

Wordy problems 2 mark scheme

Qn	Working	Answer	Mark	Notes
1	$2 \times 462 + 251$ $=1175,$ $0.95 \times 1175 = \text{£}1116.25$ $2 \times 485 + 218$ $=1188,$ $1188 - 75 = \text{£}1113.00$	Jetstream	5	<p>M1 for identifying correct costs for either Highway Airlines or Jetstream Airlines</p> <p>M1 for attempt to calculate the costs for the family eg $2 \times 462 + 251$ or $2 \times 485 + 218$</p> <p>M1 for a correct method to work out the discount for one company eg 0.95×1175 or 0.05×1175 or $1188 - 75$ oe</p> <p>A1 for (£)1116.25 and (£)1113.00</p> <p>C1 (dep on M1) calculations clearly identified with each airline and correct decision from their figures</p>
2	<p>(i) 20, 40, 60 12, 24, 36, 48, 60</p> <p>$20 = 4 \times 5 = 2 \times 2 \times 5$ $12 = 4 \times 3 = 2 \times 2 \times 3$</p> <p>(ii)</p>	<p>3 and 5 or any multiple of 3, 5</p> <p>60</p>	4	<p>M1 attempts multiples of both 20 and 12 (at least 3 of each shown but condone errors if intention is clear) or identifies 60 or a multiple of 60</p> <p>M1 (dep on M1) for a division by 20 or 12 or counts up ‘multiples’ or identifies a common multiple (implied if one answer is correct or answers reversed)</p> <p>A1 cheese slices (packets) 3, burgers (boxes) 5 or any multiple of 3, 5</p> <p>OR</p> <p>M1 for expansion of either 20 or 12 into factors M1 for demonstration that both expansions include 4 (or 2×2)</p> <p>A1 cao for cheese slices (packets) 3, burgers (boxes) 5</p> <p>B1 for 60 or ft from their correct answer in (i) or ft ‘common multiple’</p>

Qn	Working	Answer	Mark	Notes
3	<p>40, 80, 120 15, 30, 45, 60, 75, 90, 105, 120</p> <p>$40 = 2 \times 2 \times 2 \times 5$ $15 = 3 \times 5$</p>	<p>3 and 8 or any multiple of 3, 8</p>	3	<p>M1 for multiples of both 40 and 15 (at least 2 of each shown but condone errors if intention is clear) or for 40×15</p> <p>M1 (dep on M1) for a complete method to find a common multiple of 40 and 15, eg. 120, 240, 600 condoning one arithmetic error in any lists of multiples shown</p> <p>A1 for 3, 8 or any multiple of 3, 8</p> <p>OR</p> <p>M1 for factors 2,2,2,5 and factors 3,5</p> <p>M1 (dep on M1) for a complete method to find a common multiple of 40 and 15</p> <p>A1 for 3, 8 or any multiple of 3, 8</p>
4		<p>No, temp is 25°C</p>	3	<p>M1 for substitution of 77 into the RHS of the formula</p> <p>A1 for 25 cao or for $225/9$ and $180/9$ cao</p> <p>C1 (dep on M1) for conclusion (ft) following from working shown</p> <p>OR</p> <p>M1 for substitution of 20 into LHS of formula and correct process to find F</p> <p>A1 for 68 cao</p> <p>C1 (dep on M1) for conclusion (ft) following from working shown</p>

Qn	Working	Answer	Mark	Notes
5		blue paint 5 white paint 4	5	<p>M1 attempts multiples of either 12 or 15 (at least 3 but condone errors if intention is clear)</p> <p>M1 attempts multiples of both 12 and 15 (at least 3 but condone errors if intention is clear)</p> <p>M1 (dep on M1) for a division of 60 by 12 or 15, or counts up “multiples” or answer blue : white in the ratio 5 : 4</p> <p>A1 blue paint 5; white paint 4</p> <p>OR</p> <p>M1 correct expansion of either number into factors</p> <p>M1 correct expansion of both number into factors</p> <p>M1 (dep on M1) demonstrates two expansions that include 3 oe</p> <p>A1 blue paint 5; white paint 4</p>

Qn	Working	Answer	Mark	Notes
6		Yes (supported)	5	<p>M1 for method to calculate profit on one laptop e.g. 400×0.3 oe (= 120) or 400×0.15 oe (= 60)</p> <p>M1 for method to calculate selling price of one of the two deals e.g. 400×1.3 oe (= 520) or 400×1.15 oe (= 460)</p> <p>M1 for method to calculate the total selling price of one laptop e.g. $40 \times 400 \times 1.3$ oe (= 20 800) or $10 \times 400 \times 1.15$ oe (= 4600)</p> <p>M1 for total income e.g. “20 800” + “4600”</p> <p>C1 for Yes and (£)25 400 or Yes with £400 more</p> <p>OR</p> <p>M1 for a method for the profit on one laptop e.g. 400×0.3 oe (=120) or 400×0.15 oe (= 60)</p> <p>M1 for a method for the total profit for one of the two deals e.g. $40 \times “120”$ (= 4800) or $10 \times “60”$ (= 600)</p> <p>M1 for a method for total profit “4800” + “600” (= 5400)</p> <p>M1 for a method for target profit e.g. $25\ 000 - 400 \times 50$ (= 5000)</p> <p>C1 for Yes with (£)5400 and (£)5000 or Yes with £400 more</p> <p>OR</p> <p>M1 for a method for the profit on one laptop e.g. 400×0.3 oe (= 120) or 400×0.15 oe (= 60)</p> <p>M1 for a method for the total profit for one of the two deals e.g. $40 \times “120”$ oe (= 4800) or $10 \times “60”$ (= 600)</p> <p>M1 for $50 \times 400 + “4800”$ or $50 \times 400 + “600”$</p> <p>M1 for $50 \times 400 + “4800” + “600”$ (= 25400)</p> <p>C1 for Yes and (£)25 400 or Yes with £400 more</p>

Qn	Working	Answer	Mark	Notes
7		4	4	<p>M1 for $200 \div (1 + 9) (= 20)$ M1 for $750 \div 20 (= 37.5)$ $\frac{11}{15}$ A1 for 3.7(3....) or $3\frac{11}{15}$ or 37.5 and 150 C1 ft (dep on M1) for clear statement of 4 bottles with working shown OR M1 for $750 \times 10 (= 7500)$ M1 for $200 \times 140 (= 28\ 000)$ $\frac{11}{15}$ A1 for 3.7(3....) or $3\frac{11}{15}$ or 28000 and 30000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown OR M1 for $200 \times 140 (= 28\ 000)$ M1 for $28\ 000 \div (9 + 1) (= 2800)$ $\frac{11}{15}$ A1 for 3.7(3....) or $3\frac{11}{15}$ or 2800 and 3000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown</p>

Qn	Working	Answer	Mark	Notes																																			
8		74	4	<p>M1 for $200 - \frac{10}{100} \times 200 (=180)$</p> <p>M1 for “180” $\div (1 + 2 + 7) (= 18)$</p> <p>M1 for “18” $\times (1 + 2) + 20$</p> <p>A1 cao</p> <p>OR</p> <p>M1 for $200 - \frac{1}{10} \times 200 (=180)$</p> <p>M1 for $\frac{7}{10} \times 180 (=126)$</p> <p>M1 for $200 - “126” + 20$</p> <p>A1 cao</p>																																			
9	<table border="1"> <thead> <tr> <th></th> <th>Sq</th> <th>G</th> <th>S</th> <th>Tot</th> </tr> </thead> <tbody> <tr> <td>F</td> <td>2</td> <td>4</td> <td></td> <td>21</td> </tr> <tr> <td>M</td> <td>15</td> <td></td> <td></td> <td>29</td> </tr> <tr> <td></td> <td>6</td> <td>14</td> <td></td> <td></td> </tr> <tr> <td></td> <td>9</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Tot</td> <td>8</td> <td>18</td> <td></td> <td>50</td> </tr> <tr> <td></td> <td>24</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Sq	G	S	Tot	F	2	4		21	M	15			29		6	14				9				Tot	8	18		50		24				4	4	<p>M1 for a correct first step which results in a value that could be in the table: eg. $50 - 18 - 8 (= 24)$ or $50 - 21 (= 29)$ or $8 - 6 (= 2)$</p> <p>M1 for a correct method to find a second value that could be in the table using their first value eg “29” $- 9 - 6 (=14)$ or “24” $- 9 (=15)$</p> <p>M1 for a fully correct and complete method.</p> <p>A1 cao</p>
	Sq	G	S	Tot																																			
F	2	4		21																																			
M	15			29																																			
	6	14																																					
	9																																						
Tot	8	18		50																																			
	24																																						
10		69	4	<p>M1 for finding 15% of £720 (=108)</p> <p>M1 (dep) for finding total of £720 plus interest (or 115% etc) (=828)</p> <p>M1 (dep on previous M1) dividing by 12</p> <p>A1 cao</p>																																			

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11	<p>Cost of villa</p> $2600 + 200 = \text{£}2800$ <p>Cost of hotel</p> $180 \times 7 \times 2 = 2520$ $\frac{40}{100} \times 180 = 72$ $72 \times 7 = 504$ $2520 + 504 = 3024$	Comparison	6	<p>B1 for identifying 2600 or 180 from the table</p> <p>M1 for a complete correct method to find 40% of their adult price for either one day or one week.</p> <p>OR</p> <p>the total cost of the adult(s) at the hotel</p> <p>ie $2 \times '180'$ or $7 \times '180'$ or $2 \times 7 \times '180'$</p> <p>M1 for a complete correct method to find the total price of the hotel for their two adults and their one child (40% of adult) for either a week or a day</p> <p>M1 for finding the total of the villa ie $'2600'+200$</p> <p>A1 for 2800 and 3024 OR 400 and 432</p> <p>C1 (Dep on M2) for a clear conclusion from comparing their results.</p>																				
12	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">2p</td> <td style="width: 15%; text-align: center;">1p</td> <td style="width: 15%; text-align: center;">½ p</td> <td style="width: 15%; text-align: center;">Tot</td> </tr> <tr> <td>Sat</td> <td style="text-align: center;">7</td> <td style="text-align: center;">16</td> <td style="text-align: center;">(31)</td> <td style="text-align: center;">54</td> </tr> <tr> <td>Sun</td> <td style="text-align: center;">(15)</td> <td style="text-align: center;">14</td> <td style="text-align: center;">17</td> <td style="text-align: center;">(46)</td> </tr> <tr> <td>Tot</td> <td style="text-align: center;">(22)</td> <td style="text-align: center;">(30)</td> <td style="text-align: center;">48</td> <td style="text-align: center;">(100)</td> </tr> </table>		2p	1p	½ p	Tot	Sat	7	16	(31)	54	Sun	(15)	14	17	(46)	Tot	(22)	(30)	48	(100)	14	4	<p>M1 for total Sat bottles $100 - 46 (=54)$ or for total ½ pint bottles $100 - 22 - 30 (=48)$ or (total 2 pint bottles on Sat) $22 - 15 (=7)$</p> <p>M1 for total Sun bottles of ½ pint $"48" - 31 (=17)$ or for total Sat bottles of 1 pint: $"54" - 31 - (22 - 15) (=16)$</p> <p>M1 for $46 - 15 - "17"$ or for $30 - "16"$</p> <p>A1 cao</p> <p>NB: any of the above figures could be shown in a 2-way table</p>
	2p	1p	½ p	Tot																				
Sat	7	16	(31)	54																				
Sun	(15)	14	17	(46)																				
Tot	(22)	(30)	48	(100)																				

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13	$1155 \div 15 = 77$ $x + 2x + x - 7 = 77$ $4x - 7 = 77$ $4x = 84; x = 21$ OR $15x + (15 \times 2x) + 15(x - 7) = 1155$ $60x - 105 = 1155$ $60x = 1260$ $x = 21$	Redlands 21 St Samuels 42 Francis Long 14	5	M1 for $2x$ or $x-7$ M1 for $1155 \div 15 (= 77)$ M1 (dep M2) for equation summing their three expressions to “77” A1 for 21, 42 and 14 C1 for fully correct answer with correct labels OR M1 for an expression for the cost of the pupils from Redlands M1 for expression for the cost of the pupils from either St Samuels or Francis Long M1 (dep M2) for equation summing their three expressions to 1155 A1 for 21, 42, and 14 C1 for fully correct answer with correct labels
14		1.01	4	P1 fruit syrup $15 \times 1.4 (= 21)$ or water $280 \times 0.99 (= 277.2)$ or apple juice $25 \times 1.05 (= 26.25)$ P1 (dep) for complete process to find the total mass e.g. “277.2” + “26.25” + “21” (= 324.45) or a weighted density eg $15 \times 1.4 \div 320 (= 0.065625)$ or $280 \times 0.99 \div 320 (= 0.86625)$ or $25 \times 1.05 \div 320 (= 0.08203125)$ P1 (dep P2) for complete process to find the density eg “324.45” $\div 320 (=1.01..)$ or “0.065625” + “0.86625” + “0.08203125” (= 1.0139..) A1 1.01 to 1.014

Qn	Working	Answer	Mark	Notes
15	24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288 36, 72, 108, 144, 180, 216, 252, 288	12 boxes of book marks 8 packs of dust covers	4	M1 attempts multiples of either 24 or 36 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 24 and 36 (at least 3 but condone errors if intention is clear) M1 (dep on M2) for a division of 250 or 288 by 24 or 36, or counts up “multiples” (implied if answers reversed) A1 for 12 boxes of book marks, 8 packs of dust covers (accept 15b, 10p), (18b, 12p), etc.
16		No (supported)	5	M1 for $\pi \times 9 \div 2$ (=14.137...) or $\pi \times 5 \div 2$ (=7.85...) or for $\pi \times 9$ (=28.27...) or $\pi \times 5$ (=15.7...) M1 for complete method to work out perimeter eg $2 + 2 + (\pi \times 9 \div 2) + (\pi \times 5 \div 2)$ (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg “their total perimeter” $\div 2.4$ eg $25.99 \div 2.4$ (=10.8), “47.97..” $\div 2.4$ (=19.9) or “43.47..” $\div 2.4$ (=18.3) M1 for method to work out cost eg $3 \times 10 + 2 \times 3.99$ (= 37.98) or 11×3.99 (=43.89), $20 \rightarrow 67.98$, $19 \rightarrow 63.00$ or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) e.g 10.8 and 10

Qn	Working	Answer	Mark	Notes
17		57.1	4	<p>P1 for a process to find time from Liverpool to Manchester, eg. $56 \div 70$ (= 0.8 (hrs) or 48 (mins))</p> <p>P1 for a process to find 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</p> <p>P2 (dep P2) for a correct process to find average speed with consistent units of time, eg. "117" \div "2.05" or "117" \div "123"</p> <p>A1 for answer in the range 57 to 57.1</p>
18		No with correct calculations	5	<p>M1 for splitting the cross section into separate areas and a method to find the area of one part OR for splitting up the pool into smaller prisms and a method to find the volume of one prism, e.g. a cuboid</p> <p>M1 (dep) for a complete method to find the cross-sectional area OR for a method to find the volume of more than one prism</p> <p>M1 (dep) for a complete method to find the vol of the pool (= 70 m^3) OR for a complete method to find the depth of 60000L of water</p> <p>M1 for method to find figure for comparison, eg distance between surface and top of pool ("70" – "60") \div (5 \times 10)</p> <p>C1 No, with correct calculations, eg water level is 20cm below top of pool</p>
19		Yes and correct working	3	<p>B1 for 147.5 or 148.5 or 148.4999... or 11.75 or 11.85 or 11.84999...</p> <p>P1 substitutes $11.8 < UB \leq 11.85$ and $147.5 \leq LB < 148$ in the formula to work out petrol consumption</p> <p>A1 for 'Yes' and 8.03(3898305...) from correct working</p>

Qn	Working	Answer	Mark	Notes
20		28	5	<p>M1 for method to find $\frac{1}{5}$ of children eg $60 \div 5 (=12)$</p> <p>M1 for method to find number of boys or girls eg “12” $\times 2 (=24)$ or “12”$\times 3 (=36)$</p> <p>M1 for method to find total number going in the morning eg $\frac{3}{4} \times 60 (= 45)$</p> <p>M1 for complete method to find number of girls going in the morning eg $45 - (24 - 7)$</p> <p>A1 cao</p>

Wordy problems 2 mark scheme

Qn	Original source of questions:				Mean score	Maximum score	Mean Percent	Mean score of students achieving grade:						
	Session YYMM	Spec	Paper	Qn				ALL	A*	A	B	C	D	E
1	1311	2MB01	1H	6	4.62	5	92	4.62	4.88	4.90	4.80	4.72	4.41	3.73
2	1311	1MA0	1H	7	3.50	4	68	3.50	3.95	3.89	3.80	3.57	3.09	2.24
3	1506	1MA0	1H	9	2.56	3	85	2.56	2.95	2.88	2.79	2.61	2.15	1.41
4	1406	1MA0	1H	12(a)	1.99	3	66	1.99	2.89	2.75	2.45	1.78	0.82	0.21
5	1406	2MB01	2H	8	3.18	4	80	3.18	3.91	3.81	3.50	3.19	2.42	1.24
6	1706	1MA0	1H	2	2.65	5	53	2.65	4.69	4.54	4.20	3.67	2.76	1.59
7	1406	2MB01	1H	4	2.56	4	64	2.56	3.89	3.67	3.26	2.48	1.47	0.84
8	1611	2MB01	2H	3	2.70	4	68	2.70	4.00	4.00	3.33	3.08	2.55	1.67
9	1406	1MA0	1H	3	3.00	4	75	3.00	3.82	3.56	3.30	2.91	2.12	1.17
10	1511	1MA0	1H	1	2.18	4	55	2.18	3.69	3.49	3.19	2.80	1.92	0.80
11	1306	2MB01	1H	9	4.46	6	74	4.46	5.46	5.23	4.99	4.85	4.34	3.48
12	1511	1MA0	1H	8	1.50	4	38	1.50	3.77	3.42	2.90	2.12	1.11	0.34
13	1506	1MA0	2H	5	3.19	5	64	3.19	4.70	4.23	3.74	2.97	2.00	1.14
14	1706	1MA1	3H	6	2.56	4	64	2.56	4.00	3.10	2.20	1.54	1.00	0.50
15	1606	2MB01	2H	7	2.54	4	64	2.54	3.66	3.03	2.78	2.24	2.20	1.82
16	1706	1MA0	2H	11	0.83	5	17	0.83	4.52	3.71	2.66	1.59	0.66	0.16
17	1706	1MA1	2H	4(a)	1.99	4	50	1.99	3.50	2.49	1.75	1.00	0.50	0.25
18	1706	1MA0	2H	16	0.50	5	10	0.50	3.84	2.80	1.92	0.95	0.35	0.11
19	1711	1MA1	3H	16	0.22	3	7	0.22	2.50	1.58	1.00	0.10	0.00	0.00
20	1411	2MB01	1H	7	1.04	5	21	1.04	3.50	1.67	1.35	0.76	0.25	0.20
TOTAL					47.77	85	56	47.77	78.12	68.75	59.91	48.93	36.12	22.90

(Data in italics is estimated)

Questions have been set in order of mean difficulty as found by students who achieved Grade A(7).

Based on past student performance on this set of questions, suggested grade boundaries are

9	8	7	6	5	4
80	72	64	57	50	43