

**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

Question	Working	Answer	Mark	Notes
1.	<p>(a) <math>12 = 2 \times 2 \times 3</math></p> <p><math>20 = 2 \times 2 \times 5</math></p> <p>OR</p> <p>12: 1, 2, 3, 4, 6, 12</p> <p>20: 1, 2, 4, 5, 10, 20</p>	4	2	<p>M1 for dealing with both 12 <b>and</b> 20 by,</p> <p>Writing each number as a product of prime factors (condone one error only); or by,</p> <p>Listing the factors of each number (condone one error only), or by,</p> <p>Drawing a Venn Diagram (or two factor trees) showing all prime factors of each number (condone one error only)</p> <p>A1 for HCF = 4 (accept <math>2 \times 2</math> or <math>2^2</math>)</p>
	<p>(b) <math>32 = 2 \times 2 \times 2 \times 2 \times 2</math></p> <p><math>48 = 2 \times 2 \times 2 \times 2 \times 3</math></p> <p>OR</p> <p>32. 64, 96, 128, ...</p> <p>48, 96, 144, ....</p>	96	2	<p>M1 for dealing with both 32 <b>and</b> 48 by,</p> <p>Writing each number as a product of prime factors (condone one error only); or by,</p> <p>Listing the multiples of each number , up to at least 96 in each list (condone one error only), or by,</p> <p>Drawing a Venn Diagram (or two factor trees) showing all prime factors of each number (condone one error only)</p> <p>A1 for LCM = 96 (accept <math>2^5 \times 3</math> or <math>2 \times 2 \times 2 \times 2 \times 2 \times 3</math>)</p> <p>[SC: B1 for any multiple of both 32 and 48 (eg 192) if M0 scored]</p>

**1MA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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2.			240	4	M1 for $16 \times 2$ (= 32 girls) M1 for $16 + '16 \times 2'$ (= 48) M1 (dep on the previous M1) for $(16 + '32') \times 5$ <b>or</b> $(16 + '32') \times (4 + 1)$ A1 cao  <b>OR</b> M1 for $1 : 2 = 3$ parts M1 for 5 schools $\times$ 3 parts (= 15 parts) M1 (dep on the previous M1) for '15' parts $\times$ 16 A1 cao

**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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3.	(a) $(6 \times 10^8) \times (4 \times 10^7) =$ $24 \times 10^{8+7}$  $24 \times 10^{15}$	$2.4 \times 10^{16}$	2	M1 $24 \times 10^{8+7}$ oe or 24 000 000 000 000 000 or $2.4 \times 10^n$  A1 cao
	(b) $(6 \times 10^8) + (4 \times 10^7)$  $= 6 \times 10^8 + 0.4 \times 10^8$	$6.4 \times 10^8$	2	M1 $6 \times 10^8 + 0.4 \times 10^8$ or $60 \times 10^7 + 4 \times 10^7$  or 600 000 000 + 40 000 000 or 640 000 000 oe  or $6.4 \times 10^n$  A1 cao
4.	$150 \div 6$ or $\frac{1}{6} \times 150$	25	2	M1 $150 \div 6$ or $\frac{1}{6} \times 150$  A1 cao  NB $\frac{25}{150}$ scores M1 A0
5.		21	2	M1 for $\frac{12}{8}$ oe or $\frac{8}{12}$ oe or $\frac{14}{8}$ oe or $\frac{8}{14}$ oe  A1 cao

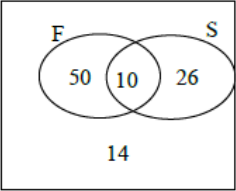
**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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6.	(a)	$\frac{5}{15} + \frac{6}{15}$	$\frac{11}{15}$	2	M1 for common denominator with at least one numerator correct  A1 for $\frac{11}{15}$ oe  (B2 for 0.73 recurring)
	(b)	$\frac{11}{4} \times \frac{8}{5} = \frac{88}{20}$	$\frac{22}{5}$	3	M1 for $\frac{11}{4}$ or $\frac{8}{5}$  M1 for $\frac{11}{4} \times \frac{8}{5}$ or $\frac{88}{20}$ oe  A1 for $\frac{22}{5}$ or $4\frac{2}{5}$ or 4.4
7.	(a)	$3t + 1 < t + 12$  $3t - t < 12 - 1$  $2t < 11$	$t < 5.5$	2	M1 $3t - t < 12 - 1$  A1 $t < 5.5$ oe  (B1 for $t = 5.5$ or $t > 5.5$ or $5.5$ or $t \leq 5.5$ or $t \geq 5.5$ on the answer line)
	(b)		5	1	B1 for 5 or ft (a)

**1MA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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<b>8.</b>			32.5	3	M1 for $45 \div 30 (=1.5)$ or 1hr 30 min seen or for $20 \div 40 (= 0.5$ or 30min)  M1 (dep) for $(45 + 20) \div ("1.5" + "0.5")$  A1 cao
<b>9.</b>	(a)		$(x + 7)(x - 7)$	1	B1 cao
	(b)	$2y^2 - 6y + 7y - 21$	$2y^2 + y - 21$	2	M1 for 3 out of no more than 4 terms correct with correct signs or the 4 terms $2y^2$ , $6y$ , $7y$ and $21$ seen, ignoring signs  A1 cao
<b>10.</b>	(a)		C	1	B1 cao
	(b)		B and C	1	B1 cao
<b>11.</b>			$3xy(y - 2x^2)$	2	M1 for $3x \times (y^2 - 2x^2y)$ or $3y \times (xy - 2x^3)$ or $xy \times (3y - 6x^2)$ or $3xy \times$ (a 2 term expression in $x$ and $y$ , with just one error)  A1 cao

**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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<b>12.</b>	(a)		-13, -1, 2	2	B2 for all values correct  (B1 for any one value correct)
	(b)		Graph drawn	2	M1 ft for at least 4 points plotted correctly from their table  A1 cao for correct curve drawn from (-2, -13) to (2, 11)
<b>13.</b>	(a)	$100 - 14 = 86$ $60 + 36 - 86 = 10$ $60 - 10 = 50$ $36 - 10 = 26$		4	M1 for two overlapping labelled circles  B1 for 14 shown outside the circles  M1 for 60-'10' or 36-'10' ('10'≠0)  A1 for a fully correct and labelled Venn diagram  (condone omission of surrounding rectangle)
	(b)	$\frac{100 - 14}{100}$	$\frac{86}{100}$	2	M1 for '50' + '10' + '26' or 100 - '14'
<b>14.</b>			126	4	M1 for method to find exterior or interior angle of octagon  M1 for method to find exterior or interior angle of pentagon  M1 for complete method  A1 cao

**1MA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

Question		Working	Answer	Mark	Notes
15.			28	4	<p>M1 for forming a correct equation , eg</p> $2(3x + 5) = 10x - 2 \text{ oe}$ $3x + 5 = \frac{1}{2}(10x - 2) \text{ oe}$ <p>or <math>10x - 2 - (3x + 5) = 3x + 5 \text{ oe}</math></p> <p>M1 (dep) for dealing with brackets correctly <b>or</b> correct method to isolate all x terms on one side.</p> <p>A1 <math>x = 3</math></p> <p>B1 ft (dep on M1) for 28</p> <p>SC: B3 for an answer of 14 if no previous marks scored</p>

IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0

Question	Working	Answer	Mark	Notes
16.	<p>(a) <math>1 - \frac{2}{9}</math></p> <p>(b) Tree diagram or</p> <p>(i) <math>\frac{5}{9} \times \frac{1}{9} + \frac{1}{9} \times \frac{5}{9}</math></p>	<p><math>\frac{7}{9}</math></p> <p><math>\frac{10}{81}</math></p>	<p>1</p> <p>5</p>	<p>B1 <math>\frac{7}{9}</math> oe</p> <p>B1 for <math>\frac{5}{9}</math> or <math>\frac{1}{9}</math> seen</p> <p>M1 Indication of correct 2 branches from a tree diagram leading to <math>\frac{5}{9} \times \frac{1}{9} + \frac{5}{9} \times \frac{1}{9}</math> seen</p> <p>A1 <math>\frac{10}{81}</math></p> <p>Or</p> <p>B1 <math>\frac{5}{9}</math> or <math>\frac{1}{9}</math> seen</p> <p>M1 <math>\frac{5}{9} \times \frac{1}{9} \times 2</math></p> <p>A1 <math>\frac{10}{81}</math></p>



**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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17.			1 hour 45 mins	6	<p>M1 for method to find volume of pond, eg <math>\frac{1}{2}(1.3 + 0.5) \times 2 \times 1</math> (= 1.8)</p> <p>M1 for method to find the volume of water emptied in 30 minutes, eg <math>1 \times 2 \times 0.2</math> (= 0.4), <math>100 \times 200 \times 20</math> (= 400000)</p> <p>A1 for correct rate, eg 0.8 m<sup>3</sup>/hr, 0.4 m<sup>3</sup> in 30 minutes</p> <p>M1 for correct method to find total time taken to empty the pond, eg “1.8” ÷ “0.8”</p> <p>M1 for method to find extra time, eg 2 hrs 15 minutes – 30 minutes</p> <p>A1 for 1.75 hours, <math>1\frac{3}{4}</math> hours, 1 hour 45 mins or 105 mins</p> <p><b>OR</b></p> <p>M1 for method to find volume of water emptied in 30 minutes, eg. <math>1 \times 2 \times 0.2</math> (= 0.4), <math>100 \times 200 \times 20</math> (= 400000)</p> <p>M1 for method to work out rate of water loss eg. “0.4” × 2</p> <p>A1 for correct rate, eg 0.8 m<sup>3</sup>/hr</p> <p>M1 for correct method to work out remaining volume of water</p>

**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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					e.g. $\frac{1}{2}(1.1 + 0.3) \times 2 \times 1 (= 1.4)$  M1 for method to work out time, e.g. “1.4” ÷ “0.8”  A1 for 1.75 hours, $1\frac{3}{4}$ hours, 1 hour 45 mins or 105 mins
<b>18.</b>	(a)		$2^{-2}, \frac{1}{2}, \frac{1}{\sqrt{2}}, 2^0, \sqrt{2}$	2	M1 for changing to powers of 2, e.g. sight of $2^{0.5}$ or $2^{-1}$ or $2^{-0.5}$  A1 for correct order (accept alternative equivalent forms, e.g. all powers of 2)  (SCB1 if M0 scored, for all in correct reverse order)
	(b)		$2\sqrt{2}$	3	M1 for cubing  M1 for a correct method to rationalise  A1 for $2\sqrt{2}$ (accept $a = 2$ )

**IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0**

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19.	(a)		Circle, centre $O$ ,  radius 2	2	B2 cao  (B1 for a circle radius 2 any centre or for a circle or part of a circle centre $(0, 0)$ any radius)
	(b)		Cosine curve crossing at $(0, 1)$ , $(90, 0)$ ,  $(270, 0)$ and $(360, 1)$	2	B2 cao (ignore if sketch outside region)  (B1 for a curve with correct intercepts but incorrect amplitude OR for a curve starting at $(0,1)$ with correct amplitude but incorrect intercepts; curves must have a shape that approximates to a cosine curve)
20.			$\frac{3x}{x-3}$	3	M1 for factorising numerator, e.g. $(x+3)(2x-5)$  M1 for factorising denominator, e.g. $2x^2(x+3)$ and $(2x-5)(x-3)$  C1 fully correct working leading to $\frac{3x}{x-3}$

IMA1 Practice papers Set 5: Paper 1H (Regular) mark scheme – Version 1.0

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21.	$2y = 3x - 4$ $y = \frac{3}{2}x - 2; m = \frac{3}{2}$ $\frac{3 - -1}{1 - 4} = -\frac{4}{3}$ $\frac{3}{2} \times -\frac{4}{3} = -2$	No, with reason	4	<p>M1 for <math>\frac{3}{2}</math> oe or <math>y = \frac{3}{2}x \left(-\frac{4}{2}\right)</math> oe</p> <p>M1 for method to find gradient of <math>AB</math>, e.g. <math>\frac{3 - -1}{1 - 4}</math></p> <p>or <math>\frac{-1 - 3}{4 - 1}</math> or <math>-\frac{4}{3}</math> oe</p> <p>A1 for identifying gradients as <math>\frac{3}{2}</math> oe <b>and</b> <math>-\frac{4}{3}</math> oe</p> <p>C1 (dep on M1) for a conclusion with a correct reason, e.g. No, as product of <math>\frac{3}{2}</math> and <math>-\frac{4}{3}</math> is not <math>-1</math>, ft (from their two gradients)</p>

National performance data from Results Plus

Original source of questions					Mean score of students achieving grade:								
Qn	Spec	Paper	Session YYMM	Qn	Topic	Max score	ALL	A*	A	B	C	D	E
1	5MM1	1H	1106	Q07	HCF and LCM	4	2.90	3.78	3.48	2.90	2.25	1.47	1.00
2	1MA0	1F	1303	Q23	Ratio	4	1.60				2.94	1.81	0.87
3	1380	1H	1111	Q13	Standard form	4	1.25	3.53	2.71	1.86	0.90	0.34	0.19
4	5MM1	1H	1306	Q06	Relative frequency	2	1.34	1.96	1.76	1.43	1.07	0.78	0.35
5	5MM1	1H	1506	Q14	Congruence and similarity	2	1.46	1.97	1.89	1.67	1.00	0.32	0.12
6	5MM1	1H	1406	Q15	Fractions	5	3.57	4.88	4.69	3.97	2.70	1.31	0.63
7	1380	1H	906	Q20	Solve inequalities	3	1.51	2.87	2.40	1.51	0.64	0.18	0.06
8	5MB2	2H	1306	Q11	Speed	3	0.98	2.51	1.93	1.17	0.72	0.35	0.16
9	5MB2	2H	1511	Q08de	Expanding brackets	3	1.28	3.00	3.00	2.55	1.35	1.03	0.27
10	5MM1	1H	1211	Q12	Gradients	2	1.37	2.00	1.86	1.59	1.27	0.74	1.00
11	5MM1	1H	1211	Q19	Factorise quadratic expressions	2	0.91	2.00	1.83	1.30	0.47	0.00	0.00
12	5MB3	3H	1306	Q12	Cubic graph	4	3.38	3.82	3.66	3.46	3.17	2.63	1.76
13	5MM1	1H	1311	Q17	Venn diagrams	6	4.34	5.79	5.44	4.72	3.73	2.91	2.26
14	1MA0	1H	1511	Q14	Angles	4	0.52	3.65	3.08	1.99	0.61	0.18	0.04
15	5MM1	1H	1306	Q15	Solve linear equations	4	1.83	3.80	3.22	1.94	0.75	0.29	0.00
16	5MM1	1H	1111	Q21	Probability	6	2.35	4.37	3.87	1.76	1.05	0.50	0.50
17	1MA0	1H	1306	Q17	Volume	6	0.51	3.08	1.20	0.44	0.12	0.03	0.02
18	5MM1	1H	1311	Q20	Index laws	5	0.92	3.32	1.84	0.85	0.28	0.07	0.00
19	1MA0	1H	1211	Q27	Graph of a circle	4	0.24	2.72	1.07	0.18	0.03	0.01	0.00
20	NEW				Manipulating algebraic fractions	3							
21	1MA0	1H	1411	Q24	Gradients	4	0.10	2.16	0.90	0.16	0.01	0.00	0.00
						<b>80</b>							