0575 ADDITIONAL MATHEMATICS
P1 - MCQ KEY
SWR MOCK 2025

Q/N	KEY		Q/N	KEY
1	C		26	D
2	A		27	C
3	D		28	B
4	B		29	A
5	C		30	B
6	B		31	D
7	C		32	C
8	A		33	C
9	D		34	B
10	C		35	A
11	A		36	D
12	B		37	A
13	C		38	B
14	A		39	D
15	C		40	C
16	D		41	D
17	C		42	A
18	B		43	B
19	D		44	C
20	A		45	A
21	A		46	C
22	B		47	B
23	D		48	D
24	C		49	A
25	A		50	B

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1	C		26	D
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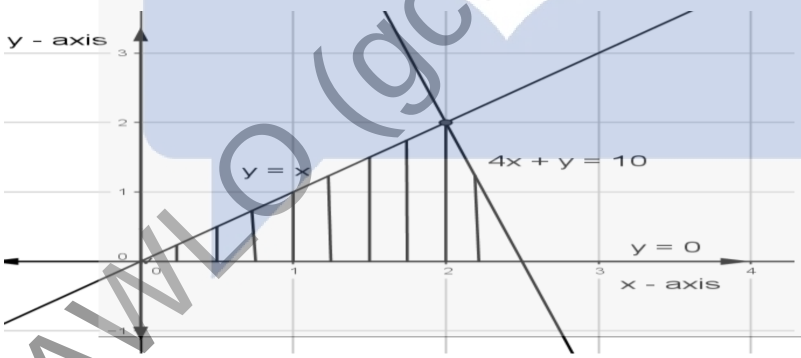
5	C		30	B
6	B		31	D
7	D		32	C
8	A		33	C
9	D		34	B
10	C		35	A
11	A		36	D
12	B		37	A
13	B		38	B
14	A		39	D
15	C		40	C
16	D		41	D
17	C		42	A
18	B		43	B
19	D		44	C
20	A		45	A
21	A		46	C
22	B		47	B
23	D		48	D
24	C		49	A
25	A		50	B

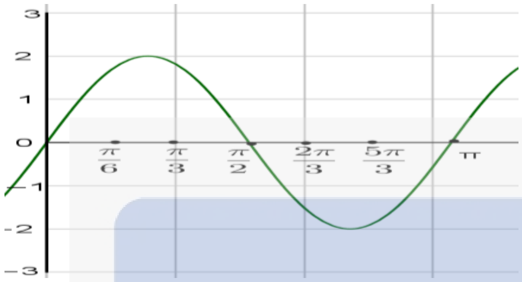
MAKING QUIDE FOR MOCK- ADDITIONAL MATHEMATICS

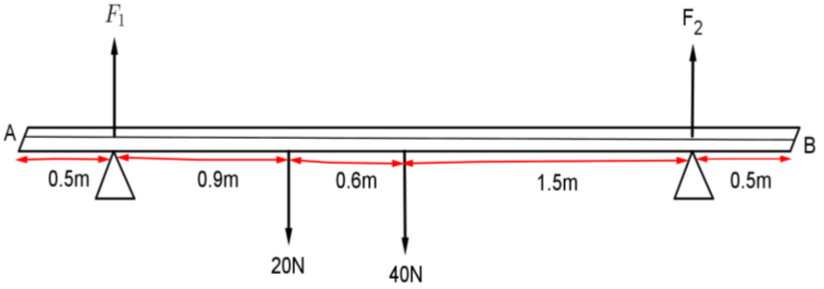
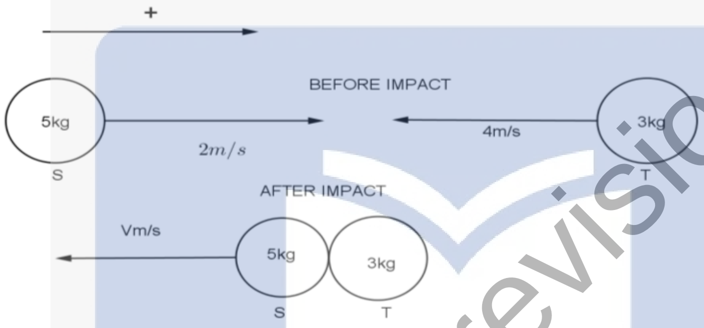
0575 O/L - PAPER 2

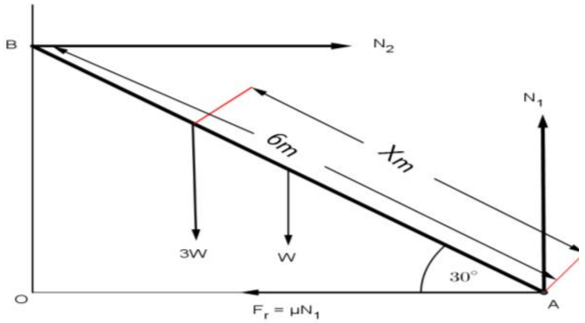
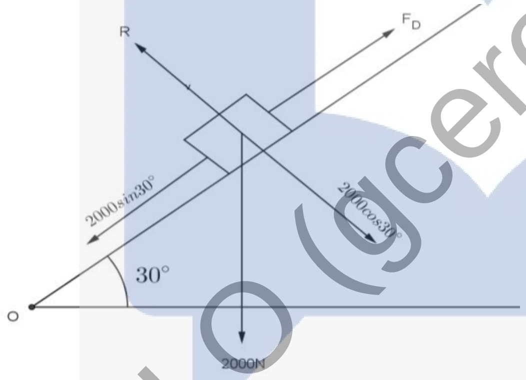
SECTION A

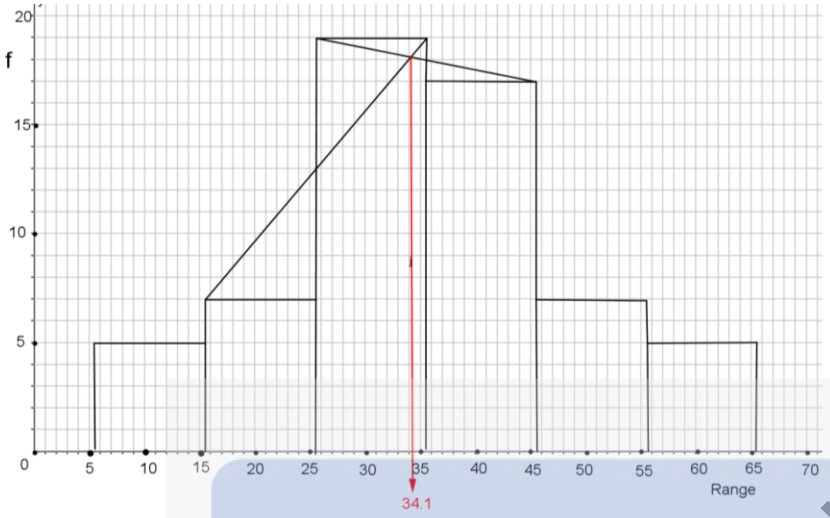
<table>
<tr><th>Q. No</th><th>REFERENCES AND SOLUTIONS</th><th>MARKS</th><th>COMMENTS</th></tr>
<tr><td rowspan="3">1</td><td>a) $\log_2\left(\frac{2x+1}{3x-2}\right) = 1$
$\Longrightarrow \frac{2x+1}{3x-2} = 2^1$
$\Longrightarrow 2x + 1 = 6x - 4 \quad \therefore x = \frac{5}{4}$</td><td>4</td><td>$M_2$ div.
1 for simplification
A_1</td></tr>
<tr><td>b) i) $\alpha + \beta = -\frac{3}{2}, \alpha\beta = -\frac{1}{2}$</td><td>1</td><td>0.5 for Sum
0.5 for Product</td></tr>
<tr><td>ii) $x^2 - \left(\frac{1}{\alpha} + \frac{1}{\beta}\right)x + \frac{1}{\alpha\beta} = 0$
$x^2 - \left(\frac{\alpha+\beta}{\alpha\beta}\right)x + \frac{1}{\alpha\beta} = 0$
$x^2 - \left[\left(-\frac{3}{2}\right)\left(-\frac{2}{1}\right)\right]x - 2 = 0$
$x^2 - 3x - 2 = 0$
∴ New Equation $\Longrightarrow \quad x^2 - 3x - 2 = 0$</td><td>3</td><td>$M_1$
M_1
1</td></tr>
<tr><td rowspan="2">2</td><td>a) $\frac{10!}{2!2!} = 5x9x4x7!\text{ways} \quad = 907200$ ways</td><td>4</td><td>$M_3 - Divisible$
1</td></tr>
<tr><td>b) $\left(x^2 - \frac{1}{x}\right)^9 \equiv \sum_{r=0}^{9} nC_r\,(x^2)^{9-r}\left(-\frac{1}{x}\right)^r$
$\equiv \sum_{r=0}^{9} nC_r\,(x^2)^{9-r}\left(-\frac{1}{x}\right)^r x^{18-3r}(-1)^r$
Term independent of x is possible when $x^{18-r} = x^0$
$\therefore r = 6\ A_{1,}$
So $9C_6(-1)^6 = 9C_6$</td><td>4</td><td>M_1
$M_{1,}$
$M_{1,}$
A_1</td></tr>
<tr><td rowspan="3">3</td><td>(a)
<table><tr><td>Level</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>No of Seat</td><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td><td>600</td><td>700</td><td>800</td><td>900</td><td>1000</td></tr></table>TOTAL = 100 +200 + 300 + ………………. + 900 + 1000 = 5500
As required</td><td>4</td><td>0.5 for copying
$A_{0.5x7}$</td></tr>
<tr><td>b.) AP with a =100 and d = 100, n = No. of levels
$\Longrightarrow T_n = 100 + (n-1)100 = 5500$
$\Longrightarrow 100n = 5500 \quad \therefore \quad No. of\ levels, n = 55$</td><td>2</td><td>0.5 for d
M1
$A_{0.5}$</td></tr>
<tr><td>c) $S_{55} = \frac{55}{2}(2(100) + (55-1)100) = 55[\,100 + 54(50)]$
∴ 154,000 Seats</td><td>2</td><td>$M_{1,}$
A_1</td></tr>
</table>

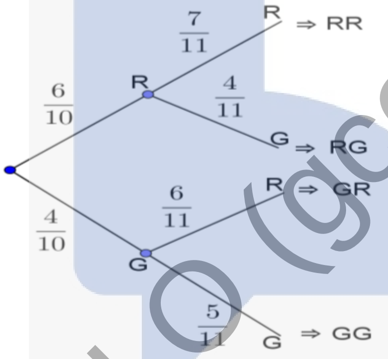
<table>
<tr><th>Q. No</th><th>REFERENCES AND SOLUTIONS</th><th>MARKS</th><th>COMMENTS</th></tr>
<tr><td rowspan="5">4)</td><td>a) i)
<table>
<tr><td>*</td><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>a</td><td>b</td><td>d</td><td>a</td><td>c</td></tr>
<tr><td>b</td><td>d</td><td>c</td><td>b</td><td>a</td></tr>
<tr><td>c</td><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>d</td><td>c</td><td>a</td><td>d</td><td>b</td></tr>
</table></td><td>3</td><td>$A_{0.5x6,}$ for any first 6 correct values</td></tr>
<tr><td>ii) c</td><td>1</td><td>A_1</td></tr>
<tr><td>iii)
<table>
<tr><td>Element</td><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>Inverse</td><td>d</td><td>b</td><td>c</td><td>a</td></tr>
</table></td><td>1</td><td>$A_{0.25x4}$</td></tr>
<tr><td>b.) i) $T = \begin{pmatrix} 2 & 1 \\ -1 & 2 \end{pmatrix}$</td><td>1</td><td>1</td></tr>
<tr><td>ii) Let the point be $(x\,, y) \implies \begin{pmatrix} 2 & 1 \\ -1 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$
$\implies \begin{cases} 2x + y = -1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1) \\ -x + 2y = 2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2) \end{cases}$
Solving, $x = -\frac{4}{5}$ $and\ y = \frac{3}{5}$ $\implies$ Point is $\left(-\frac{4}{5}\,, \frac{3}{5}\right)$</td><td>3</td><td>$M_2$ divisible
A_1</td></tr>
<tr><td rowspan="4">5</td><td>a)

</td><td>2</td><td>$M_{0.5x3}$ for the 3 graphs
$A_{0.5}$ for shading</td></tr>
<tr><td>b) $A = \frac{1}{2}\left(\frac{5}{2}\right) \times 2 = \frac{5}{2}$ Square Units</td><td>2</td><td>M_1, A_1</td></tr>
<tr><td>c.) Maximum point for feasible solution is at (2, 2). For $3x + 2y$
$\implies Max = 3(2) + 2(2) = 6 + 4 = 10$</td><td>3</td><td>$M_1, A_1$</td></tr>
<tr><td>d) $Max(x, y) = 2x + 3y \implies M(2{,}2) = 2(2) + 3(2) = 10$</td><td>2</td><td>$M_1, A_1$</td></tr>
<tr><td>6</td><td>a) $tan\theta = \frac{1}{\sqrt{3}}$
$\implies \theta_0 = pv = tan^{-1}\left(\frac{1}{\sqrt{3}}\right) = 30^0$ Also, $\theta_1 = 180^0 + 30^0 = 210^0$
$\therefore\ \theta = \{30^0\,, 210^0\}$</td><td>3</td><td>$M_1$
M_1, A_1</td></tr>
</table>

<table>
<tr><th>Q. No</th><th>REFERENCES AND SOLUTIONS</th><th>MARKS</th><th>COMMENTS</th></tr>
<tr><td rowspan="4"></td><td></td><td></td><td></td></tr>
<tr><td>b) i)
<table>
<tr><td>x</td><td>0</td><td>$\frac{\pi}{6}$</td><td>$\frac{\pi}{3}$</td><td>$\frac{\pi}{2}$</td><td>$\frac{2\pi}{3}$</td><td>$\frac{5\pi}{6}$</td><td>π</td></tr>
<tr><td>$f(x)$</td><td>0</td><td>$\sqrt{3}$</td><td>$\sqrt{3}$</td><td>0</td><td>$-\sqrt{3}$</td><td>$-\sqrt{3}$</td><td>0</td></tr>
</table></td><td>3</td><td>$M_{1,}$
A_2</td></tr>
<tr><td>ii)

</td><td>2</td><td>0.5x2 −For the correct axes
1- for shape</td></tr>
<tr><td>iii) Min. Value of $f(x) = y_{min} = -2$</td><td>1</td><td>1</td></tr>
<tr><td rowspan="3">7</td><td>a) $l_1 = OA + \mu\overrightarrow{AB}$
$\Rightarrow l_1 = 3i - 2j + \mu(\overrightarrow{OB} - \overrightarrow{OA}) \equiv 3i - 2j + \mu(-i + 5j)$</td><td>2</td><td>$M_1$
A_1</td></tr>
<tr><td>b.) $l_2 = 2i + 3j + \lambda(5i + j)$
At the point of intersection $l_1 = l_2$
$3 - \mu = 2 + 5\lambda - - - - - - - - 1$
$-2 + 5\mu = 3 + \lambda - - - - - - - - 2$
5(eqn. 1) – (eqn. 2) $\Rightarrow 13 = 13 + 26\lambda \quad \Rightarrow \lambda = 0$
$\therefore \overrightarrow{OD} = 2i + 3j$ is the position vector</td><td>4</td><td>M_1
M_1
A_1
A_1</td></tr>
<tr><td>c) $\theta = cos^{-1}\left(\frac{(-i+5j)\cdot(5i+j)}{\sqrt{1^2+25}\,x\sqrt{25+1}}\right) = cos^{-1}(0) = 90^0$</td><td>2</td><td>$M_1,A_1$</td></tr>
<tr><td rowspan="3">8</td><td>a) $P = 2K + 2X = 24 \quad \Rightarrow K = 12 - X$
$\Rightarrow A = XK = X(12 - X) \quad \therefore \quad A = 12x - x^2$</td><td>3</td><td>$M_1$
M_1,A_1</td></tr>
<tr><td>(b) $\frac{dA}{dx} = 12 - 2x = 0 \Rightarrow x = 6$, $\frac{d^2A}{dx^2} = -2, < 0$ Therefore A is max.
$A_{MAX} = 12(6) - 6^2 = 36cm^2$</td><td>3</td><td>$M_1$
M_1,A_1</td></tr>
<tr><td>c) $\int(3x^2 - x)dx = \frac{3x^3}{3} - \frac{x^2}{2} + k$
$= x^3 - \frac{x^2}{2} + k$</td><td>2</td><td>$M_1$
A_1</td></tr>
<tr><td colspan="4">SECTION B</td></tr>
<tr><td rowspan="3">9</td><td>a) i) $\frac{dx}{dt} = v = 3t^2 - 4t - 20 \Rightarrow \frac{dx}{dt} = 3(2)^2 - 4(2) - 20$
$\therefore \frac{dx}{dt} = -16$</td><td>3</td><td>$M_2$ −divisible
A_1</td></tr>
<tr><td>ii) $\frac{d^2x}{dt^2} = a = 6t - 4$ t =2, $\Rightarrow a = 6(2) - 4 \therefore a = 8m/s^2$</td><td>2</td><td>$M_1,A_1$</td></tr>
<tr><td>b) i)</td><td></td><td></td></tr>
</table>

Q. No	REFERENCES AND SOLUTIONS	MARKS	COMMENTS
		4	2---for two forces with correct directions. 2—for two weights with correct directions.
	ii) AT Equilibrium $F_1 + F_2 = 60N$ Taking moments about $F_1 \implies 3F_2 = 40Nx1.5 + 20Nx0.9$ $\implies F_2 = 26N$ Then $F_1 = 60 - 26 \implies F_1 = 34N$	3	$M_{1,}$ A_2
	c) i)  From the Law of Conservation of Linear Momentum $5 \times 2 - 3 \times 4 = 8v \implies 8v = -2 \therefore v = -\frac{1}{4}ms^{-2}$	3	$M_{2,}$ A_1
	ii) $\lvert Impulse \rvert = \lvert M_T(V_T - U_T) \rvert = \left\lvert 3\left(-\frac{1}{4} - 4\right)\right\rvert = \frac{51}{4}N$	2	M_1,A_1
10	(a) i) $A = 4\pi r^2 \implies \frac{dA}{dr} = 8\pi r \quad \therefore \frac{dA}{dr} = 8\pi x2 = 16\pi m$ $\frac{dA}{dt} = \frac{dr}{dt}x\frac{dA}{dr} = 2x16\pi = 32\pi m^2/s$	3	M_2 A_1
	ii) $v = \frac{4}{3}\pi r^3 \implies \frac{dv}{dr} = 4\pi r^2 = 4\pi(2)^2 = 16\pi m^2$ $\implies \frac{dv}{dt} = \frac{dv}{dr}x\frac{dr}{dt} = 16\pi x2 \quad \therefore \frac{dv}{dt} = 32\pi m^3/s$	2	M_1,A_1
	(b) $v = \pi\int_1^3 y^2dx = \pi\int_1^3(x^2+1)dx$ $= \pi\left\lvert\left(\frac{x^3}{3} + x\right)\right\rvert_1^3 = \pi\left(\left(\frac{27}{3} + 3\right) - \left(\frac{1}{3} + 1\right)\right)$ $= \pi\left(12 - \frac{4}{3}\right) = \frac{32}{3}\pi$ *cubic units*	6	M_2 2 M_1,A_1
	(c). $\bar{x} = \frac{2(-2)+5(4)+7(3)}{2+5+7}$, $\bar{y} = \frac{2(3)+5(3)+7(-5)}{2+5+7}$ ∴ The position vector of the centre of gravity , $r_{cg} = \frac{37}{14}i - j$	6	M_1,A_1 M_1,A_1 A_1,A_1

Q. No	REFERENCES AND SOLUTIONS	MARKS	COMMENTS
11	a) i)  	2	$A_{0.5}x4$ −for the four forces
	ii) $N_1 = 3W + W = 4W - - - - (1)$ $N_2 = Fr = \mu N_1 = \frac{4}{\sqrt{3}}W - - - - (2)$	2	M_1 M_1
	iii) Taking moments about the point A; $\Longrightarrow 6N_2 sin30^0 = 3Wxcos30^0 + 3Wcos30^0 - - - (3)$	2	$M_{1,}$ A_1
	iv) Solving equation (2) and (3) simultaneously; $\frac{4}{\sqrt{3}}W \times 3 = 3Wx \times \frac{\sqrt{3}}{2} + 3W \times \frac{\sqrt{3}}{2}$ $\therefore x = \frac{5}{3}m$	5	M_2 M_2 A_2
	b)  $F_D - 2000sin30^0 = ma \quad \Longrightarrow F_D - 1000 = 200a - - - - (1)$ But $P = F_D V \quad \Longrightarrow F_D = \frac{P}{V} = \frac{800}{4} = 2000N$ (1) $\Longrightarrow a = \frac{F_D - 1000}{2000} = 5m/_{s^2}$	6	$M_{2,}$ M_1A_1 M_1A_1
	SECTION C		

<table>
<tr><th>Q. No</th><th>REFERENCES AND SOLUTIONS</th><th>MARKS</th><th>COMMENTS</th></tr>
<tr><td>12</td><td>a)

</td><td>3</td><td>$A_{0.5}x6$</td></tr>
<tr><td></td><td>b). From the graph, the estimated mode 34.1 ±0.3</td><td>3</td><td>$M_1M_1A_1$</td></tr>
<tr><td></td><td>c).
<table>
<tr><th>x (mid value)</th><th>x^2</th><th>f</th><th>x^2f</th><th>xf</th></tr>
<tr><td>10.5</td><td>110.25</td><td>5</td><td>551.25</td><td>52.5</td></tr>
<tr><td>20.5</td><td>420.25</td><td>7</td><td>2,941.75</td><td>143.5</td></tr>
<tr><td>30.5</td><td>930.25</td><td>19</td><td>17,674.74</td><td>579.5</td></tr>
<tr><td>40.5</td><td>1,640.25</td><td>17</td><td>27,884.25</td><td>688.5</td></tr>
<tr><td>50.5</td><td>2,550.25</td><td>7</td><td>17,851.75</td><td>353.5</td></tr>
<tr><td>60.5</td><td>3,660.25</td><td>5</td><td>18,301.25</td><td>302.5</td></tr>
</table>
Mean $(\bar{x}) = \frac{\sum xf}{\sum f} = \frac{2{,}120}{60} \approx 35.3$</td><td>5</td><td>$M_1M_1M_1M_1$
A_1</td></tr>
<tr><td></td><td>d) Standard deviation $= \sqrt{\frac{\sum x^2f}{\sum f} - \left(\frac{\sum xf}{\sum f}\right)^2} = \sqrt{\frac{85{,}205}{60} - \left(\frac{2{,}120}{60}\right)^2} = 13.101$</td><td>6</td><td>$M_1M_1M_1A_1M_1A_1$</td></tr>
<tr><td>13</td><td>a) i)
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>$P(x)$</td><td>k</td><td>3k</td><td>5k</td><td>7k</td><td>9k</td></tr>
</table></td><td>2</td><td>$M_{1,}A_1$</td></tr>
<tr><td></td><td>ii) k+3k+5k+7k+9k=1 $\Rightarrow 25k = 1 \quad \therefore k = \frac{1}{25}$</td><td>2</td><td>$M_1A_1$</td></tr>
<tr><td></td><td>iii) Mean $(x) = \sum xP(x) = 3k(1) + 5k(2) + 7k(3) + 9k(4) = \frac{14}{5} = 2.8$
$Variance(x) = 1^2(3k) + 2^2(5k) + 3^2(7k) + 4^2(9k) - \left(\frac{14}{5}\right)^2$
$= \frac{230}{25} - \left(\frac{14}{5}\right)^2 = 1.36$</td><td>5</td><td>$M_1A_1$
M_2-divisible
A_1</td></tr>
</table>

Q. No	REFERENCES AND SOLUTIONS	MARKS	COMMENTS
	b) i) $Mean(x) = np = 6 \times \frac{1}{2} = 3$ $\sigma = \sqrt{npq} = \sqrt{6 \times \frac{1}{2} \times \frac{1}{2}} = \sqrt{\frac{3}{2}} \approx 1.2$	3	$M_{0.5,}A_1$ $M_{0.5}A_1$
	ii) b) $P(x < 2) = P(x = 0) + P(x = 1)$ $= 6C_0 \left(\frac{1}{2}\right)^0 \left(\frac{1}{2}\right)^6 + 6C_1 \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^5$ ≈ 0.109375	3	M_1 M_1 A_1
	iii) $P(X \geq 2) = 1 - P(X < 2) = 0.890625$	2	M_1A_1
14	a) i) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= \frac{1}{5} + \frac{3}{20} - \frac{3}{100} \quad \therefore P(AUB) = \frac{8}{15}$	3	M_1 M_1 A_1
	ii) $P(A) \times P(B) = \frac{1}{5} \times \frac{3}{20} = \frac{3}{100} = P(A \cap B)$ Hence A and B are independent	2	M_1,A_1
	iii) $P(A) + P(B) = \frac{1}{5} + \frac{3}{20} - \frac{7}{2} \neq P(A \cup B)$ Hence, A and B are not mutually exclusive	3	M_1M_1 A_1
	b) i)  	3	$A_{0.5}x6$ for the six branches.
	ii) $P(RR) + P(RG) = \frac{48}{120} + \frac{24}{120} = \frac{3}{5}$	3	$M_1M_1A_1$
	iii) $P(GR) + P(RG) = \frac{24}{120} \times 2 = \frac{2}{5}$	3	$M_{1,}M_1A_1$