



Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCSE (9 – 1)

In Mathematics (1MA1)

Higher (Non-Calculator) Paper 1H

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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

- 1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

- 2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.

Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

- 3 **Crossed out work**

This should be marked **unless** the candidate has replaced it with an alternative response.

- 4 **Choice of method**

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks**.

- 5 **Incorrect method**

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

- 6 **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. $2 \times 6 (= 12)$ then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. “12” $\times 50$; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] $\times 1.5$: the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	0.4, 0.4	P1	for process to find sum of unknown probabilities, eg $1 - 0.2 (= 0.8)$	Award mark for any two probabilities given that sum to 0.8, eg given in the table
		A1	oe	Accept any equivalent fraction or 40%
(b)	60	P1	for complete process to find total number of cubes, eg $12 \div 0.2$ or 12×5 or $(“0.4” \div 0.2) \times 12 + (“0.4” \div 0.2) \times 12 + 12$ OR states $0.1 = 6$ or $0.4 = 24$	
		A1	cao	
2 (a)	600	P1	for starting process to calculate amount of flour eg $60 \div 15 (= 4)$ or $3 \times 50 (= 150)$	4 implied by 200g of sugar
		P1	for complete process eg $\frac{60}{15} \times “150”$	
		A1	cao	
(b)	2	P1	for process to calculate amount of butter eg $\frac{60}{15} \times 2 \times 50 (= 400)$ OR for process to calculate the number of packs of butter needed eg $[\text{butter}] \div 250$	[butter] must be clearly stated or calculated, may be seen in part (a)
		A1	cao	2 must not come from incorrect working

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	18	M1 A1	for listing factors of 72 and 90, at least 4 correct for each (with no more than 1 incorrect in each list), could be in factor pairs OR for the prime factors of 72 (2, 2, 2, 3, 3) or 90 (2, 3, 3, 5) for 18 or 2×3^2 oe SC B1 for answer of 6 or 9 if M0 scored	Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72 Factors of 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90 2, 3^2 is not enough, it must be a product
4	sketch	M1 A1	for sketch of a cylinder sketch of cylinder, with dimensions shown	Hidden edges may or may not be shown 2 (cm) for radius or 4 (cm) for diameter and 5 (cm) for height
5	$c = -6$ $d = -1$	M1 A1 A1	for reflection in x -axis shown on diagram for $c = -6$ or $d = -1$ for both $c = -6$ and $d = -1$ SCB2 for $c = -1$ and $d = -6$	Vertices (3, -2), (5, -2), (3, -5) One correct value is M1A1 regardless of second value or diagram

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	96	P1	for process to find the ratio of the number of pens of each colour sold, eg $2 \times 7 : 5 \times 3 : 6 \times 4$ (= 14 : 15 : 24)	Does not have to be seen as a ratio but all three needed P3 can be implied by the values 56, 60 and 96
		P1	for process to find the proportion of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \text{ or } \frac{"24"}{"14"+"15"+"24"}$	
		P1	for a complete process to find the number of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \times "24" \text{ or } \frac{"24"}{"14"+"15"+"24"} \times 212$	
		A1	cao	
7	8.5	P1	for process to use the area of $PQRS$ to find the length of PQ , eg $10y = 45$ or $45 \div 10$ (= 4.5)	Sets up equation for area Uses perimeter of $ABCD$ Accept $\frac{17}{2}$
		P1	for process to use the perimeter of $ABCD$, eg $2x + 2 \times "4.5" = 26$ or $26 - 2 \times "4.5"$ (= 17) or $26 \div 2$ (= 13)	
		P1	for process to use length of BC to find length of AB , eg solves $2x + 2 \times "4.5" = 26$ or $(26 - 2 \times "4.5") \div 2$ or $"13" - "4.5"$	
		A1	for 8.5 or $8\frac{1}{2}$	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	75 to 81	B2	for answer in the range 75 to 81	Can use standard form
		(B1	for 60 or 100 or 6000 or 6400 or $\sqrt{64 \times 100}$)	
(b)	0.000 148	B1	for 0.000 148 oe	
(c)	$\frac{1}{25}$	B1	for $\frac{1}{25}$ or 0.04	
9	$5\frac{3}{5}$	M1	for writing as improper fractions with at least one correct, eg $\frac{7}{2} \times \frac{8}{5}$ oe	
		M1	(dep) for multiplying improper fractions, eg $\frac{56}{10}$ or $5\frac{6}{10}$ or $\frac{28}{5}$ oe	
		A1	cao	
10	$x = 2.2$ to 2.3 $y = -1.3$ to -1.4	M1	for recognition of use of intersection point, one of the solutions given, solutions reversed or solutions given as a coordinate.	
		A1	x given in the range 2.2 to 2.3, y given in the range -1.3 to -1.4	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	59, 53, 66	B2	for Median = 59, LQ = 53, UQ = 66, may be seen in working	
		(B1	for one correct)	
(b)	Yes, with reason	C1	<p>for Yes and comment comparing median ages, ft from (a)</p> <p>Acceptable examples</p> <p>“59” < 70</p> <p>All statistics/values are lower for coach A (so they are younger)</p> <p>Median is lower</p> <p>The middle age is lower on coach A</p> <p>Not acceptable examples</p> <p>Median is higher</p> <p>Median for coach A is “59” and coach B is 70</p> <p>The oldest on coach A is 79 and the oldest on coach B is 85</p> <p>There are people on coach B that are older than on coach A</p>	
(c)	No, with reason	C1	<p>for No and comment comparing spreads of ages from ranges or IQRs, ft from (a)</p> <p>Acceptable examples</p> <p>38 < 43 or “13” < 19</p> <p>Greater difference between greatest and least age for coach B</p> <p>Range for coach B is larger than coach A</p> <p>The range of ages is wider on coach B than on coach A</p> <p>The range is 5 greater on coach B</p> <p>There is a smaller difference between the lower and upper quantiles on coach A than on coach B</p> <p>The IQR is shorter for coach A</p> <p>Not acceptable examples</p> <p>Quartiles are less for coach A</p> <p>53 < 54 or 79 < 85 (oe)</p> <p>Range for coach A is 38 and range for coach B is 43</p> <p>Coach A ranges from 41-79 but coach B ranges from 42-85</p>	<p>Working</p> <p>A: Range = 38, IQR = “13”</p> <p>B: Range = 43, IQR = 19</p>

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
12	$\frac{4}{9}$	P1 P1 A1	<p>for process to find link between volume of Q and volume of P or between volume of R and volume of Q, eg ratio 1.5 : 1 or $Q = 1.5P$ or $P = \frac{2}{3}Q$ or two values in the ratio 1 : 1.5 such as 100 and 150</p> <p>for process to find link between volume of R and volume of P eg 1.5² : 1 or two values in the ratio 1 : 2.25 such as 100 and 225</p> <p>for $\frac{4}{9}$ oe fraction eg $\frac{100}{225}$</p>	<p>1.5² ($=\frac{9}{4}$) is enough for this mark, award P1P1</p> <p>Accept $P = \frac{4}{9}R$</p>
13	Proof shown	C2 (C1)	<p>for complete argument, eg $n(n - 1)$ is the product of two consecutive integers and must be even as either n or $n - 1$ must be even</p> <p>or gives correct reasoning for n odd and n even n odd: odd \times odd = odd and odd $-$ odd = even n even: even \times even = even and even $-$ even = even</p> <p>or n odd: $(2n + 1)^2 - (2n + 1) = 4n^2 + 2n = 2(2n^2 + n)$ n even: $(2n)^2 - (2n) = 4n^2 - 2n = 2(2n^2 - n)$</p> <p>for factorising, eg $n(n - 1)$</p> <p>OR gives correct reasoning for n odd or n even</p> <p>OR gives a partial explanation using n odd and n even, eg odd² $-$ odd = even and even² $-$ even = even)</p>	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	$\frac{1}{2}$	M1 A1	for $\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{2}$ or $\frac{\sqrt{3}}{3} \times \frac{\sqrt{3}}{2}$ or $(\frac{1}{2} \div \frac{\sqrt{3}}{2}) \times \frac{\sqrt{3}}{2}$ OR $\tan 30 = \frac{1}{\sqrt{3}}$ oe or $\sin 60 = \frac{\sqrt{3}}{2}$ for $\frac{1}{2}$ or 0.5	
15	48	M1 M1 M1 A1	for method to use a volume formula with correct substitution for the cone, sphere or hemisphere eg $\frac{1}{3} \times \pi \times 3^2 \times 10$ or $\frac{4}{3} \times \pi \times 3^3$ or $\frac{2}{3} \times \pi \times 3^3$ oe for complete method to find total volume eg $\frac{1}{3} \times \pi \times 3^2 \times 10 + \frac{2}{3} \times \pi \times 3^3$ (dep first M1) for correct partial simplification, eg 30π or 18π cao SC B2 for answer of 264 or 264π	May work without π or with an approximation of π ; must use the correct radius of 3 (and 10) in substitution Must be cone or hemisphere Accept 48π

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	125	M1	for method to find the number of 3 digit combinations, eg 5^3 or $5^3 - 1$	
		A1	for 125 or 124	
	60	M1	for method to find the number of combinations with 3 different digits eg $5 \times 4 \times 3$ or finds there are 65 combinations that do not have 3 different digits	
		A1	cao	
17	-1, 2.5	P1	for process to form an equation, eg $\frac{x^2}{3x+5} = \frac{1}{2}$ or $2x^2 = 3x + 5$	
		P1	for writing in a suitable form ready for solution, eg $2x^2 - 3x - 5 (= 0)$ or $-2x^2 + 3x + 5 (= 0)$	
		P1	(dep 1st P1) for process to solve quadratic equation of form $ax^2 + bx + c (= 0)$ eg $(2x - 5)(x + 1) (= 0)$ or $\frac{- -3 \pm \sqrt{(-3)^2 - 4 \times 2 \times -5}}{2 \times 2}$	
		A1	for -1, 2.5 oe	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
18 (a)	$3\sqrt{3}$	M1	for working unambiguously with $\sqrt{12}$, eg $\sqrt{4 \times 3}$ or $\sqrt{4} \times \sqrt{3}$ or $2\sqrt{3}$	May be seen as the first step
		A1	cao	
(b)	$\frac{\sqrt{3}}{81}$	M1	for simplifying the power eg $(\sqrt{3})^7 = 27\sqrt{3}$	
		M1	for method to rationalise the denominator eg multiplying by $\frac{\sqrt{3}}{\sqrt{3}}$	
		A1	for $\frac{\sqrt{3}}{81}$ or equivalent fraction in form $\frac{\sqrt{b}}{c}$, eg $\frac{\sqrt{2187}}{2187}$	
19 (i)	3, 8	M1	for $a = 3$, may be seen in working or as part of an expression, eg $(x - 3)^2 - 9$	9 does not have to be seen for this mark
		A1	for $a = 3$, $b = 8$	
(ii)	3, -8	B1	for 3, -8 or ft (i)	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	$h = \frac{120}{\sqrt{t}}$	<p>P1</p> <p>P1</p> <p>P1</p> <p>A1</p>	<p>for setting up a proportional relationship between h and p, eg $h \propto \frac{1}{p}$ or $h = \frac{k}{p}$ OR a proportional relationship between p and t, eg $p \propto \sqrt{t}$ or $p = K\sqrt{t}$</p> <p>for process to substitute at least 2 values, eg $10 = \frac{k}{6}$ ($k = 60$) or $6 = K\sqrt{144}$ ($K = 0.5$)</p> <p>for full process leading to $h = \frac{60}{p}$ oe and $p = "0.5"\sqrt{t}$ oe</p> <p>$h = \frac{120}{\sqrt{t}}$ oe eg $h = \frac{120\sqrt{t}}{t}$ or $h = \frac{60}{0.5\sqrt{t}}$</p>	<p>Condone the use of 'α' instead of '=' for the first two P marks</p> <p>Relationship may be implied by substitution</p> <p>Both constants must come from a correct process</p> <p>Formula for h in terms of t Does not need to be in simplest form</p>
21	(a) $\frac{x+1}{3}$	M1 A1	<p>first step to change the subject of $y = 3x - 1$ or $x = 3y - 1$, eg $y + 1 = 3x$</p> <p>oe</p>	
	(b) Shown	M1 M1 M1 M1 M1 C1	<p>for method to find $fg(x)$, eg $fg(x) = 3(x^2 + 4) - 1$</p> <p>for method to find $gf(x)$, eg $gf(x) = (3x - 1)^2 + 4$</p> <p>(dep on previous two M marks) for setting up equation, eg $3(x^2 + 4) - 1 = 2[(3x - 1)^2 + 4]$</p> <p>(dep 2nd M1) for correct expansion of $(3x - 1)^2$ eg $9x^2 - 3x - 3x + 1$</p> <p>for $15x^2 - 12x - 1 = 0$ from correct working</p>	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
22	12 red, 9 green	P1	for process to find a relationship between r and g eg $\frac{g}{r+g} = \frac{3}{7}$ or $\frac{g}{r} = \frac{3}{4}$	
		P1	for process to find a second relationship between r and g eg $\frac{g+3}{r+2+g+3} = \frac{6}{13}$ or $\frac{g+3}{r+2} = \frac{6}{7}$	
		P1	(dep P2) for start to process of solving pair of equations, eg eliminates one variable from the equations or removes fractions from both equations	
		P1	(dep P3) for complete process to solve equations to find g or r	
		A1	cao	
			OR	
		P1	for two of $3x + 3$, $4x + 2$ and $7x + 5$	
		P1	for $\frac{3x+3}{7x+5} = \frac{6}{13}$	
		P1	(dep P2) for removing fractions from the equation, eg $13(3x + 3) = 6(7x + 5)$ or $39x + 39 = 42x + 30$	
		P1	(dep P3) for complete process to solve $13(3x + 3) = 6(7x + 5)$	
		A1	cao	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1H

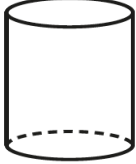
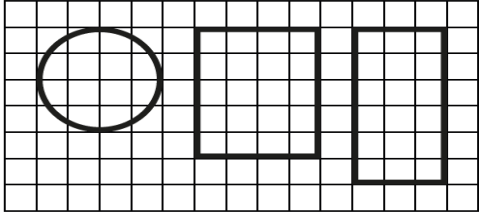
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1/1H		
Question		Modification
1(a)		Table turned to vertical format. Braille only: Spaces labelled (i) and (ii). Wording added 'There are two spaces to fill.'
		Mark scheme notes Standard mark scheme

Question	Modification	Mark scheme notes
4	<p data-bbox="360 279 909 311">Question changed. Model should be provided.</p> <div data-bbox="595 316 730 507"> <p data-bbox="629 316 696 331">Diagram 1</p>  </div> <div data-bbox="423 608 900 865"> <p data-bbox="629 608 696 624">Diagram 2</p> <div data-bbox="423 635 900 865"> <div data-bbox="456 635 584 651">Option A</div> <div data-bbox="647 635 775 651">Option B</div> <div data-bbox="792 635 920 651">Option C</div>  </div> </div> <p data-bbox="551 887 1538 1054"> Look at the diagrams for Question 25. You may be provided with a model. Diagram 1 and the model show a solid cylinder. They are not accurate. Look at Diagram 2 below Diagram 1. Diagram 2 shows three options labelled Option A, Option B and Option C on a grid of squares. Each square on the grid represents a one centimetre square. </p> <p data-bbox="551 1091 1162 1123">The cylinder is placed with its flat face on a surface.</p> <p data-bbox="551 1126 1456 1158">(a) Which of the options, A, B or C, shows the plan of the cylinder? (1 mark)</p> <p data-bbox="551 1161 1431 1193">(b) Remember: Each square on the grid represents a one centimetre square.</p> <p data-bbox="551 1197 763 1228">Using Diagram 2,</p> <p data-bbox="551 1232 1057 1264">(i) write down the diameter of the cylinder.</p> <p data-bbox="551 1295 1189 1327">(ii) write down the height of the cylinder. (1 mark)</p>	<p data-bbox="1565 279 1733 311">Mark scheme:</p> <p data-bbox="1565 314 1807 346">(a) B1 for Option A</p> <p data-bbox="1565 349 2042 445">Could be indicated on the diagram eg by circling etc. Accept a description eg circle</p> <p data-bbox="1588 448 2042 480">(b) B1 for (i) as 4 or (ii) as 3, 4, 5 or 6</p>

PAPER: 1MA1/1H

Question	Modification	Mark scheme notes
5	<p>Diagram enlarged. Grid cut to make the axes from -7 to 7. Shading changed to dotted shading. Labels removed from inside the shapes. Shapes labelled as 'shape A' and 'shape B'. Wording added 'It shows shape A and shape B on a coordinate grid.' Question changed to: (a) Reflect shape A in the x-axis. Label the new shape X. (1 mark). (b) Shape X can be transformed to shape B by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$ Find the value of c and the value of d. (2 marks)</p>	<p>Apply the standard mark scheme but in two stages: (a) B1 for showing the reflected shape X (need not be labelled if there is only one shape drawn). (b) B2 for $c = -6$ or $d = -1$ (B1 for one correct value or reverse order)</p>
7	<p>Diagram enlarged. Wording changed to 'It shows two rectangles, $ABCD$ and $PQRS$.' Rectangle $PQRS$ moved to lie landscape below $ABCD$. $PQRS$ relabelled to follow clockwise vertex labelling convention prescribed in $ABCD$. Wording changed to '$PQ = 10\text{cm}$', '$AD = PS$'. Braille only: rectangles labelled 'Rectangle 1' and 'Rectangle 2'.</p>	<p>Standard mark scheme but note the change in vertex labelling.</p>
10	<p>Diagram enlarged. Graph line made thicker. Intermediates added to the grid at 0.25 intervals. Grid cut to make x axis -0.5 to 3 and the y axis 0.25 to 0.5</p>	<p>Standard mark scheme but apply the usual greater tolerances in reading off values.</p>
11	<p>Tables combined. Headings 'Coach A' and 'Coach B' added. Braille only: spaces labelled (i) to (iii). Part (a) wording added 'There are three spaces to fill.'</p>	<p>Standard mark scheme</p>
12	<p>Wording changed to 'It shows a simplified 2D diagram. There are three spheres, P, Q and R.' Diagram simplified. Braille only: three models provided.</p>	<p>Standard mark scheme</p>

PAPER: 1MA1/1H			
Question		Modification	Mark scheme notes
15		Diagram enlarged and labelled as ‘Diagram 1’. Simplified 2D diagram added and labelled as ‘Diagram 2’. Wording changed to ‘Diagram 1 shows a solid shape.’ Wording added: ‘Diagram 2 is a simplified 2D diagram of the solid shape. A hemisphere is half a sphere.’	Standard mark scheme
16		Diagram enlarged and simplified.	Standard mark scheme
17		MLP only: ‘ x ’ changed to ‘ y ’. Answer will change as x is changed to y .	Standard mark scheme with x changed to y .
19		Braille only: ‘ a ’ changed to ‘ r ’ and ‘ b ’ changed to ‘ s ’.	Standard mark scheme with change of letters for Braille.

