Mark Scheme (Results)

June 2020

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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 (eg 3.5 – 4.2) then this is inclusive of the end points (eg 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 eg 2 × 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 eg "12" × 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 eg [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

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

Guidance on the use of abbreviations within this mark scheme

M   method mark awarded for a correct method or partial method

P   process mark awarded for a correct process as part of a problem solving question

A   accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)

C   communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity

B   unconditional accuracy mark (no method needed)

oe   or equivalent

cao   correct answer only

ft   follow through (when appropriate as per mark scheme)

sc   special case

dep   dependent (on a previous mark)

indep independent

awrt answer which rounds to

isw   ignore subsequent working

Question	Answer	Mark	Mark scheme	Additional guidance
1	$3n - 2$	B2	for $3n - 2$ oe	Accept a different variable, eg. $3x - 2$
		(B1	for $3n + k$ where $k \neq -2$ or is absent unambiguously shown)	$n = 3n - 2$ gets B1 only $n + 3$ gets NO marks
2	Shown	M1	for conversion to improper fractions eg. $\dfrac{7}{3}$ **or** $\dfrac{15}{4}$	Need not be shown with operators
		M1	(dep) for method to multiply fractions, eg. $\dfrac{7 \times 15}{3 \times 4}$ $(=\dfrac{105}{12})$ **or** $\dfrac{28 \times 45}{12 \times 12}$ $(=\dfrac{1260}{144})$ oe	
		C1	for complete working showing each stage as far as $\dfrac{35}{4}$ or $8\dfrac{9}{12}$	
3	B C D A	B2	cao	
		(B1	for two or three correct)	
4	A & D	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
5	20	P1	for process to find SP of 24 chocolate bars, eg. 0.50 × 24 (= 12) oe **or** for process to find the overall profit eg (24 × 0.5) – 10 (= 2) **or** for process to find CP of one chocolate bar, eg. 1000 ÷ 24 (= 41.66…) oe	Working can be carried out in either pounds or pence.
		P1	(dep) for start to a process to find percentage profit, eg. using $\dfrac{"12"-10}{10}$ **or** $\dfrac{"12"}{10}$ **or** $\dfrac{50-"41.66..."}{"41.66..."}$ oe with consistent units	
		A1	cao	
6	85 with working and reasons	M1	for correct use of corresponding angles eg $AEB = 63$ **or** co-interior angles eg $BCD = 180 – 148$ (= 32) or $DEB = 180 – 63$ (= 117)	Angles must be clearly labelled on the diagram or otherwise identified. Full solution must be seen.
		M1	(dep) for a complete method to find angle EAB eg. 180 – "63" – (180 – 148) **or** 148 – "63" **or** "117" – (180 – 148)	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for $EAB = 85$ (identified)	
		C2	(dep on M2) all working correct with all appropriate reasons stated. <u>Corresponding</u> angles are equal <u>Allied</u> angles / <u>Co-interior</u> angles add up to 180 Angles on a straight <u>line</u> add up to 180 Angles in a <u>triangle</u> add up to 180 The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u>.	When reasons are given the key words underlined must be present. Reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
		(C1	for **one** reason relating to parallel lines clearly used and stated **or** for any **two** reasons clearly stated for their fully correct method)	

Question	Answer	Mark	Mark scheme	Additional guidance
7	20 or 24 or 168	B1	for identification of the range of the girls (20) **or** the range (24) **or** the median (168) of the boys	
	Comparison	C2	for a correct comparison of medians **and** a correct comparison of ranges supported by correct figures	Simply quoting values for median, range is insufficient; they must be compared.
			eg the median height for girls (165) is less than the median height for boys (168) and the range for girls (20) is less than the range for boys (24)	
			At least one comparison must be in context referring to height or quoting cm.	
		(C1	for a correct comparison of medians **or** a correct comparison of ranges that could ft their incorrect figure(s))	Context not necessary for C1
8	450	M1	for $18 \div 3$ (=6)	Ignore units
		M1	for substitution eg. $75 = \dfrac{F}{"6"}$ or $75 \times "6"$	
		A1	cao	
9	$0.000\,672$, 67.2×10^{-4} 6.72×10^5 672×10^4	B2	cao	Accept correct numbers in any form
		(B1	for correct conversions to same format, condoning one error **or** for 3 numbers in the correct order (ignoring one) **or** for all 4 numbers listed in reverse order)	

Question	Answer	Mark	Mark scheme	Additional guidance
10	6 : 15 : 20	P1	chooses a multiplier to equate the two fractions in terms of b eg $\frac{2}{5} \times \frac{3}{3} \ (= \frac{6}{15})$ **or** $\frac{3}{4} \times \frac{5}{5} \ (= \frac{15}{20})$ **or** lists equivalent fractions to $\frac{2}{5}$ up to at least $\frac{6}{15}$, eg. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \ .....$ **or** lists equivalent fractions to $\frac{3}{4}$ up to at least $\frac{15}{20}$, eg. $\frac{3}{4}, \frac{6}{8}, \frac{9}{12}, \frac{12}{16}, \frac{15}{20}, \ .....$ **or** $(a : b =)$ 2 : 5 **and** $(b : c =)$ 3 : 4 **or** for 6 : 15 or 15 : 20 seen	
		P1	puts into related terms ready for ratio eg $\frac{2}{5} \times \frac{3}{3} = \frac{6}{15}$ **and** $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$ **or** for $(a : b =)$ 6 : 15 **and** $(b : c =)$ 15 : 20 **or** lists equivalent ratios up to a common element for b, eg $a : b$ = 2 : 5, 4 : 10, 6 : <u>15</u> **and** $b : c$ = 3 : 4, 6 : 8, 9 : 12, 12 : 16, <u>15</u> : 20	Need not be written in ratio form
		A1	for 6 : 15 : 20 oe	Accept equivalent ratios Accept a =6, b = 15 and c = 20

Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	300	M1	for working out $\sqrt[4]{81}$ as 3 **or** $\sqrt[4]{10^8}$ as 10^2 or 100	Mark may be awarded if operations are attempted on 8100000000 eg 300000000
		A1	for 300 **or** 3×10^2 or 3×100	
(b)	$\dfrac{1}{8}$	M1	for showing a square root of 64 as 8 **or** recognition of the reciprocal eg $\dfrac{1}{n}$ **or** shows expressions that show an understanding of the ½ index and the minus index eg $\dfrac{1}{\sqrt{64}}$ or other equivalent forms	
		A1	oe	Accept $\pm\dfrac{1}{8}$ oe
(c)	3^{2-n}	M1	for $3^{2(n-1)}$ **or** 3^{2n-2} **or** $\left(3^2\right)^{n-1}$	
		A1	for 3^{2-n} oe eg $3^{n-2(n-1)}$	

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	5,15,35,55,70,80	B1	cao	
(b)	Graph drawn	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 SC B1 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	If histograms drawn, points must be identified Accept a smooth curve or line segments
(c)	Correct decision and correct figures	M1	for 60 ÷ 100 × 80 (=48) oe	reading value from graph at wage = 360 (=40) **or** for $35 + \frac{1}{5} \times 20$ (=39)	ft from a cum freq graph
		M1	reading value from graph at cf = 48 (=380)	for "40" ÷ 80 × 100 (=50(%)) **or** for 60 ÷ 100 × 80 (=48)	
		C1	ft for correct decision and correct figures, eg No with 48 and "380" **or** with "40" and "50"(%) **or** with "40" and 48	
13	196	P1	for vol A = 1400 ÷ 70 (=20) **or** for mass B = 280 × 30 (=8400)	
		P1	for density C = $\frac{1400 + "8400"}{"20" + 30}$ (= $\frac{9800}{50}$) or answer with digits 196	
		A1	cao	An answer of 350 from 70 + 280 gets no marks
14	0.42	P1	for appropriate multiplication eg 0.3 × 0.7 (=0.21) **or** 0.3 × 0.1 (=0.03) **or** 0.3 × 0.6 (=0.18)	Probabilities could also be given in fraction or percentage form
		P1	(dep) for complete process eg 0.3 × 0.7 + 0.7 × 0.3 **or** 0.3 × 0.1 + 0.3 × 0.6 + 0.6 × 0.3 + 0.1 × 0.3	
		A1	oe	Acceptable equivalents are 42% or $\frac{42}{100}$ oe

Question	Answer	Mark	Mark scheme	Additional guidance
15	$y = -\dfrac{1}{3}x + 8$	M1	for a method for finding the gradient of L_2 eg use of $-\dfrac{1}{m}$ **or** $-\dfrac{1}{3}$	
		M1	(dep) for substitution of (9, 5) into $y = "-\dfrac{1}{3}"x + c$	
		A1	for $y = -\dfrac{1}{3}x + 8$ oe	$y - 5 = -\dfrac{1}{3}(x - 9)$ gets M2A1
16 (a)	540	P1	for $\dfrac{120}{20}$ (=6) **or** $\dfrac{20}{120}$ (=0.16..) **or** $\dfrac{90}{20}$ (=4.5) **or** $\dfrac{20}{90}$ (=0.22..)	Decimal values truncated or rounded to 2 dp or more
		P1	for $\dfrac{20}{120} = \dfrac{90}{n}$ **or** $\dfrac{20}{90} = \dfrac{120}{n}$ **or** $\dfrac{90 \times 120}{20}$ oe	
		A1	cao	
(b)	Explanation	C1	for explanation **Acceptable examples** If marks fall off Shirley will have over-estimated the number of bees There will be fewer bees Her amount will go down **Not acceptable examples** My answer will be wrong It will increase the answer	

Question	Answer	Mark	Mark scheme	Additional guidance
17	$f = \dfrac{4d+3}{d+3}$	M1	for clearing the fraction eg $d(f-4) = 3(1-f)$ **or** $df - 4d = 3 - 3f$	Condone error in expansion of RHS for this mark
		M1	(dep M1) for isolating f terms in a correct equation eg $df + 3f = 3 + 4d$	
		M1	(dep on two terms in f) for factorising eg $f(d+3) = 3 + 4d$	
		A1	oe	
18	20	P1	for a statement of proportionality eg $x = k\sqrt{y}$ **or** 1.44 oe	Must be written in the form of an equation with a constant term, accept $x \propto k\sqrt{y}$
		P1	for using $\sqrt{1.44}$ as multiplier eg $(x_2 =) k\sqrt{1.44y}$ **or** 1.2 oe	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
19 (a)	33	B1	cao	
(b)	27	M1	for f(9) = 12 ÷ √9 (=4) **and** a clear intention to find g("4") **or** for $3 \times (2 \times \dfrac{12}{\sqrt{9}} + 1)$ **or** for stating gf eg $3(2 \times \dfrac{12}{\sqrt{x}} + 1)$ oe	
		A1	cao	
(c)	$\dfrac{1}{2}$	M1	for g^{-1} as $\dfrac{x-3}{6}$ oe **or** for starting to solve 3(2x + 1) = 6	Accept $\dfrac{y-3}{6}$
		A1	for $\dfrac{1}{2}$ oe	
20	$1 + \dfrac{\sqrt{5}}{5}$	P1	for writing $\sqrt{180}$ as $6\sqrt{5}$	This process mark can be awarded whenever this is seen, which might be later in the process.
		P1	for process to rationalising the denominator eg $\dfrac{\sqrt{180} - 2\sqrt{5}}{5\sqrt{5} - 5} \times \dfrac{5\sqrt{5} + 5}{5\sqrt{5} + 5}$ **or** $\dfrac{4\sqrt{5}}{5\sqrt{5} - 5} \times \dfrac{5\sqrt{5} + 5}{5\sqrt{5} + 5}$ oe	
		P1	(dep on previous P1) for expanding terms eg $\dfrac{5\sqrt{5}\sqrt{180} + 5\sqrt{180} - 50 - 10\sqrt{5}}{125 - 25}$ **or** $\dfrac{100 + 20\sqrt{5}}{100}$ oe	
		A1	for $1 + \dfrac{\sqrt{5}}{5}$	Accept written as $a = 1$, $b = 5$

Question	Answer	Mark	Mark scheme	Additional guidance
21	Proof	M1	for $\overrightarrow{DQ} = \tfrac{1}{2}(\mathbf{b}-\mathbf{a})$ oe or $\overrightarrow{EQ} = \tfrac{1}{2}(\mathbf{a}-\mathbf{b})$ oe	Vectors could be written on the diagram
		M1	for $\overrightarrow{PQ} = \tfrac{1}{2}\mathbf{a} + \overrightarrow{DQ}$ **or** $\tfrac{1}{2}\mathbf{a} + \tfrac{1}{2}(\mathbf{b}-\mathbf{a})$ oe **or** $\overrightarrow{PQ} = -\tfrac{1}{2}\mathbf{a} + \mathbf{b} + \overrightarrow{EQ}$ **or** $-\tfrac{1}{2}\mathbf{a} + \mathbf{b} + \tfrac{1}{2}(\mathbf{a}-\mathbf{b})$ oe	
		B1	for $\overrightarrow{PQ} = \tfrac{1}{2}\mathbf{b}$	
		C1	for complete proof with statement, eg $FE = 2PQ$ **or** FE is a multiple of PQ **or** $\mathbf{b} = 2(\tfrac{1}{2}\mathbf{b})$	
22	0.5	P1	derive an algebraic expression for the area of A eg $\dfrac{1}{8}\pi\,[\,(5x-1)^2 - (3x-1)^2\,]$	
		P1	expand and simplify for either area A or area B eg $\dfrac{1}{8}\pi\,(16x^2-4x)$ **or** $\pi(x^2-2x+1)$	
		P1	(dep P2) equate and rearrange into a quadratic eqn of the form $ax^2 + bx + c = 0$ eg $2x^2 + 3x - 2 = 0$	
		P1	(dep P3) factorise eg $(2x-1)(x+2) = 0$ **or** use of formula eg $\dfrac{-3 \pm \sqrt{3^2 - 4\times 2\times -2}}{2\times 2}$	
		A1	oe	Accept only the single value of 0.5 oe but award 0 marks for a correct answer with no supportive working

Question	Answer	Mark	Mark scheme	Additional guidance
23	$\dfrac{27}{56}$	P1	for $\dfrac{3}{8}$ **and** $\dfrac{7}{9}$ **OR** uses a total of 72 cards and shows a process to find the number of cards with a black shape **or** the number of cards with a triangle, eg $72 \div 8 \times 3$ (=27) **or** $72 \div 9 \times 7$ (=56)	72 or any multiple of 72
		P1	for process shown to divide fractions $\dfrac{3}{8} \div \dfrac{7}{9}$ **or** $\dfrac{3}{8} \times \dfrac{9}{7}$ **OR** for $\dfrac{3}{8} \times \dfrac{9}{9}$ ($=\dfrac{27}{72}$) **and** $\dfrac{7}{9} \times \dfrac{8}{8}$ ($=\dfrac{56}{72}$) **OR** uses a total of 72 cards and shows a process to find the number of cards with a black shape **and** the number of cards with a triangle, eg $72 \div 8 \times 3$ (=27) **and** $72 \div 9 \times 7$ (=56)	Could be seen in a ratio, eg 27 : 45 or 16 : 56 Accept the division shown as $\dfrac{\frac{3}{8}}{\frac{7}{9}}$ Could be seen in ratios, eg 27 : 45 and 16 : 56
		A1	for $\dfrac{27}{56}$ or any other equivalent fraction	Answer of 27 : 56 gets P2A0

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: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1/1H		
Question	**Modification**	**Mark scheme notes**
3	Wording added "Look at the diagram for Question 3 in the Diagram Book." The wording "The diagram shows four graphs" removed and replaced by "It shows four graphs labelled graph A, graph B, graph C and graph D." Diagrams enlarged. Graph lines made thicker. Open headed arrows. Headings moved above the graph.	Standard mark scheme
4	Wording added "Look at the diagram for Question 4 in the Diagram Book." The wording "The diagram shows four triangles" removed and replaced by "It shows four triangles." Diagram enlarged. Headings moved above the diagrams. Angles moved outside of the angle arcs and the angle arcs made smaller. Triangles straightened up so a 10 cm side lies horizontally. Braille only: Description added of the triangles.	Standard mark scheme
6	The wording "ADC is a triangle" removed. Diagram enlarged. Wording added "Look at the diagram for Question 6 in the Diagram Book. It shows the triangle ADC." Angles moved outside of the angles arcs and the angle arcs made smaller.	Standard mark scheme

PAPER: 1MA1/1H		
Question	**Modification**	**Mark scheme notes**
7	Wording added "Look at the table and the diagram for Question 7 in the Diagram Book." Wording "This stem and leaf diagram shows…" removed and replaced with "The stem and leaf diagram shows…" The wording "…of a group of Year 9 girls" removed and replaced by "…of a group of girls in Year 9". The wording "…of a group of 15 Year 9 boys" removed and replaced by "…of a group of 15 boys in Year 9". Table enlarged and kept on the same page as the stem and leaf diagram. Diagram enlarged and a tracking line added. Key moved above the diagram.	Standard mark scheme
8	Model provided for all candidates with a base added to represent the horizontal floor. Wording added "Look at the diagram for Question 8 in the Diagram Book. You may be provided with a model." The wording "The diagram shows a prism…" removed and replaced by "The diagram and the model show a prism…". Diagram enlarged. Dashed lines to be made thicker and longer. The pressure formula to be kept in the Question Paper and moved to the left of the diagram in the Diagram Book.	Standard mark scheme
9	The wording "Write these numbers in order of size" removed and replaced by "Write these four numbers in order of size."	Standard mark scheme
10	The letter a changed to w. The letter b changed to x. The letter c changed to y.	Standard mark scheme except for the letter changes indicated.

Question		Modification	Mark scheme notes	
12	(a)	The value of the 350-400 interval changed from '20' to '25'. The value of the 450-500 interval changed from '10' to '5'. Wording added "Look at the table for Question 12(a) in the Diagram Book." Table enlarged. The wording "The table gives information…" removed and replaced by "It gives information…"	Standard mark scheme	
	(b)	Wording added "Look at the diagram for Question 12(b) in the Diagram Book." The wording "On the grid opposite…" removed and replaced by "On the grid,…" Diagram enlarged. Right axis labelled. Small squares removed. The axes labels moved to the top of the vertical axis and to the left of the horizontal axis.	Standard mark scheme	
	(c)	The wording "60% of this group of people have a weekly wage of £360 or less" removed and replaced by "75% of this group of people have a weekly wage of £375 or less" to make the question accessible.	M1 for $75 \div 100 \times 80$ (=60) oe	M1 reading value from graph at wage = 375 (=48)
			M1 reading value from graph at cf = 60 (=400)	M1 for "48" $\div$ 80 $\times$ 100 (=60(%)) **or** for $75 \div 100 \times 80$ (=60)
			Standard mark scheme (NO) with 60 and "400" **or** with "48" and 60(%) **or** with "48" and 60	
17		The letter f changed to p, d changed to m.	Standard mark scheme but note the changes to the letters.	
21		The wording "DEF is a triangle" replaced by "Look at the diagram for Question 21 in the Diagram Book. It shows the triangle DEF." Diagram enlarged.	Standard mark scheme	

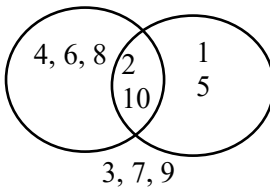| PAPER: 1MA1/1H		
Question	**Modification**	**Mark scheme notes**
22	Wording added "Look at the diagram for Question 22 in the Diagram Book." The wording "The diagram shows…" removed and replaced by "It shows…" Diagram enlarged. Open headed arrows. Shading changed to dotty shading. Angle moved outside of the angle arc the angle arc made smaller. The shapes labelled 'shape A' and 'shape B.' The labels "(3x-1) cm" and "2x cm" added to the bottom of the diagram. The label "(5x-1) cm" added to the top of the diagram.	Standard mark scheme
23	Wording added: "Look at the information for Question 23 in the Diagram Book. It shows the four types of cards in a game." Diagram enlarged. Black cards changed to dotty shading. All reference of 'black' changed to 'shaded'. Headings added above the cards e.g. "shaded circle".	Standard mark scheme

Mark Scheme (Results)

June 2020

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	2×2×3×7	M1	for a complete method to find prime factors, could be shown on a factor tree, with no more than one arithmetic error **or** for 2, 2, 3, 7	Condone the use of 1
		A1	for $2 \times 2 \times 3 \times 7$ oe	Accept $2^2 \times 3 \times 7$
(b)	420	M1	for at least 3 multiples of both 60 and 84 (can include 60 and 84) **or** finds the prime factors of both 84 (may be seen in (a)) and 60, may be seen in factor trees	60, 120, 180, 240, 300, 360, 420 84, 168, 252, 336, 420 $60 = 2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$ If factor tree in (a) is incorrect ft this factor tree in part3 (b) for M1 only
		A1	420 **or** $2 \times 2 \times 3 \times 5 \times 7$ oe	
2 (a)	Venn diagram	M1	for correct numbers in at least one region	Ignore all entries except the region you are marking for each method mark
		M1	for correct numbers in at least two regions	
		A1	for all regions correct	
(b)	$\dfrac{2}{10}$	M1	for $\dfrac{a}{10}$ where $0 < a < 10$ and a is an integer **or** $\dfrac{2}{b}$ where $b > 2$ and b is an integer **or** ft diagram	Need not be written in correct form at this stage eg could be a ratio 2 : 10 Repeated digits in the diagram should be counted as 2 elements
		A1	$\dfrac{2}{10}$ oe **or** ft diagram	Accept any equivalent fraction, decimal form 0.2 or percentage form 20%

Question	Answer	Mark	Mark scheme	Additional guidance
3	No	P1	for $3000 \div (2 + 3)$ (= 600)	
	(supported)	P1	for "600" $\times$ 2 (= 1200) **or** "600" $\times$ 3 (= 1800) **or** "600" $\div$ 6 (= 100) **or** "600" $\div$ 20 (= 30)	
		P1	for "1200" $\div$ 6 (= 200) **or** "1800" $\div$ 20 (= 90) **or** "100" $\times$ 2 (= 200) **or** "30" $\times$ 3 (= 90)	
		P1	for "90" $\div$ ("200" + "90") $\times$ 100 (= 31.0...) oe **or** "90" $\div$ ("200" + "90") (= 0.31...) **or** 0.3 $\times$ ("200" + "90") (= 87)oe	Full method to compare
		C1	correct conclusion **and** fully correct calculations with accurate figure eg No and 87 **or** No and 31% **or** No and 0.31	No working, answer only no marks No may be implied by a statement
4 (a)	13, (6), 5, 4, –3	B2	for all 4 values correct	
		(B1	for 2 or 3 correct values)	
(b)	Correct graph	M1	ft (dep on B1) for plotting at least 4 of the points from their table correctly	
		A1	for a fully correct curve drawn	Accept a freehand curve drawn that is not made of line segments Line sections outside the required range can be ignored.

Question	Answer	Mark	Mark scheme	Additional guidance
5	99.5	M1	for $\sin (34) = \dfrac{x}{178}$ oe **or** alternative method to find x	
		A1	for answer in range 99.5 to 99.7	If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks
6	$\begin{pmatrix} -9 \\ 14 \end{pmatrix}$	M1	for $2\begin{pmatrix} 3 \\ 4 \end{pmatrix} - 3\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ **or** $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$ **and** $\begin{pmatrix} 15 \\ -6 \end{pmatrix}$ **or** $\begin{pmatrix} -9 \\ y \end{pmatrix}$ **or** $\begin{pmatrix} x \\ 14 \end{pmatrix}$	May be seen in two separate calculations eg 2×3 + –3×5 and 2×4 + –3×–2 Condone incorrect notation if method is clear for this mark only
		A1	cao	
7	35.3	P1	for starting the process to find length of third side of triangle, eg $9^2 - 6^2 (= 45)$ **or** $6^2 + x^2 = 9^2$	
		P1	for $\sqrt{9^2 - 6^2}$ or $\sqrt{81 - 36}$ or $\sqrt{45}$ or $3\sqrt{5}$ $(= 6.7..)$ **or** $r^2 = 45$	
		P1	for stating or using $\pi \times [\text{radius}]^2 \div 4$	[radius] is any value
		A1	for answer in range 35.2 to 35.4	If an answer in the range 35.2 to 35.4 is given in the working space then incorrectly rounded, award full marks No working, answer only, no marks

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	580	M1	for method to find value before increase eg $551 \div 0.95$	
		A1	cao	
(b)	6354.67	M1	for 6000×1.024 oe $(= 6144)$	
		M1	for "6144" $\times 1.017^2$ oe	$6000 \times 1.024 \times 1.017^2$ scores M2
		A1	for 6354.66 **or** 6354.67 **or** 6354.68	If correct answer is stated then subsequently rounded isw and award 3 marks If correct answer stated and then interest only given as the answer award M2A0
9	Two changes	C1	plot the median at 162, not 161 oe	
		C1	plot the upper quartile at 171, not 172 oe **Acceptable examples** the median has been plotted at 161 / upper quartile at 172 the upper quartile should be 171 (not 172) UQ is wrong as IQR is 17 not 18 **Not acceptable examples** the median / upper quartile have been plotted / drawn wrong the upper quartile has been worked out incorrectly She needs to work out the UQ	

Paper: 1MA1/2H					
Question		Answer	Mark	Mark scheme	Additional guidance
10	(a)	1	B1	cao	
	(b)	$\dfrac{8}{x-4}$	B1	cao	
	(c)	$27n^{12}w^6$	B2	cao	
			(B1	for two of 27, n^{12}, w^6 in a product)	
11		Yes (supported)	P1	for process to find number of combinations, eg 5×8 oe (= 40) **or** for $240 \div 5$ (= 48) **or** $240 \div 8$ (= 30) **or** for $240 \div 5 \div 8$ (= 6) **or** $5 \times 8 \times x = 240$	
			C1	Yes **and** 6	
12	(a)	−0.09	M1	for suitable method to find gradient, eg $27 \div 300$	Any readings from the graph must be reasonable. Condone missing negative for M1
			A1	for answer in the range −0.1 to −0.08 oe	
	(b)		C1	for explanation **Acceptable examples** volume of petrol used each km litres/km Rate of fuel consumption For every 9 litres you can travel 100 km **Not acceptable examples** volume ÷ distance volume of petrol used per distance km/litre as distance increases volume decreases	Can ft explanation linked to incorrect gradient in part (a)

Question	Answer	Mark	Mark scheme		Additional guidance
13	15.4	M1	for $\dfrac{AB}{\sin 34} = \dfrac{23.8}{\sin"120"}$ **or** $\dfrac{\sin 34}{AB} = \dfrac{\sin"120"}{23.8}$		"120" comes from $180 - 26 - 34$
		M1	for $(AB =) \dfrac{23.8}{\sin"120"} \times \sin 34$		
		A1	for answer in range 15.36 to 15.4		If an answer in the range 15.36 to 15.4 is given in the working space then incorrectly rounded, award full marks
14	116	P1	for setting up an equation, eg $(x + 4)^2 = x^2 + 70$	for setting up an equation, eg $x^2 - (x - 4)^2 = 70$	Equation must be in a single variable. If a candidate uses a trial and improvement method, it is either full marks or no marks.
		P1	for process to reduce equation down to a linear equation ready to solve eg $8x = 54$ oe	for process to reduce equation down to a linear equation ready to solve eg $8x = 86$ oe	Candidates must get as far as $ax = b$
		A1	for 6.75 oe	for 10.75 oe	
		B1	ft (dep P2) for finding the area of B **or** for answer in range 115 to 116		
15	Enlargement sf −1.5 centre (1, 1)	B2	for enlargement scale factor −1.5 **and** centre (1, 1)		Award no marks if more than one transformation is given
		(B1	for enlargement scale factor −1.5 **or** enlargement centre (1, 1))		

Question	Answer	Mark	Mark scheme	Additional guidance
16	$3n^2 + 2n + 5$	M1	for a correct start to a method to find the nth term, eg equal 2nd differences imply a term in n^2	Need to see constant second difference found and n^2
		M1	for working with $3n^2$, eg $3n^2$ and sequence 7, 9, 11, …	$3n^2 + 2n$ implies M2
		A1	for $3n^2 + 2n + 5$	
17	$-12, -7$	B1	cao	
18	160π	P1	for process to find curved surface area of cone, eg $\pi \times 10 \times 25$ $(= 250\pi)$ $(= 785…..)$	
		P1	for process to find the radius or diameter of the smaller cone eg $10 \times \dfrac{15}{25}$ $(= 6)$ **or** $20 \times \dfrac{15}{25}$ $(= 12)$ oe **OR** uses area scale factor, eg "250π" $\times \left(\dfrac{15}{25}\right)^2$ $(= 90\pi)$	15 comes from $25 - 10$ $\dfrac{15}{25}$ may be seen as 0.6
		P1	for a complete process, eg "250π" $- \pi \times$ "6" $\times 15$ $(= 785… - 282…)$ **or** answer in range 502 to 503	
		A1	for 160π	Award 0 marks for an answer of 160π or an answer in range 502 to 503 with no supportive working. If 160π seen but answer in range 502 to 503 given on answer line isw and award full marks

Question	Answer	Mark	Mark scheme	Additional guidance
19	788.4	P1	for substituting values, eg $1040 = K \times 1200 + 20$	
		P1	for process to find K, eg $(1040 - 20) \div 1200$ oe $(= 0.85)$	
		P1	for complete process, eg 09 17: "0.85" $\times$ 1040 + 20 $(= 904)$; 09 18: "0.85" $\times$ "904" + 20	
		A1	for 788.4 or 788 or 789	
20 (a)	Shown	M1	for $\dfrac{n}{n+8}$ **or** starts to work with ratios, eg 3:7	
		M1	forms equation and clears fractions, eg $10n = 7n + 56$ or $10n + 3(n + 8) = 10(n + 8)$ **or** equates $\dfrac{3}{10} = \dfrac{8}{x}$ or $\dfrac{3}{10} = \dfrac{8}{n+8}$ **or** continues to work with ratios, eg 3:7 = 24:56	
		C1	gives the total sweets eg $\dfrac{80}{3}$ oe **or** number of red sweets $n = \dfrac{56}{3}$ oe **or** gives number of red as $\dfrac{56}{3}$ **OR** award 3 marks for a complete written argument, eg, P(y) = $\dfrac{3}{10}$ and there are 8 yellows. This cannot work as 3 is not a factor of 8 (and $\dfrac{3}{10}$ is in its simplest form)	Does not have to restate the $\dfrac{7}{10}$; giving a different probability will suffice

Question	Answer	Mark	Mark scheme	Additional guidance
20 (b)	28	P1	for $\dfrac{n}{n+8}$ and $\dfrac{n-1}{n+7}$ oe	
		P1	forms an appropriate equation, eg $\dfrac{n}{n+8} \times \dfrac{n-1}{n+7} = \dfrac{3}{5}$	
		P1	for correctly forming a quadratic ready for solving, eg $an^2 + bn + c\ (=0)$, $2n^2 - 50n - 168\ (= 0)$, $n^2 - 25n - 84\ (= 0)$ oe	Note we do not need to see "= 0"; just the LHS is sufficient.
		P1	process to solve quadratic equation, ft a 3 term quadratic factorising eg $(n + 3)(n - 28)\ (=0)$ oe **or** completing the square **or** correct use of formula eg $\dfrac{--25 \pm \sqrt{25^2 - 4 \times -84}}{2}$, $\dfrac{--50 \pm \sqrt{50^2 - 4 \times 2 \times -168}}{2 \times 2}$	
		A1	cao	Award 0 marks for a correct answer with no supportive working.

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 (a)	Graph drawn	C2	for graph reflected in the *y*-axis	Key points: (0, 0), (1, 2), (2, 1), (3, 0), (4, 2) Award C1 if line segments but goes through all key points
		(C1	for a graph reflected in the *x*-axis **or** for a correct graph through four of the five key points)	
(b)	$y = 5 + 2(x - 3) -$ $(x - 3)^2$	C2	for $y = 5 + 2(x - 3) - (x - 3)^2$ oe eg $y = -x^2 + 8x - 10$, $y = -[(x-4)^2 - 6]$	For either C mark accept equivalent expressions If a correct answer for C2 is given and is then incorrectly simplified, award C1 *a* need not be positive
		(C1	for $y = 5 + 2(x + 3) - (x + 3)^2$ **or** $y = 5 + 2(x - a) - (x - a)^2$, $a \neq 3$, $a \neq 0$) **or** $y = f(x - 3)$ **or** $y = (x - 4)^2 + 6$ **or** correct expression missing "$y =$"	

Question	Answer	Mark	Mark scheme	Additional guidance
22	$x^2 + y^2 = 80$	P1	for process to find gradient of tangent eg $\dfrac{10-0}{0--20}$ $\left(=\dfrac{1}{2}\right)$ **or** for $20^2 + 10^2$ (= 500) **or** start to method to find angle between tangent and x axis, eg $\tan\theta = \dfrac{10}{20}$	
		P1	for process to find gradient of normal/radius eg $\dfrac{-1}{"0.5"}$ (=−2) **or** for $\sqrt{20^2 + 10^2}$ or $\sqrt{500}$ or 22.36... or 22.4 **or** completes process to find angle between tangent and x axis. eg $\theta = \tan^{-1}\left(\dfrac{10}{20}\right)$ (=26.565…)	
		P1	for equation of tangent eg $y =$ "0.5"$x + 10$ oe or for equation of radius eg $y =$ "−2"x oe **or** for using similar triangles eg $\dfrac{r}{10} = \dfrac{20}{"\sqrt{500}"}$ **or** for $\sin($"26.565…") $= \dfrac{r}{20}$	
		P1	for process to find the x coordinate eg "0.5"$x + 10 =$ "−2"x ($x = -4$) **or** for $r = \dfrac{20}{"\sqrt{500}"} \times 10$ **or** $r = 20 \times \sin($"26.565…")	
		A1	oe	Accept $(4\sqrt{5})^2$ for 80

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:
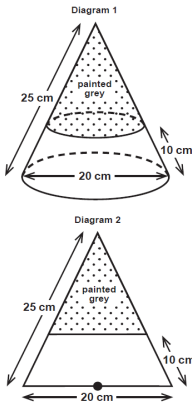Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1/2H			
Question		Modification	Mark scheme notes
2		Wording added "Look at the diagram for Question 22 in the Diagram Book. It shows an incomplete Venn diagram." Diagram enlarged. Labels "set A" and "set B" moved above the circles. Braille only: The Venn diagram labelled (i) to (iv).	Standard mark scheme
4	(a)	Wording added "There are four spaces to fill." Table enlarged and turned to vertical format.	Standard mark scheme
4	(b)	Wording added "Look at the diagram for Question 24(b) in the Diagram Book. It shows a grid." Diagram enlarged. Small squares removed and intermediate lines added.	Standard mark scheme
5		Wording added "Look at the diagram for Question 25 in the Diagram Book. It shows a right-angled triangle ABC." Triangle labelled ABC. Wording added "Angle ABC is a right angle, Angle ACB = 34°, AB = x mm, AC=178 mm." Diagram enlarged. Right angle made thicker. Angle moved outside of the angle arc, and the arc has been made smaller.	Standard mark scheme
7		Wording added "Look at the diagram for Question 27 in the Diagram Book." Wording "The diagram shows…" removed and replaced with "It shows…" Wording added "AC = 9 metres, AB = 6 metres" Wording added "Angle BCD=90°". Diagram enlarged. Right angles made thicker.	

PAPER: 1MA1/2H		
Question	**Modification**	**Mark scheme notes**
9	Wording added "Look at the diagram for Question 9 in the Diagram Book. It shows a box plot." Wording added "She used her results to work out the information in the table below." Table values changed as shown: | Least height	140 cm
Lower quartile	155 cm
Interquartile range	17 cm
Median	162 cm
Range	40 cm | Wording "Aisha drew this box plot…" removed and replaced with "Aisha drew the box plot in the Diagram Book…" Diagram enlarged. Axis label moved to the left of the horizontal axis. Box plot values changed as below: Least height: 140; Lower quartile: 155; Median: 160; Upper quartile: 175; Greatest height: 180	Standard mark scheme but with the numerical values changed: C1 plot the median at 162, not 160 oe C1 plot the upper quartile at 175, not 172 oe
12	Wording added "Look at the diagram for Question 12 in the Diagram Book." Wording "The graph gives information…" removed and replaced with "It shows a graph which gives information…" Diagram enlarged. Graph line made thicker. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and to the top of the vertical axis.	Standard mark scheme but in part (a) allow some leeway in the award of the A mark.

PAPER: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
13		Wording added "Look at the diagram for Question 13 in the Diagram Book." Wording "Here is triangle ABC" removed and replaced with "It shows a triangle ABC. Diagram enlarged. Angle ACB = 34° Angle ABC = 26° CB = 23.8 cm". Angles moved outside of the angle arcs, and the arcs has been made smaller.	Standard mark scheme
14		Wording added "Look at the diagram for Question 14 in the Diagram Book." Diagram enlarged. Wording "Here are two squares, A and B" removed, replaced with "It shows two squares, A and B." Labels removed and replaced with "square A" and "square B" above the squares.	Standard mark scheme
15		Two labelled cut out shapes provided for all candidates. The grid reduced in size and cut at $x = 6$ and $y = -6$. Wording added "Look at the diagram for Question 15 in the Diagram Book. It shows triangle A and triangle B on a grid. Two cut out shapes may be available if you wish to use them." Diagram enlarged. Shading changed to dotty shading. Shape outlines made thicker. Shapes labelled "triangle A" and "triangle B". Labels moved above the shapes.	Standard mark scheme

PAPER: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
18		Model provided for all candidates. Wording added "Look at the two diagrams for Question 18. You may be provided with a model." "The diagram represents a solid cone" removed and replaced with "Diagram 1 and the model represent a solid cone. Diagram 2, below Diagram 1, shows a 2D view of the cone." Diagram enlarged. Diagram 2 provided as a 2D representation of the cone. Grey shading removed and replaced with dotty shading. The diagrams labelled 'painted grey' where it is shaded. Dashed lines longer and thicker. 	Standard mark scheme
21	(a)	Wording added "Look at the diagram for Question 21(a) in the Diagram Book." Wording "The graph of the curve with equation … is shown on the grid below" removed and replaced with "It shows the graph of the curve with equation … on a grid." Diagram enlarged. Curve made thicker. Wording "On the grid above,…" removed and replaced with "On the same grid, …"	Standard mark scheme
21	(b)	Wording added "Look at the diagram for Question 21(b) in the Diagram Book." Diagram enlarged. Curves made thicker. Crosses changed to solid dots/circles.	Standard mark scheme

Mark Scheme (Results)

June 2020

Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	n^8	B1	cao	
(b)	cd^3	M1	for partial simplification, eg c or d^3	May be seen as simplification in original fraction
		A1	for cd^3	Accept $c^1 d^3$
(c)	$x > \dfrac{14}{5}$	M1	for $5x > 14$ or $5x = 14$ or critical value, $\dfrac{14}{5}$ oe	Must see carried out correctly, ie at least $5x > 7 \times 2$ not just intention seen. Allow other signs for this mark.
		A1	$x > \dfrac{14}{5}$ or $x > 2\dfrac{4}{5}$ or $x > 2.8$	
2	2 hours 45 minutes	P1	for $30 \div 24 \ (= 1.25)$ or $12 \div 8 \ (= 1.5)$	May be written in hours and/or minutes
		P1	for finding the sum of their two times eg "1.25" + "1.5" (= 2.75) or 165 (minutes)	or 3 h 15 min or 2 h 75 min
		A1	cao	
3	9.35, 9.45	B1	for 9.35 in the correct position	
		B1	for 9.45 in the correct position	Accept $9.44\dot{9}$ oe or 9.4499…oe

Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	Yes (supported)	P1	for start of process, eg 5 × 9 (= 45) **or** 10 × 14 (= 140) **or** 5 × 2 (= 10 (kg)) **or** 3 ÷ 2 (= 1.5 (boxes))	Accept values rounded or truncated to 1dp in both (a) and (b). Ignore units
		P1	for process using ratio of areas, eg "140" ÷ "45" (= 3.1...) **or** for using ratio of amount of seed eg "10" ÷ 3 (= 3.3...) **or** for finding coverage for 1 kg of grass seed, eg "45" ÷ 3 (= 15 (m^2))	
		P1	for process to find amount of seed needed, eg "140" ÷ "45" × 3 (= 9.3...kg) **or** "140" ÷ "45" × "1.5" (= 4.6...(boxes)) oe **or** "15" × 2 (= 30 (m^2 per box)) **and** "140" ÷ "30" (= 4.6...(boxes)) **or** for process to find area that can be seeded, eg "10" ÷ 3 × "45" (= 150 (m^2)) **or** "140" ÷ "10" (= 14 (m^2)) oe	Accept 9.4 Accept 4.7
		C1	for "Yes" supported by correct figures eg 4.6...(and 5), **or** 9.3...and 10 **or** 150 and 140 (or 140 to 148.5) **or** 15 and 14	
(b)	Yes, (does not have enough) (supported)	C1	for reasoning supported with correct figures, eg does not have enough seed and compares 9 (kg) with 9.3…(kg) or 4.5 (boxes) with 4.6… (boxes) or 135 (m²) with 140 (m²) ft from (a)	Values used in (a) do not need repeating in (b) as long as intention is clear

Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	$\dfrac{1}{3},\dfrac{2}{3}$ $\dfrac{1}{3},\dfrac{2}{3},\dfrac{1}{3},\dfrac{2}{3}$	B2	six fully correct probabilities	Accept any equivalent fraction, decimal form 0.33(3...) and 0.66(6...) or 0.67 or percentage form 33(.3...)% and 66(.6...)% or 67%
		(B1	at least 2 correct probabilities)	
(b)	$\dfrac{2}{9}$	M1	for $\dfrac{1}{3}\times\dfrac{2}{3}$ oe or ft probabilities from diagram	
		A1	for $\dfrac{2}{9}$ oe	Accept any equivalent fraction, decimal form 0.22(2...) or percentage form 22(.2...)%
6 (a)	−2, 4	B1	cao	
(b)	0.55 to 0.65, 3.35 to 3.45	M1	for correct method, eg marking intercepts with x-axis or one correct answer or both solutions given as a coordinate eg (0.6, 3.4) or (0.6, 0) (3.4, 0)	If answers are stated as coordinates, award M1 for both coordinates and M0 for one coordinate.
		A1	for answers in the ranges 0.55 to 0.65 and 3.35 to 3.45	With no extras
7	16.5	M1	for method to find total of ages of boys, eg 18×16.2 (= 291.6) or total of ages of girls, eg 27×16.7 (= 450.9) or total of ages of boys and girls, eg 742.5	May use an equivalent method with number of boys and girls used in the ratio 2 : 3 $\dfrac{16.2+16.7}{2}$ scores 0 marks
		M1	for complete method, eg $\dfrac{"291.6"+"450.9"}{45}$ $\left(=\dfrac{742.5}{45}\right)$	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
8	24	P1	for start to process of working out the unknown probabilities, eg $1 - 0.32 - 0.20 (= 0.48)$ **or** assigning probabilities as $5x$ and x **or** process to work out the number of blue or green counters, eg $0.32 \times 300 (= 96)$ or $0.20 \times 300 (= 60)$ or $0.52 \times 300 (= 156)$	Award for P(R) + P(Y) = 0.48, may be seen in table
		P1	for process to find the probability, eg $5x + x = $ "0.48" or "0.48" $\div 6 (= 0.08)$ **or** process to find the number of red or yellow counters, eg $300 - $ "96" $- $ "60" or $300 \times$ "0.48"	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
9	2820	P1	for start to process to find height of triangle, eg $\tan(40) = \dfrac{h}{5}$ oe **or** equivalent process to find the height of the triangle **or** start to process to find slant height, eg $\dfrac{10}{\sin 100} = \dfrac{x}{\sin 40}$	
		P1	for complete process to find height of triangle, eg 5tan 40 (= 4.19...) **or** complete process to find the slant height, eg $\dfrac{10}{\sin 100} \times \sin 40$ (= 6.5...)	Accept 4.2
		P1	for start of process to find volume of prism, eg 10 × 20 × 12 (= 2400) or 0.5 × 10 × "4.19..."× 20 (= 419....) or $\frac{1}{2}$ × 10 ×"6.52..." ×sin 40 × 20 (419....) **or** process to find total area of cross section, eg 0.5 × 10 × "4.19..." + 10 × 12 (= 140.9...) or $\frac{1}{2}$ × "6.52..." ×"6.52..." × sin 100 + 10 × 12 (= 140.9...)	10 × 20 × 12 may be seen as part of a calculation to find the volume of the prism
		P1	for complete process to find total volume, eg (0.5 × 10 × "4.19..." + 10 × 12) × 20	
		A1	for an answer in the range 2810 to 2820	If an answer is given in the range in working and then rounded incorrectly award full marks.

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	3.0×10^9	P1	for correct process, eg $10^5 \times 365 \times 81$ or for a correct answer not written in standard form, eg 2956500000 or $2.9(565) \times 10^n$ where $n \neq 9$ oe	Values may be rounded. Allow 350, 360, 366, 370, 400 and 80, 100
		A1	for an answer in the range 2.8×10^9 to 4.0×10^9	
(b)	4.5×10^{-11}	P1	for correct process, eg $\dfrac{90}{2\times10^{12}}$ **or** for correct answer not written in standard form, eg 45×10^{-12} or 0.45×10^{-10} **or** 4.5×10^n where $n \neq -11$	Allow $90 \div 2 \times 10^{12}$
		A1	cao	
11 (a)	rotation of 180° about $(2.5, -1)$	M1	for method to find position of **Q**, eg shape drawn at $(-1, -2)$, $(-1, -5)$ and $(-2, -5)$ **or** for method to find position of **R**, eg shape drawn at $(4, -4)$, $(4, -7)$ and $(3, -7)$ **or** for method to translate their **Q** correctly	The method mark is awarded if no working is shown but at least 2 of the 3 aspects are correct in the description
		A2	for rotation of 180° about $(2.5, -1)$ or enlargement by scale factor -1, centre $(2.5, -1)$	Cannot award A marks for a combination of transformations With no extra incorrect aspects
		(A1	for any 2 of the 3 aspects)	
(b)	$(2.5, -1)$	B1	for $(2.5, -1)$ ft from rotation or enlargement in (a)	No follow through from a combined transformation in part (a)

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	$\dfrac{3x^2}{(x-4)(x+2)}$	M1	for method to identify a common denominator, eg $(x-4)(x+2)$	
		M1	for method to combine the fractions, eg $\dfrac{2x(x+2)+x(x-4)}{(x-4)(x+2)}$	Accept $\dfrac{2x(x+2)}{(x-4)(x+2)}+\dfrac{x(x-4)}{(x-4)(x+2)}$
		A1	for $\dfrac{3x^2}{(x-4)(x+2)}$ or $\dfrac{3x^2}{x^2-2x-8}$	
(b)	$8x^3-2x^2-51x-45$	M1	for method to find the product of two linear expressions, eg 3 correct terms out of 4 terms or 4 terms ignoring signs	Note that, for example, $-3x-9$ in expansion of $(x-3)(2x+3)$ is to be regarded as 3 correct terms.
		M1	for a complete method to obtain all terms, half of which are correct (ft their first product) eg $8x^3-12x^2-15x+10x^2-36x-45$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
		A1	cao.	
13 (a)	region identified	M1	for 2 of lines $x=2$, $y=x+3$, $2x+3y=6$ correctly drawn	Accept use of full or broken lines for all marks
		M1	for all 3 lines $x=2$, $y=x+3$, $2x+3y=6$ correctly drawn	
		M1	for region which satisfies at least 2 of the inequalities $x\le 2$, $y\le x+3$, $2x+3y\ge 6$	Award for clear intention, shading not needed.
		A1	for correct region identified	Award for clear intention, shading not needed.
(b)	no supported with reason	B1	for no and reason, eg (2, 4) does satisfy $x+y\le 6$ or (2, 4) lies on the boundary of the region satisfying the equality sign.	

Question	Answer	Mark	Mark scheme	Additional guidance
14	60 (supported)	M1	for angle *DBF*, eg 180 – 100 (= 80)	Angles may be shown on the diagram or in working
		M1	for angle *BFD*, eg 180 – "80" – 40 (= 60) or for angle *CBF* = 40	
		A1	for angle *ABD* = 60	
		C1	(dep M2) for at least 2 reasons from Opposite angles of a cyclic quadrilateral add up to 180 Angles in a triangle add up to 180 Alternate segment theorem **OR** Opposite angles of a cyclic quadrilateral add up to 180 Alternate segment theorem Angles on a straight line add up to 180	Underlined words need to be shown; reasons need to be linked to their method
15	Proof	M1	for 10*x* = 7.333… (7.$\dot{3}$) and for finding difference that would lead to a terminating decimal	100*x* and 1000*x*, etc could also be used
		A1	for completing algebra to reach $\frac{11}{15}$	

Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	129 to 160	M1	for a method to find an estimate for the area under the curve eg 0.5 × 30 × 9	Do not accept 30 × 9
		A1	for value in the range 129 to 160 (If M0, SC B1for 126 or 127.5)	Award full marks for any correct method leading to a better estimate.
(b)	underestimate with reason	C1	(dep M1) for "underestimate" and appropriate reason linked to their method, eg area between triangle and curve not included	
(c)	Explanation	C1	for explanation, **Acceptable examples** method gives average acceleration (in first 60 seconds) he has not used/drawn a tangent (at time 60 seconds) he has not worked out the gradient (at time 60 seconds) **Not acceptable examples** he has not used strips he has calculated it accurately rather than using an estimate the estimate of 13 should be about 4.4 the answer should be approximately 0.073	
17	7.645	P1	for process to use area to find at least one frequency, eg for first frequency (7.2 − 6.4) × 10 (= 8) or (7.2 − 6.4) × 5 (= 4) or 4 × 5 × 5 (= 100)	Frequencies could be written on the graph
		P1	for process to find all frequencies, eg 8, 20, 40, 12 or multiples eg 4, 10, 20, 6 or 100, 250, 500, 150	Marks are for correct processes, one or more frequencies may be incorrect
		P1	(dep P2) for process to estimate mean, eg ((6.8 × [8]) + (7.4 × [20]) + (7.8 × [40]) + (8.1 × [12])) ÷ ([8] + [20] + [40] + [12])	
		A1	for 7.645 (accept 7.65)	Award full marks if a correct answer is seen in working and is then incorrectly rounded.

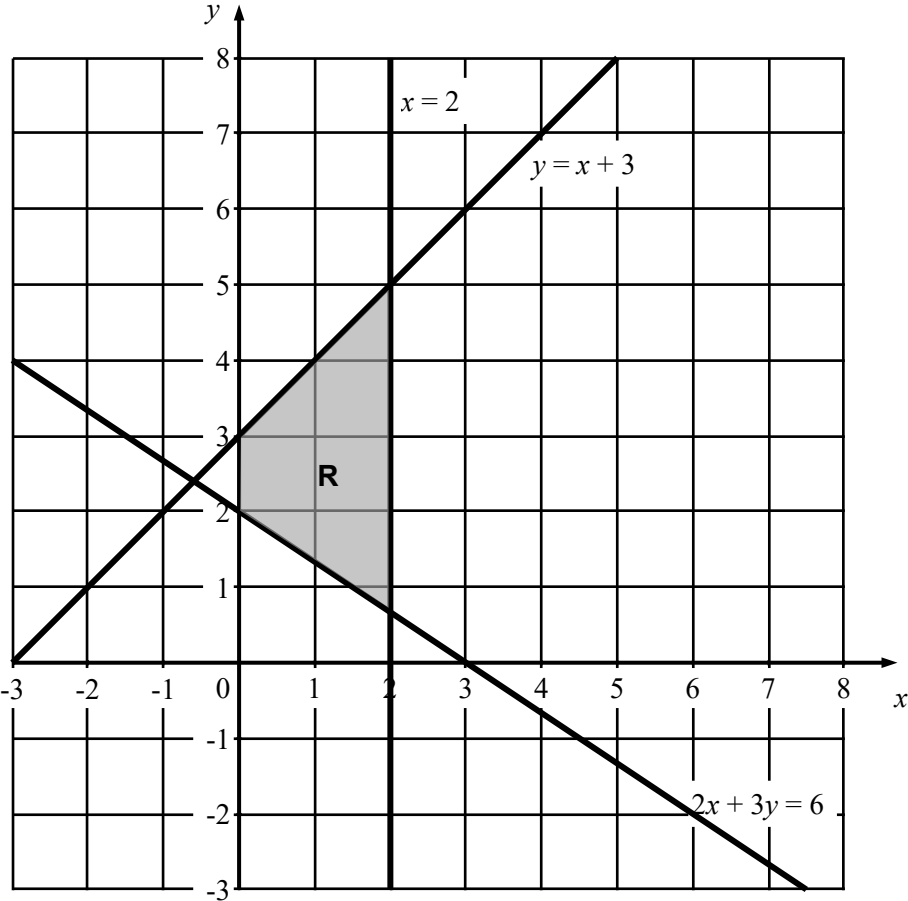| Question	Answer	Mark	Mark scheme	Additional guidance
18	6.495190528	B1	for 11.25 or 11.35	
		M1	use $a^2 + a^2 + a^2$ oe for the square of the length of a diagonal	
		M1	for writing an equation to find the length of a side, eg $a^2 + a^2 + a^2 = [LB]^2$ where $11.25 \leq LB < 11.3$ oe	
		A1	for an answer in the range 6.49 to 6.50	If the answer is given in the range 6.49 to 6.5 without supportive evidence award 0 marks.

Question	Answer	Mark	Mark scheme	Additional guidance
19	Proof	P1	for start to process to find area of *ABCDEF*, eg area of equilateral triangle $= \dfrac{1}{2} \times x \times x \times \sin 60 \ (= \dfrac{\sqrt{3}}{4}x^2)$ **OR** for start to process to find area of *FGHIJK*, eg area of equilateral triangle $= \dfrac{1}{2} \times px \times px \times \sin 60 \ (= \dfrac{\sqrt{3}}{4}p^2x^2)$	Any correct process to find the area of part of the hexagon is acceptable for this mark, eg $\dfrac{1}{2} \times x \times x \times \sin 120$ or $\dfrac{1}{2} \times (x + 2x) \times \dfrac{\sqrt{3}}{2}x$ Allow sin 60 left in expressions for the first 3 marks.
		P1	for complete process of finding area of *ABCDEF*, eg $6 \times \dfrac{1}{2} \times x \times x \times \sin 60$ or $6 \times \dfrac{1}{2} \times x \times x \times \dfrac{\sqrt{3}}{2}$ $\left(= \dfrac{3\sqrt{3}}{2}x^2 \right)$ oe **OR** for complete process of finding area of *FGHIJK*, eg $6 \times \dfrac{1}{2} \times px \times px \times \dfrac{\sqrt{3}}{2}$ $\left(= \dfrac{3\sqrt{3}}{2}p^2x^2 \right)$ oe	
		P1	for process of finding area of *ABCDEF* eg $\dfrac{3\sqrt{3}}{2}x^2$ oe **AND** for process of finding area of *FGHIJK*, eg $p^2 \times \dfrac{3\sqrt{3}}{2}x^2$ oe	
		C1	correct algebra leading to given result, $\dfrac{3\sqrt{3}}{2}(p^2 - 1)x^2$	Accept $\dfrac{3\sqrt{3}}{2}x^2(p^2 - 1)$ as final result.

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	98^{91}	B1	cao	Must be clear and unambiguous
21 (a)	3 : 4	P1	for start of process, eg isolate terms in c, eg $4c = 3d$ **or** divide all terms by d, eg $\dfrac{5c}{d}+1=\dfrac{c}{d}+4$	
		A1	for 3 : 4	Accept any equivalent ratio or $c = 3$, $d = 4$
(b)	5 : 2	P1	for start of process: to take all terms to one side eg $6x^2 - 7xy - 20y^2\ (= 0)$ **or** divide all terms by y^2, eg $\dfrac{6x^2}{y^2}=\dfrac{7xy}{y^2}+\dfrac{20y^2}{y^2}$ **or** substitute a value of x ($x > 0$) or a value of y ($y > 0$) into the equation, eg $x = 5$, $150 = 35y + 20y^2$	
		P1	for second step in process, eg $(2x - 5y)(3x + 4y)\ (= 0)$ **or** $6p^2 - 7p - 20\ (= 0)$ (where $p = \dfrac{x}{y}$) **or** $20y^2 + 35y - 150\ (= 0)$	
		A1	5 : 2	Accept $x = 5$, $y = 2$ or equivalent ratios, eg, $1 : \dfrac{2}{5}$

Q13(a)

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.
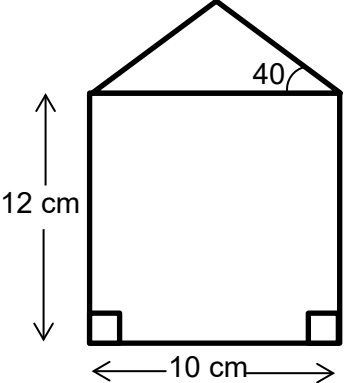
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

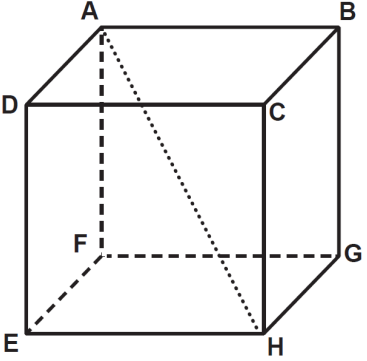| PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
1	(b)	The letter c changed to p. The letter d changed to q.	Standard mark scheme but note the change in letters.
5		Wording added 'Look at the diagrams for Question 27 in the Diagram Book.' Diagrams enlarged. Spinner headings moved above the spinners. Spinners straightened, stick replaced with black dot. Wording added 'There are six spaces to fill.'	Standard mark scheme
6	(a)	Wording added 'Look at the diagram for Question 28(a) in the Diagram Book. It shows the graphs of $5x - 9y = -46$ and $y = -2x$' Diagram enlarged and turned landscape. Label '$y = -2x$' moved to the other end of the graph line.	Standard mark scheme
6	(b)	Wording added 'Look at the diagram for Question 28(b) in the Diagram Book. It shows the graph of $y = x^2 - 4x + 2$.' Diagram enlarged. Grid cut at $y=8$. Small squares removed. Graph line made thicker.	Standard mark scheme but for answers in the ranges 0.5 to 0.7 and 3.3 to 3.5

PAPER: 1MA1/3H		
Question	**Modification**	**Mark scheme notes**
8	Wording added 'Look at the table for Question 8 in the Diagram Book.' Table turned vertical.	Standard mark scheme
9	Wording added 'Look at Diagram 1 and Diagram 2 for Question 9 in the Diagram Book. You may be provided with a model.' Wording 'The diagram shows a prism' removed and replaced by 'Diagram 1 and the model represent a prism.' Wording added 'One angle is marked 40°. The prism has length 20 cm'; 'as shown in Diagram 2'. Diagram enlarged, angle moved outside angle arc and the angle arc made smaller. Diagram 2 provided below Diagram 1 as shown: 	Standard mark scheme

PAPER: 1MA1/3H		
Question	**Modification**	**Mark scheme notes**

11	Shape provided for all candidates.
	Wording added 'Look at the diagram for Question 11 in the Diagram Book.'
	The wording 'The diagram shows a…' removed and replaced by 'It shows triangle P, triangle Q and triangle R on a grid'. Wording added 'A cut out shape may be available if you wish to use it.'
	Triangle Q and triangle R added to the diagram. Diagram enlarged, shading removed and changed to dotty shading. Open headed arrows. Labels added to the diagrams 'triangle P' etc.
	
	The question split into 3 separate parts:
	(a)(i) Describe fully the single transformation that maps triangle P onto triangle Q.
	   (ii) Describe fully the single transformation that maps triangle Q onto triangle R.
	   (iii) Describe fully the single transformation that maps triangle P onto triangle R.
		New mark scheme:
		(a)(i) B1 for "Rotation 180 about (0,0) [or origin]"
		(a)(ii) B1 for "Translation of $\binom{5}{-2}$"
		(a)(iii) B1 for "Rotation 180 about (2.5, −1)"
		
		(b) B1 for (2.5, −1) ft from rotation stated in (a)(iii)

12	Change x to y.	Standard mark scheme but note letter change.

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
13	(a)	Grid cut at *x*=7 and *y*=7. Diagram enlarged. Wording added "Look at the diagram for Q13(a) in the Diagram Book.'	Standard mark scheme
13	(b)	Wording added 'Look at the diagram for Question 13(b) in the Diagram Book.' Wording 'The diagram below shows…' changed to 'It is a grid showing…'. Diagram enlarged. Shading changed to dotty shading. Right axis labelled.	Standard mark scheme
14		Wording added 'Look at the diagram for Question 14 in the Diagram Book.' Diagram enlarged. Angle labels moved outside angle arcs and the angle arcs made smaller. Wording added 'Angle BDF = 40° Angle DEF = 100°'	Standard mark scheme
16		Wording added 'Look at the diagram for Question 16 in the Diagram Book.' The wording 'Here is a…' removed and replaced by 'It shows a…'. Diagram enlarged. Axis labels moved above the vertical axis and to the left of the horizontal axis. Right axis labelled. Small squares removed. Intermediates added at every 1 m/s. In part (c) box removed from around information.	Standard mark scheme Apply a greater tolerance in reading off and therefore arriving at the answer for part (a).
17		Wording added 'Look at the diagram for Question 17 in the Diagram Book. It shows a histogram.' Axis labels moved above the vertical axis and to the left of the horizontal axis. Right axis labelled. Shading changed to dotty shading. Small squares removed.	Standard mark scheme

Question		Modification	Mark scheme notes
18		Wording added 'Look at the diagram for Question 18 in the Diagram Book. You may be provided with a model.' Wording 'The diagram shows a cube.' changed to 'The diagram and the model show a cube ABCDEFGH.' A dotty line joining A to H. Diagram enlarged. Model provided with AH joined. 	Standard mark scheme
19		Wording added 'Look at the diagram for Question 19 in the Diagram Book.' Diagram enlarged. Shading removed, ABCDEF shaded instead with dotty shading. Add wording 'ABCDEF is a shaded regular…'. Wording 'shaded' changed to 'unshaded'. 'x' labelled in between AF and FE.	Standard mark scheme
20		Options stacked vertically.	Standard mark scheme
21		Wording added 'Given that'. The letter c changed to p. The letter d changed to q.	Standard mark scheme but note the changes in letters.