Chhetri Academy

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GCSE MATHS

Number

Edexcel 1MA1 | Subtopic collection Topic 08

Rounding, estimation and error intervals

Foundation tier

Answers and examiner comments

81	2010-2025	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.

Question		Working	Answer	Mark	Notes
1	(a)		3109	1	B1 cao
	(b)		6 hundredths	1	B1 for 6 hundredths or 0.06 or $\frac{6}{100}$
	(c)		4300	1	B1 cao

4	(a)		64	1	B1 cao
	(b)		1000	1	B1 for 1000 or one thousand
	(c)		4 < answer < 5	1	B1 for 4 < “answer for √20” < 5 [accept answer in words, eg. “greater than 4 and less than 5”]

5MB2F_01

2	(a)		507	1	B1 cao
	(b)		40	1	B1 for 40 or forty or 4 tens (do not accept an answer of "tens")
	(c)		6000	1	B1 for 6000 or six (6) thousand

3	(a)		43	1	B1 cao
	(b)	3 + 10	13	1	B1 cao
	(c)		7.1 – 7.9 inc.	1	B1 for answer in the range 7.1 – 7.9 inc

4	(a)		5600	1	B1 cao
	(b)		198 000	1	B1 cao

5MB2F_01

Question		Working	Answer	Mark	Notes
11	(a)		1.5 - 2	1	B1 estimate of man as 1.5 to 2.0 m
	(b)		50 - 70	3	M1 comparison of the heights ie sight of $\frac{1}{3}$ (accept 0.3 to 0.4 or 2.5 to 3.5) indication can be on diagram and can be in measurements if in correct ratio M1 for correct conversion from metres to centimetres or × by 100 A1 for 50 to 70 OR SC B2 ft 'a'÷3x100

19		$\pi \times 20$	62.8 cm	3	M1 $\pi \times 20$ or $\pi \times 19.5$ or $\pi \times 19.95$ A1 62.8 – 63 B1(indep) for units consistent with answer

5MB3F_01

21		$9^2 + 14^2 = 81 + 196 = 277$ $AB = \sqrt{277}$	16.6	3	M1 $9^2 + 14^2$ or 81 + 196 or 277 M1 $\sqrt{277}$ or $\sqrt{81+196}$ or A1 16.6 -16.643

Original question 1

The full source mark scheme begins on page 112. Use the original paper code, tier and question number shown above.

Original question 17

The full source mark scheme begins on page 112. Use the original paper code, tier and question number shown above.

17			2400	3	B1 for one of 20, 40, 3 or 300 M1 for “20”×“40”×“3” **or** “20”×“40”×"300") (values do not need to be rounded) A1 for answer in range 2280 − 2520 SC : Award B3 for an answer of 2400 if no working seen NB. An answer of 2416.05 implies B0 M1 A1

PAPER: 1MA0_1F

Question		Working	Answer	Mark	Notes
1	(a)		2085	1	B1 for 2085 or 2,085
	(b)		five thousand, one hundred and eight	1	B1 for five thousand, one hundred (and) eight
	(c)		9 tenths		B1 for 9 tenths oe, eg $\frac{9}{10}$ or $\frac{90}{100}$
	(d)		160	1	B1 cao

Question		Working	Answer	Mark	Notes
1	(a)		Three thousand four hundred and sixty	1	B1 oe
	(b)		300	1	B1 cao
	(c)		6.04,6.37,6.48,6.5(0),6.59	1	B1 cao

PAPER: 1MA0_2F

Question		Working	Answer	Mark	Notes
1	(a)		3502	1	B1 cao
	(b)		Two thousand and nineteen	1	B1cao
	(c)		7 tens	1	B1 for 7 tens or 70 accept in words
	(d)		6700	1	B1 cao

Paper: 5MB2F_01

Question		Working	Answer	Mark	Notes
11	(a)		40	1	B1 cao
	(b)		18000 - 22000	2	M1 simplification of one number eg 110, 100, 180, 190, 200 A1 answer in the range 18000 – 22000 excluding 20905

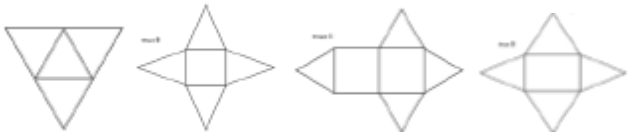
Question		Working	Answer	Mark	Notes
22			43	3	M1 for π×40 or 2× π ×20 M1 for 34×2×π×20 A1 for 42.7 – 43

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: 5MB3F_01			
Question		**Modification**	**Notes**
2	(d)	Remove triangle H	
4	(b)	Grid enlarged. 'mirror line' repeated on the left	
5		Road given as straight line	
8	(a) (b)	MLP x changed to y t changed to e	
10		Given line 7 cm	
12		No picture – just information given	
15		Model given and a diagram for MLP Question revised – 4 shapes drawn (cut out shapes for braille) Candidates asked which shape would be a net of the square based pyramid	

PAPER: 5MB3F_01			
Question		**Modification**	**Notes**
15	ii	 Shape A Shape B Shape C Shape	
18		Garden enlarged – fountain to bench is 9.5 cm North lines put in from fountain and bench and removed from the right side.	
		Line joins fountain to bench.	
	(c)	Change 7 metres to 11 metres. Change 12 metres to 14 metres.	
12		Ground labelled	

Original question 1

The full source mark scheme begins on page 132. Use the original paper code, tier and question number shown above.

3	(a)		0.7	1	B1
	(b)		45	1	B1 cao
	(c)		$\frac{3}{10}$	2	M1 for $\frac{30}{100}$ or equivalent fraction A1 cao
	(d)		2.74	1	B1 cao

PAPER: 1MA0_2F

4	(a)		Gulf	1	B1 cao
	(b)		Avris	1	B1 cao
	(c)		19 200	1	B1 cao

PAPER: 1MA0_1F

Question		Working	Answer	Mark	Notes
17			3.2 m - 5 m	3	M1 man's height seen as 1.6 m - 2 m oe or 5 ft 3 in - 6 ft 7 in oe M1 for 2 to 2.5 × 'man's height' A1 for 3.2 m - 5 m oe or 10 ft 6 in - 16 ft 6 in oe (units needed)

PAPER: 1MA0_2F

Question		Working	Answer	Mark	Notes
1	(a)		4726 in words	1	B1 accept 4 thousand 7 hundred and twenty six
	(b)		5 000 000	1	B1 cao
	(c)		3600	1	B1 cao
	(d)	7.04, 7.47, 7.58, 7.6 7.69	ordered	1	B1 cao

PAPER: 5MB2F/01

Question		Working	Answer	Mark	Notes
1	(a)		6037	1	B1 cao
	(b)		8380	1	B1 cao
	(c)		19,21,26,37,43	1	B1 cao

PAPER: 5MB2F/01

Question		Working	Answer	Mark	Notes
13	(a)		7000	1	B1 cao
	(b)		6	1	B1 cao

2	(i) (ii)		25.1 CSHSYC or CYSHSC	4	M1 for any route starting and ending at C going through H, S and Y. Condone missing last section back to C M1 for a valid route for which their correct total is shown A1 for 25.1 B1 ft for communicating their shortest route (must start and end at C and pass through S, H and Y).

Question	Working	Answer	Mark	Notes
1 (a)		6500	1	B1 cao
(b)		168	1	B1 cao
(c)		Arrow at 7.2	1	B1 cao

2		7.265	B1	cao

Question	Working	Answer	Mark	Notes
18 (a)		6 to 8	M1	evidence of recall of area formula with correct radius e.g. $\pi \times 10^2$
			M1	calculation to find number of boxes, (area) ÷ (coverage figure)
			M1	(indep) evidence of estimation, eg π in range 3 to 3.2, or coverage figure of 40, 42, 45, 48 or 50
			A1	(dep on M3) answer in the range 6 to 8
(b)		underestimate	C1	e.g. (ft from (a)) underestimate: true area greater so could need more boxes. Must relate to estimation, not rounding of answer.

2		60	B1	cao

Original question 23

The full source mark scheme begins on page 148. Use the original paper code, tier and question number shown above.

Question	Working	Answer	Mark	Notes
16 (a)		Explanation	C1	eg States over-estimated for both values
(b)		182.7(0)	P1	for a process to find 10% of a value stated in the question eg $\frac{10}{100}$ ×5.80 (=0.58) **or** $\frac{10}{100}$ × 35 (=3.5) oe **or** 35 × 5.80 (=203), allow 30 × 5.80 (=174) **or** 35 × [reduced price]
			P1	for a process to find 90% of a value stated in the question eg 35 – "3.5" (=31.5) **or** 0.9 × 5.80 (=5.22) oe **or** $\frac{10}{100}$ × "203" (=20.3) **or** $\frac{10}{100}$ × "174" (=17.4) oe
			P1	for a complete process to find actual cost of 35 eg 0.9 ×5.80 × 35 oe
			A1	cao
				SC B2 156.6(0)

Question	Working	Answer	Mark	Notes
22		32.3	P1	for using Pythagoras to find length of third side of triangle, eg $7.5^2 - 6^2$ or $6^2 + x^2 = 7.5^2$
				or uses trigonometry to find angle in triangle eg $\sin A = \frac{6}{7.5}$ or $\cos B = \frac{6}{7.5}$
			P1	(dep P1) for complete process to find length of third side of triangle
				eg $\sqrt{7.5^2 - 6^2}$ or $\sqrt{56.25 - 36}$ or $\sqrt{20.25}$ (=4.5)
				or uses trigonometry to find base length of triangle eg $7.5 \times \cos$ "A" or $7.5 \times \sin$ "B" or $\frac{6}{\tan "A"}$
			P1	(dep P2) for $24 - 10 -$ "4.5" (= 9.5)
			P1	(indep) for process to find angle CDA, eg $\tan CDA = \frac{6}{base}$ from right-angled triangle
			A1	for answer in the range 32.2 to 32.3

Paper: 1MA1/3F

Question	Working	Answer	Mark	Notes
1		4000	B1	for 4000

8		30	M1 A1	for 12 m = 1.9 to 2 cm or for a scale factor of 2.25 to 2.75 (comparing length of bus with height of the building) or a **complete** method using the height of the bus to compare with the height of the building. answer in range 27 to 33

23	(a)		0.625	B1	cao
	(b)		$9.75 \leq x < 9.85$	B2 [B1	$9.75 \leq x < 9.85$ for 9.75 **or** 9.85 (or $9.84\dot{9}$)]

Paper: 1MA1/3F

Question	Answer	Mark	Mark scheme	Additional guidance
1	6000	B1	cao	Accept 6 thousand or six thousand

2		1.6	B1	cao	

3	2500	B1	cao	

4	8000	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
24	9.85	M1	for $\sin(38) = \frac{AB}{16}$ oe **or** alternative method to find *AB*	
		A1	for an answer in the range 9.76 to 9.92	

25	8.3 and 8.4	B1 B1	for 8.3 in the correct position for 8.4 in the correct position	 Accept $8.3\dot{9}$ or 8.399…

Question	Answer	Mark	Mark scheme	Additional guidance
1	500	B1	cao	

11	(a)	241.56	P1	for difference for 1 parcel eg 35.38 – 15.25 (= 20.13) **OR** for total cost for 12 parcels by either service eg 35.38 × 12 (= 424.56) **or** 15.25 × 12 (= 183)	
			P1	for a complete process eg "20.13" × 12 **or** "424.56" – "183"	
			A1	cao	
	(b)	Explanation	C1	for explanation **Acceptable examples** both figures rounded down (refers to both figures) 20 is less than 21 and 15 is less than 15.25 **Not acceptable examples** both figures rounded (up); rounded down either 20 is less than 21 or 15 is less than 15.25 (refers to just one figure) the cost is 320.25 (more than 300); multiplying with bigger numbers	

Paper: 1MA1/3F

17	9	M1 A1	for a method to find the scaling factor eg "10.8" ÷ "1.8" (= 6) or "1.8" ÷ 1.5 (=1.2) or 1.5 ÷ "1.8" (=0.833..) **or** a sf given from 5.5 to 6.5 or from 1.06 to 1.4 or from 0.75 to 0.94 eg used with 1.5 accept an answer in the range 8 to 10	Could be shown on the diagram by appropriate working eg 6 steps Allow 10.6 to 11.0 and 1.6 to 2.0 for their measured lengths.

Paper: 1MA1/3F

2	4.6	B1	cao	

2	8000	B1	cao	

22	127.5 and 128.5	B1 B1	for 127.5 in the correct position for 128.5 in the correct position	 Accept $128.4\dot{9}$ or 128.499...

Paper: 1MA1/2F

3	5	B1	cao	

18	4550 to 4800	M1	for rounding at least two figures to 800, 50, 300 or 290 (which could be evidenced through partial calculation)	Any attempt to find the exact answer gets NO marks even if followed by rounding
		M1	(dep) for a correct calculation using their rounded values eg. sight of 240000 (= 800 × 300) **or** 232000 (= 800 × 290) **or** 229100 (= 790 × 290) **or** 16 (= 800 ÷ 50) **or** 15.8 = (790 ÷ 50) **or** 6 (= 300 ÷ 50) **or** 5.8 = (290 ÷ 50)	Various operations possible
		A1	for answer in range 4550 to 4800	

Paper: 1MA1/1F

2	29 000	B1	cao	

25	99.5	M1	for $\sin(34) = \frac{x}{178}$ 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

19	(a)	140	M1	for complete method eg $56 \div 40 \times 100$	May be seen in different ways, eg 2.5×56
			A1	cao	
	(b)	32	M1	for method to find percentage, eg $\frac{18}{56} \times 100$ (=32.14…)	
			A1	for an answer in the range 32 to 32.2	

Paper: 1MA1/3F

25	9.35, 9.45	B1 B1	for 9.35 in the correct position for 9.45 in the correct position	 Accept 9.44$\dot{9}$ oe or 9.4499… oe

Paper: 1MA1/3F

4	330	B1	cao	

27	7.15 and 7.25	B1 B1	for 7.15 as the lower bound for 7.25 as the upper bound	 Accept 7.24$\dot{9}$ oe or 7.2499… oe

Paper: 1MA1/2F

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	1.844977205	M1	for 3.403(940887) or 3.717(526059) or 2.014(944168) or 1.84(...) or 1.8(...)	Accept consistent use of a comma to indicate a decimal point
		A1	for 1.844(977205)	Answer must be given to at least 3 decimal places rounded or truncated
(b)	1.84	B1	for 1.84 or ft from (a) provided answer to (a) has at least 3 dp	

Question	Answer	Mark	Mark scheme	Additional guidance
24	260	P1	conversion to common units of capacity eg 2.2 × 4.54 (= 9.988) **or** 8 ÷ 4.54 (= 1.76...) **OR** **for company A** 2400 ÷ 4.54 (= 528.63...) **OR** 2400 ÷ 8 (= 300) **OR** a rate per minute 8 ÷ [time for Company A] (= 4.8…) oe	[time for Company A] could be 1 min 40 sec or 1.66… or 1.6 or 1.40 etc as long as it is clear it relates to 1 min 40 sec Results of calculations may be truncated or rounded.
		P1	for a complete process to find the time for one water rate in minutes. eg in litres Company A 2400 ÷ "4.8.." (= 500) or "300" × [1 min 40 sec] (= 500) **or** Company B 2400 ÷ "9.988" (= 240.28...) **OR** eg in gallons Company A "528.63.." ÷ ("1.76. .." ÷ [1 min 40 sec]) (= 500) **or** Company B "528.63…" ÷ 2.2 (= 240.28…)	
		P1	for complete processes to find the times for both company A and company B in minutes. Company A eg in litres 2400 ÷ "4.8…" (= 500) or "300" × [1 min 40 sec] (= 500) or in gallons "528.63.." ÷ ("1.76. .." ÷ [1 min 40 sec]) (= 500) **AND** Company B eg in litres 2400 ÷ "9.988" (= 240.28...) or in gallons "528.63…" ÷ 2.2 (= 240.28…)	
		A1	for an answer in the range 259 to 260	If the answer is given within the range but then rounded incorrectly award full marks.

Paper: 1MA1/3F

15	(a)	180	M1	rounds one figure appropriately 92 to 90 or 100 **or** 1.63 to 2 or 1.5 or 1.6 or 1.7	
			A1	for 180 (= 90×2) or 135 (= 90×1.5) or 144 (= 90×1.6) or 153 (= 90 × 1.7) or 200 (= 100×2) or 150 (= 100×1.5) or 160 (= 100×1.6) or 170 (= 100 × 1.7) or 163 (= 100×1.63) or 184 (= 92 × 2) or 138 (= 92 × 1.5) or 147.2 (= 92 × 1.6) or 156.4 (= 92 × 1.7)	Answer of 149.96 (92 × 1.63) gets M0A0 Answer with no working gets M0A0 Ignore further rounding of their result
	(b)	947.2	B1	cao	

Paper: 1MA1/1F

Paper: 1MA1/2F

Question	Answer	Mark	Mark scheme	Additional guidance
1	1480	B1	cao	

Paper: 1MA1/2F

Question	Answer	Mark	Mark scheme	Additional guidance
23	89.5 and 90.5	B1 B1	for 89.5 in the correct position for 90.5 in the correct position	 Accept $90.4\dot{9}$ or 90.499(…)

24	(a)	19	P1	for process to find area available at festival B, eg 700 × 2000 (=1 400 000)	
			P1	for finding the area available per person at one festival, eg 80 000 ÷ 425 (= 188.23..) **or** [area] ÷ 6750 (= 207.40..)	Accept either number rounded eg 207 or 188
			P1	for finding the area available per person at both festivals, eg 80 000 ÷ 425 (= 188.23..) **and** [area] ÷ 6750 (= 207.40..)	Accept both numbers rounded eg 207 and 188
			A1	answer in the range 18.7 to 19.5	
	(b)	explanation	C1	for a valid statement relating to scale factor for area, **Acceptable examples** there are 10000 (cm^2) in 1 (m^2) because 1 m^2 is the same as 100 × 100 = 10000 cm^2 there are 2 side lengths that change from 1 m to 100 cm 300 ÷ 3 is 100 should use 100^2 300 ÷ 100 ÷ 100 = 0.03 3 × 100 × 100 = 30000 Because it's area not length. Because it's in m^2 not just metres He hasn't taken the squared sign into account **Not acceptable examples** there are 1000 cm in 1 m Callum is correct because ……. 300 ÷ 3 is 100 $3^2 = 9$ 300 × 300 = 90000 You have to square the number	

Paper: 1MA1/2F

18	(a)	2500	B1	cao	
	(b)	0.09	B1	cao	

Paper: 1MA1/3F

25	(a)	1.25	B1	for 1.25 or $\frac{5}{4}$ or $1\frac{1}{4}$	
	(b)	4650 and 4750	B1	for 4650 in the correct position	
			B1	for 4750 in the correct position	Accept $4749.\dot{9}$ or 4749.99(…)

Paper: 1MA1/2F

4	19	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	248	P1	for 700 – 452	
		A1	cao	
(b)	11000	P1	for evidence of rounding values to 1 significant figure, eg 300 **or** 400 **or** 10 or 9 **or** 20	
		P1	(dep on P1) for beginning a process to work with ticket sales, eg. 300 × 10 (= 3000) or 290 × 10 (= 2900) or 297 × 10 (= 2970) or 300 × 9 (= 2700) or 300 × 9.5 (= 2850) or 290 × 9 (= 2610) or 297 × 9 (= 2673) **OR** 400 × 20 (= 8000) or 390 × 20 (= 7800) or 399 × 20 (= 7980) or 400 × 19.5 (= 7800) or 400 × 19 (= 7600)	Note: **not** 290 × 9.5 (= 2755) or 297 × 9.5 (= 2821.5) Note: **not** 390 × 19 (= 7410) or 390 × 19.5 (= 7605) or 399 × 19 (= 7581) or 399 × 19.5 (= 7780.5)
		A1	for using **correct** values giving an answer in the range 10 200 to 11 000 from calculations using their rounded values	Award 0 marks for an answer in the range with no supportive working
(c)	Overestimate with reason	C1	(dep on P2 in (b)) for overestimate and reason, eg (ft from (b)) true total amount of money paid will be less as all values were rounded up	Must relate to estimation and not to rounding of their final answer and they must have a final answer to part (b)

Question	Answer	Mark	Mark scheme	Additional guidance
1	6200	B1	for 6200 (accept in words)	

18	(a)	45	P1 P1 A1	for a valid start to the process, eg 180 ÷ 12 (= 15) or 3(.00) ÷ 12 (= 0.25) for complete process, eg “15” × 3(.00) or 180 × “0.25” for 45(.00)	Calculations can be in £ or p or a combination for both process marks

Paper: 1MA1/2F				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 (b)	9	P1	for a valid start to the process, eg cost of each can, eg 7(.00) ÷ 24 (= 0.2916...) or 700 ÷ 24 (= 29.16...) **or** total volume of 24 cans, eg 330 × 24 (= 7920) **or** proportion of m*l*, eg 330 ÷ 100 (= 3.3)	Calculations can be in £ or p
		P1	for complete process, eg $\frac{100}{330}$ × "0. 2916..." (= 0.08838...) or $\frac{100}{330}$ × "29.16..." (= 8.838...) **or** $\frac{100}{"7920"}$ × 7(.00) (= 0.08838...) or 7(.00) ÷ 24 ÷ $\frac{330}{100}$ (= 0.08838...) or 7(.00) ÷ $\frac{"7920"}{100}$ (= 0.08838...)	
		A1	for 9	Accept £0.09(p)

26	12.65, 12.75	B1 B1	for 12.65 in correct position for 12.75 in correct position	 Accept $12.74\dot{9}$ or 12.7499(…)

Paper: 1MA1/2F

14	1.3	M1	for working with boxes or bags eg 600 ÷ 120 (= 5) or 1000 ÷ 270 (= 3.7(037..)) 6 ÷ 120 (=0.05) or 10 ÷ 270 (= 0.037(037..))	Cost ÷ quantity For the M marks allow working in £ instead of p.
		M1	for working with bags and boxes where they are working to the same quantities of boxes and bags eg 600 ÷ 120 (= 5) **and** 1000 ÷ 270 (= 3.7(037..)) 6 ÷ 120 (=0.05) **and** 10 ÷ 270 (= 0.037(037..))	Other values are possible where they are using alternative quantities of boxes and bags, but these must be the same quantities of each.
		M1	for finding the difference eg "5" – "3.7(037..)" (= 1.29.. to 1.3) or "0.05" – "0.037(037..))" (= 0.0129.. to 0.013)	Must have consistent units for this mark.
		A1	for answer in the range 1.29 to 1.3	If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/3F

Question	Answer	Mark	Mark scheme	Additional guidance
21 (a)	11533	P1	for working with 68%, eg 800 × 0.68 (= 544 people) oe or "16960" × 0.68 oe	Percentage calculation could be done at any stage
		P1	for a correct process, other than that of finding a %, eg "544" × 2 (= 1088) or 10.6 × 2 (= 21.2) or 800 × 2 (= 1600) or "544" × 10.6 (= 5766.4) or 800 × 10.6 (= 8480)	
		P1	for full process to find amount of coffee required eg "1088" × 10.6 or "544" × "21.2" or "5766.4" × 2 (= 11532.8) or for an answer of 11532	
		A1	for answer in the range 11532.5 to 11533	If a correct answer within the range is shown in working but incorrectly rounded award full marks.
(b)	Statement	C1	for a correct statement **Acceptable examples** the amount will be more; he will need more coffee it is an underestimate my answer in part (a) means there would not be enough for everyone he will need 12211(.2); needs 678(.4) more **Not acceptable examples** amount will decrease, amount of coffee will change	If figures are given as part of the answer they must be correct, but can allow ft.

Paper: 1MA1/3F

25	65	P1	for a correct process to find the number of seconds, eg 67 205 600 ÷ 11.9 (= 5 647 529.4...) **or** for a correct process to convert between seconds and days, eg 24 × 60 × 60 (= 86 400) oe, may be seen in stages or 11.9 × 60 × 60 × 24 (= 1 028 160)	Note that this mark may be awarded at any stage in the working.
		P1	for a complete process, eg "5 647 529.4..." ÷ "86 400" or 67 205 600 ÷ "1 028 160"	
		A1	accept answers in the range 65 to 65.4 or 66	If a correct answer within the range is shown in working but incorrectly rounded award full marks.

Paper: 1MA1/1F

Question	Answer	Mark	Mark scheme	Additional guidance
26	160 to 200	M1	rounds one figure appropriately (6, 8, 0.25 or 0.3)	Do not award any marks for an accurate calculation if then rounded
		M1	(dep) for carrying out an accurate calculation using 0.25 or 0.3 eg $6 \div 0.3 = 20$, $8 \div 0.25 = 32$, $6 \div 0.25 = 24$ **or** digits 16	
		A1	Answer in the range 160 to 200 from appropriate rounding	

28	65	P1	for a full process to find the volume of the container, eg $\pi \times 15^2 \times 43$ (= 30 394.9…)	These steps may be completed in a different order Accept 9675π
		P1	for a process to convert between cm^3 and litres, eg "30 394.9…" ÷ 1000 (= 30.39…) **or** [volume] ÷ 1000 **or** 0.47 × 1000 (= 470)	Accept 9.675π or $\frac{387}{40}\pi$
		P1	for a complete process to find the time taken, eg [volume] ÷ 0.47 **or** [volume] ÷ "470"	[volume] can be any value they believe to be the volume that might have been incorrectly converted (or not at all)
		A1	answer in the range 64.6 to 65	If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/2F

2	8100	B1	cao	

Paper: 1MA1/1F

Question	Answer	Mark	Mark scheme	Additional guidance
1	18 000	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
24 (a)	Estimated value	P1	for using a value rounded to 1sf in a calculation eg 500 ÷ 10 **or** 500 × 0.8 **or** 510 × 0.8 **or** 513 × 0.8 **or** 500 × 0.81	Their rounded value must be used in a calculation Rounding may occur after a correct process, eg 513 ÷ 10 = 51.3 ≈ 50 and 50 × 0.81 513 ÷ 10 = 51.3 ≈ 51 and 51 × 0.8 scores P1P1 Accept 0.81 rounded to 0.80 for this mark Condone 0.81 rounded to 1 for this mark.
		P1	for a full process to find the total amount eg 500 ÷ 10 × 0.8 (= 40) **or** 510 ÷ 10 × 0.8 (= 40.8) **or** 500 ÷ 10 × 0.81 (= 40.5) or [distance] ÷ 10 × [amount] oe	Where [distance] is their rounded 513 or 513 and [amount] is their rounded 0.81 or 0.81 Accept 513 ÷ 10 × 0.81 for this mark.
		A1	for a correct answer following through their correct rounded value(s)	Do not award this mark if 0.81 is rounded to 1
(b)	underestimate with reason	C1	ft from (a) eg underestimate as numbers rounded down	Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

Paper: 1MA1/1F

28	63	P1 P1 P1 A1	for process to find volume, eg $\pi \times 100^2 \times 30$ (= $300\,000\pi$ or 942 477(.796...)) for process to find time in seconds, eg "942 477(.796...)" ÷ 250 (= 1200π or 3769(.911...)) **or** [volume] ÷ 250 **or** for converting rate to minutes, eg 250 × 60 (= 15 000) for complete process, eg "3769(.911...)" ÷ 60 (= 20π) **or** "942 477(.796...)" ÷ "15 000" (= 20π) for answer in the range 62 to 63	(volume =) 942 478 implies P1 (time =) 3770 implies P2 [volume] ≠ 30, 60, 100, 250 A correct answer with no supportive working gets 0 marks If an answer is shown in the range in working and then incorrectly rounded award full marks

Paper: 1MA1/3F

23	10.2 and 10.3	B1 B1	for 10.2 in the correct place for 10.3 in the correct place	 Accept 10.2$\dot{9}$ or 10.299(99...)

24	14.3	M1	for a correct statement for AB using trigonometry, eg $\tan 62 = \frac{AB}{7.6}$ **or** (AB =) $7.6 \times \tan 62$	
		A1	answer in the range 14.28 to 14.3	If an answer is given in the range in working and then rounded incorrectly award full marks

Paper: 1MA1/3F

Paper: 1MA1/1F

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	24 000	B1		
(b)	600	M1	for 6 or 100 or 98 used in a calculation	578.2 from 5.9 × 98 scores M1A0
		A1	for 600 (from 6 × 100) or 588 (from 6 × 98) or 590 (from 5.9 × 100) or 588.6 (from 6 × 98.1)	M0A0 for working with unrounded figures with answer rounded to 600 ISW rounding of an estimated answer e.g. rounding 588 to 600 Subtraction of additional products after a rounded calculation may score the M mark for 6 or 100 or 98, but will not score the A mark unless one of the acceptable answers is reached.

Question	Answer	Mark	Mark scheme	Additional guidance
26	60.3	M1	for a correct trig statement, eg tan $x = \frac{7}{4}$	Other methods are possible but only award this mark at the point of an equation with x as the only unknown
		A1	60.2 to 60.42	

26	23.75 and 23.85	B1 B1	for 23.75 in the correct position for 23.85 in the correct position	Accept $23.84\dot{9}$ or 23.8499(9...)

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.

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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.

PMT

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

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)

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

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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

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)

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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

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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.

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.

PMT

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)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question 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: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		Lhotse	1	B1 cao
	(b)		8200	1	B1 cao
	(c)		Seven thousand four hundred and twenty-eight	1	B1 for any unambiguous answer
	(d)		8051	1	B1 cao
2	(a)		4,8,3,3,2	2	M1 for at least 2 tallies or 2 frequencies correct A1 for 5 correct frequencies
	(b)		correct graph	3	M1 for bar chart or other suitable chart with at least 2 correct frequencies drawn for their scale (ft from (a)) M1 for all bars labelled and vertical axis correctly scaled A1 for accurately representing their data, with all labels, ft from (a)
3	(a)		56 000	1	B1 cao
	(b)		276	1	B1 cao
	(c)		6	1	B1 cao
	(d)		29	1	B1 cao
	(e)		13	1	B1 cao

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
4			3	3	M1 for attempt to find number of bags needed eg 254 ÷ 20 oe (= 12.7) **or** 12 **or** 13 M1 (dep) for "254 ÷ 20" ÷ 5 oe (= 2.4) A1 cao **OR** M1 for 5 × 20 (=100) M1 (dep) for intention to find how many "100" in 254 (= 2.54) A1 cao
5	(a)		B or C	1	B1 for B **or** C **or** B and C
	(b)		G, E	2	B1 for G; B1 for E
	(c)		Hexagon	1	B1 cao
	(d)		Parallelogram	1	B1 cao
6	(a)		$3m$	1	B1 cao
	(b)		$7e$	1	B1 cao
	(c)		$15g$	1	B1 cao
7	(a)		31	2	M1 for 3 × 5 + 2 × 8 **or** 15 and 16 A1 cao
	(b)		$6x + 8y$	2	M1 for $6x$ **or** $8y$ A1 for $6x + 8y$ oe as final answer

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
*8		Tables-R-Us 120 + (120 + 2 × 40) = 320 Fred's Furniture 120 + (32 × 6) = 312 Tables 'n Chairs 120 + (3 × 70) = 330	Fred's Furniture with working	4	M1 for correct method to find total cost of chairs (and table) for at least one shop M1 for correct method to find total cost of chairs (and table) for at least two shops A1 for 3 comparable totals (eg. chairs £200, £192, £210 **or** table and chairs £320, £312, £330) C1 (dep on M1) ft for correct statement with shop name from comparable figures
9			48	2	M1 for method to find 15% of 320 A1 cao
10	(a)		5	1	B1 cao
	(b)		evens	1	B1 cao
	(c)		$\frac{2}{6}$ oe	2	M1 for $\frac{a}{6}$ where $a < 6$ **or** $\frac{2}{b}$ where $b > 2$ A1 for $\frac{2}{6}$ oe
11	*(a)		No with working	2	M1 for 19.5 + 22.8 (= 42.3) **or** 40 − 19.5 − 22.8 (= −2.3) **or** 22 + 19 (= 41) C1 for statement with No and 42.3 **or** ±2.3 **or** 41 seen
	(b)		12 40	3	M1 for correct start eg. addition of two times **or** subtraction of one time from 1430 M1 for a complete method A1 for 12 40 (pm)

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			126 or 176	4	M1 for correct unit conversion of 2 m or 3 m or 20 cm M1 for method to find number in width or number in length **or** 14 or 9 or 16 or 11 M1 (dep on M1) for "number in length" × "number in width" eg 14 × 9 eg 16 × 11 A1 for 126 or 176
*13			Amsterdam with figures	3	B1 for a correct conversion from miles to km or km to miles eg 8 km = 5 miles eg 28 miles = 44 km M1 for a correct method to convert 280 miles to km or 500 km to miles **or** 420 – 460 (km) **or** 300 − 320 (miles) C1 (dep on M1) for statement with correct conclusion and correct conversions (420 – 460 km or 300 – 320 miles)
14			correct shape	2	M1 for at least 2 correctly enlarged sides A1 for correct shape **SC:** B1 for a fully correct enlargement scale factor 2 or 4
15	(a) (b) (c)		18 56 33	1 1 2	B1 cao B1 cao M1 for 23 and 56 identified A1 cao

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
*16			No with reason	3	M1 for 17, 20 .**or** + 3 **or** $3n + 2$ M1 for method to show that 34 is not in the sequence eg continue sequence to at least 32 eg attempt to solve $3n + 2 = 34$ C1 (dep on M2) for statement with conclusion eg No with 32, 35 shown eg $n = 32 \div 3$ which is not a whole number
17			700 cm^3	3	M1 for $20 \times 5 \times 7$ A1 for 700 B1 (indep) for cm^3
18			4	3	B1 for 11.8 − 12.2 (cm) or 1180 − 1220 (km) M1 for "12" × 100 ÷ 300 oe A1 for 3.9 – 4.1 from correct figures or ft from "12" × 100 ÷ 300 oe
19			1340	4	M1 for 500 × 4 (= 2000) M1 for 960 – 300 (= 660) or "2000" + 300 (= 2300) or "2000" – 960 (= 1040) M1 (dep on M2) for a fully correct method eg "2000" – "660" or "2300" – "960" or "1040" + 300 A1 cao

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)		$\frac{5}{12}$	2	M1 for $\frac{150}{360}$ or equivalent fraction A1 cao
	(b)		42	2	M1 for 60 ÷ 12 (= 5) **or** 210 ÷ 60 (= 3.5) oe A1 cao
	(c)		not enough information	1	B1 for 'not enough information' ticked **and** appropriate explanation given
21			25	4	M1 for 600 ÷ 4 (= 150) M1 for 4500 ÷ "150" (= 30) M1 for 750 ÷ "30" A1 for 25 with supporting working **OR** M1 for 4500 ÷ 750 (= 6) M1 for 600 ÷ 4 (= 150) or 600 ÷ "6" (= 100) M1 for "150" ÷ "6" or "100" ÷ 4 A1 for 25 with supporting working **OR** M1 for 4500 ÷ 750 (= 6) or 750 ÷ 4500 (= $\frac{1}{6}$) M1 for $\frac{1}{4}\times"\frac{1}{6}"$ $\left(=\frac{1}{24}\right)$ M1 for $"\frac{1}{24}"\times 600$ A1 for 25 with supporting working

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
*22			130 + correct reasons	4	M1 for angle *BFG* = 65 (may be seen on diagram) M1 (dep) for correct method to calculate *x* eg (*x* =) 65 + 65 (= 130) **or** (*x* =) 180 − (180 − 2 × 65) (= 130) C2 for *x* =130 **and** full appropriate reasons related to method shown (C1 (dep on M1) for any one appropriate reason related to method shown) eg alternate angles are equal ; base angles in an isosceles triangle are equal; angles in a triangle add up to 180°; angles on a straight line add up to 180°; exterior angle of triangle = sum of two interior opposite angles co-interior angles (allied angles) add up to 180°
23	(a)		2 reasons	2	B2 for two different reasons (B1 for 1 reason) eg No units (of distance) eg Overlapping intervals (2 and/or 3 in two boxes) eg Missing box (no box for more than 6 (km/miles) or 'other' or 4.5 (km/miles))
	(b)		Question	2	B1 for a suitable question which includes a time frame (time frame could appear with response boxes) B1 for at least 3relevant non-overlapping **and** exhaustive response boxes [Do not allow inequalities in response boxes]

PAPER: 1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)		$e(3e + 5)$	1	B1 for $e(3e + 5)$
	(b)		4	3	M1 for intention to expand brackets eg $7k - 21$ **or** division of all terms on RHS by 7 as a first step M1 for correct method to isolate terms in k in an equation A1 cao
	(c)		$a = 2f - 1$	2	M1 for a correct first step eg intention to multiply both sides by 2 A1 cao
25			$2 \times 2 \times 3 \times 3 \times 5$	3	M1 for continual prime factorisation (at least two consecutive steps correct) **or** at least two stages of a factor tree correct M1 for a fully correct factor tree **or** list 2, 2, 3, 3, 5 A1 for $2 \times 2 \times 3 \times 3 \times 5$ or $2^2 \times 3^2 \times 5$
26			9	4	M1 for method to find the area of one rectangle eg 15×8 (=120) or 15×11 (=165) M1 (dep) for subtraction from/by given area eg 138 − "120" (=18) or "165" – 138 (=27) M1 for final step from complete method shown eg 15 − "18"÷ 3 or for "27" ÷ 3 A1 cao **OR** M1 for a correct expression for the area of one rectangle eg $(8 + 3) \times (15 - x)$ or $8 \times x$ M1 (dep) for a correct equation eg $(8 + 3) \times (15 - x) + 8 \times x = 138$ M1 for correct method to isolate x eg $3x = 27$ A1 cao

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: 1MA0_1F			
Question		**Modification**	**Notes**
1		Take out Jannu	
2	(b)	Table layout modified 2 cm grid provided with 14 squares across and 12 squares up Space on left and at the bottom for labeling	
5		Shapes H and I removed	
7		*a* changed to *e* *c* changed to *f*	
10		Spinner straightened up,● at centre to represent spike	
13		2 cm grid provided	
14		1½ cm grid provided Enlargement given Question reversed – 'Describe fully the transformation that maps Shape A onto Shape B	

PAPER: 1MA0_1F			
Question		**Modification**	**Notes**
15		Horizontal lines inserted to separate rows	
17		Model provided	

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Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 2F



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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

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

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (e.g.. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (e.g.. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g. 3.5 – 4.2) then this is inclusive of the end points (e.g. 3.5, 4.2) and all numbers within the range.

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

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		$3p$	B1	cao
(b)		$2m^3$	B1	cao
(c)		$10 - 4c + 6d$	M1	for $-4c$ or $6d$ (accept $+-4c$)
			A1	for $10 - 4c + 6d$
2		60	B1	cao
3 (a)		Walk	B1	cao
(b)		7 on chart	B1	for bar of height 7 drawn for girls walking
(c)		4	B1	cao
(d)		96	M1	for method to find number of Year 6 students in the survey e.g. $5 + 9 + 6 + 4 + 9 + 7 + 4 + 1 + 2 + 1$ (= 48) or $14 + 10 + 16 + 5 + 3$ (= 48)
			A1	for 96 or ft from (b), eg 82 if no bar in (b)
4		$\frac{11}{30}, \frac{2}{5}, \frac{7}{15}, \frac{1}{2}$	M1	converts fractions to a common form, e.g. fractions with a denominator of 30, decimals or percentages, at least two conversions correct or any 3 fractions in correct order
			A1	correct order

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
5 (a)		Monday wrong	C1	for seeing difference in tally marks and frequency for Monday
(b)		Comment	C1	for suitable comment, eg extra picture for Tuesday needed or explains that 0.5 of a CD is not possible
6		268.20	P1	for a process to work out the value of the £1 coins, eg. 495 ÷ 3 (= 165) or 495 × 0.33...or of the 50p coins, eg. 124 ÷ 2 (= 62)
			P1	for process to find the number of 20p coins, eg. (495 – 124 – (“165”) (= 206)
			P1	for complete process to find total value using consistent units., eg. (“165”) + (124 ÷ 2) + (“206” × 0.2) or 165 + 62 + 41.2
			A1	cao (accept 268.2)
7		0.985	B1	oe
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		54	M1	for method to form equation, eg 90 + 2x + 3x = 360 or for 360 – 90 (= 270)
			M1	for 5x = 360 – 90 or for 2x + 3x = 360 – 90 or for 2x = 108 or for 3x = 162 or for 270 ÷ 5
			A1	cao

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
10		Letters2send (supported)	P1	for the start of a process to find comparable costs at either shop, e.g. 150 ÷ 25 (= 6) or 150 ÷ 30 (= 5), 150 ÷ 10 (= 15), 2.10 ÷ 15 = (=0.14)
			P1	for process to find cost from Letters2send, e.g. (150 ÷ 25) × 3.49 (= 20.94)
			P1	for process to find cost at Stationery World, e.g. (150 ÷ 30) × 2 × 2.10 (= 21)
			C1	for correct conclusion with correct values from each shop (20.94 and 21)
				OR
			P1	for the start of a process to find comparable costs, eg 3.49 ÷ 25 (= 0.1396), 2.10 ÷ 10 (= 0.21), 25 ÷ 3.49 = (7.1...), 2.10 ÷ 15 = (= 0.14)
			P1	for process to take into account the offer at Stationery World, eg buy 30 envelopes pay for 20,
			P1	for complete process to find values that can be used for comparison, eg 30 × 0.13(96) and 2 × 2.10 (= 4.2(0))
			C1	for correct conclusion with correct values from each shop (4.1(88) and 4.2(0))

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
11 (a)		29	B1	answer in the range 29 to 30
(b)		186 to 195	M1	for changing 6ft 3 inches to inches e.g. $6 \times 12 + 3$ (= 75) or changing 1ft to 30 cm
			M1	for a method to convert to cm, e.g. 25 →63 then × 3, $6 \times 30 + \frac{1}{4} \times 30$
			A1	for answer in the range 186 to 195 or ft from correct use of graph
12		0.0733(03...)	M1 A1	for correct numerator (3.4496.....) or correct denominator (47.0596) or 0.073 for 0.0733(03.....)
13 (a)		Rotation	B2	for a fully correct rotation at (–4,–1), (–3,–1), (–4,–4), (–1,–2)
			[B1	for the quadrilateral in correct orientation and size or rotated 90° anticlockwise about the origin]
(b)		Reflection in the *y*-axis	B1	for reflection
			B1	for *y*-axis (or *x* =0)
				[A combination of transformations scores 0 marks]

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
14 (a)		$5(1 - 2m)$	B1	cao
(b)		$2ab(a + 3b)$	M1	for $2a(ab + 3b^2)$ or $2b(a^2 + 3ab)$ or $ab(2a + 6b)$ or $2ab$(2 term expression with terms in a or b or ab, can include constants), eg $2ab(1a + 3ab)$, $2ab(1 + 3b)$
			A1	for $2ab(a + 3b)$
15 (a)		0.47	B1	
(b)		2.28×10^9	M1	for correct value but not in standard form, eg $22.8 \times 10^{3+5}$, 228×10^7, 2 280 000 000 or for 2.28×10^n , $n \neq 9$
			A1	cao
16		T shown on the map	C1	for showing a perpendicular bisector or point T equidistant from points B and C.
			C1	for a circle or arc of circle of radius 2.5 cm or point T 2.5 cm from point A
			C1	for T shown in correct position

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
17		98	P1	for process to find P(1), e.g. 1 – 0.17 – 0.18 – 0.09 – 0.15 – 0.1 (= 0.31) or for a process to find P(1 or 3), e.g. 1 – 0.17 – 0.09 – 0.15 – 0.1 (= 0.49)
			P1	for process to find the number of 3s, e.g. 0.18 × 200 (=36) or process to find the number of 1s, e.g. P(1) × 200 (= 62), or process to find the number of (1 or 3)s, eg [P(1) + 0.18] × 200 or process to find any expected frequency, using any probability × 200, eg 0.17 × 200
			A1	cao
				OR
		98	P1	for process to find P(2 or 4 or 5 or 6), eg 0.17 + 0.09 + 0.15 + 0.1 (= 0.51)
			P1	for process to find the number of (2 or 4 or 5 or 6)'s, eg "0.51" × 200 (= 102)
			A1	cao

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
18		Yes (supported)	P1	for process to work out the total number of children, e.g. 117 × 4 (= 468)
			P1	(dep P1) for process to work out total number of adults or the total number of people, e.g. "468" × 5 ÷ 2 (= 1170) or "468" × 7 ÷ 2 (= 1638)
			A1	for 1170 or 1638
			P1	for process to work out the percentage of theatre full, e.g. $\frac{"468"+"1170"}{2600} \times 100$ (= 63) or for a process to work out 60% of 2600 (= 1560)
			C1	for a correct conclusion supported by correct figures e.g. 63% or 1560 **and** 1638
				OR
			P1	for a process to work out 60% of 2600, eg. $\frac{60}{100} \times 2600$ (= 1560)
			P1	(dep P1) for process to work out total number of children, e.g. "1560" × 2 ÷ 7 (= 445(.7...)
			A1	for 445(.7...)
			P1	for process to work out number of children in the circle, eg. "445(.7...)" ÷ 4 (= 111 to 112)
			C1	for a correct conclusion supported by correct figures e.g. 111 to 112
				[Where appropriate, accept rounded or truncated values]

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
18 cont.				OR
			P1	for a process to find the maximum number of children, eg. 2600 × 2 ÷ 7 (= 742(.8…))
			P1	for process to work out the total number of children, e.g. 117 × 4 (= 468)
			A1	for 468 and 742(.8...)
			P1	for $\frac{"468"}{"742(.8..)"} \times 100$ (= 63) or process to work out 60% of "742.8.." (= 445(7..))
			C1	for a correct conclusion supported by correct figures e.g. 63% or 468 and 445(.7...)
				[Where appropriate, accept rounded or truncated values]
19		Side elevation	C2	for the side elevation (4 cm by 2 cm rectangle with a solid line drawn 1 cm from the 2 cm edge, and correct orientation)
			[C1	for the side elevation as a rectangle]
		Front elevation	C2	for the front elevation as a trapezium in correct orientation with base 4 cm, parallel sides 1 cm and 4 cm
			[C1	for the front elevation as a trapezium with two right angles]
				[Ignore incorrect or no labelling]

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

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
22		Secure Bank (supported)	P1 P1 C1	for a process to work out the interest after one year e.g. 0.02×25000 (= 500) or 0.043×25000 (= 1075) or for 1.02 or 25500 or 1.043 or 26075 for process to find value of the investment after 3 years or the multiplicative factor for 3 years at one of the banks, e.g. $25000 \times 1.02 \times 1.02 \times 1.02$ oe (= 26530...) or 1.02^3 (= 1.0612...) or $25000 \times 1.043 \times 1.009 \times 1.009$ oe (= 26546...) or $1.043 \times 1.009 \times 1.009$ (= 1.0618.....) [accept total interest of 1530...or 1546...if final values of investment are not found] for Secure Bank from correct figures eg 26530.. and 26546..or 1530.. and 1546.. or 1.0612.. and 1.0618
23		$4.755 \leq n < 4.765$	B2 [B1	for $4.755 \leq n < 4.765$ for 4.755 or 4.765 or 4.764$\dot{9}$]
24		$x = -8$, $x = 3$	M1 M1 A1	for factorisation or for substitution into quadratic formula $(x \pm a)(x \pm b)$ where product of a and b = 24, eg $(x \pm 4)(x \pm 6)$ or difference of a and b = 5, eg $(x \pm 2)(x \pm 7)$ $\frac{-5 \pm \sqrt{5^2 - 4 \times 1 \times -24}}{2}$ oe (condone one sign error) for $(x + 8)(x - 3)$ or for $\frac{-5 \pm \sqrt{121}}{2}$ oe cao

Paper 1MA1: 2F				
Question	**Working**	**Answer**	**Mark**	**Notes**
25 (a)		$5n - 2$	B2	for $5n - 2$ oe
			[B1	for $5n + k$, k may be 0]
(b)		No (supported)	C1	for No with evidence, e.g. $3 \times 4^2 = 48$, $\sqrt{48}$ is not an integer, he has multiplied by 3 first but should have squared first

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: 1MA1_2F			
Question		**Modification**	**Mark scheme notes**
1	(c)	MLP and braille: *c* and *d* changed to *s* and *t*.	Standard mark scheme but change *c* & *d* to *s* & *t*
3		Grid enlarged. Key moved above the diagram. Right axis has been labelled. Boys shading has been changed to dotty. The vertical axis label has been moved above the vertical axis	Standard mark scheme
5	(b)	Pictogram enlarged. Key moved above the diagram.	Standard mark scheme
8		Wording 'nine' added	Standard mark scheme
9		Diagram enlarged. Angle sizes moved outside the angle arcs; the arcs have been made smaller.	Standard mark scheme
11		Grid enlarged. Right axis labelled. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. In (a) Number '74' changed to '90'.	(a) becomes 35 to 37. In (b) suggest 180 to 200
13	(a)	Question reversed. Rotation drawn on the diagram and labelled as 'shape B'. Grid enlarged and *y* axis reduced so it finishes at 2. Shapes labelled 'shape A' and 'shape B'. Wording changed 'It shows shape A and shape B given on a grid. Describe fully the single transformation that maps shape A onto shape B.'	Award B1 for "rotation" Award B1 for "90° clockwise about centre O [or (0,0)] NB: award B0 for any indication of a mention of other transformations
13	(b)	Grid enlarged and y axis reduced so it starts at -2. Wording 'B' and 'C' deleted and shapes labelled as 'shape P' and 'shape Q'. Triangles P and Q moved above the *x* axis. Wording added 'It shows shape P and shape Q given on a grid.'	Standard mark scheme

PAPER: 1MA1_2F			
Question		**Modification**	**Mark scheme notes**
14	(b)	MLP only: *a* changed to *x* and *b* changed to *y*.	Standard mark scheme but change *a* & *b* to *x* & *y*
16		Number '250 metres' changed to '500 metres'. Points *B* and *C* moved to the right to allow for use of specialist equipment. Points *B* and *C* joined with a line. Scale moved above the diagram.	Standard mark scheme, but given the alternations to the given diagram, the relative positions of any constructions and the position(s) of *T* will change.
17		Table turned to vertical format.	Standard mark scheme
19		Alternative question. Model has been provided for all candidates. Diagram enlarged and also provided for MLP. The measurements on the prism have been doubled. Wording added next to the diagram of the trapezium 'Diagram NOT accurately drawn'. Four shapes have been provided below the trapezium labelled A to D. Wording added above the four shapes 'scale: 2 cm to 1 metre'. Question wording has changed and has been split into two parts: 'Look at the model or at the diagrams for Question 19 in the Diagram Book. They show a prism with a cross section in the shape of a trapezium. All measurements are in metres. Below the prism there are four shapes A, B, C and D. (i) Which shape shows the front elevation of the prism? (ii) Which shape shows the side elevation of the prism?'	Mark scheme amended as follows: (i) B2 for C (ii) B2 for A (B1 for B or D)
21		Diagram enlarged. Measurements '2.6 cm' and '5.4 cm' added to the diagram.	Standard mark scheme

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Question 24

This question was very poorly answered suggested that many students had not covered trigonometry as part of their course, or were insufficiently confident in the application of trigonometry. Many tried simply using the numbers in the question in a variety of incorrect calculations. Students with some knowledge of trigonometry usually selected sine as the function to use, although cosine and to a lesser extent tangent were sometimes their choice. The correct quoting of sin 38° was usually followed by a fully correct solution. Some students however, having their calculators set on an incorrect mode, were unable to score full marks. Correct answers written in the body of a script, and then rounded or truncated incorrectly, gained full credit. Less able students often worked out the missing angle and gave that as their answer rather than finding the side as required.

Question 25

Only a very few students gained the full two marks in this question. Some did earn one mark for one correct entry, usually 8.3. Near misses included answers of $8.25 \leq y < 8.35$ indicating some understanding of error intervals but from a rounded rather than a truncated number.

Question 1

A very well answered question. Most students gave the correct answer of 500 but 400 was sometimes seen.

Question 11

This was very much a question of two halves. Part (a) was well understood and many saw it through to an accurate conclusion. A small minority chose to do this by multiple addition, presumably without a calculator, and usually lost the final mark due to arithmetic error. Some just found the difference between the given costs. Too many mis-copied the figures from the table.

In part (b) few gained the mark as their explanation was frequently incomplete: reference must be made to both the number of parcels and the cost. Just working out the accurate calculation was also insufficient. The crucial feature was that both figures had been rounded down.

Question 17

Students found this question difficult. Instead of using the given width of the box (1.5 metres) and measurement (1.8 cm) some measured the height of the box instead and used that measurement. Common incorrect methods included multiplying 10.8 by 1.5 or dividing 10.8 by 1.5. Others chose to just measure the pole and give that as their answer. Some gave their scaling factor as the final answer. But those who realised that they could use the length of the box to divide up the mast into between 5.5 and 6.5 sections and then multiply this by the real length of 1.5 scored full marks.

Question 2

This question was also answered well. Incorrect responses seen included 5, 4.5, 4.60 and 45.8.

Question 2

This question was answered well with many students able to write 8375 correct to the nearest thousand. The most common mistake was to attempt to write it to the nearest hundred.

Question 22

This question was answered surprisingly poorly with many students unable to complete the error interval correctly. Those who used 127.5 as the lower value sometimes used 128.4 as the upper value. Answers that used integers, such as $128 \leq \text{length} < 130$ or $127 \leq \text{length} < 129$, were very common. In many responses the number on the left of the error interval was larger than the number on the right.

Question 3

Whilst a correct answer of 5 was given by the majority of candidates, answers of 4.7, 4700 and 5000 were not uncommon.

Question 18

Far too many students tried to work out the exact result for this calculation, employing methods of long multiplication and division. It should be made clear to students that such methods are not appropriate when being asked to work out an estimate for a calculation. Much time was wasted during the examination by students failing to understand what is required in estimating problems.

800, 300 and 50 were of course the most common estimated values used but subsequent calculations using these values were often flawed. The result of 800 × 300 was often written with an insufficient number of 0s and division by 50 was poor, with many simply halving or rounding their product while some divided it by 100 and then by 2.

Students using 290 as an estimated value for 289 usually made errors in subsequent calculations.

Question 2

This question was not so well answered as question one. 30 000 and 29 400 were given as popular incorrect answers.

Question 25

Students found this question challenging. Some scripts were left blank and others knew to use trigonometry but didn't know which to use out of sine, cosine or tangent, even when all the ratios were given correctly. Of those students that achieved the method mark, many could not then rearrange correctly to give the final answer. A common error seen was to try to use Pythagoras' Theorem or to try to use $\sin(34\times178)$ in their calculators.

problems for many, even in the earlier part of the paper. This includes questions 15, 20 and 24. Question 25 to 29 were the more challenging questions for those striving to demonstrate ability at the highest grades available, and a significant proportion of students therefore failed to score on these questions.

There were far fewer attempts using trial and improvement approaches. These mainly occurred when students showed evidence of not having a calculator, mainly evident in questions 15, 18, 19 and 20 where non-calculator methods were also seen, such as multiple additions.

The inclusion of working out to support answers remains an issue for many; but not only does working out need to be shown, it needs to be shown legibly, demonstrating the processes of calculation that are used. This is most important in longer questions, and in "show that" questions.

Report on Individual Questions.

Question 1

This was a poorly answered question. Most students gave the correct answer of 3 but 300, 30 and 3000 were frequently seen.

Question 2

A well answered question with nearly all giving the correct answer of 8.

Question 3

This was not always answered correctly.

Question 4

There were few incorrect answers in this question.

Question 5

This was very well answered with few failing to gain the mark. The most common error was the absence of one of the numbers.

Question 6

A very well answered question. There were a few who gave the answer of 4 to part (a).

Question 7

Students were generally very successful with this question with most obtaining full marks. Those achieving partial marks tended to mis-read the shaded section and recorded the fraction unshaded instead leaving their answer as $\frac{1}{4}$. A significant minority failed to give their answer in its simplest form, usually leaving the answer as $\frac{12}{16}$.

Question 8

This question was generally well done with the majority dividing 200 by 25 (some with multiple additions of 25) and then completing the process of 9.75 × 8 and giving the correct answer 78. Some students preferred to list eight lots of £9.75. The most common errors were students multiplying the cost by 200 or by 25.

Question 9

Parts (a) and (b) were not always answered correctly, with students having difficulty with the order of operations on their calculators.

It was rare to see any correct answers to part (c). Knowing the meaning of the term "reciprocal" is clearly a weakness in students.

Question 10

Most students got the marks in parts (a) and (b).

In part (c) students were able to explain that the drop in the first 3 minutes was steeper than the last 3 minutes. Some struggled to articulate this and some forgot to agree and imply that Pam was correct. There were a wide variety of values presented by students, although this question assessed the interpretation of the graph rather than the accuracy of reading values. Students generally used suitable values to explain their reasoning. Some students didn't use the graph at all but tried to explain that water cools more quickly when it is hotter.

Question 11

Many responses achieved full marks. Many managed to use the fact that angles in a quadrilateral sum to 360 or found the angle on the straight line to *y* was 70 degrees and score one mark. Not all students who correctly calculated angle *PSR* were able to complete this question correctly, deciding to go off in all sorts of related incorrect calculations. Some of the weaker students knew that angles on a straight line totalled 180° but chose to use angle *QPS* with angle *y* to sum to this total.

Question 12

Part (a)(i) was well answered. In parts (a)(ii) and (b) it was clear students did not properly understand the meaning of "term". This was evidenced by statement involving algebra, "*n*th term", "*n* –5" and numbers not relating to the sequence given in the question.

Question 13

Many students added up the numbers that they saw on the diagram to get an answer of 26. Many more managed to score at least one mark on this question as they identified the length of one of the missing sides, usually on the diagram. For some reason finding 2cm was much more prevalent than finding 6cm. Some then forgot to find the missing length of 6cm leading to an answer of 28. The majority understood the meaning of perimeter, but some divided the shape into rectangles and added together the perimeter of both rectangles. The other common mistake was trying to find the area.

Question 14

In part (a) most students understood the need to collect like terms and it was often done successfully. If full marks were not awarded, students usually achieved one method mark, usually for the $5x$.
The negative sometimes caused problems when collecting the *y* terms. Common errors seen included $6xy$ and $5x^2 \pm y^2$.
Part (b) was well done by many with the answer 3 on the answer line, though a formal algebraic approach was not seen very often, students preferring to show $22 - 7 \div 5$. Some showed "–7" written by the equation but this was not credited unless the next stage was shown by, for example, writing $5p = 15$. Few attempted to divide by 5 as their first step. The most common incorrect answer seen was 10 from subtracting the 5 and 7 from 22.

Question 15

There were some good attempts at this question, encouraging since there were several steps needed to get to the answer: division to get the number of packs and rounding 7.5 to 8 before calculating the cost. Conclusions were well stated. The common error was to work out the individual cost of the batteries in each shop and then find the cost of 30 which clearly demonstrated misunderstanding about the packs.

Part (b) was usually well stated with 'No' and a clear reason. Most calculated the cost of 30 individual batteries of £12 and £13.50 and stated 'No, shop A is still cheaper'.

Question 16

In part (a) the majority wrote the correct answer on the answer line. Some went on to convert their answer to a decimal which was unnecessary. It was also pleasing to see most students using the

correct notation for probability with only a minority using the incorrect notation of a ratio. Of those not gaining both marks, most earned M1 for $\frac{5}{n}$ or $\frac{m}{11}$.

In part (b) a common incorrect answer was 0.3, but the majority of students gave the correct answer of 0.7, which was sometimes written as an equivalent fraction.

Question 17

The majority of students attempting this question gained full marks. There were many who gained 1 mark for drawing only one 6cm line correctly, though quite a few struggled to draw an accurate isosceles triangle. Though they were not required in this question, there was very little evidence of construction lines/arcs drawn; it seemed most measured using their rulers.

Question 18

Many students secured one mark for providing an accurate conversion using the graph. However, others drew lines on the graph, not always correctly, but failed to take any accurate readings from these. Of those that did, most went on to complete the method, but many of these confused their $ with £ and so lost the method mark. Other students chose to take their initial reading near the origin, for instance using £5 = $6, which by the time they had multiplied it up to $345 was too inaccurate to give an answer within the range allowed. There was some misunderstanding of the scale on the $ axis, with some students assuming 1 small square = $1

Question 19

In part (a) to achieve both the marks, students needed to understand through proportional reasoning that the number of tuna sandwiches represented 40% of the total sold. Many students were not able to demonstrate this and as such scored no marks. There were some who adopted a bar modelling approach e.g. stating 40% = 56 so 20% = 28, and adding 56 + 56 + 28.

Part (b) was answered slightly better, but still demonstrated that students need more practice of ratio and proportion. Where students showed some understanding of what was required but chose to use a percentage of 18 to scale up were often not able to achieve a solution that was accurate enough.

Question 20

Students that were able to demonstrate some understanding of the context were rewarded with one of two process marks if they able to sum the total of money (200) that Akhtar, Ben and Carl had without the £10 notes or used the mean amount to calculate the total of all the money (240). After scoring one or two process marks there was a variable understanding of how to use these values to solve the problem. Of those who made mistakes many appreciated that the answer had to be an integer and rounded their mistakes rather than reflecting that there had to have been an error and a further check of their work was needed.

Question 21

Part (a) was answered well, with many students gaining the mark. The most common incorrect answer was $\frac{25}{50}$, a probability statement rather than a statement of the number of times.

In part (b) some students thought that the answer was Paula because "10 times was enough" as her approach was quicker. Lots of students had the right idea that the more trials, the more reliable your results, but some failed to actually say "Simon, because…" A common mistake was just talking about 100 throws and not making comparisons.

Question 22

This question was attempted by most students but very few correct plan views were seen. Most students incorrectly drew a net or a side elevation involving a square with a triangle attached. Out of the ones who scored any marks, most scored one mark for a square with sides 6cm, but without the diagonals drawn.

Question 23

Part (a) was not well answered. n^{15} was a common incorrect answer.

In part (b) c was usually shown correctly (frequently written as c^1 but often paired with d^4). Most achieved one mark for c or (less likely) d^3. There were a significant number of correct values for c found from an incorrect method.

In part (c) many students were unsure where to start and a common incorrect answer given was $2.5x > 7$. Of those students who did start to approach the question correctly, many ignored the inequality sign throughout the process getting $x = 2.8$ or $x = \frac{14}{5}$ and as a result could not gain the accuracy mark.

Question 24

Most students attempted this question but very few achieved full marks. The distance, speed, time triangle did not help in this question; students always seem to make more errors at this level when using it rather than taking an everyday approach to the problem. Some added the distances together and the speeds together then divided by 2. Quite a few students gained one mark, but more students gained two marks for finding the times as decimals and adding the two times but failing to convert the times correctly and ended up with 2 hr 75 mins or 3 hr 15 mins which were the most common answers seen.

Question 25

Error intervals remain a weakness and was poorly attempted. Some were able to correctly give 9.35 but rarely gave 9.45; a few 9.44 but not 9.4499...

Question 4

A very well answered question, although incorrect answers of 30 and 320 were common.

Question 27

Only a few students correctly found either bound for the length of the pencil; 7.1 and 7.2 or 7.3 were the best of the sensible incorrect attempts.

Question 12

It was pleasing to see that a high proportion of students gained full marks on both parts of this question.

A common incorrect answer to part (a) was 0.9156… from $\frac{\sqrt{13.82}}{4.06}$ i.e., failing to square root the whole calculation, this gained no marks.

The students that wrote down intermediate stages in their calculations could gain a mark for their working eg $\sqrt{13.82} = 3.717…$.

Some students lost the mark for part (b) by writing 1.8, rather than 1.84. It was pleasing to see that many students gained the mark in part (b) by correctly rounding their answer, even if incorrect, from part (a).

Question 24

Many students made a correct first step of 2400 ÷ 8 = 300 but then misunderstood the subsequent value as 300 minutes rather than 300 lots of 1 minute and 40 seconds. Conversions involving time caused problems for the majority of students who went on to multiply 300 by 1.4 rather than multiplying by 1.666666 to reach the value of 500. A few struggled to work with 2.2 gallons, even on calculator paper. A significant number multiplied 4.54 by 2 (instead of 2.2), some then trying to adjust their answers by adding on values such as 0.2, but by this stage marks were lost. Use of 2 rather than 2.2 was incorrect processing as this figure was given in the question. The different types of units involved within the question often overwhelmed students who were then unsure of the resultant units they were dealing with. Solutions to this problem were often very disorganised; examiners found it quite difficult to follow the working whist searching to see if credit could be given.

Question 15

In part (a), either the concept of estimation seems to be poorly understood at this level or students are increasingly not reading questions carefully enough, but it was very common for students to attempt to find the exact product of the two given values. This gained no credit at all.

Unfortunately, in part (b), many students used long multiplication techniques to find the value of 29.6×32, often making arithmetical errors along the way. Some, perhaps thinking this part was similar to the previous part, estimated the result, working out $30 \times 30 = 900$. This would have been an ideal approach in order to find the relative size of the answer but alone gained no credit.

Question 1

A good accessible start to the paper with a question, that was well answered with most students scoring the mark.

Question 23

This error interval question was not well answered by students. Most students had an idea of what was being asked but struggled to find the upper and lower bounds due to not considering the place value of the initial value.
The most successful answers were often those where a number line was drawn with the nearest metres shown and subsequently identifying where the bounds would be.

In addition to blank responses, common errors included giving the values as 89 and 90, 85 and 95, 85.5 and 95.5 or 89 and 91. Finding 89.5 as the lower bound was seen as a single answer and awarded a mark more often than finding the upper bound.

To improve student outcomes, centres should encourage students to use a number line method where the number to add or subtract is half the degree of accuracy asked for. Students would also benefit from having a better understanding of inequality notation.
It is also worth reinforcing that numbers are not always rounded to the nearest 10.

Question 24

It was pleasing to see that the many students were able to at least begin this multi-step problem involving area and proportion, with many gaining marks on this question.
Most students were able to work out the area of the field at festival B and score the first mark, with many then continuing to use proportion correctly. Two or three marks were often awarded to students who were able to find the available area per person for each field, with many then continuing to complete the solution and gain full marks. However, a larger than expected number of students were unable to progress any further once they had found the area available at Festival B, with common mistakes being to subtract or divide the two areas rather than using proportionality. The final mark was occasionally lost due to arithmetic errors but the amount of working shown was pleasing to see.

Part (b) of this question was demanding for most students. This type of question is a specification requirement and, as with previous years, the conversion of units of area proved not to be well known. For this example some students did have the notion that the squared term was involved but mistakenly wanted to square the 3 as well giving the popular incorrect value of 90000 or 9. Others said that you had to use 100×100 but said this was to multiply by 1000. This is a contradiction and as such so no marks were awarded. Students should be encouraged to check for contradictions in their explanations.

Question 18

In part (a) most students were able to correctly round to 2 significant figures if they attempted the question, but a common incorrect response was 25 showing they thought 2 significant figures meant the first 2 digits.

Part (b) was answered less successfully than part (a). Some incorrect responses included

0.1, 0.08, 0.0900 and 1, showing the students were less confident dealing with smaller numbers rather than larger ones.

Question 25

Both parts of this question proved challenging for this cohort with very few gaining any marks at all.

In part (a) students did not seem to know what to do so a lack of understanding of the term reciprocal would seem to be the problem here

In part (b) the use of the term significant figures seem to pose more of a challenge then when this type of question is set around decimal places.

Students would benefit from being given examples of mathematical terms they need to know and practice in rounding to a fixed number of significant figures as often as they round to a given number of decimal places.

Question 4

The main error here was when candidates thought they had to round up to 20.

Question 11

The modal answer in part (a) was the correct answer 248 but a great many students showed a complete inability to compute this subtraction accurately. Answers of 252, 352 and 348 were very common. A mark was often obtained by writing out the subtraction even if the technique was poorly executed.
In part (b) many students insisted on trying to find the exact cost of the 696 tickets and consequently spent an inordinate amount of time following long multiplication processes. This life skill of estimating calculations is clearly an area that needs to be addressed. The numbers in the question are chosen to encourage, in this case, rounding up to values of 300, 400, 10 and 20 enabling the calculation to be straightforward. Those that did this usually gained the mark in part (c) for a correct reason for their answer being an overestimate. Some candidates thought rounding to the nearest 10, 100 etc explained that they had rounded up. Many students correctly said it was an overestimate but followed it up saying it had been rounded to the nearest whole number.

Question 1

A good accessible start to the paper with this question being well answered most students scoring the mark.

Question 18

It was very pleasing to see that the majority of students could gain full marks in part (a). When full marks were not awarded, the most likely score was zero and was often due to a range of approaches being attempted. Most students chose to divide 180 by 12 and then multiply by 3. Occasionally a student would try a build-up method of 12 cans cost £3, 24 cans cost £6 etc. Unless completely correct, this approach rarely scored partial marks.
The addition of an extra measure alongside money when using proportion appeared to cause great difficulty for many students in part (b). Fully correct solutions were rare in comparison

with part (a) and many more students demonstrated a choice of approaches, often simply trying to make use of the values in the question using a range of operators. Of the students who correctly showed that each can cost 29p, many then struggled to know how to use this to calculate the cost of a proportion of the can, with many simply dividing by 3 as they thought 100 was a third of 330 ml. Whilst some students got as far as 0.088... or 0.09, unfortunately the accuracy mark was often lost for leaving their answer in pounds when it was requested in pence. Centres should encourage students to read the question again at the end of their calculations to ensure the final answer is given in the correct units or to the required level of accuracy.

Question 26

The majority attempted the question and but very few fully correct answers were seen. Of the students who gained partial marks for finding one correct value, usually 12.65, it was common to provide the incorrect upper bound of 12.74. In addition to blank responses, whole number answers of 12 and 13 or 12.6 and 12.8 were often seen as incorrect values that gained no credit. The most successful answers were often those where a number line was drawn showing 12.6 to 12.8 and subsequently identifying where the bounds would be. Therefore, to improve student outcomes, centres should encourage students to use a number line method where the number to add or subtract is half the degree of accuracy asked for. Students would also benefit from having a better understanding of inequality notation.

Question 14

Failing to understand what the question was asking and a lack of working both contributed to this being a poorly answered question. Many candidates started the process with quantity divided by cost, thus finding 20 boxes per £1 and 27 bags per £1. They were then unable to progress any further, usually calculating 27 – 20 to arrive at the common incorrect answer of 7p. Those who started with cost divided by quantity nearly all gained a mark for showing 0.05 or 5 for one box. For the bag, when candidates failed to show working and only gave the figure 0.03 or 0.04 their penalty was the eventual loss of an accuracy mark, at the very least. Examiners needed to be able to see where the 0.03 or 0.04 came from in order to award marks for working. Those who did show their calculations up to this stage often did not show the subtraction and struggled with using the correct units, getting no further than 0.01296, 0.013, 0.02, 2, 0.01 or 1p thus losing the accuracy mark.

Question 21

A large proportion of candidates were able to secure a mark for commencing this problem by taking into consideration the two cups of coffee by doubling one of the other stated values, or by multiplying by 10.6 to take into consideration the amount of coffee required for one cup of coffee. These two steps could have been completed after working with the proportion of the 800 people (68%) that would drink coffee. In order to progress with this problem, candidates had to work with the 68% and in most cases, this was completed by working out how many people this was. Although they could use calculators for this paper, a significant number of candidates chose to compute this by demonstrating a build-up method. When this was done correctly, most went on to arrive at the correct solution of 11532.8. Where candidates did not show all stages of their working and simply stated correct and incorrect percentage values that they then added, no marks or no further marks were able to be awarded. Generally, partitioning methods frequently led to error, but those using a more direct approach, typically by multiplying by 0.68, usually went on to work the percentage out correctly.
In part (b) responses of "there will not be enough coffee" or "more coffee will be needed" or similar equivalent responses were rewarded with the communication mark. Some candidates chose to recalculate the problem and chose to work out the new total of people drinking coffee or the new weight of coffee required. When they did this correctly this also secured this last mark. Candidates should be encouraged to generalise so that they do not have to complete additional unnecessary work, particularly when there was only one mark to be gained. It was encouraging to see many correct responses to this part.

Question 25

There was mixed success with this question. The majority of students successfully started this question by dividing 67205600 by 11.9 to find the number of seconds, thereby gaining P1, but were then unable to convert this to days. Few students calculated $60 \times 60 \times 24$ separately and the minority of students who successfully went on to find the correct answer often did the conversion to days in stages. Common errors in the time conversion were to omit one or more of the numbers, or to multiply when they should have divided and vice versa. Some students saw the m^3 and incorrectly surmised that they needed to cube 11.9.

Question 26

It was common to see students gain the first method mark for rounding one of the figures appropriately, 6 or 8 on the numerator being seen most often. The majority then struggled with the next step which was to carry out an accurate calculation. Some were able to reach the digits 16, from attempting $48 \div 0.3$ but resulting in incorrect place value. Some students attempted to work out the accurate calculation and then round the answer, gaining no marks. A few students were able to deal with the decimal value of 0.3 in the denominator by multiplying both the top and bottom of their fraction by 10. This is a useful skill for centres to continue teaching their students but in general dividing by decimals is a skill that needs more practice. Some students rounded 0.26 down to 0 which led to $48 \div 0$ and were confused with what to do with the calculation.

Question 28

This multi-step question required the use of a variety of skills being combined to solve a problem and appeared to be very challenging to a large number of students. Whilst many students knew they needed to find the volume, only a very few students were able to correctly

calculate this, with many simply multiplying the radius by the height or the circumference by the height. Converting cm^3 to litres or 0.47 litres to cm^3 was generally only seen in fully correct responses. The final skill of working with a flow rate was often the only mark being awarded, namely for [volume] ÷ 0.47 to find the time taken. However, a large number multiplied by the flow rate rather than divided.

Question 2

This question was well answered with most candidates correctly rounding off to obtain 8100. The most common error was to round off to the wrong place value, normally to the nearest 1000 leading to 8000 as an answer. Several wrote 100 rather than 8100.

Question 1

Candidates were generally able to write 18475 to the nearest thousand correctly. Common errors were giving the answer 19000, rounding to the nearest 10000 (answer 20000) or loss of the place value with an answer of 1800. Some candidates incorrectly gave an answer of 8000 as rounded to the nearest 1000.

Question 24

This question differentiated well between candidates. The estimation of the cost of fuel had two aspects that students needed to achieve – estimation and the calculation of cost. Where candidates were able to get full credit for this question they worked with a value correctly rounded to 1 significant figure and used a correct process to find an estimate of the total cost of fuel. The most common complete processes were $500 \div 10 \times 0.8 = 40$ and $510 \div 10 \times 0.8 = 40.8$, although some struggled to accurately evaluate their calculation due to arithmetic errors often in calculations working with decimals (0.8 or 0.81). A significant minority of candidates chose to round 0.81 euros to 1 euro which allowed for 2 marks to be awarded if used in a complete correct process. Some candidates worked with a value rounded to 1 significant figure in an incomplete or incorrect calculation and gained 1 mark. A common error was to attempt to work accurately with the values in the question before rounding the answer, where a correct process was used this could gain 1 mark.
In part (b) candidates were asked whether their answer was an overestimate or an underestimate. Less than half of the candidates were able to give a decision that was consistent with their calculation in part (a) together with a reason that related to rounding up or rounding down. Some incorrectly referred to their rounding of the final answer.
Where candidates rounded 513 and 0.81 down they were expected to indicate underestimate in (b) together with reference to rounding down. Where candidates rounded 0.81 to 1 and worked with 513 then overestimate and an indication of rounding up was required. Where a candidate chose to round 513 to 500 and 0.81 to 1 then credit was awarded in (b) for either indicating that the answer was an overestimate as they had rounded 0.81 up more than 513 had been rounded down (in relative terms) or that they could not tell if it was an overestimate

or an underestimate as one value had been rounded up and the other rounded down. Many that rounded km down and euros to 1, only referenced rounding euros up in their explanation.

Question 28

A significant number of this cohort gained 0 marks on this question. It is clear that many did not know the formula for the volume of a cylinder. Of those that did not gain 0 marks, gaining 1 mark for [volume] ÷ 250 was often seen, with the most common incorrect volume used being 3000. Success beyond 1 mark was rarely seen and a minority of students were able to go on and gain 4 marks for a correct answer in the range 62 to 63.

Question 23

This question saw very few learners scoring 2 marks. Some were able to gain one correct limit, usually 10.2. There were a variety of incorrect answers with 10.15, 10.25 being the most common.

Question 24

Some were able to work with trigonometry correctly, those that produced a correct trigonometric statement or equation generally went on to gain 2 marks; a small number had the correct method but prematurely rounded their answer to 14, without first seeing an answer in range this was awarded M1A0. Many attempts to use Pythagoras were seen.

Question 10

Learners were generally confident at rounding to the nearest 1000 and were able to identify that 23619 to the nearest 1000 is 24000. Incorrect answers, when seen, included 23620 (rounding to the nearest 10), 23600 (rounding to the nearest 100), 23000 (truncating to 1000s) or 20000 (rounding to the nearest 10000).

Working out an estimate to the calculation 5.9×98.1 was often answered successfully. Learners chose from a range of the acceptable calculations given in the mark scheme, with 6×100 and 5.9×100 being very commonly seen and almost universally correctly evaluated. The estimation of 6×98 was also commonly seen but there were more errors in evaluation in this case. Some learners began by working with one of the acceptable estimated calculations but then subtracted additional products after the rounded calculation in an attempt to reach a more accurate value, this was accepted for 1 mark unless one of the acceptable estimations was reached as their final answer. Use of 5 as an estimate for 5.9 was not accepted, but this was often seen in a calculation that gained credit for use of 100 or 98. The most common incorrect answer was to attempt to work the given calculation out accurately, this was sometimes followed by rounding the answer obtained.

Question 26

This question required the use of trigonometry to find the size of an angle and a correct trigonometric statement was needed for the M mark to be awarded. An answer between 60.2 and 60.42 allowed for both marks to be awarded to reward responses that were substantially correct other than a small amount of premature rounding. Incorrect or incomplete attempts included work with Pythagoras' Theorem, or measurement of the angle using a protractor, and gained no marks, as did incorrect trigonometry work using tan, often muddling the 7 and 4 using $4 \div 7$ rather than $7 \div 4$. Some responses showed addition or multiplication of the given lengths of the triangle, sometimes seen in calculations that also involved 90 or 180, and these also gained no credit.

Question 26

To gain 2 marks, responses needed two correct bounds, 23.75 and 23.85. If 2 marks were not gained, 1 mark was often awarded for one correct bound, usually 23.75. It was common to see e.g. 23.84 or 23.849 for the upper bound; it should be noted that for the upper bound, 23.8499(9...) (e.g. minimum of two 9's) or $23.84\dot{9}$ (recurring symbol needed) were both accepted but 23.849 was not. Common incorrect answers for 0 marks included 23.7 / 23.9 and 23 / 24.



Examiners' Report
Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 3F

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GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 3

Introduction

The overall quality of the presentation of work was good. However, students need to read the questions carefully. There remain a concerning number of cases where students copy down the wrong figures from the question, mis-copy their own figures, or round figures almost randomly. Equally another error sometimes occurs when students prematurely round or truncate figures, either their own figures or figures from the calculator, which usually result in lost accuracy marks and could also make questions more difficult than they were designed to be.

Approaches to questions that required some interpretation or explanation were inconsistent. Questions 10 and 21 were answered well, but poor attempts were made in questions 15 and 26. On too many occasions students included contradictory or incorrect statements, which cannot be credited.

Within a broad range of questions, the paper was able to discriminate well. Weakest areas continue to be the application of ratios, scales and rates, but also algebraic manipulation and problem solving. Most demonstrated good use of a calculator, though on some occasions it was clear that they did not have an understanding of the way in which their calculator worked or did not have one at all, such as in question 9.

Questions which had a slightly unexpected approach, that is required more thought, caused immediate problems for many, even in the earlier part of the paper. This includes questions 18, 20 and 24. Question 25 to 29 were the more challenging questions for those striving to demonstrate ability at the highest grades available, and a significant proportion of students therefore failed to score on these questions.

There were far fewer attempts using trial and improvement approaches. These mainly occurred when students showed evidence of not having a calculator, mainly evident in questions 15, 18, 19 and 20 where non-calculator methods were also seen, such as multiple additions.

The inclusion of working out to support answers remains an issue for many; but not only does working out need to be shown, it needs to be shown legibly, demonstrating the processes of calculation that are used. This is most important in longer questions, and in “show that” questions.

Report on Individual Questions.

Question 1

This was a poorly answered question. Most students gave the correct answer of 3 but 300, 30 and 3000 were frequently seen.

Question 2

A well answered question with nearly all giving the correct answer of 8.

Question 3

This was not always answered correctly.

Question 4

There were few incorrect answers in this question.

Question 5

This was very well answered with few failing to gain the mark. The most common error was the absence of one of the numbers.

Question 6

A very well answered question. There were a few who gave the answer of 4 to part (a).

Question 7

Students were generally very successful with this question with most obtaining full marks. Those achieving partial marks tended to mis-read the shaded section and recorded the fraction unshaded instead leaving their answer as $\frac{1}{4}$. A significant minority failed to give their answer in its simplest form, usually leaving the answer as $\frac{12}{16}$.

Question 8

This question was generally well done with the majority dividing 200 by 25 (some with multiple additions of 25) and then completing the process of 9.75 × 8 and giving the correct answer 78. Some students preferred to list eight lots of £9.75. The most common errors were students multiplying the cost by 200 or by 25.

Question 9

Parts (a) and (b) were not always answered correctly, with students having difficulty with the order of operations on their calculators.

It was rare to see any correct answers to part (c). Knowing the meaning of the term “reciprocal” is clearly a weakness in students.

Question 10

Most students got the marks in parts (a) and (b).

In part (c) students were able to explain that the drop in the first 3 minutes was steeper than the last 3 minutes. Some struggled to articulate this and some forgot to agree and imply that Pam was correct. There were a wide variety of values presented by students, although this question assessed the interpretation of the graph rather than the accuracy of reading values. Students generally used suitable values to explain their reasoning. Some students didn’t use the graph at all but tried to explain that water cools more quickly when it is hotter.

Question 11

Many responses achieved full marks. Many managed to use the fact that angles in a quadrilateral sum to 360 or found the angle on the straight line to *y* was 70 degrees and score one mark. Not all students who correctly calculated angle *PSR* were able to complete this question correctly, deciding to go off in all sorts of related incorrect calculations. Some of the weaker students knew that angles on a straight line totalled 180° but chose to use angle *QPS* with angle *y* to sum to this total.

Question 12

Part (a)(i) was well answered. In parts (a)(ii) and (b) it was clear students did not properly understand the meaning of "term". This was evidenced by statement involving algebra, "*n*th term", "*n* –5" and numbers not relating to the sequence given in the question.

Question 13

Many students added up the numbers that they saw on the diagram to get an answer of 26. Many more managed to score at least one mark on this question as they identified the length of one of the missing sides, usually on the diagram. For some reason finding 2cm was much more prevalent than finding 6cm. Some then forgot to find the missing length of 6cm leading to an answer of 28. The majority understood the meaning of perimeter, but some divided the shape into rectangles and added together the perimeter of both rectangles. The other common mistake was trying to find the area.

Question 14

In part (a) most students understood the need to collect like terms and it was often done successfully. If full marks were not awarded, students usually achieved one method mark, usually for the $5x$.
The negative sometimes caused problems when collecting the *y* terms. Common errors seen included $6xy$ and $5x^2 \pm y^2$.
Part (b) was well done by many with the answer 3 on the answer line, though a formal algebraic approach was not seen very often, students preferring to show $22 - 7 \div 5$. Some showed "–7" written by the equation but this was not credited unless the next stage was shown by, for example, writing $5p = 15$. Few attempted to divide by 5 as their first step. The most common incorrect answer seen was 10 from subtracting the 5 and 7 from 22.

Question 15

There were some good attempts at this question, encouraging since there were several steps needed to get to the answer: division to get the number of packs and rounding 7.5 to 8 before calculating the cost. Conclusions were well stated. The common error was to work out the individual cost of the batteries in each shop and then find the cost of 30 which clearly demonstrated misunderstanding about the packs.

Part (b) was usually well stated with 'No' and a clear reason. Most calculated the cost of 30 individual batteries of £12 and £13.50 and stated 'No, shop A is still cheaper'.

Question 16

In part (a) the majority wrote the correct answer on the answer line. Some went on to convert their answer to a decimal which was unnecessary. It was also pleasing to see most students using the

correct notation for probability with only a minority using the incorrect notation of a ratio. Of those not gaining both marks, most earned M1 for $\frac{5}{n}$ or $\frac{m}{11}$.

In part (b) a common incorrect answer was 0.3, but the majority of students gave the correct answer of 0.7, which was sometimes written as an equivalent fraction.

Question 17

The majority of students attempting this question gained full marks. There were many who gained 1 mark for drawing only one 6cm line correctly, though quite a few struggled to draw an accurate isosceles triangle. Though they were not required in this question, there was very little evidence of construction lines/arcs drawn; it seemed most measured using their rulers.

Question 18

Many students secured one mark for providing an accurate conversion using the graph. However, others drew lines on the graph, not always correctly, but failed to take any accurate readings from these. Of those that did, most went on to complete the method, but many of these confused their $ with £ and so lost the method mark. Other students chose to take their initial reading near the origin, for instance using £5 = $6, which by the time they had multiplied it up to $345 was too inaccurate to give an answer within the range allowed. There was some misunderstanding of the scale on the $ axis, with some students assuming 1 small square = $1

Question 19

In part (a) to achieve both the marks, students needed to understand through proportional reasoning that the number of tuna sandwiches represented 40% of the total sold. Many students were not able to demonstrate this and as such scored no marks. There were some who adopted a bar modelling approach e.g. stating 40% = 56 so 20% = 28, and adding 56 + 56 + 28.

Part (b) was answered slightly better, but still demonstrated that students need more practice of ratio and proportion. Where students showed some understanding of what was required but chose to use a percentage of 18 to scale up were often not able to achieve a solution that was accurate enough.

Question 20

Students that were able to demonstrate some understanding of the context were rewarded with one of two process marks if they able to sum the total of money (200) that Akhtar, Ben and Carl had without the £10 notes or used the mean amount to calculate the total of all the money (240). After scoring one or two process marks there was a variable understanding of how to use these values to solve the problem. Of those who made mistakes many appreciated that the answer had to be an integer and rounded their mistakes rather than reflecting that there had to have been an error and a further check of their work was needed.

Question 21

Part (a) was answered well, with many students gaining the mark. The most common incorrect answer was $\frac{25}{50}$, a probability statement rather than a statement of the number of times.

In part (b) some students thought that the answer was Paula because "10 times was enough" as her approach was quicker. Lots of students had the right idea that the more trials, the more reliable your results, but some failed to actually say "Simon, because…" A common mistake was just talking about 100 throws and not making comparisons.

Question 22

This question was attempted by most students but very few correct plan views were seen. Most students incorrectly drew a net or a side elevation involving a square with a triangle attached. Out of the ones who scored any marks, most scored one mark for a square with sides 6cm, but without the diagonals drawn.

Question 23

Part (a) was not well answered. n^{15} was a common incorrect answer.

In part (b) c was usually shown correctly (frequently written as c^1 but often paired with d^4). Most achieved one mark for c or (less likely) d^3. There were a significant number of correct values for c found from an incorrect method.

In part (c) many students were unsure where to start and a common incorrect answer given was $2.5x > 7$. Of those students who did start to approach the question correctly, many ignored the inequality sign throughout the process getting $x = 2.8$ or $x = \frac{14}{5}$ and as a result could not gain the accuracy mark.

Question 24

Most students attempted this question but very few achieved full marks. The distance, speed, time triangle did not help in this question; students always seem to make more errors at this level when using it rather than taking an everyday approach to the problem. Some added the distances together and the speeds together then divided by 2. Quite a few students gained one mark, but more students gained two marks for finding the times as decimals and adding the two times but failing to convert the times correctly and ended up with 2 hr 75 mins or 3 hr 15 mins which were the most common answers seen.

Question 25

Error intervals remain a weakness and was poorly attempted. Some were able to correctly give 9.35 but rarely gave 9.45; a few 9.44 but not 9.4499...

Question 26

Many were able to secure the first process mark for finding the area of one of the lawns (45 m^2 or 140 m^2) or the amount of seed available (10kg) but did not proceed any further with many reasoning incorrectly that if 3kg covered 5 × 9 area, then 6kg would cover 10 × 18, more than is needed. Other students were successful in gaining the second process mark mainly for the coverage of 1 kg of grass seed ($15m^2$). The most successful approaches seen where students were able to reach the correct conclusion were finding the amount of grass seed needed (9.3…kg) and comparing it with 10kg or finding the area that could be seeded with 10kg ($150m^2$) and comparing it with $140m^2$.

Part (b) required reasoning supported by correct figures and as a result, students were not successful in gaining many marks.

Question 27

Part (a) was generally answered well, and most students were able to write at least two correct probabilities on the tree diagram, sometimes writing these as equivalent fractions of $\frac{2}{4}$2/6 and 4/6. Some students chose to try to use decimals for this problem but were not able to score any marks due to inaccurate approximations of $\frac{1}{3}$.

Having perhaps achieved one or both marks in part (a) many students lacked the knowledge that they needed to select the correct branches and multiply the fractions together and the few that did were rewarded with the marks in part (b).

Question 28

There were very few correct answers in part (a). There seemed little evidence of an understanding that the solutions could be read from the graph. A significant number attempted an algebraic solution, but their algebraic abilities were insufficient for such a task.

In part (b) there were a few who got full marks but for those who knew to read from the intercepts often included 2 with 0.6 and 3.4. Some spoilt their answers by writing the two values as coordinates. Other errors included those who attempted to substitute values into the equation, then plot the points on the graph, using algebraic solving/factorising methods or stating the *y* value at the minimum point.

Question 29

Many started off knowing that they needed to multiply the dimensions 6, 4 and 10 but many failed to take into account that the end shape was a triangle and division by 2 was required. The biggest failing, after calculating the volume correctly, was to divide by 0.8 getting the answer 150. For those students that only omitted division by 2 there was a special case mark for the answer of 192.

Summary

Based on their performance on this paper, students should:

- accurately transcribe figures taken from the question, and taken from their own work
- avoid rounding or truncating answers, and to use the most accurate values in subsequent calculations
- ensure that their work is legible for examiners to consider awarding marks. For example, avoid any possible confusion when writing 1s and 7s, when writing 4s and 9s, and even when writing 0s and 6s.
- ensure that they include working out to support answers
- work on algebraic manipulation and derivation, and application of ratios, scaling and rates in preparing for future examinations.
- learn the meaning of technical terms such as “reciprocal”, the “term” of a sequence and error intervals
- continue to need practise answering response type questions where a written explanation is required.

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