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## Mark Scheme (Results)

Summer 2019

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

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Summer 2019

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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

<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 awarded for a fully correct statement(s) with no contradiction or ambiguity
<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: 1MA1/1H					
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  Accept any equivalent fraction or 40%
		A1	oe		
	(b)	60	P1	for complete process to find total number of cubes, eg $12 \div 0.2$ <b>or</b> $12 \times 5$ <b>or</b> $(“0.4” \div 0.2) \times 12 + (“0.4” \div 0.2) \times 12 + 12$  <b>OR</b> states $0.1 = 6$ <b>or</b> $0.4 = 24$	
			A1	cao	
2	(a)	600	P1	for starting process to calculate amount of flour eg $60 \div 15 (= 4)$ <b>or</b> $3 \times 50 (= 150)$	4 implied by 200g of sugar      [butter] must be clearly stated or calculated, may be seen in part (a)  2 must not come from incorrect working
			P1	for complete process eg $\frac{60}{15} \times “150”$	
			A1	cao	
	(b)	2	P1	for process to calculate amount of butter eg $\frac{60}{15} \times 2 \times 50 (= 400)$  <b>OR</b> for process to calculate the number of packs of butter needed eg [butter] $\div 250$	
			A1	cao	

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  <b>OR</b> for the prime factors of 72 (2, 2, 2, 3, 3) <b>or</b> 90 (2, 3, 3, 5)  for 18 or $2 \times 3^2$ 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 $\frac{212}{"14"+"15"+"24"}$ or $\frac{"24"}{"14"+"15"+"24"}$	
		P1	for a complete process to find the number of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \times "24"$ 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	for Yes and comment comparing median ages, ft from (a) <b>Acceptable examples</b> "59" < 70 All statistics/values are lower for coach A (so they are younger) Median is lower The middle age is lower on coach A  <b>Not acceptable examples</b> Median is higher Median for coach A is "59" and coach B is 70 The oldest on coach A is 79 and the oldest on coach B is 85 There are people on coach B that are older than on coach A	
	(c)	No, with reason	C1	for No and comment comparing spreads of ages from ranges or IQRs, ft from (a) <b>Acceptable examples</b> 38 < 43 <b>or</b> "13" < 19 Greater difference between greatest and least age for coach B Range for coach B is larger than coach A The range of ages is wider on coach B than on coach A The range is 5 greater on coach B There is a smaller difference between the lower and upper quantiles on coach A than on coach B The IQR is shorter for coach A  <b>Not acceptable examples</b> Quartiles are less for coach A 53 < 54 <b>or</b> 79 < 85 (oe) Range for coach A is 38 and range for coach B is 43 Coach A ranges from 41-79 but coach B ranges from 42-85	Working A: Range = 38, IQR = "13" B: Range = 43, IQR = 19

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 <b>or</b> between volume of R and volume of Q,            eg ratio 1.5 : 1 <b>or</b> <math>Q = 1.5P</math> <b>or</b> <math>P = \frac{2}{3}Q</math> <b>or</b> 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 <math>1.5^2 : 1</math> <b>or</b> two values in the ratio 1 : 2.25 such as 100 and 225</p> <p>for <math>\frac{4}{9}</math> oe fraction eg <math>\frac{100}{225}</math></p>	<p><math>1.5^2 (= \frac{9}{4})</math> is enough for this mark, award P1P1</p> <p>Accept <math>P = \frac{4}{9}R</math></p>
13	Proof shown	C2          (C1)	<p>for complete argument,            eg <math>n(n - 1)</math> is the product of two consecutive integers and must be even as either <math>n</math> or <math>n - 1</math> must be even</p> <p><b>or</b> gives correct reasoning for <math>n</math> odd <b>and</b> <math>n</math> even  <math>n</math> odd: odd <math>\times</math> odd = odd and odd <math>-</math> odd = even  <math>n</math> even: even <math>\times</math> even = even and even <math>-</math> even = even</p> <p><b>or</b> <math>n</math> odd: <math>(2n + 1)^2 - (2n + 1) = 4n^2 + 2n = 2(2n^2 + n)</math>  <math>n</math> even: <math>(2n)^2 - (2n) = 4n^2 - 2n = 2(2n^2 - n)</math></p> <p>for factorising, eg <math>n(n - 1)</math></p> <p><b>OR</b> gives correct reasoning for <math>n</math> odd <b>or</b> <math>n</math> even</p> <p><b>OR</b> gives a partial explanation using <math>n</math> odd <b>and</b> <math>n</math> even, eg odd<sup>2</sup> <math>-</math> odd = even and even<sup>2</sup> <math>-</math> even = even)</p>	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	$\frac{1}{2}$	M1  A1	for $\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{2}$ <b>or</b> $\frac{\sqrt{3}}{3} \times \frac{\sqrt{3}}{2}$ <b>or</b> $(\frac{1}{2} \div \frac{\sqrt{3}}{2}) \times \frac{\sqrt{3}}{2}$  <b>OR</b> $\tan 30 = \frac{1}{\sqrt{3}}$ <b>oe</b> <b>or</b> $\sin 60 = \frac{\sqrt{3}}{2}$  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 $\frac{1}{3} \times \pi \times 3^2 \times 10$ <b>or</b> $\frac{4}{3} \times \pi \times 3^3$ <b>or</b> $\frac{2}{3} \times \pi \times 3^3$ <b>oe</b>  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 $30\pi$ <b>or</b> $18\pi$  cao  SC B2 for answer of 264 or $264\pi$	May work without $\pi$ or with an approximation of $\pi$ ; must use the correct radius of 3 (and 10) in substitution      Must be cone or hemisphere  Accept $48\pi$

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 $5^3$ <b>or</b> $5^3 - 1$	
		A1	for 125 <b>or</b> 124	
(b)	60	M1	for method to find the number of combinations with 3 different digits eg $5 \times 4 \times 3$ <b>or</b> 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 $\frac{x^2}{3x+5} = \frac{1}{2}$ <b>or</b> $2x^2 = 3x + 5$	
		P1	for writing in a suitable form ready for solution, eg $2x^2 - 3x - 5 (= 0)$ <b>or</b> $-2x^2 + 3x + 5 (= 0)$	
		P1	(dep 1st P1) for process to solve quadratic equation of form $ax^2 + bx + c (= 0)$ eg $(2x - 5)(x + 1) (= 0)$  <b>or</b> $\frac{-3 \pm \sqrt{(-3)^2 - 4 \times 2 \times -5}}{2 \times 2}$	
		A1	for -1, 2.5 oe	

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

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

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 $\frac{g}{r+g} = \frac{3}{7}$ <b>or</b> $\frac{g}{r} = \frac{3}{4}$	
		P1	for process to find a second relationship between $r$ and $g$ eg $\frac{g+3}{r+2+g+3} = \frac{6}{13}$ <b>or</b> $\frac{g+3}{r+2} = \frac{6}{7}$	
		P1	(dep P2) for start to process of solving pair of equations, eg eliminates one variable from the equations <b>or</b> removes fractions from both equations	
		P1	(dep P3) for complete process to solve equations to find $g$ <b>or</b> $r$	
		A1	cao  <b>OR</b>	
		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 $13(3x + 3) = 6(7x + 5)$ <b>or</b> $39x + 39 = 42x + 30$	
		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.

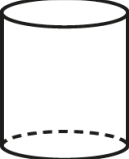
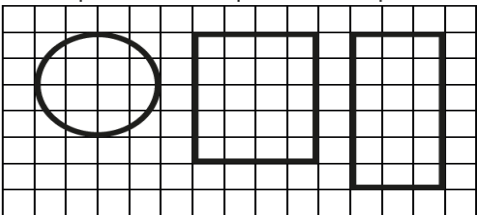
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles:  $\pm 5^\circ$

Measurements of length:  $\pm 5$  mm

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

Question	Modification	Mark scheme notes
4	<p>Question changed. Model should be provided.</p> <p style="text-align: center;">Diagram 1</p>  <p style="text-align: center;">Diagram 2</p>  <p>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.</p> <p>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.</p> <p>Each square on the grid represents a one centimetre square.</p> <p>The cylinder is placed with its flat face on a surface.</p> <p>(a) Which of the options, A, B or C, shows the plan of the cylinder? (1 mark)</p> <p>(b) Remember: Each square on the grid represents a one centimetre square.</p> <p>Using Diagram 2,</p> <p>(i) write down the diameter of the cylinder.</p> <p>(ii) write down the height of the cylinder. (1 mark)</p>	<p>Mark scheme:</p> <p>(a) B1 for Option A            Could be indicated on the diagram eg by circling etc. Accept a description eg circle</p> <p>(b) B1 for (i) as 4 <b>or</b> (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 <math>-7</math> to <math>7</math>.                      Shading changed to dotted shading.                      Labels removed from inside the shapes. Shapes labelled as 'shape <b>A</b>' and 'shape <b>B</b>'.                      Wording added 'It shows shape <b>A</b> and shape <b>B</b> on a coordinate grid.'                      Question changed to:                      (a) Reflect shape <b>A</b> in the <math>x</math>-axis. Label the new shape <b>X</b>. (1 mark).                      (b) Shape <b>X</b> can be transformed to shape <b>B</b> by a translation <math>\begin{pmatrix} c \\ d \end{pmatrix}</math>                      Find the value of <math>c</math> and the value of <math>d</math>. (2 marks)</p>	<p>Apply the standard mark scheme but in two stages:                      (a) B1 for showing the reflected shape <b>X</b> (need not be labelled if there is only one shape drawn).                      (b)                      B2 for <math>c = -6</math> or <math>d = -1</math>                      (B1 for one correct value or reverse order)</p>
7	<p>Diagram enlarged.                      Wording changed to 'It shows two rectangles, <math>ABCD</math> and <math>PQRS</math>.'                      Rectangle <math>PQRS</math> moved to lie landscape below <math>ABCD</math>.  <math>PQRS</math> relabelled to follow clockwise vertex labelling convention prescribed in <math>ABCD</math>.                      Wording changed to '<math>PQ = 10\text{cm}</math>', '<math>AD = PS</math>'.                      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 <math>0.25</math> intervals.                      Grid cut to make <math>x</math> axis <math>-0.5</math> to <math>3</math> and the <math>y</math> axis <math>0.25</math> to <math>0.5</math></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**

<b>Question</b>		<b>Modification</b>	<b>Mark scheme notes</b>
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.

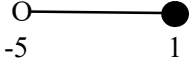


Pearson  
Edexcel

## Mark Scheme (Results)

Summer 2019

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

Paper: 1MA1/2H																				
Question	Answer	Mark	Mark scheme	Additional guidance																
1 (a)	$n > 2$	M1	for a method to isolate terms in $n$ in any inequality or equation eg $14n - 11n > 6$ or $n = 2$	Ignore incorrect inequality sign and accept “=” sign  A circle around $-5$ and $1$ implies M1  A line from $-5$ to $1$ implies M2 if no working shown																
(b)		A1	cao																	
		M1	for $-2 - 3 < x \leq 4 - 3$ ( $-5 < x \leq 1$ )																	
		M1	for drawing a line from $-5$ to $1$ <b>or</b> (indep) for an open circle at either $-2$ or $-5$ <b>or</b> (indep) for a closed circle at $4$ or $1$																	
		A1	cao																	
2	Graph	B3	for a correct line between $x = -2$ and $x = 4$	Ignore any incorrect points. Points need not be plotted for a correct line (segment) drawn  Table of values <table border="1" data-bbox="1541 919 2024 999"> <tr> <td><math>x</math></td> <td><math>-2</math></td> <td><math>-1</math></td> <td><math>0</math></td> <td><math>1</math></td> <td><math>2</math></td> <td><math>3</math></td> <td><math>4</math></td> </tr> <tr> <td><math>y</math></td> <td><math>-7</math></td> <td><math>-5</math></td> <td><math>-3</math></td> <td><math>-1</math></td> <td><math>1</math></td> <td><math>3</math></td> <td><math>5</math></td> </tr> </table>	$x$	$-2$	$-1$	$0$	$1$	$2$	$3$	$4$	$y$	$-7$	$-5$	$-3$	$-1$	$1$	$3$	$5$
$x$	$-2$	$-1$	$0$		$1$	$2$	$3$	$4$												
$y$	$-7$	$-5$	$-3$		$-1$	$1$	$3$	$5$												
		(B2)	for a correct straight line segment through at least 3 of $(-2, -7), (-1, -5), (0, -3), (1, -1), (2, 1), (3, 3), (4, 5)$ <b>or</b> for all of these points plotted but not joined  <b>OR</b> for a line drawn with a positive gradient through $(0, -3)$ <b>and</b> clear intention to use a gradient of 2, eg line through $(0, -3)$ going across 2 squares and up 4 squares )																	
		(B1)	for at least 2 correct points stated or plotted  <b>OR</b> for a line drawn with a positive gradient through $(0, -3)$  <b>OR</b> a line with gradient 2)																	

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
3	(i) 65	M1	for working with proportion eg $10 \div 30 \times 195 (=65)$	Condone use of 200 for 195	
	(ii) statement	A1 C1	cao for statement  <b>Acceptable examples</b> sample is representative (otherwise answer wrong) random sample (otherwise answer will be different) the 30 students are from the 195 (otherwise not accurate) 10 out of every 30 want to go to the Theme Park (otherwise answer will be different/wrong) there is no bias  <b>Not acceptable examples</b> There would be more than 10 people who want to go to the Theme Park I rounded my answer		
4	8	P1  P1  P1  A1	for working with volume of the cuboid, eg $30 \times 6 \times 19 (= 3420)$ <b>OR</b> for using $\frac{2}{3}$ with one dimension, eg, $30 \times 2 \div 3 (= 20)$  for “3420” $\times 2 \div 3 (= 2280)$ <b>or</b> “3420” $\div 3 (= 1140)$ <b>OR</b> “20” $\times 6 \times 19 (= 2280)$ <b>OR</b> “3420” $\div 275 (= 12.4\dots = 12 \text{ cups})$  (dep on P2) for “2280” $\div 275 (= 8(.29\dots))$ <b>or</b> “1140” $\div 275 (= 4(.14\dots))$ <b>OR</b> “12” $\times 2 \div 3$ <b>OR</b> for $275 \times 8 (= 2200)$ <b>or</b> $275 \times 9 (= 2475)$  cao	For P marks, ignore attempts at unit conversion	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	9.85	M1  A1	for $\sin(38) = \frac{AB}{16}$ oe <b>or</b> alternative method to find $AB$  for an answer in the range 9.76 to 9.92	
6	8.3 and 8.4	B1  B1	for 8.3 in the correct position  for 8.4 in the correct position	Accept 8.39 or 8.399...
7	168	P1  P1  P1  A1	for working with ratio to find the amount for C or D eg $1.5 \times 2 (=3)$ or (A, B, C, D =) 2, 7, 3, 3 oe <b>OR</b> for suitable expressions linking A with C or D, eg. $A = x, C = 1.5x$  for “2 + 3 + 3 + 7” (=15) <b>OR</b> adds 4 suitable expressions, eg. “ $x + 3.5x + 1.5x + 1.5x$ ” (= 7.5x)  for a complete process to find the amount of money eg $360 \div “15” \times 7$ <b>OR</b> $360 \div “7.5” \times 3.5$  cao	
8 (a)	$5.62 \times 10^{-3}$	B1	cao	
(b)	1452	B1	cao	



Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
9	(a)	100 : 81	M1 for a scale factor of 0.9 oe used; <b>OR</b> for 10 : 9 oe <b>OR</b> 81 : 100 oe <b>OR</b> 81%	eg. 1 : 0.81, accept 1.23(4...) : 1  eg 1.2 : 1, accept 1 : 0.83(3...)	
		A1 for 100 : 81 oe			
	(b)	6 : 5	P1 for 1.44 oe used as the scale factor <b>or</b> 1.2 oe <b>OR</b> for 144 : 100 oe or $\sqrt{144} : \sqrt{100}$ oe <b>OR</b> 5 : 6 oe		
			A1 for 6 : 5 oe		
10	(a)	Diagram completed	M1 for $1 - 0.15 (=0.85)$	ft their diagram provided probabilities are less than 1  ft their diagram provided probabilities are less than 1	
		0.85	A1 fully correct diagram		
	0.15, 0.85, 0.15, 0.85				
	(b)	0.2775	M1 for one correct product eg $0.15 \times 0.15 (= 0.0225)$ or $0.15 \times 0.85 (= 0.1275)$ or $0.85 \times 0.85 (= 0.7225)$		ft their diagram provided probabilities are less than 1  ft their diagram provided probabilities are less than 1
			M1 for a complete method eg “0.0225” + 2×”0.1275” <b>OR</b> 1 – “0.7225” oe		
			A1 oe, eg $\frac{111}{400}$		

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
11	(a)	5, 35, 55, 70, 78, 80	B1	cao	
	(b)	cf graph	M1	for 5 or 6 of their points plotted correctly from a cf table	Ignore to the left of the first point and right of the last point
			A1	for a fully correct graph	Accept a smooth curve or line segments
				SCB1 if 5 or 6 of their points plotted not at end but consistent within each interval and joined by a curve or line segments providing no gradient is negative	
	(c)	7.5	M1	for a clear method to read off the cf graph at 90	Sight of 74 or 6 implies M1
			M1	for a full method to find the percentage eg $(80 - "74") \div 80 \times 100 (=7.5)$	The following readings give the following percentages
			A1	for 7.5 or ft cf graph	72 = 10% 73 = 8.75% 74 = 7.5% 75 = 6.25% 76 = 5%

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
12	25.4	P2	for finding the size of the angle eg $\frac{40 \times 360}{\pi \times 7^2}$ (=93.5(4..))  or for working with proportion, eg $\frac{40}{49\pi}$ (=0.259(8...)) or 0.26) or $\frac{49\pi}{40}$ (=3.84(8...)) or 3.85)	
		(P1	for finding the area of the circle eg $\pi \times 7^2$ (=153(.938..) or 154) )	May be embedded
		P1	(dep on P2) for a process to find the arc length, eg $\frac{"93.5(4...)"}{360} \times \pi \times 2 \times 7$ (=11.4(28...)) or $\frac{40}{49\pi} \times \pi \times 2 \times 7$ (=11.4(28...)) or $\pi \times 2 \times 7 \div \frac{49\pi}{40}$ (=11.4(28...))	
		A1	for answer in the range 25 to 25.44	If an answer is shown in the range in working and then incorrectly rounded award full marks. Accept $\frac{178}{7}$

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	$\frac{7x - 13}{x - 2}$	B1	for factorising eg $(x+5)(x-2)$	
		M1	for a method to divide $(x+5)$ by the algebraic fraction eg $(x+5) \times \frac{(x-1)}{x^2+3x-10}$	Condone incorrect factorising
		M1	for finding 2 fractions with a common denominator or a single fraction eg $\frac{6(x-2)}{x-2} + \frac{(x-1)}{x-2}$ <b>or</b> $\frac{6(x-2)+(x-1)}{x-2}$ <b>or</b> $\frac{6(x^2+3x-10)}{x^2+3x-10} + \frac{(x+5)(x-1)}{x^2+3x-10}$ <b>or</b> $\frac{6(x^2+3x-10)+(x+5)(x-1)}{x^2+3x-10}$	Condone incorrect factorising
		A1	$\frac{7x-13}{x-2}$	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
14 (a)(i)	0.83	B1	for a tangent drawn at $t = 15$	Working: $7.5 \div 9 = 0.83\dots$ No tangent scores 0 marks
		M1	full method to use the tangent to find the gradient (eg $7.5 \div 9$ )	This mark can be awarded if the tangent is drawn at $t \neq 15$ Working may be seen on the diagram
		A1	for answer in the range 0.6 to 1.0	
(ii)	Statement	C1	statement <b>Acceptable examples</b> acceleration rate of change of speed increase in speed over time <b>Not acceptable examples</b> rate of change m/s/s increase in speed	
(b)	220	P1	for splitting the area into strips and correct process to find the area of one strip, eg $\frac{5 \times 4}{2} (=10)$ <b>or</b> $\frac{(4+12)}{2} \times 5 (=40)$ <b>or</b> $\frac{(12+18)}{2} \times 5 (=75)$ <b>or</b> $\frac{(18+20)}{2} \times 5 (=95)$	Working 4, 12, 18, 20
		P1	for a complete process using at least 4 strips to find the area under the curve eg, "10" + "40" + "75" + "95"	Allow one error in the reading of speeds
		A1	for answer in the range 215 to 225 from correct working using at least 4 strips	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	$m = \frac{f+4}{f-3}$	M1  M1  A1	for multiplying both sides by $m - 1$ , eg. $f(m - 1) = 3m + 4$  (dep) for a method to rearrange the formula to isolate terms in $m$ in a correct equation, eg. $fm - 3m = f + 4$ <b>or</b> $-fm + 3m = -f - 4$  for $m = \frac{f+4}{f-3}$ oe, eg $m = \frac{-f-4}{-f+3}$	Condone missing brackets for this mark only
16	$y = -\frac{3}{4}x - \frac{11}{4}$	M1  M1  A1	for identifying gradient of $\frac{4}{3}$  for beginning a method to find the gradient of the perpendicular line eg $\frac{4}{3} \times m = -1$ <b>or</b> identifies gradient of perpendicular line as $-\frac{3}{4}$  for $y = -\frac{3}{4}x - \frac{11}{4}$ or any equivalent equation	Ignore constant term  Can fit providing gradient is clearly stated  $4y + 3x = -11$ $y + 5 = -\frac{3}{4}(x - 3)$

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	Explanation	C1	For stating the LCM of (4+7) and (5+3) is 88 <b>or</b> there is no smaller multiple of 8 and 11 (than 88)	
(b)	23	P1	for using a scale factor appropriately eg $4 \times 8 (=32)$ <b>or</b> $3 \times 11 (=33)$ <b>or</b> $7 \times 8 (=56)$ <b>or</b> $5 \times 11 (=55)$ <b>or</b> for writing a pair of suitable fractions, eg $\frac{7}{11}$ and $\frac{3}{8}$ <b>or</b> $\frac{4}{11}$ and $\frac{5}{8}$ <b>or</b> $\frac{3}{8}$ and $\frac{4}{11}$	May be seen in a two-way table or probability tree
		P1	for finding the number of large cubes and red cubes <b>or</b> small and yellow <b>or</b> small and red eg $7 \times 8 (=56)$ and $3 \times 11 (=33)$ <b>or</b> $4 \times 8 (=32)$ and $5 \times 11 (=55)$ <b>or</b> $4 \times 8 (=32)$ and $3 \times 11 (=33)$ <b>OR</b> a suitable fractional equation, eg $\frac{7}{11} - x = \frac{3}{8}$ <b>or</b> $\frac{5}{8} - x = \frac{4}{11}$ <b>or</b> $x = 1 - \frac{3}{8} - \frac{4}{11}$ <b>OR</b> a suitable pair of probabilities with a common denominator, eg $\frac{56}{88}$ and $\frac{33}{88}$ <b>or</b> $\frac{32}{88}$ and $\frac{55}{88}$ <b>or</b> $\frac{33}{88}$ and $\frac{32}{88}$	May be seen in a two-way table or probability tree
		A1	cao	$\frac{23}{88}$ scores P2A0

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
18	75° with reasons	M1	for finding angle $BAD = \frac{180 - 40}{2}$ (= 70)  or angle $BDA = \frac{180 - 40}{2}$ (= 70)	Could be shown on the diagram or in working
		M1	for finding angle $BCD = 180 - \text{“70”}$ (=110) or $40 + x + 70 + x = 180$	
		A1	for finding angle $ADE = 75$	
		C2	(dep M2) for <u>Opposite angles</u> of a <u>cyclic quadrilateral</u> add up to 180 <b>and</b> one other reason; all reasons given must be appropriate for their working Base angles of an <u>isosceles triangle</u> are equal <u>Angles in a triangle</u> add up to 180, <u>Angles on a straight line</u> add up to 180 [ <b>or</b> <u>exterior angle</u> of a <u>cyclic quadrilateral</u> is equal to the <u>interior opposite angle</u> ]	Underlined words need to be shown; reasons need to be linked to their method
		(C1	(dep M2) for <u>Opposite angles</u> of a <u>cyclic quadrilateral</u> add up to 180, <b>or</b> all other reasons given appropriate for their working)	Apply the above criteria



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	31.0	P1	for $\tan 35 = BE \div 15$ or $BE = 10.5(0\dots)$ <b>OR</b> finding the length $DM = \frac{2}{5} \times 15 (= 6)$ <b>or</b> $MA = \frac{3}{5} \times 15 (= 9)$ <b>or</b> 6:9 <b>OR</b> showing the required angle on a diagram eg with an arc	$MB = \sqrt{9^2 + 15^2} = \sqrt{306} (=17.4(9\dots))$ or 17.5) $BE = 15 \times \tan 35 (=10.5(0\dots))$ $AE = 15 \div \cos 35 (=18.3(1\dots))$ $ME = \sqrt{9^2 + 18.31\dots^2} = \sqrt{416. (3\dots)}$ (=20.4(0\dots))
		P1	for $MB = \sqrt{15^2 + "9"}^2$ or $\sqrt{306}$ or 17.4(9\dots) <b>OR</b> $ME = \sqrt{"9"}^2 + "18.3(1\dots)"^2$ or $\sqrt{416. (3\dots)}$ or 20.4(0\dots)	Check diagram for working
		P1	for using appropriate trigonometry ratio to set up an equation in angle $EMB$ eg $\tan \theta = "10.5(0\dots)" \div "17.4(9\dots)"$ <b>or</b> $\cos \theta = "17.4(9\dots)" \div "20.4(0\dots)"$ <b>or</b> $\sin \theta = "10.5(0\dots)" \div "20.4(0\dots)"$	
		A1	for answer in the range 30.9 to 31	If an answer is shown in the range in working and then incorrectly rounded award full marks.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
20 (a)	2a	M1	for $\mathbf{a} - \mathbf{b} + \mathbf{a} + \mathbf{b}$ ( $=2\mathbf{a}$ )	
		A1	cao	
(b)	4	P1	for a process to find $\overrightarrow{MF} = -0.5\mathbf{b} - \mathbf{a} - (\mathbf{a} - \mathbf{b})$ ( $=0.5\mathbf{b} - 2\mathbf{a}$ ) or $\overrightarrow{CE} = \mathbf{a} + \mathbf{b}$ or $\overrightarrow{FM} = \mathbf{a} - \mathbf{b} + \mathbf{a} + 0.5\mathbf{b}$ ( $=2\mathbf{a} - 0.5\mathbf{b}$ )	Accept ft from (a) providing vectors are clearly stated
		P1	For finding a suitable vector expression for <b>two</b> of ( $\overrightarrow{CE}$ or $\overrightarrow{EC}$ ), ( $\overrightarrow{CX}$ or $\overrightarrow{XC}$ ) or ( $\overrightarrow{EX}$ or $\overrightarrow{XE}$ ) eg, $\overrightarrow{CX} = \mathbf{a} + 0.5\mathbf{b} + \frac{1}{n+1}(0.5\mathbf{b} - 2\mathbf{a})$ or $\overrightarrow{CX} = -\mathbf{a} + \mathbf{b} + \frac{n}{n+1}(2\mathbf{a} - 0.5\mathbf{b})$ $\overrightarrow{XE} = \frac{1}{n+1}(2\mathbf{a} - 0.5\mathbf{b}) + 0.5\mathbf{b}$ or $\overrightarrow{XE} = \frac{n}{n+1}(0.5\mathbf{b} - 2\mathbf{a}) + 2\mathbf{a}$ or $\overrightarrow{XC} = \frac{n}{n+1}(0.5\mathbf{b} - 2\mathbf{a}) + \mathbf{a} - \mathbf{b}$ or $\overrightarrow{XC} = \frac{1}{n+1}(2\mathbf{a} - 0.5\mathbf{b}) - 0.5\mathbf{b} - \mathbf{a}$ or $\overrightarrow{EX} = -0.5\mathbf{b} + \frac{1}{n+1}(0.5\mathbf{b} - 2\mathbf{a})$ or $\overrightarrow{EX} = -2\mathbf{a} + \frac{n}{n+1}(2\mathbf{a} - 0.5\mathbf{b})$	$\overrightarrow{CX} = \frac{n-1}{n+1}\mathbf{a} + \frac{n+2}{2(n+1)}\mathbf{b}$ $\overrightarrow{XE} = \frac{2}{n+1}\mathbf{a} + \frac{n}{2(n+1)}\mathbf{b}$ $\overrightarrow{XC} = \frac{1-n}{n+1}\mathbf{a} + \frac{-n-2}{2(n+1)}\mathbf{b}$ $\overrightarrow{EX} = \frac{-2}{n+1}\mathbf{a} - \frac{n}{2(n+1)}\mathbf{b}$
		P1	for complete process to equate the coefficients of $\mathbf{a}$ and $\mathbf{b}$ eg $\frac{n-1}{n+1} = \frac{n+2}{2(n+1)}$	
		A1	cao	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
			<b>ALTERNATIVE</b>	
		P1	for a process to find $\overrightarrow{MF} = -0.5\mathbf{b} - \mathbf{a} - (\mathbf{a} - \mathbf{b}) (=0.5\mathbf{b} - 2\mathbf{a})$ or $\overrightarrow{CE} = \mathbf{a} + \mathbf{b}$ or $\overrightarrow{FM} = \mathbf{a} - \mathbf{b} + \mathbf{a} + 0.5\mathbf{b} (=2\mathbf{a} - 0.5\mathbf{b})$	Accept ft from (a) providing vectors are clearly stated
		P1	For finding two suitable vector expressions for $\overrightarrow{FX}$ eg $\overrightarrow{FX} = \frac{n}{n+1}(2\mathbf{a} - 0.5\mathbf{b})$ and $\overrightarrow{FX} = \mathbf{a} - \mathbf{b} + k\mathbf{a} + k\mathbf{b}$	
		P1	for complete process to equate the coefficients of <b>a</b> and <b>b</b> eg $\frac{2n}{n+1} - 1 = 1 - \frac{n}{2(n+1)}$	
		A1	cao	

## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

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:

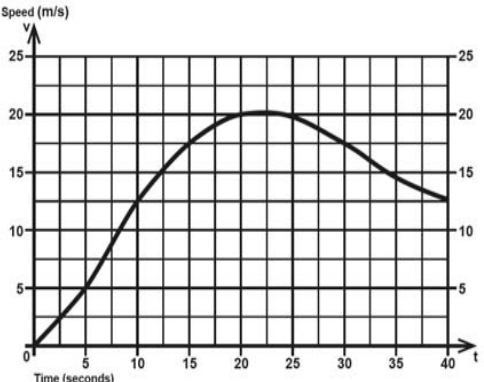
Angles:  $\pm 5^\circ$

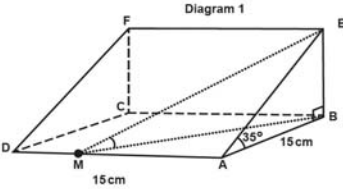
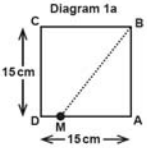
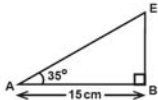
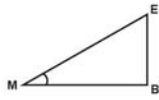
Measurements of length:  $\pm 5$  mm

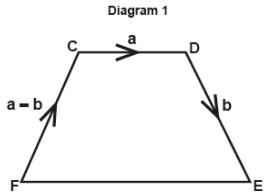
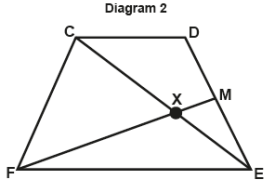
PAPER: 1MA1/2H		
Question	Modification	Mark scheme notes
1	(b) Diagram enlarged. Wording 'below' removed.	Standard mark scheme
2	Diagram enlarged. Wording 'below' removed.	Standard mark scheme
4	Diagram enlarged. Wording changed to 'It shows a container in the shape of a cuboid with length 30 cm, width 6 cm and height 19 cm.' Second 19 cm label added on the left of the diagram. Dashed line and 'Water' added.	Standard mark scheme
5	Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller. Wording added: 'AC = 16 cm Angle ACB = $38^\circ$ Angle ABC is a right angle.'	Standard mark scheme
9	Braille only: 'A' to 'P', 'B' to 'Q', 'E' to 'S', 'F' to 'T', 'e' and 'f' to 's' and 't'.	Standard mark scheme but note changes of letters for Braille.
10	Diagram enlarged. Braille only- spaces labelled (i) to (v).	Standard mark scheme

PAPER: 1MA1/2H		
Question	Modification	Mark scheme notes
11	<p>Numbers in the frequency column now: 5, 25, 20, 15, 10, 5</p> <p>(a) Wording added 'There are six spaces to fill.'</p> <p>(b) Diagram enlarged. Right axis labelled.</p> <p>Axis labels moved to the left of the horizontal axis and above the vertical axis.</p>	<p>(a) B1 for 5, 30, 50, 65, 75, 80</p> <p>(b) use standard mark scheme</p> <p>(c)</p> <p>M1 for a clear method to read off the graph at 90</p> <p>M1 for a full method to find the percentage eg <math>(80 - "70") \div 80 \times 100 (=12.5)</math></p> <p>A1 for an answer in the range 12.5 or ft their diagram</p>
12	Diagram enlarged	Standard mark scheme

**PAPER: 1MA1/2H**

Question	Modification	Mark scheme notes
14	<p>Wording added ‘It shows a graph.’ Diagram enlarged. Graph line made thicker.                      Axis labels moved to the left of the horizontal axis and above the vertical axis.                      Right axis labelled. Graph line moved:                      Graph line changed to go through: (5,5), (10,12.5), (15,17.5), (20,20), (30,17.5)</p> 	<p>(a)(i)                      B1 for a tangent drawn at <math>t = 15</math>                      M1 full method to use the tangent to find the gradient (eg <math>7.5 \div 9</math>)                      A1 for answer in the range 0.6 to 1.0                      (a)(ii) use standard mark scheme                      (c) use standard mark scheme leading to an answer of approx. 225 or in the range 215 to 235                      Strips: <math>12.5 + 43.75 + 75 + 93.75</math></p>
18	<p>Diagram enlarged.                      Angle moved outside of the angle arc and the angle arc made smaller.</p>	<p>Standard mark scheme</p>

Question	Modification	Mark scheme notes
19	<p>Model may be provided for candidates. Enlarged diagram for MLP.</p> <p>Three extra diagrams added and labelled 1a, 1b and 1c. See screen shot below.</p> <p>Wording added: ‘Diagram 1 shows’, ‘shown in diagram 1a’, ‘Diagram 1b shows the face ABE.’, ‘Diagram 1c shows triangle <i>MBE</i>.’</p>  <p>Diagram 1a: A square with vertices D, M, A, B. The side length DM is labeled as 15 cm. A diagonal line connects D and B.</p>  <p>Diagram 1b: A right-angled triangle with vertices A, B, E. The angle at vertex A is labeled as 35 degrees. The side length AB is labeled as 15 cm. A right-angle symbol is shown at vertex B.</p>  <p>Diagram 1c: A right-angled triangle with vertices M, B, E. A right-angle symbol is shown at vertex B.</p> 	Standard mark scheme

Question	Modification	Mark scheme notes
20	<p>(a) Original diagram enlarged/changed and labelled as Diagram 1.</p>  <p style="text-align: center;">Diagram 1</p> <p>(b) A second diagram added for part (a) and labelled as Diagram 2. Wording added 'Below diagram 1, diagram 2 shows the same quadrilateral CDEF.' Line CXE added to diagram 2.</p>  <p style="text-align: center;">Diagram 2</p>	Standard mark scheme for both parts.



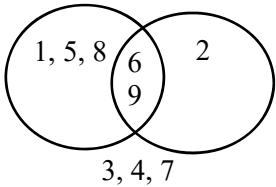


Pearson  
Edexcel

## Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCSE (9 – 1)  
In Mathematics (1MA1)  
Higher (Calculator) Paper 3H

Paper: IMA1/3H					
Question	Answer	Mark	Mark scheme	Additional guidance	
1	(a)	6, 9	M1	for 6, 9 in the intersection only	Ignore all entries except the region you are marking for each method mark  
		1, 5, 8	M1	for 1, 5, 8 in set $A$ only	
		2		or 2 in set $B$ only	
		3, 4, 7	C1	for all numbers correctly placed in the Venn Diagram	
	(b)	$\frac{2}{9}$	M1	ft for identification of 2 or 9 or ft diagram	
			A1	$\frac{2}{9}$ oe or ft diagram	
2	12272.70 12272.71 or 12272.72	M1	for evidence of using a correct first step eg $200000 \times 0.015 (= 3000)$ or $200000 \times 1.015 (= 203000)$	values may be rounded or truncated to 2 dp	
		M1	for evidence of a compound interest method eg $203000 \times 0.015 (= 3045)$ or $203000 \times 1.015 (= 206045)$ <b>or</b> $206045 \times 0.015 (= 3090.675)$ or $206045 \times 1.015 (= 209135.675)$ <b>or</b> $209135.675 \times 0.015 (= 3137.035\dots)$ or $209135.675 \times 1.015 (= 212272.710\dots)$ <b>or</b> $200000 \times 1.015^t, t \geq 2$		
		A1	for 12272.7(0) or 12272.71 or 12272.72  SC B2 for 212272.7(0) or 212272.71 or 212272.72		

Paper: 1MA1/3H					
Question	Answer	Mark	Mark scheme	Additional guidance	
3	(a)	$40 < h \leq 50$	B1	accept 40 – 50 oe	
	(b)	<p>polygon drawn</p> <p>(15,7), (25,13)</p> <p>(35,14), (45,12)</p> <p>(55,16), (65,18)</p>	<p>B2</p> <p>(B1</p>	<p>for fully correct polygon with points plotted at the midpoints</p> <p>for points plotted correctly but not joined by straight lines</p> <p><b>or</b> joining points at correct heights consistently within intervals including plotting at end values</p> <p><b>or</b> correct frequency polygon with one point incorrect</p> <p><b>or</b> correct frequency polygon with first and last points joined directly)</p>	<p>Joining must be with line segments</p> <p>for example, at 10, 20, 30,...or at 20, 30, 40,...</p> <p>Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted</p>

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	statement	B2	<p>Two different statements</p> <p><b>Acceptable</b></p> <p>eg should be joined with straight lines (not curve)/should use a ruler</p> <p>1<sup>st</sup> (quarter) not shown/plotted/labelled/not all quarters labelled</p> <p>does not show all 4 seasons</p> <p>9.5 missing from vertical axes/not linear</p> <p>vertical (number) axis does not start at 0/the y axis starts at 6</p> <p>the graph does not begin at 0, it starts at 6</p> <p>it is not clear what 2, 3, 4 on the x-axis mean</p> <p>the scale of years doesn't make sense</p> <p>there is lack of clarity about what the numbers on the x axis represent</p> <p>graph is curved line</p> <p><b>Not acceptable</b></p> <p>eg no value plotted for 2 in 2016</p> <p>it does not start at 0 (no reference to vertical axis)/missing 0</p> <p>they should not have connected the dots like that</p> <p>the numbers on the x axis are repeated</p> <p>the numbers along the x axis 2, 3, 4</p> <p>the years on the x axis have not been written properly</p> <p>does not follow a sequence</p> <p>it needs a discontinuity wiggle on the axis</p> <p>no title</p>	Ignore additional statements provided no contradiction
	statement	(B1	One statement eg from those above.)	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	162 supported	M1	<p>for method to find sum of the interior angles of a hexagon eg <math>(6 - 2) \times 180 (= 720)</math> oe</p> <p><b>OR</b></p> <p>for method to find sum of the interior angles of a pentagon, eg <math>(5 - 2) \times 180 (= 540)</math></p> <p><b>OR</b></p> <p>for method to find angle <math>AFC</math> or <math>BCF</math>, eg <math>(360 - 2 \times 117) \div 2 (= 63)</math></p> <p><b>OR</b></p> <p>for dropping a perpendicular from <math>A</math> or <math>B</math> to <math>ED</math> with <math>90^\circ</math> marked on <math>ED</math> and <math>27^\circ</math> at the top</p>	<p>Must be a complete process that would lead to a figure of 720 if evaluated correctly.</p> <p>For a pentagon there must be an indication that they have divided the hexagon into two halves.</p> <p>63 may be shown on the diagram for angle <math>AFC</math> or angle <math>BCF</math></p>
		M1	<p>for method to use ratio 2 : 1 eg marks as <math>2x</math> and <math>x</math> or as <math>x</math> and <math>\frac{1}{2}x</math> on diagram</p> <p><b>OR</b></p> <p>for <math>([\text{angle sum of hexagon}] - 2 \times 117) \div 6 (= 81)</math> oe or <math>([\text{angle sum of hexagon}] \div 2 - 117) \div 3 (= 81)</math> oe <b>or</b> <math>117 + 117 + 2x + 2x + x + x = [\text{angle sum of hexagon}]</math> oe</p> <p><b>OR</b></p> <p>eg <math>([\text{angle sum of pentagon}] - 117 - 180) \div 3 (= 81)</math> oe <b>or</b> <math>117 + 180 + 2x + x = [\text{angle sum of pentagon}]</math> oe</p>	<p>Ratio must be used correctly if awarded for diagram</p> <p>Award provided <math>[\text{angle sum of hexagon}]</math> is greater than 700 or <math>[\text{angle sum of pentagon}]</math> is greater than 500 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified.</p>
		M1	<p>for finding angle <math>FED = 81</math> or for finding angle <math>CDE = 81</math></p> <p><b>OR</b></p> <p>for complete process to find angle <math>AFE</math> eg <math>([\text{angle sum of hexagon}] - 2 \times 117) \div 6 \times 2</math> oe</p> <p><b>OR</b></p> <p><math>([\text{angle sum of pentagon}] - 117 - 180) \div 3 \times 2</math> oe</p>	<p>This may be shown by solving a correct equation to find the value of <math>x</math>.</p>
		C1	<p>for accurate working leading to angle <math>AFE = 162</math></p>	<p>Award marks for 162 on the diagram with working and not contradicted by the answer line. Award 0 marks for 162 without working.</p>

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	No Supported	P1	for finding the area of a circle eg $\pi \times 0.8^2$ (= 2.01...)	Must be area of circle and not part of a volume, eg $\pi r^2 h$ May be seen as $2\pi r^2$
		P1	for finding the curved surface area eg $2\pi \times 0.8 \times 1.8$ (= 9.047...)	May be seen from $2\pi r h$ or from $\pi d h$
		P1	for use of the coverage information with an area eg “2.01...” $\div 5$ (= 0.402...) or “4.02...” $\div 5$ (= 0.804...) or “9.047...” $\div 5$ (= 1.8095...) or “11.058” $\div 5$ (= 2.2116..) or “13.069...” $\div 5$ (= 2.6138...) <b>OR</b> for process to find total coverage for comparison eg $5 \times 7$ (= 35)	Accept numbers without working written to no less than 2dp Do not award if a volume has been used as part of the calculation.  An independent mark for $5 \times 7$
		P1	(dep P1) for finding total surface area for 3 tanks eg [total surface area] $\times 3$ (= 39.2...) <b>OR</b> for complete process to find the number of tins needed for total area of 3 tanks eg “13.069”... $\times 3 \div 5$ (= 7.84.....) <b>OR</b> for complete process to find coverage needed from each tin eg “13.069”... $\times 3 \div 7$ (= 5.6...)	[total surface area] must come from the addition of two attempts at area, but not from volume.
		C1	for conclusion “No” supported by accurate figures eg 8 tins <b>or</b> 7.84 ( $> 7$ ) <b>or</b> 39.2 $> 35$ <b>or</b> 5.6 ( $> 5$ )	Clear statement that there is <b>not</b> enough paint supported by correct figures for comparison. NB: $2.6 \times 3 = 9$ tins needed is inaccurate 8 or 7.84 tins is sufficient without restating the 7, 5.6 m <sup>2</sup> is sufficient without restating the 5 but 39.2 and 35 are needed for comparison. A statement of “No, 8 tins” alone gets 0 marks without supporting working.

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	0.319	M1 A1	for partial method eg 1.70(499...) or 16.74 or $\frac{837}{50}$ or 0.101(8516...) or 0.102 or 0.32 for 0.319(1419...)	Accept 0.319 or better. Condone incorrect digits after the 0.319; isw incorrect rounding if 0.319(1419...) is shown in working.
8	(a) Mistake described	C1	for statement describing a mistake <b>Acceptable</b> eg should be $AC^2 - AB^2$ she should do $8^2 - 6^2$ she should be subtracting not adding the numbers she thought that $BC$ was the hypoteneuse when it was actually $AC$ should be $BC^2 + AB^2 = AC^2$ .....should be $8^2 = 6^2 + BC^2$ <b>Not acceptable</b> eg she has not used Pythagoras correctly $6^2 + 8^2$ is 120 the answer should be $\sqrt{28}$ or 5 or 5.3 or 5.2915 $BC + AB = AC$	Note that a diagram alone is insufficient.
	(b) Explanation	C1	for explanation <b>Acceptable examples</b> the scale factor used is 2.5 $5 \div 2$ is not 1.5 $10 \div 4$ is more than 1.5 the scale factor is not 1.5 he has not used the correct scale factor has enlarged it by too much $ZY$ should be 6 <b>Not acceptable examples</b> the grid is not large enough	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	10	P1  P1  A1	<p>he has used the wrong centre</p> <p>for a process to start to solve the problem eg <math>6 \times 9 (= 54)</math> machine days needed or 12 (machine days used in first 3 days) or 42 (machine days needed after first 3 days) or 6 (machine days not used in first 3 days) or <math>3 + 4 + 5</math> equivalent to 2 days with 6 machines or has used 48 machine days in first 9 days</p> <p>for "<math>42</math>" <math>\div 6 (= 7)</math> (more days needed) or <math>3 \text{ days} - 2</math> (equivalent) days <math>(= 1)</math> extra day needed to make up for the days not used</p> <p>cao</p>	<p>eg <math>3 + 4 + 5 (= 12)</math> eg <math>6 \times 9 - 12 (= 42)</math> eg <math>3 + 2 + 1 = 6</math> eg <math>12 \div 6 = 2</math></p>
10	1.8	P1  P1  A1	<p>process to find the amount of interest before tax eg <math>28.80 \div 20 \times 100 (= 144)</math> OR for equation which would lead to <math>(x =) 0.018, 1.8</math> or <math>1.018</math> eg <math>0.2 \times 8000 \times x = 28.8</math> or <math>\frac{8000(100+x)}{100} = 8144</math></p> <p>process to find the interest rate eg <math>\frac{144}{8000} (= 0.018)</math> or <math>\frac{8144}{8000} (= 1.018)</math></p> <p>cao</p>	<p>These numerical expressions may be seen multiplied by 100, eg <math>\frac{144}{8000} \times 100</math></p>



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	130	P1	for process to divide eg $(3.9 \times 10^7) \div (3 \times 10^5)$	Condone missing brackets
		A1	cao	Accept $1.3 \times 10^2$
(b)	Explanation	C1	<p>Explanation referring to the time</p> <p><b>Acceptable examples</b>            The time will be more            It will take longer            The answer will be bigger</p> <p><b>Not acceptable examples</b>            The answer will be wrong            The answer will be different</p>	
12	Explanation	C1	<p>for explanation eg needs to find 4th root or gives the correct answer of 2.828...</p> <p><b>Acceptable examples:</b>            He needs to find <math>\sqrt[4]{64}</math>            It should be 2.8..(or <math>2\sqrt{2}</math>)            It is not asking for <math>64 \div 4</math>, it is asking what number to the power of 4 = 64  <math>64^{\frac{1}{4}}</math> means the fourth root not a quarter of 64  <math>64^{\frac{1}{4}}</math> means square root and square root again, not divide by 4</p> <p><b>Not acceptable examples:</b>            It should be 2            The expression is 64 to the power of <math>\frac{1}{4}</math>  <math>64^{\frac{1}{4}}</math> is not a <math>\frac{1}{4}</math> of 64</p>	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	1.01	P1 P1 P1 A1	<p>for <math>1.09 \times 60 (= 65.4 \text{ or } \frac{327}{5})</math> <b>or</b> <math>0.97 \times 128 (= 124.16 \text{ or } \frac{3104}{25})</math></p> <p>for <math>1.09 \times 60 (= 65.4 \text{ or } \frac{327}{5})</math> <b>and</b> <math>0.97 \times 128 (= 124.16 \text{ or } \frac{3104}{25})</math>  <b>or</b> “65.4” + “124.16” (= 189.56 or <math>\frac{4739}{25}</math>)</p> <p>for a complete process to find the density of antifreeze  eg (“65.4” + “124.16”) <math>\div</math> 188 or <math>189.56 \div 188</math> or <math>\frac{4739}{25} \div 188</math></p> <p>for answer in the range 1.00 to 1.01</p>	<p>Note that the volumes may be converted to ml,  eg <math>1.09 \times 60000 (= 65400)</math></p> <p>Candidates working in ml must use 188,000</p> <p>If an answer within the range is seen in working  but then rounded incorrectly award full marks.  Accept 1 for 1.00  Note that the correct value is 1.008.....</p>
14	36	P1 P1 P1 A1	<p>for process to find an expression for the area of triangle  eg <math>\frac{1}{2} \times 24 \times AE \times \sin 30 (= 6AE)</math></p> <p>(dep P1) for process to link the area of rectangle with the area of the triangle  eg <math>2 \times \frac{1}{2} \times 24 \times AE \times \sin 30 (= 12AE)</math>  or for <math>AB = 12</math></p> <p>(indep) for use of given ratio eg <math>AE = 3AB</math> oe,  eg area of rectangle = <math>AE \times AB = 3x \times x</math></p> <p>cao</p>	<p>Accept any correct expression,  eg <math>\frac{1}{2} \times 24 \times y \times \sin 30</math></p> <p>May be shown on the diagram by labelling <math>AE</math>  and <math>AB</math> with, for example, <math>3x, x</math> or <math>x, \frac{1}{3}x</math> or <math>\frac{3}{4}x, \frac{1}{4}x</math>  Do not accept 3, 1 or <math>1, \frac{1}{3}</math> or <math>\frac{3}{4}, \frac{1}{4}</math> for this mark.</p>

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	$(-7, -1)$	M1  A1	for a method which shows understanding of the type of transformation eg reflection in the $y$ axis or translation $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ or “(0 units right and) 3 units down” <b>or</b> for $x$ coordinate as $-7$ <b>or</b> $y$ coordinate as $-1$  for $(-7, -1)$	“Reflection” or “Translation” alone is insufficient. Note that the $-7$ or the $-1$ may appear in the working space, not necessarily in the final answer.
16	$2n^2 - 3$	M1  M1  A1	begins to work with 2 <sup>nd</sup> differences  identifies $2n^2$ as part of the expression eg gives the sequence 2, 8, 18, 32, ... or gives a quadratic expression which includes the term $2n^2$  oe	6 10 14 18 22 4 4 4 4  A quadratic expression of the form $2n^2 + bn + c$ can be awarded the first 2 marks
17	B, A, D, C	B2  (B1)	for all correct  for two or three correct)	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
18 (a)	$6x^3 + 35x^2 + 58x + 21$	M1	for a method to find the product of two linear expressions, 3 correct terms out of 4 terms e.g. $2x^2 + x + 6x + 3$ or $3x^2 + 7x + 9x + 21$ or $6x^2 + 14x + 3x + 7$	Note that, for example, $7x + 3$ is regarded as three terms in the expansion of $(2x + 1)(x + 3)$
		M1	for a complete method to obtain all terms, at least half of which are correct (ft their first product) e.g. $6x^3 + 32x^2 + 42x + 3x^2 + 16x + 21$	First product must be a 3 or 4 term quadratic but need not be simplified or may be simplified incorrectly
		A1	cao	Accept $a = 6, b = 35, c = 58, d = 21$
(b)	$\frac{2}{5} < x < 1\frac{3}{5}$	M1	for first step of finding the square root of both sides eg $1 - x < \pm\frac{3}{5}$  <b>OR</b> for writing in the form $ax^2 + bx + c (< 0)$ eg $x^2 - 2x + \frac{16}{25} (< 0)$ or $25x^2 - 50x + 16 (< 0)$	Condone use of an “=” sign; accept one square root (eg $\frac{3}{5}$ ) only shown.
		M1	for showing critical values $\frac{2}{5}$ (= 0.4) and $1\frac{3}{5}$ (= 1.6) oe	Critical values can be stated, or shown in an expression (which may have incorrect inequality symbols)
		A1	for $\frac{2}{5} < x < 1\frac{3}{5}$ oe	Could be written as two separate expressions eg $x > \frac{2}{5}$ and $x < 1\frac{3}{5}$ oe

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
19 (a)	81.0662	M1	for one of 26.15 or 26.25 or 4.25 or 4.35	Accept 26.249 for 26.25 and 4.349 for 4.35  Award for $\frac{26.25^2}{4.25}$
		M1	for a correct process to find the upper bound for $D$ [UB of $u$ ] <sup>2</sup> $\div$ [ $2 \times$ LB of $a$ ] eg $\frac{26.25^2}{2 \times 4.25}$ where $26.2 < \text{UB of } u \leq 26.25$ and $4.25 \leq \text{LB of } a < 4.3$	
		A1	for answer given in the range 81.0661 to 81.0662 from correct working	
(b)	80	B1	for 80 ft answer to (a) with 78.6003	
	explanation	C1	for explanation relating to the upper bound found in (a) <b>Acceptable examples</b> bounds agree when rounded to 80 bounds agree to nearest 10 <b>Not acceptable examples</b> 80 79.83325 rounded to nearest tenth	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	$x = 3\frac{2}{5}, y = -\frac{4}{5}$	M1	for substitution of a rearrangement eg $x = \frac{7-4y}{3}$ or $y = \frac{7-3x}{4}$ into $x^2 - 4y^2 = 9$ <b>or</b> expansion of $\left(\frac{7-4y}{3}\right)^2 = \frac{49-56y+16y^2}{9}$ or $\left(\frac{7-3x}{4}\right)^2 = \frac{49-42x+9x^2}{16}$	Expansion may not be in simplest form but must be correct     Note we do not need to see "= 0"; just the LHS is sufficient.  Can be implied by both x values correct or both y values correct.
		M1	for correct expansion <b>and</b> substitution eg $\frac{49-56y+16y^2}{9} - 4y^2 = 9$ <b>or</b> $x^2 - 4\left(\frac{49-42x+9x^2}{16}\right) = 9$	
	A1	for forming quadratic ready for solving eg $-20y^2 - 56y - 32 (= 0)$ or $5y^2 + 14y + 8 (= 0)$ oe <b>or</b> $5x^2 - 42x + 85 (= 0)$ oe		
	M1	ft a 3 term quadratic, factorising eg $(5y+4)(y+2) (= 0)$ <b>or</b> $(5x-17)(x-5) (= 0)$ or correct use of formula eg $(y =) \frac{-14 \pm \sqrt{14^2 - 4 \times 5 \times 8}}{2 \times 5}$ <b>or</b> $(x =) \frac{-42 \pm \sqrt{42^2 - 4 \times 5 \times 85}}{2 \times 5}$ <b>or</b> completing the square, eg $(y + \frac{7}{5})^2 - \frac{9}{25} (= 0)$ or $(x - \frac{21}{5})^2 - \frac{16}{25} (= 0)$		
		A1	correctly pairs x and y values: $x = 3\frac{2}{5}, y = -\frac{4}{5}$ oe, $x = 5, y = -2$	Answers must be correctly paired. Accept coordinate pairs

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	210	M1	<p>for method to find total frequency,  <math>60 \times 2 (= 120) + 30 \times 5 (= 150) + 30 \times 9 (= 270) + 15 \times 6 (= 90)</math>  <math>+ 45 \times 2 (= 90)</math> or 720</p> <p><b>OR</b></p> <p>for method to find the total area, <math>4 + 5 + 9 + 3 + 3 (= 24 \text{ cm}^2)</math></p>	<p>Accept one error in total for the award of the method marks</p> <p>24 must be from adding areas of bars not heights of bars</p>
		M1	<p>for finding the number of onions less than 60g or greater than 120 g =  <math>120 + 90 + 90 (= 300)</math>,</p> <p><b>OR</b></p> <p>for finding the number of onions between 60g and 120g  <math>= 150 + 270 (= 420)</math></p> <p><b>OR</b></p> <p>for finding the area under the graph less than 60 or greater than 120  <math>= 4 + 3 + 3 (= 10 \text{ cm}^2)</math></p> <p><b>OR</b></p> <p>for finding the area under the graph between 60 and 120  <math>= 5 + 9 (= 14 \text{ cm}^2)</math></p>	<p>14 must be from adding areas of bars not heights of bars</p>
		M1	<p>(dep M2) for <math>1 - \frac{300}{720} (= \frac{7}{12})</math> oe OR for <math>\frac{420}{720} (= \frac{7}{12})</math> oe OR for <math>\frac{14}{24} (= \frac{7}{12})</math>            oe</p>	<p>Accept 58.3...%</p>
		A1	cao	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
22	2.5	P1	use of $\sin 30 = \frac{1}{2}$ to find $OA (= 8)$ or $OAB = 90^\circ$ eg $OA = 16\sin 30^\circ$ or right angle marked on diagram	
		P1	recognition that equation of circle is $x^2 + y^2 = r^2$	Accept $3p^2 + p^2 = r^2$ for the award of this mark
		P1	Correct substitution of $p, 3p$ and $r$ in $x^2 + y^2 = r^2$ eg $9p^2 + p^2 = OA^2$ or $(3p)^2 + p^2 = "8^2"$	Do not accept $3p^2 + p^2 = 8^2$ for the award of this mark
		A1	for answer in the range 2.5 to 2.53	Accept $\sqrt{6.4}$ or $\frac{4\sqrt{10}}{5}$ If an answer within the given range is seen in working and rounded incorrectly award full marks. Award 0 marks for the answer without supportive working.



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
23	098.6	P1	for using bearings to determine $ABC$ as $67^\circ$	Accept 67 written on the diagram.
		P1	for using the cosine rule to find $AC$ eg $(AC^2 =) 9^2 + 8^2 - 2 \times 9 \times 8 \times \cos[67]$ oe or $AC = 9.4199\dots$	Accept correct substitution into RHS of equation Accept $AC$ in the range 9.41 to 9.42
		P1	(dep P1) for using the sine rule to find angle $BAC$ eg $\frac{9}{\sin BAC} = \frac{"9.42"}{\sin[67]}$ oe	
			<b>OR</b>  for using the cosine rule to find angle $BAC$ eg $9^2 = "9.42^2" + 8^2 - 2 \times "9.42" \times 8 \times \cos BAC$ oe	
		P1	for rearranging eg $\sin BAC = 9 \times \frac{\sin[67]}{"9.42"}$ oe	Accept any equivalent form with values substituted
			<b>OR</b> eg $\cos BAC = ("9.42^2" + 8^2 - 9^2) \div (2 \times "9.42" \times 8)$ oe	
			<b>OR</b> for angle $BAC = 61.57\dots$	
		A1	for angle in the range 98.5 to 98.6	If the correct answer is given without supportive evidence award 0 marks. Condone missing "0" at the front. If an answer within the range is seen in working and rounded incorrectly award full marks.

## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

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

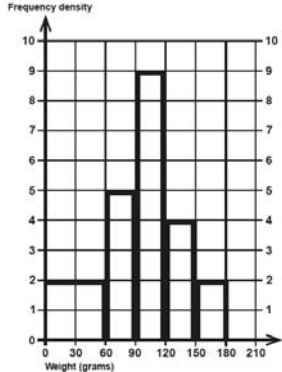
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PAPER: 1MA1/3H		
Question	Modification	Mark scheme notes
1	Diagram enlarged. Wording added 'It shows an incomplete Venn diagram.' Ovals made circular. Regions labelled 'Set A' and 'Set B' on the diagram. Braille only – spaces labelled (i) to (iv).	Standard mark scheme
3	Frequency column widened. The first two numbers in the table changed to 8 and 12 In part (b) diagram enlarged. Right axis labelled. Scale changed. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme but the first two points plotted in (b) should be at (15,8) and (25,12)
4	Diagram enlarged. Crosses changed to solid dots. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme
5	Wording added ' <i>ABCDEF</i> '. Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller.	Standard mark scheme

**PAPER: 1MA1/3H**

<b>Question</b>	<b>Modification</b>	<b>Mark scheme notes</b>
6	Diagram enlarged and labelled as Diagram 1. Inside the cylinder labelled as 'Tank'. Diagram of the circular face added and labelled as Diagram 2. Wording added 'Diagram 1 shows a tank.' Wording changed to 'Each tank is in the shape of a cylinder with both a top and a bottom as shown in Diagram 2'. Model of Diagram 1 provided for Braille candidates only.	Standard mark scheme
8	(a) Diagram enlarged and straightened. (b) Diagram enlarged. Solid dot added at C. Excess grid removed. Wording added 'It shows triangles PQR and XYZ on a grid.'	Standard mark scheme
9	Table turned vertical.	Standard mark scheme
14	Diagram enlarged. Wording added: 'AF = BC = 24 cm. Angle FAE = Angle CBD = 30°' Angles moved outside of angle arcs and angle arcs made smaller.	Standard mark scheme
17	Diagrams enlarged. Graph column widened. Braille only – descriptions labelled from (i) to (iv).	Standard mark scheme

**PAPER: 1MA1/3H**

Question	Modification	Mark scheme notes																		
21	<p>Diagrams enlarged.                      120 to 135 group changed to a 120 to 150 group with height 4.                      135 to 180 group changed to a 150 to 180 group with height 2.</p>  <p>Axes labels moved above the vertical axis and to the left of the horizontal axis.                      Right axis labelled. Shading removed.                      Wording changed to 'Work out the value of the angle marked <math>x^\circ</math>'</p>	<p>Standard mark scheme                      Note (does not change mark scheme):</p> <table border="1" data-bbox="1559 384 1800 587"> <thead> <tr> <th>Weight</th> <th>FD</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>0-60</td> <td>2</td> <td>120</td> </tr> <tr> <td>60-90</td> <td>5</td> <td>150</td> </tr> <tr> <td>90-120</td> <td>9</td> <td>270</td> </tr> <tr> <td>120-150</td> <td>4</td> <td>120</td> </tr> <tr> <td>150-180</td> <td>2</td> <td>60</td> </tr> </tbody> </table>	Weight	FD	f	0-60	2	120	60-90	5	150	90-120	9	270	120-150	4	120	150-180	2	60
Weight	FD	f																		
0-60	2	120																		
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90-120	9	270																		
120-150	4	120																		
150-180	2	60																		
22	<p>Diagram enlarged. Cross changed to solid dot. Solid dot added at B.                      Line OA shown on the diagram. Wording added 'OA is shown on the diagram.'                      Angle moved outside of the angle arc and the angle arc made smaller.</p>	Standard mark scheme																		
23	<p>Diagram enlarged. A and C connected with a dashed line.                      Angles moved outside of angle arcs and angle arcs made smaller.</p>	Standard mark scheme																		

