Chhetri Academy

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GCSE MATHS

Number

Edexcel 1MA1 | Subtopic collection Topic 05

Indices and roots

Foundation tier

Answers and examiner comments

34	2012-2025	Foundation
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

16	(a)	3×3×3×3	81	1	B1 cao
	(b)		4	1	B1 cao

Question		Working	Answer	Mark	Notes
3	(a)		16 or 4	1	B1 for 4 or 16 (or both)
	(b)		21	1	B1 cao
	(c)		10 or 15	1	B1 10 or 15 (or both)

Original question 10

The full source mark scheme begins on page 43. Use the original paper code, tier and question number shown above.

Original question 17

The full source mark scheme begins on page 43. Use the original paper code, tier and question number shown above.

16	(a)		10	1	B1 cao
	(b)	$9 + 4 \times 5$ $= 9 + 20$	29	2	M1 for evidence of correct start to order of evaluation, 3×3 **or** 9 **or** 20 A1 cao
	(c)		125	1	B1 cao
	(d)		4	1	B1 accept - 4 or ±4

Question		Working	Answer	Mark	Notes
11	(a)		12	1	B1 cao
	(b)		14	1	B1 cao
	(c)		16	1	B1 cao

3	(a)		3 or 5 or 21	1	B1 for 3 or 5 or 21
	(b)		16	1	B1 cao
	(c)		24	1	B1 cao

5	(a)		1.7	1	B1 cao
	(b)		56.96	1	B1 cao
	(c)		19.683	1	B1 cao

PAPER: 5MB3F_01

11			6 or − 6	3	M1 for 43 – 7 (=36) or √43 M1 for correct order of operations −7 then intention to square root A1 for 6 or −6 or both OR M1 for x^2 – 7 =43 M1 for adding 7 to both sides A1 for 6 or −6 or both

18	(a)	2,5	2 or 5	1	B1 cao
	(b)	1, 4, 9, 16 1 + 4 + 16	1, 4, 16	2	M1 for identifying at least 2 different square numbers from the list A1 cao
19	(a)		–0.5	2	M1 for intention to subtract 19 from both sides or divide all terms by 8 as a first step A1 for –0.5 oe
	(b)		3	2	M1 for a correct operation to collect the c terms or the number terms on one side of the equation e.g. $2c - c + 5 = 8$, $2c + 5 - 5 = c + 8 - 5$ A1 cao

15		1, 4, 9, 16, 25 1, 8, 27	Liz 25, Howard 27	2	M1 for a list of at least 2 square numbers or at least 2 cube numbers identified with no ambiguity or Liz and Howard's ages reversed A1 cao

5MB2F_01 November 2015					
Question		Working	Answer	Mark	Notes
*16			20°	4	B1 for identifying 60° angle on the diagram or in a correct statement of working M1 for completing method eg 180−(360−140−60) A1 for 20 C1 for all reasons used Angles at a point add up to 360° Angles in a triangle add up to 180° Base angles of an isosceles triangle are equal

9	(a)		2.7	1	B1 cao
	(b)		9261	1	B1 cao

PAPER: 1MA0_2F

Original question 9

The full source mark scheme begins on page 63. Use the original paper code, tier and question number shown above.

2	(a)		Style Master	1	B1 cao
	(b)		700	1	B1 cao
	(c)		3	1	B1 cao

8	(a)		25	B1	for 25 (accept 5^2)
	(b)		24	B1	cao
	(c)		23, 29	B1	for 23 and 29 and no extras

9		2, 7 or 3, 13 or 5, 11 or 2, 23	M1 A1	for identifying two different prime numbers or two numbers which add up to give a square number or for a list of at least 3 prime numbers with no errors **and** a list of 3 square numbers with no errors. for two correct prime numbers

8	(a)	2.28	B1	cao	
	(b)	2.5604	B2	cao	If the correct answer is shown and then rounded, award full marks.
			(B1	for 6.6564 seen, or for 2.56 or for digits 25604)	

Paper: 1MA1/3F

2	odd square	B1	stating an odd square number eg 1, 9, 25, 49, 81, etc.	

4	4	B1	cao	

3	1.2	B1	oe	Accept $\frac{12}{10}$ or $\frac{6}{5}$

7	6	M1 A1	for interpreting the table to find the number of green counters (26 + 7 (= 33)) or the number of red counters (16 + 11 (= 27)) or the difference in circles (26 – 16 (=10)) or squares (11 – 7 (=4)) cao	33 – 27 = 6 10 – 4 = 6

4	4.2	B1	for 4.2 **or** $\frac{21}{5}$ oe	

5	7776	B1	cao	

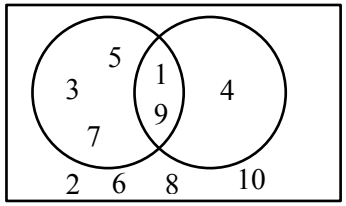
5	27	B1	cao	

6	(a)	25	B1	cao	
	(b)	24	B1	cao	

5	1.3	B1	cao	

21	2^6	M1 A1	for the start of a method of simplification, eg 2^{-5+8} (= 2^3) or $2^{-5\times2}$ (= 2^{-10}) or $2^{8\times2}$ (= 2^{16}) cao SC B1 for answer of 64 or 8^2 or 4^3 if M0 scored.	

Paper: 1MA1/1F

24	(a)	Venn diagram	B3	for a fully correct Venn diagram	Ignore all entries except the region you are marking for each method mark
			(B2	for two or three of the four regions correct)	
			(B1	for just one of the four regions correct)	
	(b)	$\frac{7}{10}$	M1	(ft diagram) for $\frac{a}{10}$ where $0 < a < 10$ and a is an integer or $\frac{7}{b}$ where $b > 7$ and b is an integer **or** $1 - \frac{3}{10}$ **or** 7 : 10	Repeated digits in the diagram should be counted as 2 elements
			A1	(ft diagram) for $\frac{7}{10}$ oe	Accept any equivalent fraction, or 0.7 or 70%

Paper: 1MA1/1F

4	One of: 16, 25, 36, 49	B1	for one correct square number	Allow more than 1 correct square number but no incorrect.

5	8	B1		Accept ± 8 or -8

Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	No and reason	C1	No **and** reason **Acceptable examples** No, because $10^2 = 100$ **or** 10^2 is 10×10 $4^2 = 16$ and $5^2 = 25$ so 20 is not a square number Junaid is wrong because $\sqrt{20} \neq 10$ **or** $\sqrt{20} = 4.47...$ Incorrect because 20 is 2×10 not 10×10 No she multiplied by 2 instead of squaring **or** 10^2 is not 10×2 Wrong as she added instead of multiplying **Not acceptable examples** Yes…. No because 20 is 10×2 Incorrect because 20 is not a square number No because 10^2 is not 20 No because she added No because a square number is when a number is multiplied by itself	
(b)	example	C1	for a correctly evaluated example, eg $12 \div 4 = 3$ or $10 \div 2 = 5$ or $2 \div 4 = 0.5$	Accept rounded and truncated values, eg $2 \div 6 = 0.3(..)$, $100 \div 6 = 16.6(..)$

5	1.5	B1	oe eg $\frac{3}{2}$, $1\frac{1}{2}$	

2	2.4	B1	oe eg $\frac{12}{5}$	

10	No with reason	C1	No with reason **Acceptable reasons:** No, the cube root of 27 is 3 (not 9) No, the answer is 3 No, 9×9×9 is not 27 No, 9×9×9 is 729 No, 3×3×3 is 27 No, 27 ÷ 3 = 9 **and** 9 ÷ 3 = 3 No, he needs to divide by 3 again No, because you don't divide by 3 for cube root No, 9×9 is 81 which is already more than 27 **Not acceptable reasons:** No, the cube root is not 9 3 divided by 27 is 9 No because a cube number is a number times by itself 3 times No, because you don't divide by 3	'No' may be implied by an equivalent statement eg 'Jason is wrong' or 'He is not correct'

Paper: 1MA1/3F

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Mark Scheme (Results)

March 2013

GCSE Mathematics (Linear) 1MA0
Foundation (Calculator) Paper 2F

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NOTES ON MARKING PRINCIPLES

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

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong 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.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
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, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, 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.

9 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: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

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10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated 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.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 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 includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		7025	1	B1 cao
	(b)		Nine thousand four hundred (and) fifty	1	B1 for Nine thousand four hundred (and) fifty Accept 'nine thousand' written as '9 thousand', 'four hundred' written as '4 hundred' and 'fifty' written as '5 tens' or any mixture of these. Do not penalise poor spelling.
	(c)		29	1	B1 for 29 or twenty nine or 29.0
	(d)		7000	1	B1 for 7000 or 7 thousand or seven thousand
2	(a)		8, 10	1	B1 cao
	(b)		24	1	B1 cao
	(c)		reason	1	B1 for a valid reason that demonstrates the understanding that the number of triangles is twice the pattern number
3	(a)		240	1	B1 for 240
	(b)		arrow at 125°C	1	B1 for arrow (or line) pointing within a range of 122.5 to 127.5 (ie nearer to 125 than either 120 or 130) Use professional judgement.
	(c)		6.05 (pm)	1	B1 for 6.05 (pm) oe

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		Thursday	1	B1 cao
	(b)		7	1	B1 cao
	*(c)		Nick	3	M1 for the intention to add Dave's 4 times or Nick's 4 times A1 for 58 and 64 C1 (dep on M1 and two totals) for clearly stating Nick as their answer or ft from their two totals OR M1 for the intention to find the difference between the times on each of the 4 days A1 for 6 or −6 C1 (dep on M1 and a net difference) for clearly stating Nick as their answer or ft from their difference [SC: B1 for "Nick spent 6 minutes more than Dave on his phone" if M0 scored.]
5			9 squares shaded	1	B1 for any 9 squares shaded oe
6			66	2	M1 for a correct method to find the number of people on the bus if the 15 get off first. (= 57) A1 cao OR M1 for a correct method to find the number of people on the bus if the 9 get on first. (= 81) A1 cao OR M1 for a correct method to find the net change in the number of people on the bus (= 6 or −6) A1 cao

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
7		20 − 6.65 13.35 ÷ 3	4.45	3	M1 for a correct method to find the amount shared by B, R and T M1 (dep) for a correct method of dividing this amount by 3 A1 cao [SC: B1 for an answer of 17.78 (20 – 6.65 ÷ 3), if M0 scored, with or without working]
8	(a)		3, 6, 9, 3	3	B3 for a table showing all 4 correct frequencies in the correct place. (condone the absence of or any incorrect tallies) [(B2 for 2 or 3 correct tallies or 2 or 3 correct frequencies even in the wrong columns) (B1 for 1 correct tally or 1 correct frequency even in the wrong column)] [SC: B2 for 3/21 and 6/21 and 9/21 and 3/21 shown in the frequency column]
	(b)		3	1	B1 for 3 or ft table in (a)
9			Circle radius 5 cm drawn	1	B1 for a circle of radius 5 cm drawn (condone an alternative centre)

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(i)		5,15 or 5,125 or 15,125 or 30,50 or 30,60 or 30,90 or 30,100 or 50,60 or 50,90 or 50,100 or 60,90 or 60,100 or 90,100	4	B1 for 2 numbers, from the list, whose sum is an even number.
	(ii)		60 or 100		B1 for 60 or 100 or both
	(iii)		5 or 15		B1 for 5 or 15 or both
	(iv)		125		B1 cao
11		9.39 × 10 24.30 × 3 + 9.39 93.90 − 82.29	£11.61	5	M1 for a correct method to find the most expensive way to buy the 10 cartridges (= 93.90) M1 for a correct method to find the least expensive way to buy the 10 cartridges (= 82.29) M1 (dep on M1 scored) for a correct method to find the difference between their least and their most expensive way, provided that both totals are for the cost of exactly 10 cartridges A1 for 11.61 B1 (indep) for correct units

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)(i)		B and D	2	B1 cao
	(ii)		G and E		B1 for G and E (allow B and D if not in (i))
	(b)	3 + 3 + 3 + 2 + 2 +1 + 1 + 1	16	1	B1 cao
13	(a)		6am	1	B1 for 6am (accept −4) Do not accept 6 alone.
	(b)		3	1	B1 for 3 (allow − 3)
	(c)	−1−5	−6	2	M1 for −1 − 5 or intention to subtract 5 from -1 (may be shown on a diagram) A1 cao

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
*14			Yes + supporting work	4	M1 for adding the weights of all the ingredients (= 96) M1 (dep) for '96' × 8 A1 cao for 768 C1 (dep on M2), ft for a correct conclusion (yes or no) from a comparison of 750 (pots) with their '768' pots; units must be quoted [SC: B1 for 768 seen without working if M0M0 scored] **OR** M1 for adding the weights of all the ingredients (= 96) M1 for 750 ÷ 8 A1 cao for 93.75 C1(dep on M2), ft for a correct conclusion (yes or no) from a comparison of their weight of ingredients in one tank full '93.75' kg with '96' kg; units must be quoted [SC: B1 for 93.75 seen without working if M0M0 scored]] **OR** M1 for adding the weights of all the ingredients (= 96) M1 (dep) for 750 ÷ '96' A1 cao for 7.8125 C1(dep on M2), ft for a correct conclusion (yes or no) from a comparison of their number of pots, '7.8125' pots with 8 (pots); units must be quoted [SC: B1 for 7.8125 seen without working if M0M0 scored]]
15			85 29 54 **168** **93** 31 47 171 13 5 **9** **27** 191 **65** **110** 366	3	B3 for fully correct table (B2 for 3 or 4 or 5 correct entries, B1 for 1 or 2 correct entries)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)(i)		5	3	B1 cao
	(ii)		8		B1 cao
	(iii)		5		B1 cao
	(b)		correct sketch	2	B2 for fully correct sketch [B1 for a square (or rectangle) drawn with 2 or 3 connecting triangles on the outside of the square]
17	(a)(i)		12.978(61279…)	2	B1 for 12.978(…..)
	(ii)		13		B1 for 13 or ft from a(i) [Note: An answer of 13.0 gets B0]
	(b)		100000	1	B1 cao
18	(a)	$2 \times 8 = 16$ $16 + 7$	23	2	M1 for correct substitution of 8 into the expression $2f$ A1 cao
	(b)	$3 \times -2 + 5 \times 4$	14	2	M1 for correct substitution into the formula A1 cao

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1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		$\frac{40}{360}$	1	B1 for $\frac{40}{360}$ oe (ignore any incorrect simplification) Accept 0.11…. if no fraction shown
	(b)		4	3	M1 for a correct method to find the angle of the 'weeding' sector If measured, accept an angle between 138 and 142 inc. M1 (dep) for a correct method to find the number of degrees per hour (= 20) or the number of hours ($\frac{1}{20}$ (3 mins) per degree A1 cao for 4
20	(a)		2.5	2	M1 for 10 (cm) or "10" ÷ 4 A1 for 2.45 – 2.55
	(b)		A marked on diagram	2	M1 for a point marked (or line drawn) on a bearing of 038° from either point B or point W, OR for a point marked (or arc drawn) 6 cm from B A1 for the position of Avebury marked (accept without label if not ambiguous)

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
21	(a)		30	1	B1 for 30 minutes oe
	(b)		20	1	B1 cao
	(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis
22	(a)		$x = 3$ drawn	1	B1 for $x = 3$ drawn [Note: each line drawn must be a single line segment satisfying $x = 3$]
	(b)		$y = x$ drawn	1	B1 for $y = x$ drawn [Note: each line drawn must be a single line segment satisfying $y = x$]
	(c)	Gradient = $\frac{3-0}{0--2}$	1.5	2	M1 for a method to find the gradient of the given line A1 for 1.5 oe
23	(a)		n^8	1	B1 for n^8 (accept n^{5+3})
	(b)		n^5	1	B1 for n^5 (accept n^{7-2})

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)	15 ÷ 6	2.5	2	M1 for 15 ÷ 6 oe A1 for 2.5 or $2\frac{1}{2}$
	*(b)		Yes + evidence	2	M1 for a correct method to change 15 miles into kilometres C1(dep on M1) for 24 km **and** statement with correct conclusion [SC: B1 for "Yes" oe and 24 km shown if M0 scored] **OR** M1 for a correct method to change 20 kilometres into miles C1(dep on M1) for 12.5 miles **and** statement with correct conclusion [SC: B1 for "Yes" oe and 12.5 miles shown if M0 scored]

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
25			414.96	5	M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the cost of oil required before the discount M1 for a correct method of finding 5% of their calculated cost M1 (dep on previous M1) for a correct method to find the discounted cost A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method of finding 5% of the cost of 1 litre of oil M1 (dep on previous M1) for a correct method to find the discounted cost of 1 litre of oil M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the discounted cost of the oil required A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method of finding 5% of their calculated amount of oil M1 (dep on previous M1) for a correct method to find the reduced amount of oil M1 for a correct method to find the cost of the reduced amount of oil A1 for correct answer of 414.96 or 41496p

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1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)	$1 - 0.2 - 0.1$ $0.7 \div 2$	0.35	3	M1 for correctly using total probability 1 or 100% if percentages used M1 (dep) for complete correct method to complete the solution A1 for 0.35 or 35% or $\frac{35}{100}$ oe
	(b)	0.1×200	20	2	M1 for 0.1×200 A1 cao [SC: B1 for an answer of $\frac{20}{200}$ if M0 scored]
27	(a)		$3x + 12$	1	B1 for $3x + 12$ or $12 + 3x$
	(b)		$x^3 + 2x$	2	M1 for the intention to multiply both terms in the bracket by x A1 for $x^3 + 2x$ OR B2 for $x^3 + 2x$ [B1 for x^3 or $2x$ seen]
	(c)		$x(x - 6)$	1	B1 for $x(x - 6)$ or $(x - 6)x$

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
28			1180	3	M1 for a correct method to find the area of the cross section M1 (dep) for a complete correct method for the volume of the prism A1 cao OR M1 for a correct method to find the volume of one cuboid M1 (dep) for a complete correct method for the volume of the prism A1 cao

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NOTES ON MARKING PRINCIPLES

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

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong 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.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
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, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, 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.

9 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: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated 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).

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 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 includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB1F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		Evens	1	B1 cao
	(b)		Impossible	1	B1 cao
	(c)		X marked	1	B1 for X marked at $\frac{1}{4}$
2	(a)		11	1	B1 cao
	(b)		49	2	M1 for 10 + 16 + "11" + 12 or ft "11" from (a) or for 11 × 4 + 2 + 3 A1 cao
3			1 lemon 3 orange	2	B2 for 1 lemon and 3 orange labelled (B1 for labels for P(Orange) > P(Lemon))
4			21 58	2	M1 for a method using a relevant time calculation, eg 22 15 – 8 mins or 22 05 + 8 mins A1 for 21 58 oe
5	*(a)		Diagram or chart	4	B1 for key or suitable labels to identify Paris and Nice B1 for diagram(s) or chart(s) set up for comparison showing data for at least three days, eg dual bar chart, composite bar chart B1 for correct heights for Paris or Nice C1 for fully correct diagram or chart with axes correctly scaled and labelled
	(b)		Statement	1	C1 for statement of comparison

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PAPER: 5MB1F/01					
Question		Working	Answer	Mark	Notes
6	(a)		5, 1, 4, 8	2	M1 for at least 2 correct frequencies or 2 correct tallies A1 for all frequencies correct (ignore tally column)
	(b)		dog	1	B1 ft from frequency column or from tally if different to frequency. Accept 8
7			4.77 m 477 cm	4	M1 for intention to subtract the 3 lengths from 10 m M1 for 1000 – (41 + 112 + 370) oe or 10 – (0.41 + 1.12 + 3.7) oe A1 for 4.77 or 477 oe B1 for correct units with final answer
8		VM, VC, VS MC, MS, CS	6 correct combinations	2	M1 for at least 4 correct combinations A1 all 6 correct with no incorrect combinations and no repeats
9.	(a)		3	1	B1 cao
	(b)		Home Style	1	B1 cao
	(c)		Sure Stitch, Compact, Classic	2	M1 for 3700 ÷ 16 or for any price × 16 A1 Sure Stitch, Compact, Classic
10	(a)		8000	1	B1 (accept 8 thousand or 8)
	(b)		4000	1	B1 cao

PAPER: 5MB1F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		46	1	B1 cao
	(b)		35.5	2	M1 for identifying 35 and 36 or for 5 and 6 or for 5.5 A1 for 35.5
	(c)		5	1	B1 cao
12	(a)		$\frac{1}{4}$	1	B1 for $\frac{1}{4}$ oe, eg $\frac{90}{360}$
	(b)		19	3	M1 for method to find the angle for 15 years (= 95), if measured accept 93 – 97 M1 for correct method to find degrees per person 115 ÷ 23 (= 5) or people per degree 23 ÷ 115 ($=\frac{1}{5}$) A1 cao
13			68 (supported)	4	M1 for 20 × 8.25 + 6 × 3 (= 183) M1 for 20 × 5.50 + 2 × 2.50 (= 115) M1 (dep on at least M1) for finding the difference between their two totals A1 cao OR M1 for 8.25 – 5.50 (= 2.75) M1 for 6 × 3 – 2 × 2.50 (= 13) M1 (dep on at least M1) for finding the total saving for their differences A1 cao

PMT

PAPER: 5MB1F/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		Point plotted	1	B1 for point plotted at (8.5, 35)
	(b)		Positive	1	B1 for positive
	(c)		40 - 50	2	M1 for suitable line of best fit drawn or evidence of vertical line at 10 or a point indicated at $(10, y)$ where $40 \leq y \leq 50$ A1 for 40 – 50
15		<table><tr><td></td><td>F</td><td>B</td><td>D</td><td></td></tr><tr><td>T</td><td>8</td><td>**11**</td><td>25</td><td>44</td></tr><tr><td>C</td><td>**12**</td><td>17</td><td>**7**</td><td>**36**</td></tr><tr><td></td><td>**20**</td><td>**28**</td><td>32</td><td>80</td></tr></table>	Completed table	3	B3 for fully correct table (B2 for 4 or 5 correct entries) (B1 for 2 or 3 correct entries)
16			$\frac{x+10+x+x-4}{3}$	3	M1 for $x + 10$ or $x - 4$ M1 for $x + 10 + x + x - 4$ A1 for $\frac{x+10+x+x-4}{3}$ oe
17			1746	3	M1 for $1 - 0.03$ (= 0.97) or for 0.03×1800 (= 54) M1 for "0.97" × 1800 or for 1800 − "54" A1 cao
*18			School £8930 Hospital £13 395	5	M1 for 23.5×1000 (= 23 500) or for $\frac{1}{20} \times 1000$ (= 50) oe M1 for "23 500" × $\frac{19}{20}$ (= 22 325) oe or for $(1000 - 50) \times 23.50$ (= 22 325) oe M1 for "22 325" ÷ 5 (= 4465) M1 for "4465" × 2 or "4465" × 3 C1 for £8930 for school and £13 395 for hospital

PMT

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: ±5°
Measurements of length: ±5 mm

PAPER: 5MB1F_01			
Question		**Modification**	**Notes**
Q1		Diagram enlarged. Wording added 'It shows a probability scale'. Diagram enlarged. Wording removed 'with a cross (x)'.	Standard mark
Q2		Wording added 'It shows a pictogram'. Diagram enlarged.	Standard mark

PMT

PAPER: 5MB1F_01			
Question		**Modification**	**Notes**
Q3		Diagram removed. Wording changed 'There are 6 sweets in a bag. The flavour of each sweet is either orange or lemon. The flavour of two of the sweets is shown below.' Wording added 'Orange' and 'Lemon'. Jane is going to take at random one on the sweets from the bag. She is twice as likely to take an orange sweet as a lemon sweet. Write a suitable flavour for the remaining sweets. Wording added 'The first two are repeated for you' and 'There are four spaces to fill'. Wording added 'Orange' and Lemon' put below the question with four short answer lines underneath.	Standard mark
Q 4		2155 column removed from table.	Standard mark
Q5		Table turned to vertical format. Wording added 'It shows a grid'. Grid enlarged: 12 squares across and 21 squares up.	Standard mark
Q6	(a)	Wording added 'It shows a frequency table'. Wording added 'using the information in the diagram book' after 'frequency table'. Wording added 'there are eight spaces to fill' below 'Complete the…'	Standard mark
Q8		Box removed.	Standard mark

PAPER: 5MB1F_01			
Question		**Modification**	**Notes**
Q9		'Number of different stitches' column removed from table.	Standard mark
Q10		Grid enlarged. Diamonds changed to solid circles.	Standard mark
Q11		Base line added to stem and leaf diagram.	Standard mark
Q12		Diagram enlarged.	Standard mark
Q13		Information stacked in vertical format and put into tables.	Standard mark
Q14		Wording added 'It shows a scatter graph'. Diagram enlarged. Crosses changed to solid circles.	Standard mark
Q15		Wording added 'There are six spaces to fill'. **Braille only**: roman numerals (i) to (vi) put in spaces on the table. 8 (i) 25 44 (v) 17 (ii) (iii) (vi) (iv) 32 80	Standard mark

PMT

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Question 7

A frequent incorrect answer was 10, where the students had only dealt with the circles, perhaps from not reading the question carefully. Many gained full marks, but it was not uncommon for one mark to be given for showing 33 or 27 from the first stage of subtracting two numbers logically from the table. There was much evidence of unnecessary errors, such as $33 - 27 = 7$ or $26 + 7 = 34$.

Question 4

This question was well answered with most students able to find the square root of 17.64

Question 5

The majority of students were able to find the value of 6^5.

Question 5

This question was not as well answered as the previous four questions. Students gave 9 as a popular incorrect answer and some gave more than one answer and hence even if 27 was one of the answers they could not have the mark as two answers meant that a choice was seen.

Question 6

In this question part (b) was more often correct than part (a).

In part (b) almost all answers were correct with just a few students giving 16 as an answer. Whilst this is a multiple of 8 it was not in the given list. However, for part (a) a wide range of incorrect answers were given using numbers from the list and it was disappointing to see that almost a third of the cohort could not recognise 25 as a square number.

Question 5

Most students responded with the correct answer. Occasionally $\frac{13}{10}$ was seen; students need to be reminded to turn off the fraction mode on their calculators, unless working with fractions.

Question 24

The completion of a fully correct Venn diagram in part (a) was rare. Many did not recognise "1" as a square number and many ignored the remaining numbers 2, 6, 8 and 10 from the universal set. Often students duplicated values in more than one section.
In part (b), it was very clear that only a very few students understood the complement notation preferring instead to just give the probability that the number chosen was in set *B*. Many students gave their probability as a decimal without previously writing it as a fraction out of 10. 0.7 the correct answer of course gained full marks but an answer of say 0.3 alone begs the question, where has it come from, $\frac{3}{10}$? or $\frac{6}{20}$? etc.

Question 4

Writing a square number between two given values appeared to be challenging for some. Common incorrect responses included 4^2, 5^2 and similar but gained no credit.

Question 5

Candidates were generally able to find the square root of 64 as was required in this question. Common incorrect answers were 32 (from 64 ÷ 2) or 4 (the cube root).

Question 8

Both parts of this question required learners to use reasoning skills, with part (a) requiring a written explanation and decision and part (b) requiring learners to show a correctly evaluated counter-example. A lot of learners gave very good answers to part (a), demonstrating an ability to clearly explain why the statement was wrong. The most common ways that they did this were either to point out that 10^2 is 100 or to explain that 10 had been multiplied by 2 rather than by itself. The mark scheme shows other acceptable ways of answering the question, but these were less commonly seen.

In part (b), many learners gave a wide range of acceptable examples of a division that produced an odd number or any non-integer. The result of the division did have to be evaluated correctly so unfortunately responses without showing the result or containing an arithmetic error did not get the mark. A significant minority of learners used odd numbers instead of even numbers, preventing the award of the mark.

Learners had to give clear, correct answers to both parts of this question, and if there were incorrect elements to their statement, or contradictions, they did not gain the mark for that part of the question.

Question 5

This question was answered very well with almost all learners gaining 1 mark for a correct answer. Most gave their answer as 1.5 but some left in fraction form, e.g. $\frac{3}{2}$, which was also acceptable.

Question 2

2.4 was the most common correct answer but some responses gave an answer of $\frac{12}{5}$ which was also accepted for 1 mark. Common incorrect answers were 2.88 and 24.

Question 10

There were several ways to gain 1 mark on this question, as outlined in the mark scheme. The most common accepted responses included those listed at the top of the Acceptable Reasons section, such as: “No, the cube root of 27 is 3 (not 9)”, “No, $9 \times 9 \times 9$ is 729”, and “No, $3 \times 3 \times 3$ is 27”. Responses that did not use the exact wording from the mark scheme were credited if the reasoning was equivalent or otherwise correct.

To gain C1, a decision was required. This could be stated explicitly as “No” or implied through phrases such as “Jason is wrong” or “He is not correct”. Some responses did not include a decision and therefore did not gain the mark.

Various incorrect responses were seen, including confusion between square roots and cube roots. The definition of a C (communication) mark should be noted: it is awarded for a fully correct statement with no contradiction or ambiguity. Some responses were unable to be awarded the C mark due to including an acceptable reason alongside an incorrect or conflicting statement.



Examiners' Report
Principal Examiner Feedback

November 2022

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Non-Calculator) Paper 1F

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GCSE Mathematics 1MA1
Principal Examiner Feedback – Foundation Paper 1

Introduction

The paper offered an opportunity for students of all abilities to demonstrate their understanding of a variety of mathematical concepts.
The early questions acted as a good confidence building way into the paper, with many students gaining a good proportion of the early marks.

Lack of careful reading of some of the questions was a cause for concern; particular ones are quoted in the summary below. Also worrying is the number of arithmetical errors that featured in many students' work. Simple application of the four rules was found wanting on many occasions. For example, 10000/8 being seen as 8/10000. Students should be encouraged to check working before being totally satisfied with their answers.

Some students were clearly avoiding tackling questions that involved algebraic techniques. These attempted trial-and-error methods from quite early on in the paper, even for the simpler questions where an algebraic approach was straightforward.

The quality of handwriting from some candidates made their responses difficult to read. Students are advised to avoid rushing through their work.

Areas of the curriculum that need more attention are, Geometric reasoning (Q9b), Describing transformations (Q11), Equation of a straight line (Q11bii), Fractions (Q20), Indices (Q21) Comparison of ratios (Q24) and Factorisation of polynomials (Q26b).

Again, it was pleasing to see many students clearly showing their working and utilising their communication skills when required. This continues to be an area of improvement.

Report on individual questions

Question 1. This first question was generally well answered and served as a good introduction to the paper. Correct answers of $\frac{3}{10}$ or $\frac{30}{100}$ were the most common.

Question 2. This question was usually answered correctly although an answer of 6 (3×2) was a common mistake.

Question 3. Another well answered question with few mistakes. It was pleasing to see most able to follow the correct order of operations.

Question 4. Although 10 and/or 12 were seen more often than not, a number of students failed to gain the mark by offering extra, incorrect values. 6 being the most common seen.

Question 5. Many students failed to score in this question by not simplifying the given expression fully. $3w \times 5t$ and $15 \times wt$ were popular partial simplifications gaining no marks.

Question 6. It was very pleasing to see so many students gaining good marks on this multi-step question. The vast majority gaining 2+ marks. In general, marks were lost through not reading the question carefully. Often just one child was considered, or two adults were included. Another common mistake was to omit the cost of petrol while in other cases it was seen as a cost for each person. Poor arithmetic often denied many full marks, mainly with the addition of two child tickets (the only non-integer), or with an inability to line up integers and non-integers successfully in a column addition method. Some gave the total cost of the trip instead of the change.

The standard of presentation of answers was lacking, in some cases, with little structure or order to what they were doing

Question 7. Part (a) was answered well, the vast majority clearly understanding the concept of mode. In part (b) also, understanding of probability scales and probability in general was good. In (ii), some simply added a cross to the probability scale, failing to quote the actual numerical probability; this gained no marks. Some students are still using terms such as unlikely in terms of describing probability.

Question 8. Part (a) was answered well, with very few failing to score the mark. Candidates performed less well in part (b) with many not collecting the like terms of $3n$ and n together as a first step. Many tried to subtract the n from both sides of the equation either resulting in $2n = 24$ (giving $n = 12$) or $3n = 24$ (giving $n = 8$). In this question, students usually scored no marks or full marks. Some used an embedded solution, with mixed success. Many candidates who achieved full marks did not attempt the algebraic approach and instead simply stated that $3 \times 6 + 6 = 24$, with a correct answer on the answer line.

Question 9. Part (a) was well answered with the vast majority subtracting 70 from 360 to get a correct answer of 290°. However, a great many were unable to give a correct reason for this answer in part (b). The most common incorrect explanation related to a circle "having 360°". Students need to be made aware that such an explanation is not acceptable. Many simply explained how they did it, rather than why e.g. "I subtracted 70 from 360". Students should be reminded that a calculation is not a reason.
In this case "angles at a point sum to 360°" or words to that effect is the reason required.
A common incorrect approach was to work with 180° rather than 360°.

Question 10. Most students correctly worked out that 5 was the greatest number of jars of coffee that could be bought for £23 in part (a). In part (b), a large number of candidates lost the mark as they hadn't read the question carefully enough, missing the word "exactly" in reference to the number of jars to be bought at half price. Many realised that Michael could now buy an extra 11th jar but then lost the mark because they answered 'yes' to the question "Is Michael correct?".

Question 11. Whilst many students correctly wrote down the scale factor of 2 in (a)(i), only a very small minority were able to pinpoint the centre of the enlargement in (ii). Many tried to position their centre either in between the two shaded triangles, in the centre of one of the triangles or on one (or two) of the vertices. In some cases, students who were able to draw lines to intersect at the point of enlargement identified it correctly but missed the mark because they also placed 'X' somewhere else on the graph.
In part (b)(i), accurate drawing of the mirror line was good. Whilst lines drawn with a straight edge are preferred, freehand, dotted or dashed lines were acceptable. In part (b)(ii), unfortunately, very few students were able to give the equation of their line. Common incorrect lines drawn were $x = 4$ or $y = 4$, which in some cases allowed a follow through mark if they stated this as their equation for (ii).

Question 12. Again with this multi-step problem in part (a), it was pleasing to see many students gaining good marks, often 2 or more. In this question, students had to find a sixth and 20% of 120 minutes. When performing calculations of this type it is important for students to show their working, eg $120 \div 6$ or $\frac{20}{100} \times 120$ so that credit can be awarded for correct method if errors are made with accuracy. In solving this problem, some students subtracted 50 from 120 to give 70 minutes and used this as the time spent playing badminton. Arithmetic errors were seen far too often from students when subtracting from 120.
In part (b), many ignored the good work they had done in part (a) and explained that Elana did not get to the café on time because she spent 2 hours at the sports centre making it 3.30pm when she left. This part followed through the working and answer in part (a) and the mark awarded if the reason and working were correct for the time given in (a).

Question 13. Part (a) was answered correctly by the majority of students, reading 60 from the bar chart. Part (b) was answered less well when a certain amount of extrapolation was required from the chart. 210 was a common incorrect answer.
In part (c), it was evident that many students weren't able to accurately read data from a composite bar chart, many reading the number of men as 90, women 200 and children 280 in 2020. The method mark here was awarded for sight of 80 (children) or 200 (men + women) used in a ratio. Many gained this mark but failed to score full marks as a result of incorrect values read from the chart. As a result of not reading the questions correctly, some students wrote an answer of 80 (child) : 90 (men) : 110 (women).

Question 14. Greater success was achieved in part (a) of this question by finding the sum of the distance travelled in one hour (54 miles) and the distance travelled in half an hour (27 miles). It was pleasing however, to see many students correctly quoting the equation distance = speed × time to solve this problem, although accuracy was often lost through incorrect use of the units of time. 54 × 90(mins) or 54 × 1.30 were common errors made.
In part (b), very few students were able to correctly convert from centimetres to kilometres. Many gained one mark for using the scale on the map correctly, 25 000 × 6. Credit was then given for a reasonable attempt at the conversion of 150 000 cm to km, usually just dividing by 1000. Most didn't seem to be clear that they had found a measurement in cm by multiplying by 25 000, those who did include units were more likely to be able to convert correctly as they often spotted that they could convert cm to m then m to km.

Question 15. The diagram proved very useful in getting one correct coordinate, for which one mark was awarded, usually $y = 1$, but rarely was a fully correct answer seen. Whilst many students did use the diagram, drawing the correct line segment, it was also rare to see the correct positioning of the required midpoint. This was often seen placed on the y-axis. There were very few instances of candidates using written methods to find the midpoint.

Question 16. Those students who attempted an algebraic solution often picked up good marks, 2 or more, for a correct expression for the perimeter and then equating it to the given value of 52. Simplifying their algebraic expression often proved more difficult and it was not uncommon to see quadratic terms creeping in. Some students assumed all the lengths to be the same and calculated 52/4 gaining no marks.
Some students correctly found the value of x and then failed to answer the question by finding $2x$, the length of DC. Poor arithmetic let many students down in being unable to divide 57 by 6 and hence not being able to achieve the accuracy mark.
Many students did however adopt a trial and improvement approach which usually cost them a great deal of time for little reward.

Question 17. Again, understanding of probability was good and many students gained the full 2 marks in part (a). One mark was awarded for sight of 100 – 30 (= 70) or a correct value for the probability of taking a blue counter. $\frac{3}{4}$ was a common incorrect answer by some of the less able students, assuming there was an equal number of coloured counters. Students should be reminded that expressing a probability as a ratio is not an acceptable form for this answer.
In part (b), the correct answer of 45 was the modal answer, with incorrect methods following no particular pattern. A common incorrect attempt was also to try to share 30 in the ratio 2 : 3.
Part (c) followed through student's answers in (b). Explanations were usually acceptable, such that 25 counters could not be shared equally between red and yellow. It should be noted that just saying '25 can't be divided by 2' gained no credit. Also, students should be aware that any calculations given as evidence in such questions need to be accurate.

Question 18. Many students were unable to make any progress in this question by not reading the question fully and jumping in to either find a half and/or a twelfth of 240 or to divide 240 by 5, then 3 then 2. Those that correctly divided 240 in the ratio 5 : 3 : 2 usually went on to gain good marks. Many scored 3 marks for finding the numbers of cans remaining, 120, 36 and 44 but were then unable to find the required percentage of cola cans remaining. Finding one number as a percentage of another is an area that needs addressing. Those that did find a percentage were often successful by simplifying their fraction of 120/200 to 60/100.

Question 19. The factorising of 500 was usually carried out with the aid of a factor tree diagram, many of which were seen to be fully correct. Failure to gain full marks was usually down to not giving their product of prime factors as powers as requested, often just leaving the factors in a list. Many arithmetical errors in the construction of a factor tree and some misunderstandings in the concept were seen where the sum instead of a product was given. Centres should emphasise here that complete tree diagrams should have each final branch ending in a prime

Question 20. In part (a), those students who dealt with the fractions and whole numbers separately often gained greater success in achieving full marks, although an answer of $3\frac{4}{9}$ was not uncommon.
Although no credit was given for simply converting the mixed numbers to improper fractions, many did so accurately and then were able to convert both to a common denominator with at least one correct numerator to gain one mark. However, the answer following this approach was often left as an improper fraction, $\frac{77}{20}$. Unfortunately, many just added the numerators and the denominators to give an incorrect answer of $\frac{17}{9}$.
Part (b) proved to be a much greater challenge for many students, many tried to concoct means of dividing $2\frac{2}{3}$ by 6 to get $\frac{4}{9}$, a few students however correctly changed $\frac{8}{3}$ to $\frac{24}{9}$ and divided this by 6 to get $\frac{4}{9}$. The most successful approach was $\frac{8}{3} \times \frac{1}{6}$ showing an ability to divide a fraction by a whole number. Some had success by transposing the problem to show that $\frac{4}{9}$ multiplied by 6 is equal to $2\frac{2}{3}$, although $\frac{24}{54}$ was often seen.
Many students seemed to not understand the requirements for this question.

Question 21. It was clear that the rules of indices are known by many students but the application of them was very poor. $(2^{-5} \times 2^{8})$ was often written as 4^3. This had to be carefully marked as 4^3 as a final answer was an acceptable Special Case answer for one mark.
Sometimes 2^{-10} or 2^{16} were seen but rarely both.
Less able students often unsuccessfully tried to evaluate the terms before finding a product or squaring and had little understanding of negative indices. Occasionally 2^3 was seen for the method mark but this was followed by 2^5. Working with negative numbers continues to be a problem with -5+8 being evaluated as 13 or -13. Many worked exclusively with the powers and did not include the base number at all; -5 + 8 = 3 was often seen.

Question 22. It was common to see the digits 128 quoted in the working or in an answer, but rarely was the fully correct answer of 0.00128 seen. Very few seemed to know the rule of finding the product of the numbers and then counting the decimal places in order to position the decimal point. Many used long multiplication techniques, usually to no avail. It was rare to see an answer given in standard form. Method marks were sometimes gained for arithmetic errors in working but with a correctly positioned decimal place.

Question 23. This question was not answered well at all. Sampling techniques were not well understood at this level. Many either multiplied 40 000 by 80 or divided by 15. Attempts to divide 40 000 by 80 often introduced arithmetic errors, some just left 500 as their answer and those that knew to multiply by 15 struggled to do so correctly. Some students tried to work with percentages which rarely gained any credit eg 15%.
Students need to be encouraged to consider the suitability of their answers as some offered answers which were greater than 40 000, the total number of cars produced.

Question 24. Students at this level find the comparing of ratios particularly challenging. The most common error in part (a)(i) was to add the values of b in the ratios to give a triple ratio of 1 : 9 : 5 or used some of the numbers in the given ratios and gave an answer of 1 : 3 : 5. Some using a correct common multiple often spoiled their final answer by more arithmetical mistakes. Although (i) was poorly answered many picked up marks for correctly following through with their values for a, b and c in part (ii).
In part (b), few students were able to make significant progress. Those who assigned values to m, n and p were often successful, but this was rare. The substitution of $n = 2m$ into $p = 5n$ was rare also but usually successful when seen. Occasionally answers lost the accuracy mark for an incorrect order of 10 : 1 or for including letters in their final answer, eg. 1n : 10n.

Question 25. This was very poorly answered. The formula and the force both being given meant there was only the need to work out the area by multiplying 4 by 2. Some students still think that when working with area, they need to square the values first before using them to divide into 10 000. Those who correctly worked out the area usually tried to divide 10 000 by 8, for one mark, but often then failed, again through poor arithmetic. Some stated the area as 6 (4 + 2) and therefore gained no credit.

Question 26. There were many trial and improvement attempts to answer part (a) of this question, the majority of which were unsuccessful, however a few did throw up the critical value of 6. Those following an algebraic approach were able to score one mark initially for a correct process to start a solution. Subtracting 3 from both sides was usually successful but multiplying both sides by 2 was often carried out incorrectly by omitting to multiply the 3 by 2 resulting in $5x + 3 > 36$ or $5x + 3 = 36$. A correct first step was often followed by an incorrect second step or no second step at all.
Replacing the inequality by an equality is not penalised but students must remember to replace the inequality for the final answer. Far too often an answer of $x = 6$ was given.
In part (b), the ability to factorise a polynomial was sketchy. Factorisation of the first two terms [eg. $x(x + 10) + 9$] was often seen but this gained no credit.
$(x + 10)(x – 1)$ was also a common incorrect answer seen. Common incorrect answers included $(x + 1x)(x + 9)$ or $(x + 9x)(x + 1)$

Summary

On the evidence of performance on this paper, students need to:

- take greater care when reading the questions. Performance in questions 6, 10b, 12 and 18 in particular was severely affected by this.
- take care when carrying out arithmetic operations and check their working to avoid careless errors.
- write clearly so that correct values quoted are not altered in subsequent working.
- show clear methods of working particularly in basic calculations such as finding fractions or percentages of quantities.
- set their working out clearly, crossing out working that is being replaced.
- be able to convert using metric units of distance.
- be clear on the specific wording required when giving geometric reasoning

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