | Alternative method 2 | | |
| | 10 ÷ 4 or 2.5 or 4 ÷ 10 or 0.4 or $\frac{1}{2} \times (18 + 10) \times 25$ or 350 | M1 | oe |
| | (Area scale factor =) (their 2.5) ² or (their 0.4) ² | M1dep | |
| | their 350 ÷ (their 2.5) ² or their 350 × (their 0.4) ² or 56 | M1dep | Must see working |
| | 350 – 56 = 294 | A1 | Do not award without working seen |
| 14(b) | $\frac{18 - 10}{2}$ or 4 | B1 | |
| | $\tan x = \frac{25}{\text{their } 4}$ | M1 | |
| | [80.9, 81] | A1 | |

| Q | Answer | Mark | Comments |
|---|--------|------|----------|
|---|--------|------|----------|

| | | | |
|----|-----------------------------|-------|--|
| 15 | Alternative method 1 | | |
| | 1800 | B3 | B2 $a \times b \times c \times d$ with at least 3 correct from 9, 10, 10 and 2 B1 $a \times b \times c \times d$ with at least 2 correct from 9, 10, 10 and 2 or identifies 9 possibilities for first digit or identifies 2 possibilities for final digit |
| | Alternative method 2 | | |
| | 9000 | M1 | The number of digits between 1000 and 9999 inclusive |
| | their $9000 \div 5$ | M1dep | |
| | 1800 | A1 | |

| | | | |
|----|----------------------------------|----|---------------------------------|
| 16 | $6c(c^2 + 5)$ or $3(c^2 + 5)$ | M1 | |
| | $\frac{6c(c^2 + 5)}{3(c^2 + 5)}$ | M1 | This mark implies first M1 |
| | $2c$ and multiple of 2 so even | A1 | oe statement Must see method |

| Q | Answer | Mark | Comments |
|--------------|---|------|--|
| 17(a) | Alternative method 1 | | |
| | $93\,000\,000 \times 2\pi$ or $186\,000\,000\pi$ or [584 000 000 , 584 412 000] | M1 | oe Allow working in millions |
| | 365×24 or 8760 | M1 | |
| | their $186\,000\,000 \pi \div$ their 8760 | M1 | oe Allow working in millions Only allow if first M1 gained or if their circumference is $93\,000\,000 \times \pi$ |
| | $[6.6 \times 10^4, 6.7 \times 10^4]$ | A1 | oe |
| | Alternative method 2 | | |
| | $93\,000\,000 \times 2\pi$ or $186\,000\,000\pi$ or [584 000 000, 584 412 000] | M1 | oe Allow working in millions |
| | their $186\,000\,000\pi \div 365$ or [1 598 904, 1 600 033] | M1 | oe Allow working in millions Only allow if M1 gained or if their circumference is $93\,000\,000 \times \pi$ their 365.25 can be 365.25×24 or 365.25×60 |
| | their $[1.6 \times 10^6, 1.602 \times 10^6] \div 24$ | M1 | |
| | $[6.6 \times 10^4, 6.7 \times 10^4]$ | A1 | oe |
| 17(b) | The average speed would be (slightly) lower | B1 | oe |

| Q | Answer | Mark | Comments |
|-------|--|-------|--------------|
| 18(a) | $(n - 6)^2$ could be zero (so she is wrong) or The sixth term is 1 | B1 | oe |
| 18(b) | 1 | B1 | |
| 19 | $\frac{x}{3}$ | B1 | |
| 20 | Alternative method 1 | | |
| | $2 = k\sqrt{36}$ or $\sqrt{36} = 6$ | M1 | |
| | $(k =) 2 \div \text{their } 6$ or $\frac{1}{3}$ | M1dep | |
| | $5 \div \text{their } \frac{1}{3}$ or $15 (\sqrt{a} =)$ | M1 | oe |
| | 225 | A1 | |
| | Alternative method 2 | | |
| | $2k = \sqrt{36}$ or $\sqrt{36} = 6$ | M1 | |
| | $(k =) \text{their } 6 \div 2$ or 3 | M1dep | |
| | $5 \times \text{their } 3$ or $15 (\sqrt{a} =)$ | M1 | oe |
| | 225 | A1 | |
| | Alternative method 3 | | |
| | $2k = \sqrt{36}$ or $\sqrt{36} = 6$ | M1 | |
| | $5 \div 2$ or 2.5 | M1 | |
| | their $6 \times \text{their } 2.5$ or $15 (\sqrt{a} =)$ | M1dep | dep on M1 M1 |
| 225 | A1 | | |

| Q | Answer | Mark | Comments |
|----|--|-------|---|
| 21 | Alternative method 1 | | |
| | 1.2 or 0.85 | M1 | |
| | 1 ÷ 0.85 or 1.1(7...) or 1.18 | M1 | |
| | 1.1(7...) or 1.18 and 1.2 and (Option) A | A1 | |
| | Alternative method 2 | | |
| | 1.2 or 0.85 | M1 | |
| | 1 ÷ 1.2 or 0.83(...) | M1 | |
| | 0.83(...) and 0.85 and (Option) A | A1 | |
| | Alternative method 3 | | |
| | 450 × 1.2 or 540 or $x \times 0.85$ or $0.85x$ | M1 | x is the usual cost of the box and may be a numerical value |
| | $x \div$ their 540 or their $0.85x \div 450$ | M1dep | |
| | 0.00185(...)x and 0.00188(...)x and (Option) A | A1 | oe |
| | Alternative method 4 | | |
| | 450 × 1.2 or 540 or $x \times 0.85$ or $0.85x$ | M1 | x is the usual cost of the box and may be a numerical value |
| | their $540 \div x$ or $450 \div$ their $0.85x$ | M1dep | |
| | $\frac{540}{x}$ and $\frac{529.(\dots)}{x}$ and (Option) A | A1 | oe |

Alternative method 5 on next page

| Q | Answer | Mark | Comments |
|---|--------|------|----------|
|---|--------|------|----------|

| | | | |
|----|---|----|---|
| 21 | Alternative method 5 | | |
| | $\frac{1}{6}$ (free for A) | M1 | oe fraction or decimal or percentage |
| | $\frac{3}{18}$ (free for A) and $\frac{3}{20}$ (free for B) | M1 | oe pairs of fractions or pairs of decimal or pairs of percentages |
| | $\frac{3}{18}$ (free for A) and $\frac{3}{20}$ (free for B) and (Option) A | A1 | |

| | | | |
|----|--|-------|--|
| 22 | Alternative method 1 | | |
| | 25×11 or 275 | M1 | |
| | their $275 \div 22$ or 12.5 | M1dep | |
| | $15 \times 30 \div$ their 12.5 | M1 | |
| | 36 | A1 | |
| | Alternative method 2 | | |
| | 25×11 or 275 | M1 | |
| | $15 \times 30 \div$ their 275 or [1.6, 1.64] | M1dep | |
| | their [1.6, 1.64] $\times 22$ | M1 | |
| | 36 | A1 | |
| | Alternative method 3 | | |
| | 11 squares or 275 squares | M1 | |
| | $22 \div 11$ or 2 or $22 \div 275$ or 0.08 | M1dep | |
| | their 2×18 or their 0.08×450 | M1 | |
| | 36 | A1 | |

| Q | Answer | Mark | Comments |
|----|---|-------|---|
| 22 | Alternative method 4 | | |
| | $\frac{15}{25}$ or $\frac{30}{11}$ | M1 | |
| | $\frac{15}{25} \times \frac{30}{11}$ or $\frac{18}{11}$ | M1dep | oe fraction |
| | their $\frac{18}{11} \times 22$ | M1 | |
| | 36 | A1 | |
| | Alternative method 5 | | |
| | $25 \times h = 22$ or $\frac{22}{25}$ or 0.88 | M1 | oe |
| | 0.88 \div 11 or 0.08 | M1dep | oe eg frequency density axis labelled with correct scale |
| | their 0.08 \times 30 \times 15 | M1 | |
| 36 | A1 | | |
| 23 | $\frac{1}{2} \times \frac{4}{3} \times \pi \times 6^3$ or 144π | M1 | oe eg [452, 452.45] |
| | $\frac{2}{5} \times$ their $144\pi = \frac{1}{3} \times \pi \times x^2 \times 12$ or $57.6\pi = 4\pi x^2$ | M1 | oe eg [180.8, 181] = [12.5, 12.6] x^2 Must equate two volumes in terms of π |
| | $3 \times \frac{2}{5} \times$ their $144\pi \div 12\pi$ or 14.4 | M1dep | oe eg their [180.8, 181] \div their [12.5, 12.6] dep on 2nd M1 Correct working to isolate x^2 |
| | [3.79, 3.8] | A1 | |

| Q | Answer | Mark | Comments |
|-------|---|------|--|
| 24(a) | $\cos x = \frac{OA}{15}$ or $OA = 15 \cos x$ | M1 | |
| | $OA = 15 \cos x$ and $OB = 15 + 2$ and $h = OB - OA = 17 - 15 \cos x$ | A1 | |
| 24(b) | $17 - 15 \cos 120$ or $15 \sin 30$ or 7.5 | M1 | |
| | 24.5 | A1 | oe |
| 24(c) | (180, 32) | B2 | B1 one correct coordinate SC1 (32, 180) |

| | | | |
|-------|--|-------|----------------------------|
| 25(a) | Alternative method 1 | | |
| | $a = 2$ or $2(x^2 - 3x + 2.5)$ or $2(x^2 - 3x) + 5$ | M1 | |
| | $x^2 - 3x = (x - 1.5)^2 - 1.5^2$ | M1dep | oe ft their $x^2 - 3x$ |
| | $a = 2$ and $b = 1.5$ and $c = 0.5$ | A1 | oe eg $2(x - 1.5)^2 + 0.5$ |
| | Alternative method 2 | | |
| | $a = 2$ | B1 | |
| | $x^2 - bx - bx + b^2$ or $x^2 - 2bx + b^2$ or $-2ab = -6$ or $-ab = -3$ or $b = 1.5$ | M1 | oe |
| | $a = 2$ and $b = 1.5$ and $c = 0.5$ | A1 | oe eg $2(x - 1.5)^2 + 0.5$ |

| Q | Answer | Mark | Comments |
|--------------|--|-------|--|
| 25(b) | Alternative method 1 | | |
| | their $2(x - 1.5)^2 = 8.5 - \text{their } 0.5$ | M1 | |
| | their $(x - 1.5) = \pm \sqrt{\frac{8.5 - \text{their } 0.5}{2}}$ | M1dep | oe |
| | 3.5 and -0.5 | A1 | oe |
| | Alternative method 2 | | |
| | $2x^2 - 6x - 3.5 (= 0)$ or $4x^2 - 12x - 7 (= 0)$ | M1 | oe 3-term quadratic equation or expression |
| | Correct use of quadratic formula eg $\frac{- -12 \pm \sqrt{(-12)^2 - 4 \times 4 \times -7}}{2 \times 4}$ or correct factorisation eg $(2x - 7)(2x + 1) = 0$ | M1dep | oe |
| | 3.5 and -0.5 | A1 | oe |
| 26 | 144% or 1.44 seen | B1 | |
| | $\sqrt{1.44}$ or 1.2 | M1 | oe |
| | their 1.2×32 | M1dep | |
| | 38.4 | A1 | |

