REGULAR QUIZ 01

Form 5

More about Equation

Part A – MC (@2 marks)

1	D	$x^2-4x+4=3x-8$ $x^2-7x+12=0$ $x=3$ or $x=4$ $y=1$ or $y=4$
2	C	$5^{2x}-10\cdot 5^x+16=0$ $5^x=2$ or $5^x=8$ $x\log 5=\log 2$ or $x\log 5=\log 8$ $x=0.43$ or $x=1.29$
3	D	$C(0,-13)$ Since y-coordinate of the orthocenter is -14 and OC is vertical. Then $y=-14$ is an altitude from B to OC. Put $B(p,-14)$ into $y=x^2+2x-13$ $p=-1$ Equation of L $y=\frac{-14+13}{-1-0}x-13$ $y=x-13$ $x-y-13=0$
4	D	$-\frac{1}{2}y=-x^2+\frac{15}{2}x-\frac{7}{2}$ $-\frac{1}{2}y+\frac{1}{2}x+\frac{27}{2}=-x^2+8x+10$ $-\frac{1}{2}y+\frac{1}{2}x+\frac{27}{2}=0$ $y=x+27$
5	C	$\cos\theta(\cos\theta+2)=0$ $\cos\theta=0$ or $\cos\theta=-2$ (rej.) $\theta=90^\circ$ or $\theta=270^\circ$ $\therefore$ 2 roots

6	B	$c=8$ $y=-x^2+4x+8$ $=-(x-2)^2+12$ $\therefore k=12$
7	D	$(x^2-4)(4x^2+9)=0$ $x^2=4$ or $x^2=-\frac{9}{4}$ (rej.) $x=2$ or $x=-2$
8	B	Put $y=0$ into $y=2(x+1)(x-k)$, then $x=-1$ or $x=k$ From the figure, we have $A(-1,0)$ Put $A(-1,0)$ into $y=mx+6$, $m=6$ $\begin{cases} y=2(x+1)(x-k) \\ y=mx+6 \end{cases}$ $2(x+1)(x-k)=mx+6$ $2x^2+(2-2k)x-2k=6x+6$ $2x^2+(-4-2k)x-2k-6=0$ x-coordinate of the mid-point of A and C $=-\frac{-4-2k}{2}\div 2$ $=\frac{k+2}{2}$

1.	D	2.	C	3.	D	4.	D	5.	C
6.	B	7.	D	8.	B				

Part B - Short Questions

1. (4 marks)

$y = x^3 + 3x^2 + \frac{1}{5}x - 1$

$5y = 5x^3 + 15x^2 + x - 5$

$5y = k - 5$ 1M

$y = \frac{k-5}{5}$

Horizontal line should be added. 1M

From the figure, for exactly two real roots,

$y = -1$ or $y = 2.6$ 1A

$\frac{k-5}{5} = -1$ or $\frac{k-5}{5} = 2.6$

$k = 0$ or $k = 18$ 1A

2. (4 marks)

$(m+3)x^2 - 2mx + 5 = -5x + 17$

$(m+3)x^2 + (5-2m)x - 12 = 0$ 1M

Δ

$= (5-2m)^2 - 4(m+3)(-12)$ 1M

$= 25 - 20m + 4m^2 + 48m + 144$

$= 4m^2 + 28m + 169$

$= 4(m + \frac{7}{2})^2 + 120$ 1A

> 0

$\therefore$ The parabola and the straight line intersect at 2 distinct points for all values of m. 1A f.t.

3. (3 marks)

$\log_4 (2x-5)(x - \frac{8}{3}) = 1$ 1M

$(2x-5)(x - \frac{8}{3}) = 4$ 1M

$6x^2 - 31x + 28 = 0$

$x = 4$ or $x = \frac{7}{6}$ (rej.) 1A

4. (3 marks)

$2x-10-2\sqrt{(2x-10)(x-4)}+x-4=1$ 1M

$2\sqrt{(2x-10)(x-4)}=3x-15$

$4(2x-10)(x-4)=(3x-15)^2$ 1M

$8(x-5)(x-4)=9(x-5)^2$

$(x-5)(9x-45-8x+32)=0$

$(x-5)(x-13)=0$

$x=13$ or $x=5$ (rej.) 1A

5. (6marks)

(a)
$$\begin{cases} y=x^2-3x \\ y=3 \end{cases}$$

$x^2-3x=3$

$x^2-3x-3=0$

$\alpha+\beta=3,\ \alpha\beta=-3$ 1A + 1A

(b) $AB=\beta-\alpha$

Consider $(\beta-\alpha)^2$

$=(\alpha+\beta)^2-4\alpha\beta$

$=3^2-4(-3)$

$=21$

$\therefore AB=\beta-\alpha=\sqrt{21}$ units 1A (accept $\sqrt{21}$)

(c) x-coordinate of P

$=\dfrac{\alpha+\beta}{2}=\dfrac{3}{2}$

Put $P(\dfrac{3}{2},k)$ into $y=x^2-3x$

$k=-\dfrac{9}{4}$

$\therefore P(\dfrac{3}{2},-\dfrac{9}{4})$ 1A

Area of ΔABP

$=\dfrac{1}{2}(\sqrt{21})(3+\dfrac{9}{4})$ 1M

$=\dfrac{21\sqrt{21}}{8}$ sq. units 1A (accept $\dfrac{21\sqrt{21}}{8}$)