



Pearson

Mark Scheme (Results)

November 2017

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

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November 2017

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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 then mark both methods **as far as they are identical** and award these marks.

- 5** **Incorrect method**

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

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.

Guidance on the use of abbreviations within this mark scheme

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

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
1		$2 \times 2 \times 3 \times 3$	M1 A1	for complete method to find prime factors; could be shown on a complete factor tree with no more than 1 arithmetic error or 2,2,3,3,(1) $2 \times 2 \times 3 \times 3$ oe
2		14:21:42	P1 P1 P1 A1	for 2 out of 3 expressions in one letter eg from $x, x+7, 2x+14$ or see a set of numbers to show interpretation of the relationships, eg 10, 17, 34 (dep) for sum of their 3 expressions =77 eg $x + x+7+2x+14 =77$ oe or 2 systematic correct trials including addition for a correct process to isolate their term in x or $x=14$ for ratio 14:21:42 oe
3	<i>CB</i> extended to form <i>CG</i>	Reasoning	B1 M1 C2 (C1)	for 35 or 75 or 145 or 105 or $DEF = 70$, marked on the diagram or 3 letter description for $180-70-35$ or $180-75-35$ or a correct pair of angles that would lead to 75 or 70, eg $AFB = 35$ and $FAB = 75$ or $AFB = 35$ and $ABG = 75$ or $FBC = 35$ and $ABG = 75$ or $EDF = 75$ and $DEF = 70$ or $FDC = 105$ and $FBC = 35$ or $ABC = 105$ and $FBC = 35$ C2 (dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen (C1 (dep on B1 or M1) for one reason clearly used and stated.) <u>Corresponding</u> angles are equal, <u>alternate</u> angles are equal, <u>opposite angles</u> in a <u>parallelogram</u> are equal, <u>angles</u> in a <u>triangle</u> sum to 180, <u>angles</u> on a straight <u>line</u> sum to 180, vertically <u>opposite angles</u> are equal, <u>vertically opposite</u> angles are equal, <u>angles</u> in a <u>quadrilateral</u> sum to 360, <u>co-interior</u> angles sum to 180, <u>allied</u> angles sum to 180, <u>angles</u> around a <u>point</u> sum to 360

Paper: 1MA1/1H						
Question	Working	Answer	Mark	Notes		
4		Daisy is wrong (supported)	P1 P1 A1 C1	for process to find area of any relevant circle ie $\pi \times 4^2 (=16\pi)$, $\pi \times 7^2 (=49\pi)$, $\pi \times 10^2 (=100\pi)$ or 7^2 and 4^2 for completed method to find shaded area eg " $\pi \times 7^2$ " – " $\pi \times 4^2$ " ($=33\pi$) or use of radii eg $7^2 - 4^2 (=33)$ for 2 comparable figures, eg 33π and 100π or 33 and 100 or 103 to 103.7 and 314 to 314.2 or 103 to 103.7 and 104.6 to 104.8 statement eg No because it should be $\frac{33}{100}$ and their accurate figures Allow use of $\pi = 3$ or better		
5 (a)		365	M1 M1 A1 C1	$f\bar{x}$ with x consistent within intervals eg 200×1 , 300×11 , 400×5 , 500×0 , 600×3 , if 200, 3300, 2000, 0, 1800 are seen without working then condone 1 error (dep) $\Sigma fx \div \Sigma f$ eg " 7300 " $\div 20$ cao		
(b)		Comment	C1	for comment about outliers affecting mean		
6		Shows reasoning to reach $y=3$	M1 M1 M1 A1	forms equation eg $2x + 6 = 5x - 9$ isolates x and number terms $3x = 15$ substitutes " 5 " into side length eg $2 \times 5 + 6 (=16)$ $48 \div 16 = 3$ or $16 \times 3 = 48$	$48 \div 3 (=16)$ forms equation $2x+6="16"$ or $5x - 9 = "16"$ isolates x and number terms $2x = "10"$ or $5x = "25"$ shows $x=5$ for both solutions	$3(2x + 6) = 48$ or $3(5x - 9) = 48$, condone missing bracket Isolates x and number terms $6x = "30"$ or $15x = "75"$ forms the second equation $x=5$ from 2 different equations.

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
7		Comment	B1	for correct mathematical comment eg line segments not a curve or should draw freehand or should not use a ruler, or should be a curve NB Do not accept statements about scale or plotting accuracy.
8		0.246, 0. $\dot{2}4\dot{6}$ 0. $\dot{2}4\dot{6}$, 0.24 $\dot{6}$	M1 A1	for correct use of recurring symbol eg $0.2\dot{4}\dot{6} = 0.24646\dots$ or 3 terms in the correct relative position cao
9		22.5	P1 P1 P1 P1 A1	for process to find James' speed eg $50 \div 2.5 (=20)$ or $50 \div 150 (= \frac{1}{3})$ for process to find James' time for 15 km eg $15 \div "20" (=0.75)$ or $15 \div \frac{1}{3} (=45)$ for process to find Peter's time for 15 km eg $"45" - 5 (=40)$ for process to find Peter's speed eg $15 \div "40"$ or $15 \div \frac{"40"}{60}$ oe
10 (a)		10	B1	accept ± 10
(b)		25	M1 A1	for $(\sqrt[3]{125})^2$ or $\sqrt[3]{125} = 5$ or $125^2 = 15625$ or $\sqrt[3]{125^2}$ cao

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
11		Tea £1.40 Coffee £1.80	P1 M1 M1 A1	for setting up two appropriate equations eg $3t + 2c = 7.80$, $5t + 4c = 14.20$ for method to eliminate one variable, condone one arithmetic error for method to substitute found variable or start again Tea £1.4(0) and Coffee £1.8(0) with amounts linked to correct drinks
12 (a)	161 + 7 154 + 20	Box plot	M1 M1 A1	for method to find UQ (168) or highest value (174), may be implied by correct values plotted for showing a box and at least 3 correctly plotted values from 154, 161, 165, 168, 174 for fully correct box plot
(b)	Med IQR Range Y11 165 7 20 Y7 157.5 10.5 24.5	Comparison	C1 C1	(ft) for comparison of the median (ft) for comparison of the spread NB: for award of both marks, at least one comparison must be in context. NB: figures need not be stated, but if they are they must be correct (ft)
13 (a)		120	P1 A1	for $\frac{4 \times 450}{15}$ or $\frac{4}{15} = \frac{x}{450}$ oe cao
(b)		$\frac{165}{450}$	P1 A1	5.5 or 6.5 or 165 or $\frac{5 \times 450}{15}$ (=150) and $\frac{6 \times 450}{15}$ (=180) for $\frac{165}{450}$ oe

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
14	$ky - y = x + kx$ $y(k-1) = x(1+k)$	$y = \frac{x(k+1)}{k-1}$	M1 M1 A1	$y + x = k(y - x)$ or $\frac{y+x}{y-x} = k$ oe For isolating x and y on opposite sides eg $ky - y = x + kx$ Completing correct algebraic reasoning to reach conclusion
15		Proof to reach $\frac{24}{55}$	M1 M1 A1	for $100x = 43.636\dots (43.\dot{6}\dot{3})$ or $10x = 4.3636\dots (4.\dot{3}\dot{6})$ and $1000x = 436.36\dots(436.\dot{3}\dot{6})$ (dep) for finding difference that would lead to a terminating decimal for completing algebra to reach $\frac{24}{55}$
16		$\frac{7}{3}$	M1 M1 A1	for $y = k \sqrt[3]{x}$ oe or $\frac{7}{6} = \sqrt[3]{8} k$ oe for $k = \frac{7}{6 \times \sqrt[3]{8}}$ oe for $\frac{7}{3}$ oe
17		Completes proof	M1 C1	Expands both expressions eg $\frac{1}{2}(n^2 + n + n^2 + n + 2n + 2)$ or $n^2 + n$ and $n^2 + n + 2n + 2$ or factorises $\frac{1}{2}(n+1)(n+n+2)$ Completes proof with explanation and reference to $(n+1)^2$

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
18		Correct enlargement	B2 (B1)	Correct enlargement (-1,-1.5), (-1,-3.5) (-2,-1.5) correct size, correct orientation in incorrect position or 2 out of 3 vertices correctly placed)
19		$y = 2x + 36$	P1 P1 P1 A1	starts process, eg by rearranging to find gradient, eg $y = 6 - \frac{x}{2}$ or $\frac{-1}{2}$ or positions of <i>B</i> and <i>E</i> complete process to find position of <i>A</i> or uses $\frac{-1}{m}$ to find the gradient of M complete process to find equation of M $y = 2x + 36$ oe
20		$1 + \sqrt{2}$	B1 P1 P1 A1	for a value for a known trigonometric ratio stated for process to form 2 equations in <i>a</i> and <i>b</i> or one correct value stated for complete process to solve to reach $a = 2$ and $b = 1$ for $1 + \sqrt{2}$ oe

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
21	$\frac{6-\sqrt{8}}{\sqrt{2}-1} \times \frac{\sqrt{2}+1}{\sqrt{2}+1}$ $\frac{6\sqrt{2}+6-\sqrt{8}\sqrt{2}-\sqrt{8}}{2-1}$ $=6\sqrt{2}+6-4-2\sqrt{2}$	$2 + 4\sqrt{2}$	M1 M1 A1	for correct first step eg multiplies numerator and denominator by $\sqrt{2} + 1$ condone missing brackets (dep) for expansion of numerator with 4 terms correct with or without signs or 3 out of exactly 4 terms correct for $2 + 4\sqrt{2}$ oe or for stating $a = 2$ and $b = 4$
22		2, 14.5	P1 A1 P1 A1 C1	for scale factor of $\frac{12}{3}$ or $\frac{3}{12}$ or $\frac{15}{12}$ or $\frac{12}{15}$ or $\frac{8}{12}$ or $\frac{12}{8}$ or $\frac{15}{8}$ oe or correctly identifies 2 pairs of corresponding sides for $x=2$ for complete method to find other value for x eg $\frac{15}{8} \times 12 - 8$ for $x = 14.5$ Describes both assumptions for similarity
23		$x > 2$	P1 M1 M1 M1 A1	for process to derive algebraic expressions for area of both rectangle and triangle eg $(x-1)(3x-2)$ and $(2x \times x) \div 2$ (condone missing brackets) for method to rearrange inequality to $2x^2 - 5x + 2 > 0$ oe providing in the form $ax^2 + bx + c > 0$ for a correct method to solve $2x^2 - 5x + 2 > 0$ for establishing critical values 2 and $\frac{1}{2}$ $x > 2$

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:

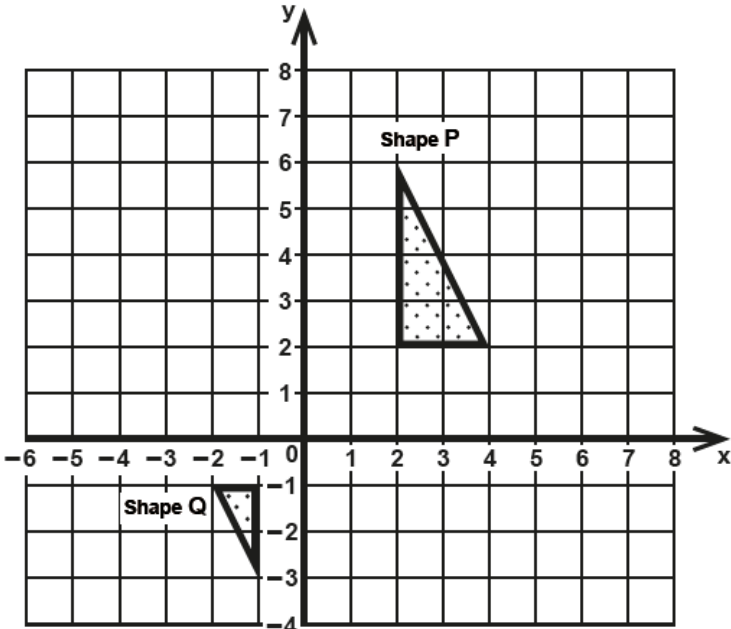
Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1_1H		
Question	Modification	Mark scheme notes
3	Diagram enlarged. Angles moved outside the angle arcs and the angle arcs made smaller. Arrow heads made longer and more obvious. Wording added 'AD is parallel to BC. AB is parallel to EC.'	Standard mark scheme
4	Diagram enlarged. Cross changed to a solid dot. Shading changed to dotty shading.	Standard mark scheme
5	Frequency column has been extended to allow for working.	Standard mark scheme
6	Diagram enlarged. Wording added 'All marked angles are right angles'. MLP only: x changed to e , y changed to f . Braille only: will label the corners of the rectangle A to D and will give information about the rectangle.	Standard mark scheme with x replaced by e , and y replaced by f .
7	Diagram enlarged. Crosses changed to solid dots.	Standard mark scheme

PAPER: 1MA1_1H

Question		Modification	Mark scheme notes
12		Numbers on the table changed: least height changed from 154 to 155, lower quartile changed from 161 to 160 and interquartile range changed from 7 to 10.	
12	(a)	Diagram enlarged and labelled 'Diagram (i)'. Diagram (ii) put below Diagram (i) on the same page in the diagram book. Axis label moved to the left of the horizontal axis.	M1 for method to find UQ (168) or highest value (174), may be implied by correct values plotted M1 for showing a box and at least 3 correctly plotted values from 155, 160, 165, 170, 175 A1 fully correct box plot
	(b)	Diagram enlarged and labelled 'Diagram (ii)'. Axis label moved to the left of the horizontal axis. Points on the box plot changed to: 145, 155, 160, 165 and 170.	Med IQR Range Y7 160 10 25 Y11 165 10 20 otherwise standard mark scheme using these figures
14		MLP only: x has been changed to e and y has been changed to f .	Standard mark scheme with x replaced by e , and y replaced by f .

Question	Modification	Mark scheme notes
18	<p>Question reversed. Wording added 'It shows Shape P and Shape Q given on a grid.'</p> <p>Question changed to 'Describe fully the transformation that maps Shape P onto Shape Q.'</p> <p>Three answer lines provided. Shape Q drawn on the grid. Shape P and Shape Q labelled.</p> <p>Shape P has been moved down a square so that the new coordinates of Shape P are (2,2) (4,2)(2,6).</p> <p>New coordinates of Shape Q are (-1,-1)(-2,-1)(-1,-3).</p> <p>X axis has been reduced so it goes from -6 to 8; Y axis has been reduced so it goes from -4 to 8.</p> 	<p>B1 for centre of enlargement (0,0)</p> <p>B1 for sf given as $-\frac{1}{2}$</p>

PAPER: 1MA1_1H

Question		Modification	Mark scheme notes
19		Diagram enlarged.	Standard mark scheme
20		Table has been turned to vertical format	Standard mark scheme
22		Diagram enlarged. Wording changed to 'It shows two triangles CDA and BEA that are similar.' Wording added 'CB equals x cm, BA = 8 cm, AE = 12 cm and ED = 3 cm.'	Standard mark scheme
23		Diagrams enlarged. Braille only: will add information about the diagram.	Standard mark scheme



Pearson

Mark Scheme (Results)

November 2017

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

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
3 (a)		31.4	P1	for working with circumference formula, eg $\pi \times 80$ (=251. ...) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π
(b)		No (supported)	C1	Mean distance stays the same with reason, eg total distance remains unchanged or same number of points
4		$\frac{1}{11}$	P1	for starting the process, eg by writing down a correct ratio or using a given number of cubes for one relationship, eg 2B 1Y or B:Y = 2:1 or 4G 1B or G:B = 4:1 or 8G, 1Y or G:Y = 8:1 oe or yellow = 2, blue = 4, or states 2:1:8 oe in any order (can be algebraic)
			P1	for complete process to find possible number of each colour or equivalent ratio, eg 8G 2B 1Y or G:B:Y = 8:2:1 oe or yellow = 2, blue = 4, green = 16 oe (can be algebraic)
			A1	$\frac{1}{11}$ oe
5 (a)		(-2, 1) (-4, 1) (-2, 2) (-5, 2)	B1	Shape labelled A
(b)		(1, -4) (3, -4) (1, -5) (4, -5)	B1	Shape labelled B

Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
6 (a)		6	B1	cao
(b)		5	B1	cao
(c)		Shown	M1 C1	for writing 100^a or 1000^b as a power of 10 ($=10^{2a}$ or 10^{3b}) or 10^{2a+3b} or $100 = 10^2$ and $1000 = 10^3$ for complete chain of reasoning leading to conclusion

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
9		65.60	P1 P1 A1	for start in using inverse proportionality, eg $5 \times 4.5 (= 22.5)$ or $4.5 = \frac{k}{5}$ or $5 \times 4.5 \times 60 (= 1350)$ or $\frac{5}{3}$ or $\frac{3}{5}$ for process to find number of hours for each cleaner today, eg $\frac{22.5}{3} (= 7.5)$ for 65.6(0) (SC B2 for 61.5(0))
10 (a)		0 to 20 seconds	B1	for between 0 seconds and 20 seconds
		with reason	C1	for reason given eg gradient is greatest oe
(b)		18	B1	ft from (a)
11		0.119	P1 P1 A1	for starting the process, eg finds area 25π or 16π oe, or finds angle for town A, $0 - 19 (70^\circ)$, may be on diagram for a complete process, eg $\frac{70}{360} \times \frac{25\pi}{41\pi}$ $0.118 - 0.119$ or $11.8\% - 11.9\%$

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
12		15	P1 P1 A1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10 \times 180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions for process to find angle <i>STR</i> , eg $\frac{180 - "150"}{2}$ or $\frac{"30"}{2}$ cao
13 (a)		58600	M1 A1	for a complete method, eg 50000×1.02^8 (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600 cao
(b)		4.5	P1 P1 A1	for a process to find multiplier for 6 year period, eg $325 \div 250$ oe (= 1.3) or 130(%) or for $250000 \times y^6 = 325000$ for a process to find multiplier for one year, eg $("1.3")^{\frac{1}{6}}$ or 1.044... or 1.045 4.4 – 4.5

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
14		Region R shaded	M1 M1 A1	for two of the lines $y = 1$, $x + y = 5$, $y = 2x$ correctly drawn for three lines correctly drawn for fully correct region indicated with all lines correct
15 (a) (b)		No with reason 66	C1 M1 A1	for “no” with reason, eg Tracey should multiply 8 and 7 for starting a method to find number of games played, eg $12 \times 11 (= 132)$ or sum of integers from 1 to 11 cao
16	$\frac{- - 4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1}$	0.268, 3.73	M1 A1	for $x - 2 = \pm\sqrt{3}$ oe or one solution or use of $x^2 - 4x + 1 = 0$ to substitute into formula (allow one error in substitution) 0.267 – 0.27, 3.7 – 3.74

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
17 (a)	1.5, 6, 10.2, 7.2, 1.2	Histogram drawn	C1	for 2 correct bars of different widths or at least 3 correct frequency densities.
			C1	for all bars in correct proportions or 4 correct bars with axes scaled and labelled.
			C1	for fully correct histogram with axes scaled and labelled.
(b)		$\frac{123}{150}$	M1	for a method to find number of students in interval, eg $30 + 51 + 36 + \frac{1}{3} \times 18 (= 123)$ or $150 - 15 - \frac{2}{3} \times 18 (= 123)$
			A1	for $\frac{123}{150}$ oe or 0.82 or 82%
18		0.98	B1	cao

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
19		Proof (supported)	M1 M1 A1 C1	for a method to find coordinates of $M(-1, -1)$ or $N(3, 1)$ for method to find gradient of MN or PR or for method to find column vector for MN or PR or for differences of x coordinates and differences of y coordinates for MN or PR for gradients of MN and PR , ie $\frac{1}{2}$ oe or for column vectors of MN and PR , $\overrightarrow{MN} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ and $\overrightarrow{PR} = \begin{pmatrix} 8 \\ 4 \end{pmatrix}$ or for differences of x coordinates and of y coordinates for MN and PR for conclusion from reasoning and correct working

Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
20		68.5	<p>B1</p> <p>P1</p> <p>P1</p> <p>P1</p> <p>A1</p>	<p>for angle $OAB = 90^\circ$ or angle $OCB = 90^\circ$, may be seen on diagram</p> <p>for a process to find the length of AB or the length of $CB (= 10\sqrt{3}$ oe) eg $10 \times \tan 60^\circ (= 17.3\dots)$ or the length of $OB (= 20)$, eg $10 \div \cos 60^\circ$</p> <p>for a process (dep previous P1) to find the area of the triangle $OAB (= 50\sqrt{3}$ oe) or area of triangle $OCB (= 50\sqrt{3}$ oe) or area of kite $OABC (= 100\sqrt{3}$ oe)</p> <p>for a process to find the area of the sector OAC e.g. $\frac{1}{3} \times \pi \times 10^2 (= 104.7\dots)$, accept rounded or truncated to 3 significant figures or more</p> <p>for 68.4 – 68.6</p>

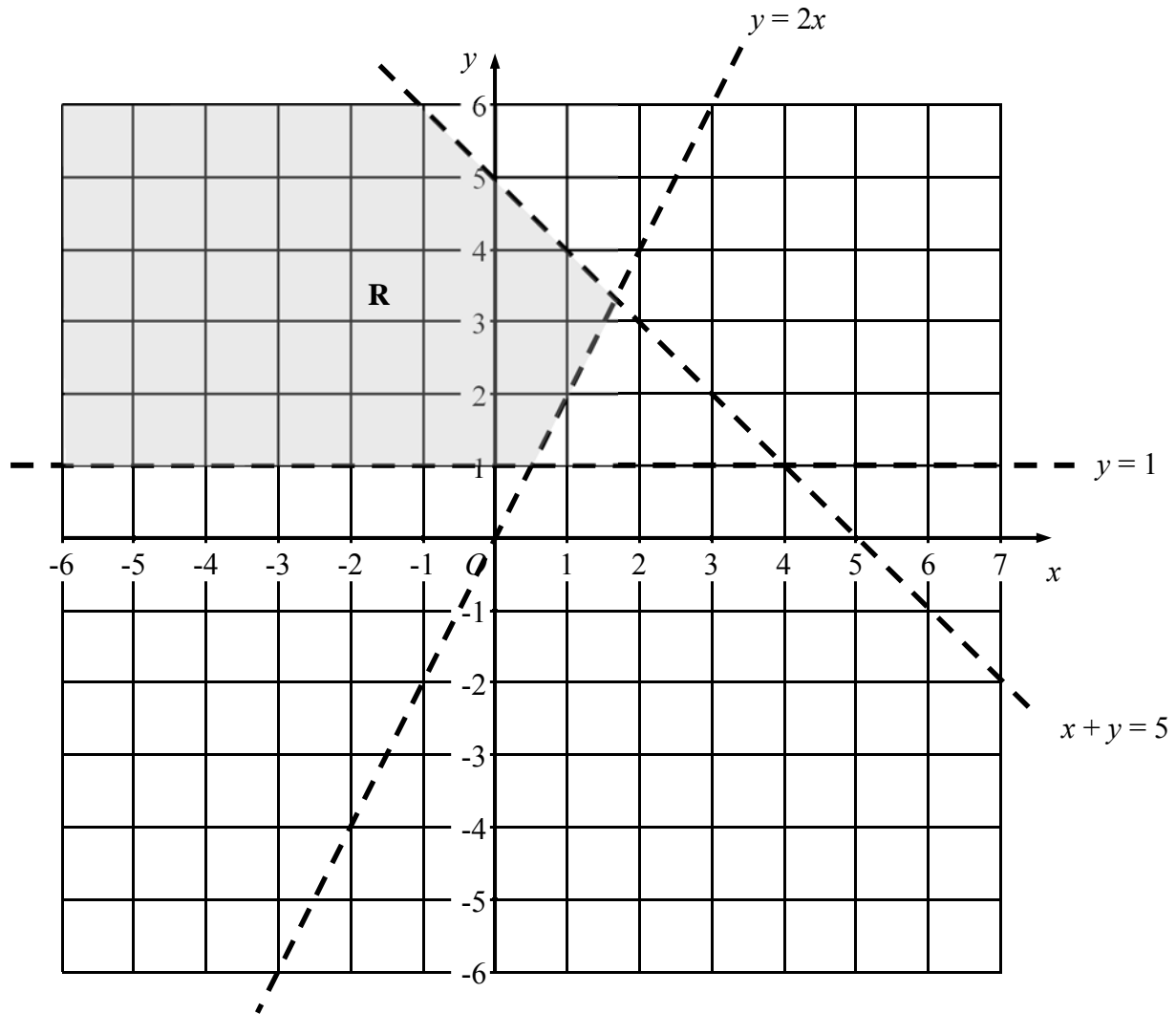
Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
21 (a)		$\frac{1}{55}$	M1	for $\frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$
(b)		Conclusion (supported)	A1	for $\frac{1}{55}$ oe
			C1	starts correct argument, eg by calculating a relevant probability, eg $\frac{5}{15} \times \frac{4}{14} \times \frac{3}{13}$
			C1	statement of “more likely” from eg comparison of probabilities, ft answer to (a) eg $\frac{1}{55}$ (= 0.018...) and $\frac{2}{91}$ (= 0.021...or 0.022)
22		7, -1	P1	for strategy to use $g(3) = 20$, e.g. $3a + b = 20$
			P1	for $g(1) = a + b$
			P1	for a process to find inverse of f. e.g. $f^{-1}(x) = \frac{x-3}{5}$ or $f^{-1}(33) = 6$
			P1	for using $f^{-1}(33) = g(1)$ to find an equation e.g. $\frac{33-3}{5} = a + b$
			A1	for $a = 7, b = -1$

Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
23 (a)		2	M1	for start to express the common ratio algebraically, eg $1/(\sqrt{x} - 1)$ or $(\sqrt{x} + 1)/1$ or $\sqrt{x} + 1 = k \times 1$ or $1 = k \times (\sqrt{x} - 1)$
			M1	for setting up an appropriate equation in x , eg $1/(\sqrt{x} - 1) = (\sqrt{x} + 1)/1$
			C1	for convincing argument to show $x = 2$
(b)		Shown	M1	for expressing the relationship between the common ratio, one of the first three terms of the sequence and the fifth term, eg $5^{\text{th}} \text{ term} = 3^{\text{rd}} \text{ term} \times (\text{common ratio})^2$
			C1	for a complete explanation to include eg, $(\sqrt{2} + 1)(\sqrt{2} + 1)^2 = 7 + 5\sqrt{2}$

Q14



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.

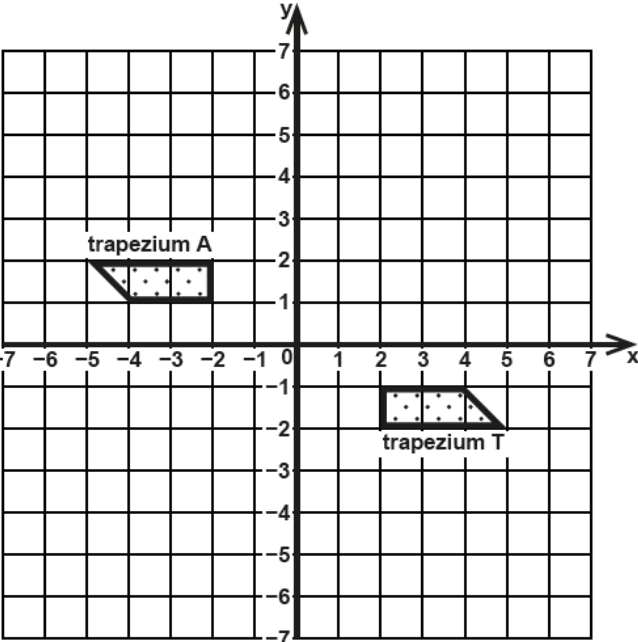
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

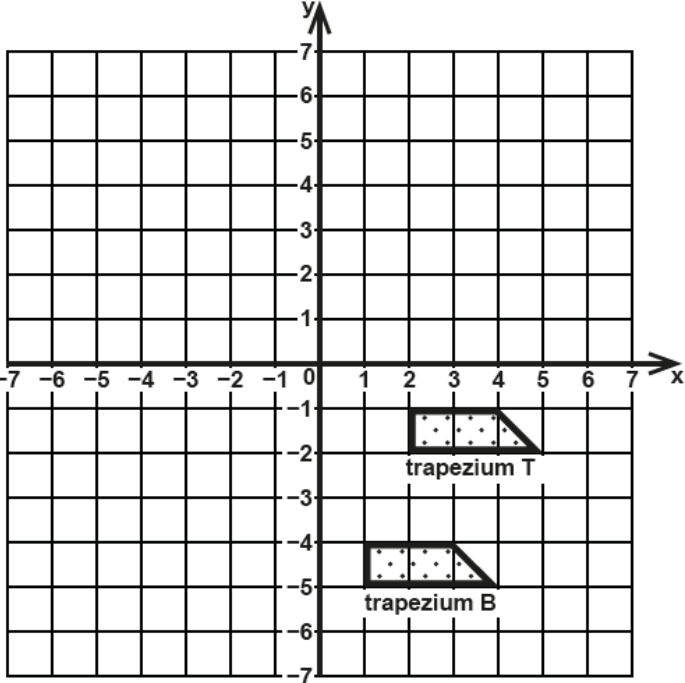
Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
3	Both diagrams enlarged and put on the same page in the diagram book. Wording changed to 'There are 8 points equally spaced on the circumference of the circle, as shown in the diagram for Question 18(a)'. Wording changed to 'Four of the points are moved, as shown in the diagram for Question 18(b)'.	Standard mark scheme

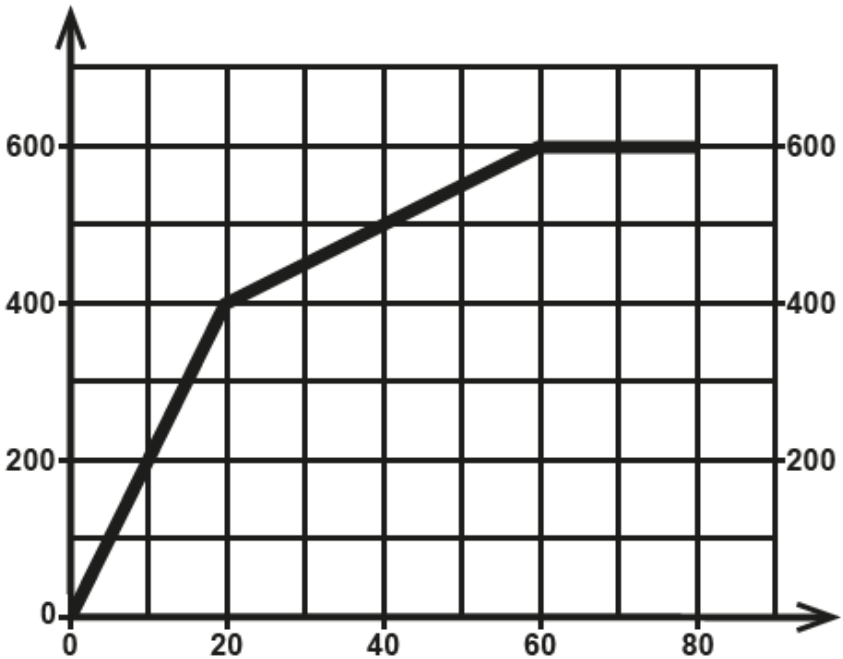
PAPER: 1MA1_2H

Question	Modification	Mark scheme notes
5	The grid has been split into two parts for part (a) and part (b).	
5	(a) Question reversed. Trapezium T and A have been put on a grid. Question wording changed to 'It shows trapezium T and trapezium A given on a grid. Describe the single transformation that maps trapezium T onto trapezium A'. 3 answer lines and have been provided	B1 for "Rotation 180° about the origin"
		

Question	Modification	Mark scheme notes
5	(b) Question reversed. Question wording changed to 'It shows trapezium T and trapezium B given on a grid. Write down the vector that translates trapezium T onto trapezium B.' Vector brackets have been provided.	B1 for $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
		

PAPER: 1MA1_2H			
Question		Modification	Mark scheme notes
6	(c)	MLP and braille: a changed to e, b changed to f.	Standard mark scheme but for Braille letters changed as indicated.
7		Diagram enlarged. Arrows have been removed from 10cm and 6cm. Wording added 'BC = 10cm, AB = 7.5cm, AD = 24cm. The vertical height of the trapezium is 6cm.'	Standard mark scheme.

PAPER: 1MA1_2H

Question	Modification	Mark scheme notes										
10	Diagram enlarged. Right axis has been labelled. Graph line moved to go through (20, 400) (60, 600) (80, 600). Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme but in (b) the answer is 20										
	<p data-bbox="436 502 649 534">Distance (metres)</p>  <table border="1" data-bbox="448 542 1288 1204"><caption>Data points from the graph</caption><thead><tr><th>Time (seconds)</th><th>Distance (metres)</th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>20</td><td>400</td></tr><tr><td>60</td><td>600</td></tr><tr><td>80</td><td>600</td></tr></tbody></table>	Time (seconds)	Distance (metres)	0	0	20	400	60	600	80	600	
Time (seconds)	Distance (metres)											
0	0											
20	400											
60	600											
80	600											

PAPER: 1MA1_2H			
Question		Modification	Mark scheme notes
11		Diagrams enlarged $\times 2$ but angles have been kept the same size.	Standard mark scheme but P1 areas are 100π and 64π P1 working is $\frac{70}{360} \times \frac{100\pi}{164\pi}$
12		Diagram enlarged. Dashes made longer and thicker.	Standard mark scheme
14		Diagram enlarged. List of inequalities stacked vertically.	Standard mark scheme
17		Numbers on the table have changed from 51 to 50, 36 to 40 and 18 to 15. In (a) grid enlarged.	Standard mark scheme in (a) using amended figures. In (b) M1 for a method to find number of students in interval eg $30 + 50 + 40 + \frac{1}{3} \times 15$ or $150 - 15 - \frac{2}{3} \times 15$ A1 for 125/150 or 0.83 – 0.84 or 83 - 84%
20		Diagram enlarged. Shading has changed to dotted shading. Angle moved outside the angle arc and the angle arc made smaller.	Standard mark scheme
23	(a)	MLP and braille: x changed to y .	Standard mark scheme but for braille note change of letters.



Pearson

Mark Scheme (Results)

November 2017

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

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
1 (a) (b)		160 <math> < h \leq 170 </math> Line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19)	B1 C2 [C1]	correct class interval for fully correct frequency polygon for points plotted correctly at midpoints of intervals OR joining points with line segments at the correct heights and consistent within the intervals (including end values) OR correct frequency polygon with one point incorrect OR correct frequency polygon with first and last point joined] NB: ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted
2		New York (supported)	P1 P1 C1	for changing between £ and \$, eg $1.089 \times 1.46 (= 1.58(9.))$ or $2.83 \div 1.46 (= 1.93(8.))$ or between litres and gallons, eg $1.089 \times 3.785 (= 4.12(1.))$ or $2.83 \div 3.785 (= 0.74(7.))$ for a complete process to give values that can be used for comparison, eg “ $1.938... \div 3.785 (= 0.51(2.))$ ” or “ $1.589... \times 3.785 (= 6.01(7.))$ ” or $1.089 \times 3.785 = (4.12(1.))$ and $2.83 \div 1.46 (= 1.93(8.))$ for New York and correct comparative values
3		648	M2 [M1 A1]	a complete method, eg $12.5 \times 1000 \div 19.3$ for using volume = mass/density, eg $12500 \div 19.3$ (condone inconsistent units or incorrect conversions) may be implied by digits 647... or 648...] for answer in range 647 to 648

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
4		15	P1 P1 A1	strategy to start the problem, eg 8:20 and 20:5 process to solve the problem, eg $\frac{5}{33} \times 100$ or 24:60:15 cao
5 (a) (b)		0.625 $9.75 \leq x < 9.85$	B1 B2 [B1]	cao for $9.75 \leq x < 9.85$ for 9.75 or 9.85 (or 9.849)]
6		147	P1 P1 P1 A1 B1	starts process, eg uses x and $x + 7$ starts to work with at least 6 correct sides, may be on the diagram or in an expression (dep on previous P1) gives a correct expression for the perimeter, eg $x + x + 7 + x + 7 + x + 7 + x + x + 7 + x + 7 + x + 7$ or adds at least 6 correct sides and equates to 70 for width = 3.5 oe and length = 10.5 oe ft (dep P2) for correct area for their x
7		0.0007452	M1 A1	digits 7452 seen cao

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
8 (a) (b)		Mel (supported) $\frac{2}{9}$	B1 M1 A1	Mel with reference to greatest number of throws selects overall total and multiplies P(point up)×P(point down) eg $\frac{50}{150} \times \frac{100}{150}$ oe (accept $\frac{14}{45} \times \frac{31}{45}$ or $\frac{27}{80} \times \frac{53}{80}$ or $\frac{9}{25} \times \frac{16}{25}$) for $\frac{2}{9}$ oe
9 (a) (b)		5 2.4	M1 A1 P1 P1 A1	evaluates $(0.85)^n$ or $12\,500 \times (0.85)^n$ for at least one value of n cao for a process to find the amount of interest before tax, eg $79.20 \div 0.6 (= 132)$ for a process to find value of R , eg “132”÷5500×100 cao
10 (a) (b)		0.05 20 Reason	B1 C1 C1	for 0.05 oe for stating that at least 20 required for reason eg explains that number of each colour must be a whole number or that there must be (at least) 1 red counter or shows that $0.05 = \frac{1}{20}$

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
11 (a)		57	B1	cao
(b)		Decision and reason	C1	Jamil might not be correct and reason, eg the maximum weight could be less than 80 or the minimum weight could be less than 40
(c)		Shown	C1	for evidence of reading from the graph at weight 65 (= 48 to 49) or at cf 45 (= 63)
			C1	eg 25% of 60 is 15 but only 11 potatoes have a weight greater than 65g or 25% of potatoes have a weight greater than 63g
12		48	M1	for $0.25 \times 0.6 (= 0.15)$ or $0.75 \times 0.4 (= 0.3)$
			M1	for $0.25 \times 0.6 (= 0.15)$ and $0.75 \times 0.4 (= 0.3)$ or for $24 \div "0.15" (= 160)$
			A1	cao
13		$(x + 3)^2 - 16$	M1	for $(x + 3)^2$ or $(x^2 + 6x - 7) = x^2 + 2ax + a^2 + b$
			A1	cao
14		Shown	M1	for $\sqrt[3]{\frac{8}{27}} (= \frac{2}{3})$ or $\sqrt[3]{\frac{27}{8}} (= \frac{3}{2})$ or 2 : 3 or 3 : 2
			M1	for $\left(\sqrt[3]{\frac{8}{27}}\right)^2 (= \frac{4}{9})$ or $\left(\sqrt[3]{\frac{27}{8}}\right)^2 (= \frac{9}{4})$ or 4 : 9 or 9 : 4
			A1	132 from correct arithmetic

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
15 (a)		Shown	M1	for method to establish at least one root between $x = 0$ and $x = 1$, eg $f(0) = -5$ and $f(1) = 3$
			C1	for correct values and a deduction about the roots eg as there is a sign change there must be at least one root between $x = 0$ and $x = 1$ (as f is continuous)
(b)		Shown	C1	for a correct first step in rearrangement, eg $x(x^2 + 7) - 5 = 0$ or $x^3 + 7x = 5$
			C1	for clear and correct steps showing complete rearrangement
(c)	$x_1 = 0.625$ $x_2 = 0.6765327696$ $x_3 = 0.6704483001$	0.6704(483001)	M1	for substitution of 1 into the formula (to get 0.625)
			M1	for substitution of " $x_1 = 0.625$ " and " $x_2 = 0.6765327696$ " to give x_2 and x_3
			A1	0.6704(483001)
(d)		Comment	M1	substitutes answer to (c) into expression (to get $-0.00549\dots$)
			C1	appropriate comment, eg accurate as answer is close to 0
16		Yes and correct working	B1	for 147.5 or 148.5 or 148.4999... or 11.75 or 11.85 or 11.84999...
			P1	substitutes $11.8 < UB \leq 11.85$ and $147.5 \leq LB < 148$ in the formula to work out petrol consumption
			A1	for 'Yes' and 8.03(3898305...) from correct working
17		14.4	P1	for start of process, eg $0.5 \times 11 \times CD \times \sin 105 = 56$
			P1	for complete process to find CD , eg $(CD =) \frac{56}{0.5 \times 11 \times \sin 105}$ oe (= 10.54)
			P1	for process to find AC , eg $(AC^2 =) 11^2 + [CD]^2 - 2 \times 11 \times [CD] \times \cos 105$ ($AC = 17.09$)
			P1	for process to find AB , eg $\frac{AB}{\sin 48} = \frac{[AC]}{\sin 118}$
			A1	answer in range 14.3 to 14.4

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
18 (a)	values 0, 2, 5, 10,18	130	M1	for starting to find area under the curve, eg $0.5 \times 5 \times 2 (= 5)$
			M1	for a complete method to find the area under the curve using 4 strips of equal width, eg “5” + $0.5 \times 5 \times (2+5) (= 17.5)$ + $0.5 \times 5 \times (5+10) (= 37.5)$ + $0.5 \times 5 \times (10+18) (= 70)$
			A1	for 130 or answer in range 130.1 to 132 supported by accurate working
(b)		overestimate with reason	C1	for “overestimate” and appropriate reason linked to method eg area between trapeziums and curve also included
19		Proof (supported)	M1	starts process to find point of intersection by substituting, eg $(10 + 2y)^2 + y^2 (= 20)$
			M1	for expanding, eg $4y^2 + 20y + 20y + 100$ (3 out of 4 terms correct)
			M1	(dep M2) for 3-term quadratic equation ready for solving, eg $5y^2 + 40y + 80 = 0$
			M1	(dep on previous M1) for method to solve an equation of the form $ay^2 + by + c = 0$, eg by factorising or correct substitution into quadratic formula
			C1	fully correct method leading to $y = -4$ or $x = 2$ or $(y + 4)^2 = 0$ or $(x - 2)^2 = 0$ and statement, eg only one point of intersection so the line is a tangent to the circle
20		Proof	C1	draws OC and considers angles in an isosceles triangle (algebraic notation may be used, eg two angles labelled x)
			C1	finds sum of angles in triangle ABC , eg $x + x + y + y = 180$, or sum of angles at O , eg $180 - 2x + 180 - 2y$
			C1	complete method leading to $ACB = 90$
			C1	complete proof with all reasons given, eg base angles of an <u>isosceles triangle</u> are equal, <u>angles</u> in a <u>triangle</u> add up to 180° , <u>angles</u> on a straight <u>line</u> add up to 180°

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
21		$\frac{2}{5}$	P1	for process to find \overrightarrow{AB} ($= \mathbf{b} - \mathbf{a}$) or \overrightarrow{BA} ($= \mathbf{a} - \mathbf{b}$)
			P1	for process to find \overrightarrow{MN} ($= -\frac{1}{2}\mathbf{b} + \mathbf{a} + 2\mathbf{a}$) or \overrightarrow{PN} ($= -k(\mathbf{b} - \mathbf{a}) + 2\mathbf{a}$) or \overrightarrow{MP} ($= -\frac{1}{2}\mathbf{b} + \mathbf{a} + k(\mathbf{b} - \mathbf{a})$ or $\frac{1}{2}\mathbf{b} + (1 - k)(\mathbf{a} - \mathbf{b})$)
			P1	for process to find two of \overrightarrow{MN} , \overrightarrow{PN} and \overrightarrow{MP}
			P1	for process to find k , using \overrightarrow{MN} as a multiple of \overrightarrow{PN} or using \overrightarrow{MN} as a multiple of \overrightarrow{MP} or using \overrightarrow{PN} as a multiple of \overrightarrow{MP}
			A1	for $\frac{2}{5}$ oe

Question 2

London	$1.089 \times 1.46 = \$1.58(9..)$ per litre \rightarrow $1.589... \times 3.785 = \$6.01(7..)$ per gallon
	$1.089 \times 3.785 = \pounds 4.12(1..)$ per gallon \rightarrow $4.121... \times 1.46 = \$6.01(7..)$ per gallon
New York	$2.83 \div 1.46 = \pounds 1.93(8..)$ per gallon \rightarrow $1.938... \div 3.785 = \pounds 0.51(2..)$ per litre
	$2.83 \div 3.785 = \$0.74(7..)$ per litre \rightarrow $0.747... \div 1.46 = \pounds 0.51(2..)$ per litre

The table shows the most commonly used approaches. There are of course other approaches that can be used.

Question 9(a)

n	$(0.85)^n$	$12\,500 \times (0.85)^n$
1		10 625
2	0.7225	9031.25
3	0.614125	7676.5625
4	0.52200625	6525.078125
5	0.4437053125	5546.316406

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: ± 5 mm

PAPER: 1MA1_3H		
Question	Modification	Mark scheme notes
1	Numbers in the table have changed to: 130-140: 5 ; 140-150: 10 ; 150-160: 20 ; 160-170: 30 ; 170-180: 15 In part (b) Diagram enlarged. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Vertical axis extended so it goes up to 35.	Standard mark scheme with the amendment: Line segments joining the points (135, 5), (145, 10), (155, 20), (165, 30) and (175, 15)
6	Diagram enlarged. Wording added 'Diagram (i) shows'. Shape labelled as 'Diagram (i)'. Wording added 'Diagram (ii)' after '8-sided shape,' Shape labelled as 'Diagram (ii)'.	Standard mark scheme
10	Table turned to vertical format.	Standard mark scheme

PAPER: 1MA1_3H

Question	Modification	Mark scheme notes
11	Diagram enlarged and right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Graph line moved so it goes through (40, 5) (55, 30) and (65, 50).	Standard mark scheme
		(a) B1 55 cao (b) standard mark scheme (c) standard mark scheme with some adjustments: C1 reads from graph at weight 65 (= 50) or at cf 45 (in range 8 to 9.5) C1 eg 25% of 60 is 15 but only 10 potatoes have a weight greater than 65g or 25% of potatoes have a weight greater than 63g (approx.)

PAPER: 1MA1_3H		
Question	Modification	Mark scheme notes
12	Diagram enlarged.	Standard mark scheme
17	Diagram enlarged. Angles moved outside of the angle arcs and the angle arcs made smaller. Wording added 'Angle ABC = 118°, Angle BCA = 48°, Angle ADC = 105° and AD = 11cm.'	Standard mark scheme
18	Diagram enlarged and right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Graph line moved to go through points (0, 0) (5, 2.5) (10, 5) (20, 17.5) (23.75, 25).	M1 for splitting the area into 4 strips and a method of finding the area of one shape under the graph, eg $0.5 \times 5 \times 2.5 (= 6.25)$ M1 for complete method to find the area under the curve, eg "6.25" + $0.5 \times 5 \times (2.5 + 5) (= 18.5) + 0.5 \times 5 \times (5 + 12) (= 42.5) + 0.5 \times 5 \times (12 + 17.5) (= 73.75)$ [figures in italic will be approximate] A1 for value near to 140-141 (b) standard mark scheme
20	Diagram enlarged. Dot at O made bigger.	Standard mark scheme
21	Diagram enlarged.	Standard mark scheme

