

Paper 1		
QN	TOPIC (Please Select)	ANSWERS (<u>Exclude</u> graphs and text answers)
1	APGP	$\frac{3x-2}{12x(1-x)}$
2	Maclaurin & Binomial Series	(i) $x = 0.462$ (3 s.f.) (ii) $y = 1 - \frac{1}{3}x + \frac{1}{3}x^2 + \frac{10}{81}x^3 + \dots$
3	Complex Numbers	(i) $w = 1.41 + 1.41i$ (ii) $z = 0.299 - 0.518i$
4	Equations & Inequalities	(i) $a > 0, b > 0$ or $a < 0, b < 0$ (ii) If $a > 0$, then $y \leq 0$ or $y \geq 4a$. If $a < 0$, then $y \leq 4a$ or $y \geq 0$. (iii) $m = -\frac{b}{2}$
5	Graphs & Transformations	
6	Vectors	(b)(i) $\frac{1}{3}\mathbf{a} + \frac{3}{8}\mathbf{b}$ (ii) $AN : NB = 9 : 8$
7	Integration & Applications	(a) $\tan 2x + C$ (b) $\frac{1}{4} - \pi$
8	Sigma Notation & MOD	(iii) $\frac{23}{12}$ (iv) $1 - \frac{3}{2}\left(\frac{1}{n}\right) - \frac{3}{2}\left(\frac{1}{n+1}\right) + \frac{1}{n+2}$
9	Differentiation & Applications	(ii) $\frac{512\pi}{3}$ (iii) $\frac{\sqrt{255}\pi}{128} \text{ cm}^3/\text{min}$ (or 0.392 (3 sf))
10	Integration & Applications	(ii) $k = \frac{3}{2}$ (iii) 22.1 unit ³ (iv) radius $\frac{3}{\sqrt{2}}$ units and height 4 units
11	Differentiation & Applications	(i) $y = u(2-u)x + u^2$ (iii) $x > 1$ (iv) $p = 1.3820, q = 3.6180; 1.43 \text{ unit}^2$

Paper 2

QN	TOPIC (Please Select)	ANSWERS (Exclude graphs and text answers)
1	Functions	(a)(i) $gf : x \mapsto (\sqrt{7-x} - 2)^4 + 2(7-x), x \in \mathbb{R}, x < 7$ (ii) $R_{gf} = [3, \infty)$ (b)(i) $h(x) = x^2 + 5 + a$ (ii) $h^{-1}(x) = \sqrt{x-5-a}, x \in \mathbb{R}, x > 10+a$
2	Vectors	(i) No (ii) $\frac{96}{\sqrt{89}}$ (iii) $\mathbf{r} \cdot \begin{pmatrix} -1 \\ 7 \\ 31 \end{pmatrix} = 0$ (iv) $x - 7y - 31z = -1011$ and $x - 7y - 31z = 1011$ (v) $\left(-\frac{123}{7}, 19, -\frac{34}{7}\right)$
3	Differential Equations	(ii) $v = \frac{10(e^{2t} - 1)}{e^{2t} + 1}; x = 10\ln(e^t + e^{-t}) - 10\ln 2$ (iii) $x = 10e^{-t} + 10t - 10$ (iv) Model 1
4	Complex Numbers	(a)(ii) Least value of $n = 5$ (b)(i) $\therefore m = 3, z_0 = 2 + i, z_1 = 2 - i$ (ii) Min $ w = 2$
5	PnC & Probability	(i) 384 (ii) 864 (iii) 47775744
6	DRV	(i) $\frac{1}{21}$ (iv) $\frac{1}{14}$ (v) There are 2 other possible values of $s : 8, 36$ For $s = 8$: $B = 4, F = 2$ or $B = 2, F = 4$ For $s = 36$: $B = 6, F = 6$
7	Hypothesis Testing	(i) $\bar{x} = \frac{216}{60} = 3.6, s^2 = \frac{\sum(x - \bar{x})^2}{60-1} = \frac{6.4}{59} = \frac{32}{295}$ (iv) largest $n = 57$
8	Binomial Distribution	(iii) 0.960 (iv) 0.771 (v) 0.896
9	Normal Distribution	(i) 0.655 (ii) 0.959 (iii) 0.963 (iv) $\mu = 27.3$ and $\sigma = 8.01$
10	DRV	(i) 24 (iv) $q = \frac{1}{4}$ and $r = \frac{1}{24}$ (v) $E(M) = 50$ $\text{Var}(M) = 2500$ (vi) 52.08