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# Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE (9 – 1)  
In Mathematics (1MA1)  
Higher (Calculator) Paper 2H

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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. (e.g. 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 (e.g.. 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 answer is given on the answer line using both incorrect and correct notation, award the 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.

### Guidance on the use of abbreviations within this mark scheme

<b>M</b>	method mark awarded for a correct method or partial method
<b>P</b>	process mark awarded for a correct process as part of a problem solving question
<b>A</b>	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)
<b>C</b>	communication mark
<b>B</b>	unconditional accuracy mark (no method needed)
<b>oe</b>	or equivalent
<b>cao</b>	correct answer only
<b>ft</b>	follow through (when appropriate as per mark scheme)
<b>sc</b>	special case
<b>dep</b>	dependent (on a previous mark)
<b>indep</b>	independent
<b>awrt</b>	answer which rounds to
<b>isw</b>	ignore subsequent working



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
1		98	P1 P1 A1  P1 P1 A1	for process to find P(1), eg. $1 - 0.17 - 0.18 - 0.09 - 0.15 - 0.1 (= 0.31)$ or for a process to find P(1 or 3), eg. $1 - 0.17 - 0.09 - 0.15 - 0.1 (= 0.49)$ for process to find the number of 3s eg. $0.18 \times 200 (=36)$ or process to find the number of 1s, e.g. $P(1) \times 200 (= 62)$ , or process to find the number of (1 or 3)s, eg $[P(1) + 0.18] \times 200$ or for process to find any expected frequency using any probability $\times 200$ eg. $0.17 \times 200$ cao  OR  for process to find P(2 or 4 or 5 or 6), eg. $0.17 + 0.09 + 0.15 + 0.1 (= 0.51)$ for process to find the number of (2 or 4 or 5 or 6)s, eg. “0.51” $\times 200 (= 102)$ cao

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
2		Yes  (supported)	P1  P1  A1  P1  C1    P1  P1  A1  P1  C1	<p>for process to work out the total number of children, e.g. <math>117 \times 4 (= 468)</math></p> <p>(dep P1) for process to work out total number of adults or the total number of people, e.g. “468” <math>\times 5 \div 2 (= 1170)</math> or “468” <math>\times 7 \div 2 (= 1638)</math></p> <p>for 1170 or 1638</p> <p>for process to work out the percentage of theatre full, e.g. <math>\frac{“468”+“1170”}{2600} \times 100 (= 63)</math> or for a process to work out 60% of 2600 (<math>= 1560</math>)</p> <p>for a correct conclusion supported by correct figures e.g. 63% or 1560 <b>and</b> 1638</p> <p>OR</p> <p>for a process to work out 60% of 2600, eg. <math>\frac{60}{100} \times 2600 (= 1560)</math></p> <p>(dep P1) for process to work out this total number of children, e.g. “1560” <math>\times 2 \div 7 (= 445(.7\dots))</math></p> <p>for 445(.7...)</p> <p>for process to work out children in the circle, eg. “445(.7...)” <math>\div 4 (= 111 \text{ to } 112)</math></p> <p>for a correct conclusion supported by correct figures e.g. 111 to 112 [Where appropriate accept rounded or truncated values]</p>



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
2 cont.			<p>P1</p> <p>P1</p> <p>A1</p> <p>P1</p> <p>C1</p>	<p>OR</p> <p>for a process to find the maximum number of children, eg. <math>2600 \times 2 \div 7 (= 742(.8\dots))</math></p> <p>for process to work out the total number of children, e.g. <math>117 \times 4 (= 468)</math></p> <p>for 468 and <math>742(.8\dots)</math></p> <p>for <math>\frac{468}{742(.8\dots)} \times 100 (= 63)</math> or process to work out 60% of “<math>742(.8\dots)</math>” (<math>= 445(.7\dots)</math>)</p> <p>for a correct conclusion supported by correct figures e.g. 63% or 468 and <math>445(.7\dots)</math> [Where appropriate accept rounded or truncated values]</p>
3		<p>Side elevation</p> <p>Front elevation</p>	<p>C2</p> <p>[C1]</p> <p>C2</p> <p>[C1]</p>	<p>for the side elevation (4 cm by 2 cm rectangle with a solid line drawn 1 cm from the 2 cm edge, and correct orientation)</p> <p>for the side elevation as a rectangle]</p> <p>for the front elevation as a trapezium in correct orientation with base 4 cm, parallel sides 1 cm and 4 cm</p> <p>for the front elevation as a trapezium with two right angles] [Ignore incorrect or no labelling]</p>

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
4 (a)		57.1	P1 P1 P1 A1	for a process to find time from Liverpool to Manchester, eg. $56 \div 70$ (= 0.8 (hrs) or 48 (mins)) for a process to find total distance, eg. $56 + 61$ (= 117) or the total time, eg. "48" + 75 (= 123) or "0.8" + $\frac{75}{60}$ (= 2.05) with consistent units of time (dep P2) for a correct process to find average speed with consistent units of time, eg. "117" $\div$ "2.05" or "117" $\div$ "123"
(b)		explanation	A1 C1	for answer in the range 57 to 57.1 for explaining that the time taken for the two parts of the journey must be the same or the distance from Leeds to York is $\frac{3}{4}$ of the distance from Barnsley to Leeds
5 (a)		3.9	M1 A1	for a ratio of $\frac{8.1}{5.4}$ (=1.5) oe or $\frac{5.4}{8.1}$ (=0.66..) oe or $\frac{2.6}{5.4}$ (= 0.48..) oe or $\frac{5.4}{2.6}$ (= 2.07..) oe cao
(b)		2.05	M1 A1	for $\frac{5.4}{8.1} \times 6.15$ oe (= 4.1) or $\frac{2.7}{8.1} \times 6.15$ oe or ft "scale factor" from (a) cao

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
6		Secure Bank (supported)	P1  P1  C1	for a process to work out the interest after one year e.g. $0.02 \times 25000 (=500)$ or $0.043 \times 25000 (=1075)$ or for 1.02 or 25500 or 1.043 or 26075  for process to find value of the investment after 3 years or the multiplicative factor for 3 years at one of the banks, e.g. $25000 \times 1.02 \times 1.02 \times 1.02$ oe ( $= 26530\dots$ ) or $1.02^3 (= 1.0612\dots)$ or $25000 \times 1.043 \times 1.009 \times 1.009$ oe ( $= 26546\dots$ ) or $1.043 \times 1.009 \times 1.009 (= 1.0618\dots)$ [accept total interest of 1530.. or 1546.. if final values of investment are not found] for Secure Bank from correct figures, eg. 26530.. and 26546.. or 1530... and 1546... or 1.0612... and 1.0618...
7		$4.755 \leq n < 4.765$	B2 [B1]	for $4.755 \leq n < 4.765$ for 4.755 or 4.765 or 4.7649]
8		12	M1 A1	for evidence of taking a reading from the graph from $h = 160$ for answer in the range 11.8 to 12.2
9		No (supported)	M2 [M1 C1  M2 C1	for the correct position of C or E for a correct position of B or D] for No with correct supporting evidence, eg. showing C and E in the correct positions  OR  for C is a rotation of $90^\circ$ anticlockwise about $O$ <b>or</b> E is a rotation of $90^\circ$ clockwise about $O$ for No with supporting evidence, eg. C is a rotation of $90^\circ$ anticlockwise about $O$ <b>and</b> E is a rotation of $90^\circ$ clockwise about $O$ .

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
10 (a)		Jupiter	B1	for Jupiter (accept $1.898 \times 10^{27}$ )
(b)		$4.5388 \times 10^{24}$	B1	for $4.5388 \times 10^{24}$ oe (e.g. $45.388 \times 10^{23}$ )
(c)		Yes (supported)	M1  A1	for $(4.35 \times 10^9) \div (4.14 \times 10^7)$ (= 105(.07..)) or $(4.14 \times 10^7) \times 100$ (= $4.14 \times 10^9$ ) or $(4.35 \times 10^9) \div 100$ (= $4.35 \times 10^7$ ) for Yes with correct supporting evidence
11		$9\frac{1}{3}$	M1  M1  M1  A1	for writing at least 2 fractions with a common denominator eg. $\frac{3(3x-2)}{12}, \frac{4(2x+5)}{12}, \frac{2(1-x)}{12}$ with at least one correct numerator or for $\frac{3x}{4} - \frac{2}{4} - \frac{2x}{3} - \frac{5}{3} = \frac{1}{6} - \frac{x}{6}$ (accept $+\frac{5}{3}$ instead of $-\frac{5}{3}$ )  (dep) for a method to eliminate all fractions in an equation, ignore errors in any expanded terms eg. $3(3x - 2) - 4(2x + 5) = 2(1 - x)$ or $6 \times [3(3x - 2) - 4(2x + 5)] = 12 \times [1 - x]$ or $3 \times 3x - 3 \times 2 - 4 \times 2x - 4 \times 5 = 2 \times 1 - 2 \times x$  OR for the correct expansion of brackets leading to $\frac{9x-6-8x-20}{12} = \frac{2-2x}{12}$  (dep on M2) for correctly isolating terms in $x$ and number terms of their linear equation e.g. $9x - 8x + 2x = 2 + 6 + 20$ for $9\frac{1}{3}$ oe

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
12 (a)		comment	C1	for comment e.g. incorrect denominator for the 2nd student or probabilities for 2 <sup>nd</sup> student do not add up to 1
(b)		No (supported)	C1	for "no" with supporting evidence, e.g. probabilities should be multiplied together or $0.4 \times 0.25$
13		7	P1  P1  A1	for correct process to find any frequency, eg. " $1.1 \times 10 (= 11)$ " or " $2.8 \times 10 (= 28)$ " or " $2.3 \times 20 (= 46)$ " or " $1.4 \times 20 (= 28)$ " or " $1.4 \times 10 (= 14)$ " or " $0.7 \times 30 (= 21)$ "  or for a correct process to find the total area and an area of any block, eg. using $1 \text{ cm}^2 = 1$ unit of area to get 53.6 and one of 4.4, 11.2, 18.4, 11.2, 5.6, 8.4  (dep P1) for complete process to find 20% of (" $1.4 \times 10 + 0.7 \times 30$ "), eg. $\frac{20}{100} \times "35"$ or $\frac{"5.6"+"8.4"}{"53.6"} \times 134 \times \frac{20}{100}$ cao
14		C, F, A, H	B3 [B2 [B1	for a fully correct table for 2 or 3 correct] for 1 correct]

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
15		Proof	C1  C1  C1	<p>for identifying one pair of equal angles with a correct reason, e.g. (angle) <math>BAE =</math> (angle) <math>CDE</math>; <u>angles</u> in the same <u>segment</u> are equal or <u>angles</u> at the circumference <u>subtended</u> on the same <u>arc</u> are equal or for identifying two pairs of equal angles with no correct reasons given (angles must be within the appropriate triangles)</p> <p>for identifying a second pair of equal angles with a correct reason, e.g. (angle) <math>AEB =</math> (angle) <math>DEC</math>; <u>opposite angles</u> or <u>vertically opposite angles</u> are equal or for identifying the three pairs of equal angles with no correct reasons given</p> <p>for stating the three pairs of equal angles of the two triangles e.g. <math>ABE = DCE</math>, <math>BEA = CED</math>, <math>EAB = EDC</math> with fully correct reasons</p>
16			M1 M1  C1  M1 M1 C1	<p>for the start of a method to convert 0.22.. to a fraction, eg <math>10y = 2.22..</math> or <math>(y =) \frac{2}{9}</math></p> <p>for the start of a method to convert 0.13636... to a fraction, <math>10x = 1.3636..</math> or <math>100x = 13.6363...</math> or <math>1000x = 136.3636..</math> or <math>(x =) \frac{13.5}{99}</math> or <math>(x =) \frac{135}{990}</math></p> <p>for correct arithmetic and concluding the proof</p> <p>OR</p> <p>for <math>0.1\dot{3}\dot{6} \times 0.\dot{2} = 0.\dot{0}\dot{3}</math> (<math>= z</math>)</p> <p>for complete method to find two appropriate recurring decimals the difference of which is a rational number, eg. <math>100z = 3.0303...</math>, (<math>z =</math>) <math>0.0303...</math> or <math>\frac{3}{99}</math></p> <p>for correct arithmetic and concluding the proof</p>

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
17		66.5	B1 P1 P1 P1 A1	for recognising an angle of 60 at $AOB$ for a process to find the area of the sector, e.g. $\frac{60}{360} \times \pi \times 11^2 (= 63.3.. \text{ or } \frac{121\pi}{6})$ for a process to find the area of the triangle, e.g. $\frac{1}{2} \times 7^2 \times \sin "60"$ ( $=21.2.. \text{ or } \frac{49\sqrt{3}}{4}$ ) for a process to find the required percentage, eg. $\frac{"63.3.."-"21.2.."}{"63.3.."} \times 100$ for answer in the range 66.5 to 66.6
18		1.45	P1 P1 A1 OR P1 A2	for converting to a common base with at least one correct conversion, eg. $(16 =) 2^4$ or $(8 =) 2^3$ P1 (dep) for correct use of index laws to derive an equation, eg. $4 \times \frac{1}{5} + x = 3 \times \frac{3}{4}$ oe A1 for 1.45 oe (accept $2^{1.45}$ ) OR P1 for a process to find the value of $2^x$ , eg. $8^{\frac{3}{4}} \div 16^{\frac{1}{5}} = 2.73\dots$ A2 for 1.45 oe (accept $2^{1.45}$ )
19		$a = 4, b = -42$	M1 M1 M1 A1	for at least two terms from $2(x - 3)(x + 3), (x + 2)(x + 3), (x - 6)(x - 3)$ M1 (dep) for the correct expansion of at least two expressions, irrespective of signs, eg. $2x^2 - 18, x^2 + 2x + 3x + 6, x^2 - 6x - 3x + 18$ oe M1 for $2x^2 - 18 - x^2 - 5x - 6 - x^2 + 9x - 18$ A1 for $a = 4, b = -42$ (accept $4x - 42$ )

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
20 (a)		-0.4 to -0.2 and 3.2 to 3.4	M1 A1	for $(y =) x + 4$ for answers in the range -0.4 to -0.2 and 3.2 to 3.4
(b)		1.6 to 2.5	M1 M1 A1	for drawing a tangent to the curve at $x = 2$ for method to find gradient of their tangent for answer in the range 1.6 to 2.5
21		8600	P1 P1 P1 A1	for process to find the length of the rectangle, e.g. $24 \times 4 (= 96)$ for process to find the perpendicular height of an equilateral triangle of side $(24 \times 2)$ cm, e.g. $48\sin 60 (= 41.5(69..))$ or $\sqrt{48^2 - 24^2} (= 24\sqrt{3}$ oe) for complete process to find the width of rectangle, e.g. “ $41.5(69..)$ ” + $24 + 24 (= 89.5(69..))$ for answer in the range 8592 to 8602
22		$2n^2 + n + 1$	M1 M1 A1	for a correct start to a method to find $n$ th term, eg. equal 2nd differences imply a term in $n^2$ or sight of $an^2 + bn + c$ for a method leading to $2n^2$ and either $n$ or 1 for $2n^2 + n + 1$ oe
23		$y = \frac{-3}{\sqrt{7}}x + \frac{8}{\sqrt{7}}$	M1 M1 A1	for method to find gradient of $OP$ , eg. $\frac{\sqrt{7}}{2} \div \frac{3}{2} (= \frac{\sqrt{7}}{3}$ or $0.88 \dots)$ oe  (dep) for method to find gradient of tangent, $m$ , eg. $\frac{\frac{\sqrt{7}}{2}}{\frac{2}{3}} \times m = -1$ ( $m = \frac{-3}{\sqrt{7}}$ or $-1.13..$ ) for $y - \frac{\sqrt{7}}{2} = \frac{-3}{\sqrt{7}}(x - \frac{3}{2})$ or $y = \frac{-3\sqrt{7}}{7}x + \frac{8\sqrt{7}}{7}$ oe or $y - 1.32.. = -1.13..(x - 1.5)$



## Modifications to the mark scheme for Modified Large Print (MLP) papers.

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:  $\pm 5^\circ$

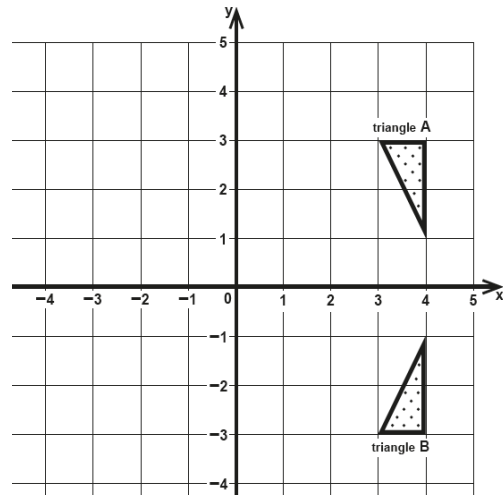
Measurements of length:  $\pm 5$  mm

<b>PAPER: 1MA1_2H</b>		
<b>Question</b>	<b>Modification</b>	<b>Mark scheme notes</b>
1	Table turned to vertical format.	Standard mark scheme
3	Alternative question. Model has been provided for all candidates. Diagram enlarged and also provided for MLP. The measurements on the prism have been doubled. Wording added next to the diagram of the trapezium 'Diagram NOT accurately drawn'. Four shapes have been provided below the trapezium labelled A to D. Wording added above the four shapes 'scale: 2 cm to 1 metre'. Question wording has changed and has been split into two parts: 'Look at the model or at the diagrams for Question 19 in the Diagram Book. They show a prism with a cross section in the shape of a trapezium. All measurements are in metres. Below the prism there are four shapes A, B, C and D. (i) Which shape shows the front elevation of the prism? (ii) Which shape shows the side elevation of the prism?'	Mark scheme amended as follows: (i) B2 for C  (ii) B2 for A (B1 for B or D)
5	Diagram enlarged. Measurements '2.6 cm' and '5.4 cm' added to the diagram.	Standard mark scheme
8	Grid enlarged. Right axis labelled	Standard mark scheme but allow an answer in the range 11 to 13.

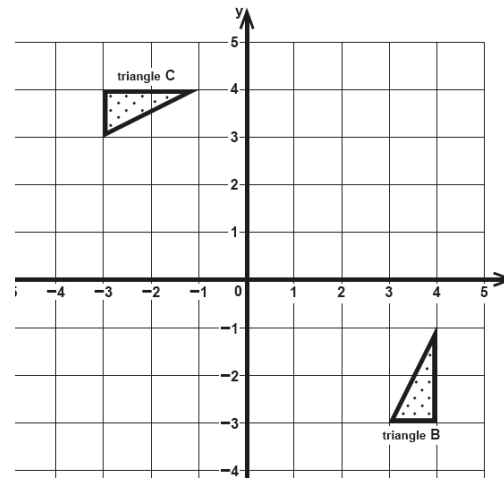
**PAPER: 1MA1\_2H**

Question	Modification	Mark scheme notes
9	<p>The question has changed and has been split into 3 parts, (a), (b) and (c). There is a separate grid with different triangles on each grid:</p> <ul style="list-style-type: none"><li>(a) Triangles A and B have been drawn on the grid.</li><li>(b) Triangles B and C have been drawn on the grid.</li><li>(c) Triangles A, B, C and D have been drawn on the grid.</li></ul> <p>The questions for each part now is:</p> <ul style="list-style-type: none"><li>(a) It shows triangle A and triangle B given on a grid. Describe the single transformation that maps triangle A onto triangle B.</li><li>(b) It shows triangle B and triangle C given on a grid. Describe the single transformation that maps triangle B onto triangle C.</li><li>(c) It shows triangles A, B, C and D given on a grid. Amy reflects triangle A in the line <math>y = x</math> to get triangle D She is then going to reflect triangle D in the <math>x</math>-axis to get triangle E Amy says that triangle E should be in the same place as triangle C. Is Amy correct? You must show how you get your answer. There is a cut out shape available for you to use</li></ul>	<p>The mark scheme for this amended question is as follows:</p> <ul style="list-style-type: none"><li>(a) B1 for “reflection in the <math>x</math>-axis”</li><li>(b) B1 for “reflection in the line <math>y = x</math>”</li><li>(c) Standard mark scheme: for No with correct supporting evidence eg showing C and E in the correct positions or stating C is a reflection in the <math>y</math>-axis rather than the <math>x</math>-axis</li></ul>
10	Rows ‘Mars’ and ‘Saturn’ removed. Wording ‘eight’ changed to ‘six’	Standard mark scheme.
11	MLP only: $x$ changed to $y$ .	Standard mark scheme but $x$ changed to $y$ .
12	Diagram enlarged. Wording added ‘It shows a probability tree diagram.’ Wording added ‘Mr Lear drew a probability tree diagram to show the information	Standard mark scheme.
13	Diagram enlarged. Right axis has been labelled. Lines on the histogram moved. 50-60 moved to 2.0; 60-90 moved to 0.5	Standard mark scheme.
14	Diagram enlarged. Wording added ‘There are four spaces to fill.’ Graphs labelled ‘Graph A, Graph B, Graph C’ etc.	Standard mark scheme.
15	Diagram enlarged.	Standard mark scheme.
17	Diagram enlarged. Shading changed to dotted shading.	Standard mark scheme.
19	MLP only: $x$ changed to $y$ .	Standard mark scheme but $x$ changed to $y$ .
20	Diagram enlarged.	Standard mark scheme.
21	Diagram enlarged.	Standard mark scheme.

(a)



(b)



(c)

