MATEMATIK TAMBAHAN
KERTAS 2
3472/2
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$\mathbf{2\frac{1}{2}}$ ***jam***

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LEMBAGA MAKTAB MAHMUD NEGERI KEDAH DARUL AMAN

PERATURAN PEMARKAHAN (PP)

PEPERIKSAAN PENINGKATAN PRESTASI SPM (PPP AR 3)
TAHUN 2021M / 1443H
MATEMATIK TAMBAHAN
KERTAS 2

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

Peraturan pemarkahan ini **SULIT**. Kegunaannya khusus untuk pemeriksa yang berkenaan sahaja. Sebarang maklumat dalam peraturan pemarkahan ini tidak boleh dimaklumkan kepada sesiapa.

Kertas peperiksaan ini mengandungi 11 halaman bercetak

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Soalan	Langkah Penyelesaian	Markah	Jumlah Markah
1. (a)	$68,73,78,...\ a=68$	1	
	$d=5$		
	$T_n \le 3000$		
	$68+(n-1)(5) \le 300$	1	
	$n=47$	1	
	Bilangan kerusi maksimum ialah 47.		
(b)	$47,45,43,...\ a=47$	1	
	$d=-2$		
	$S_{15}=\frac{15}{2}[2(47)+(15-1)(-2)]$	1	
	Tidak, hanya 495 kerusi sahaja dalam stor.	1	**6**
2. (a)	$\overrightarrow{PQ}=-p+q$	1	
	$\overrightarrow{PR}=-p+4q$	1	
(b)	$OT=p+k(-p+4q)$	1	
	$OS=p+m(-p+q)$	1	
	$OT=OS$	1	
	$k=\frac{1}{3}$	1	
	$m=\frac{2}{3}$	1	**7**
3.	$2^n(2^2)-2^n(2^1)+\frac{2^n}{2^1}$	1	
	$2^n\left(\frac{5}{2}\right)$		
	perbandingan menunjukkan $p=5$	1	
	$8[5(2^{n-1})]=5(2^{n^2})$	1	
	$2^3(2^{n-1})=2^{n^2}$	1	
	$3+n-1=n^2$	1	
	$n=-1$ $n=2$	1	**6**

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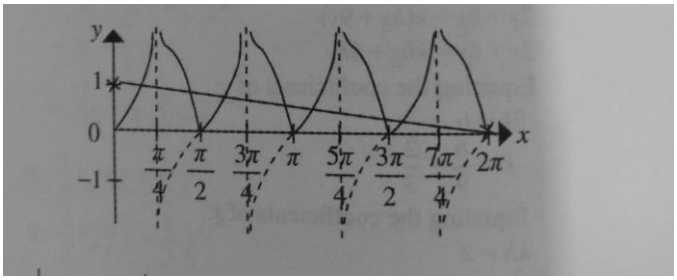
4.	(a)	$=\dfrac{\sin 2x}{\tan^2 x+2kos^2x-sek^2x}$		
		$=\dfrac{\sin 2x}{sek^2x-1+2kos^2x-sek^2x}$	1	
		$=\dfrac{\sin 2x}{2kos^2-1}$ atau $=\dfrac{\sin 2x}{kos2x}$	1	
	(b)	$y=\tan 2x$		

x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{2}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
y	0	∞	0	∞	0	∞	0	∞	0



	Skala	1
	Tempoh (Loop)	1
	Bentuk graf	1
(c)	$\left\|\dfrac{\sin 2x}{\tan^2 x+2kos^2x-sek^2x}\right\|+\dfrac{x}{2\pi}=1$	
	$\|\tan 2x\|=1-\dfrac{x}{2\pi}$	
	$y=1-\dfrac{x}{2\pi}$	1
	Graf garis lurus dilukis dengan tepat	1

x	0	2π
y	1	0

	Bilangan penyelesaian = 8	1	**8**

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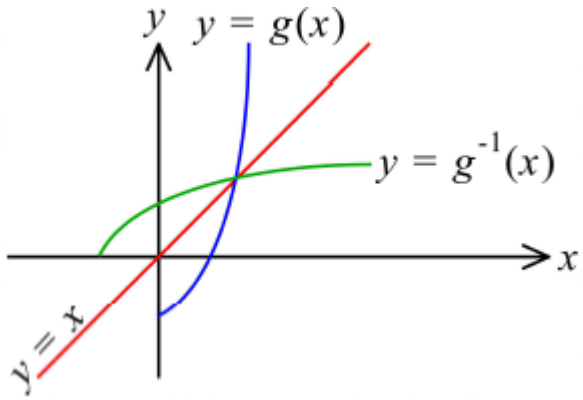
5.	(a)			
		Jadual nilai x dan g(x)	1	
		Graf g(x)	1	
		Graf $g^{-1}(x)$	1	
	(b)	Garis mengufuk memotong graf $g(x)$ hanya pada satu titik dalam domain yang diberi. Oleh itu g^{-1} wujud.	1	
	(c)	(i) $g^{-1}(x)=\sqrt{2x+1}$	1	
		(ii) Domain : $-\frac{1}{2}\le x\le 4$	1	
		Julat : $0\le g^{-1}(x)\le 3$	1	**7**
6.	(a)	$Jumlah\ \ kebarangkalian=1$		
		$2p+p+p=1$	1	
		$p=\frac{1}{4}$		
		$Merah=8$ (atau lain-lain kaedah)	1	
	(b)	Bulatan (mahkota) + gelang (bulatan /2)		
		$=\frac{8!\times 8!\times 2}{4!\times 8!\times 4!\times 2}+\frac{8!\times 8!\times 2}{4!\times 8!\times 4!\times 2\times 2}$	2 + 2	
		$=70+35$	1	
		$=105$	1	
				8

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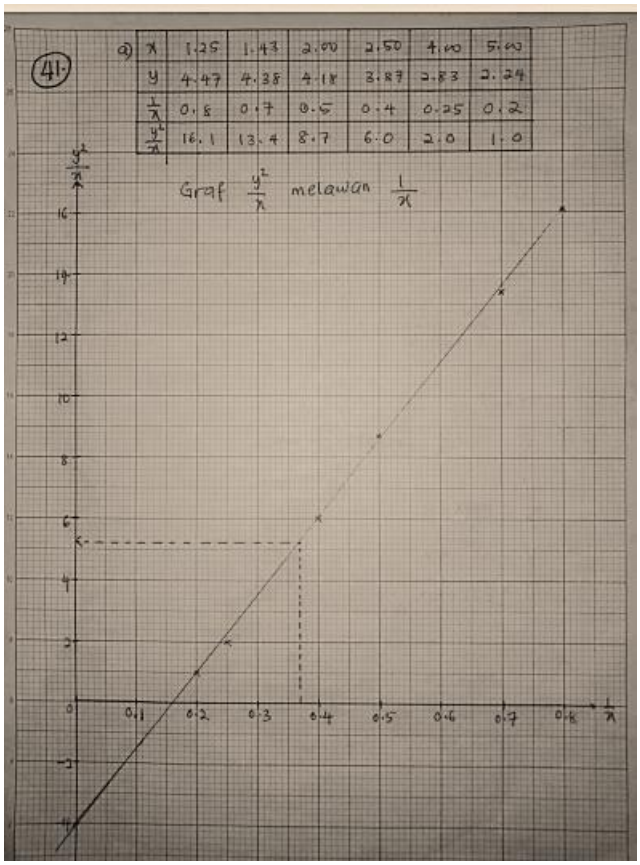
7.	(a)	$y = 4x - x^2$		
		$\frac{dy}{dx} = 4 - 2x \qquad x = h \rightarrow \frac{dy}{dx} = 4 - 2h$	1	
		$\frac{4h - h^2 - 5}{h - 2} = 4 - 2h$	2	
		$h^2 - 4h + 3 = 0$	1	
		$h = 3$ (ditunjukkan) $\quad h = 1$ (diabaikan)	1	
	(b)	$L_1 = \frac{1}{2}(5 + 3)(1) = 4$	1	
		$L_2 = \int_2^3 4x - x^2 dx = \frac{11}{3}$	1	
		$L_1 - L_2 = \frac{1}{3}$	1	**8**

8.



Jadual	1+1	
Plot	1	
Garis Lurus Penyuaian Terbaik	1	
(i) $x=2.7,\ \frac{1}{2.7}=0.37$	1	
$\frac{y^2}{x}=5.2 \qquad \frac{y^2}{2.7}=5.2 \qquad y=3.747$	1	
(ii) $m=\frac{6.0-1.0}{0.4-0.2}=25$	1	
$Y=mX+C$		
$Y=\frac{y^2}{x}\ ,\ X=\frac{1}{x}\ , m=25, C=-4$	1	
$\frac{y^2}{x}=\frac{25}{x}-4$	1	
$y=\sqrt{25-4x}$	1	**10**

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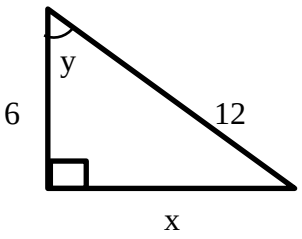
9. (a)	$PA=\sqrt{10}$	1	
	$\sqrt{(x+2)^2+(y-1)^2}=\sqrt{10}$	1	
	$x^2+y^2+4x-2y-5=0$	1	
(b)	$25+q^2-20-2q-5=0$	1	
	$q=0, q=2$	1	
(c)	$m_{AB}=-3$	1	
	$m_{BC}=\frac{1}{3}$	1	
	$C(5,0)$	1	
	Luas ΔABC		
	$\frac{1}{2}\ \lvert(5+4)-(-1-10)\rvert$	1	
	$10\,unit$	1	**10**
10. (a)			
	$x=\sqrt{12^2-6^2}$ $x=10.39$	1	
	$\angle y$ $10.39^2=6^2+12^2-2(6)(12)\,kos\,y$	1	
	$y=59.98°\ \approx 60°$	1	
	$s=j\theta$ $s=12\times\left(60°\times\frac{\pi}{180}\right)=4\pi$ $\frac{4\pi}{12\pi}=\frac{x}{1.2kg}$		
	panjang lengkuk separuh bulatan $=12\pi$		
	$x=0.4kg$	1	
	$=1.2kg-0.4kg$ $=0.8kg$	1	

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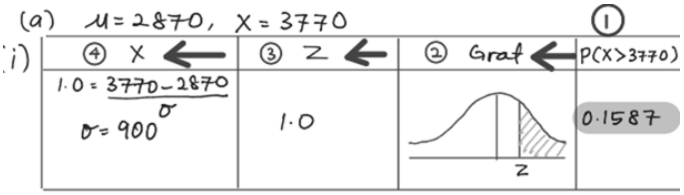
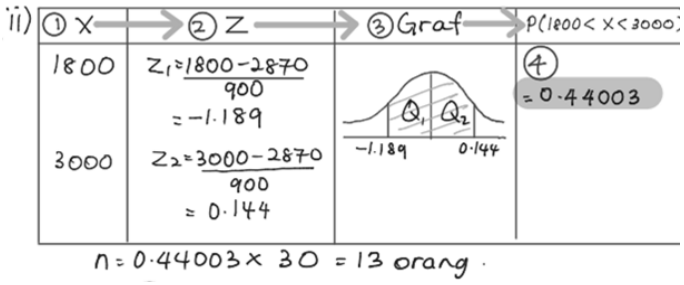
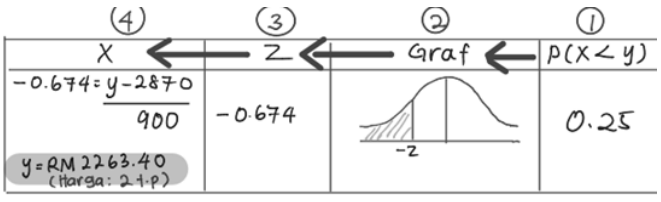
(b)	$\text{Luas} = \frac{1}{2}\times 12^2 \times \frac{1}{3}\pi - \frac{1}{2}\times 6\times 10.39$	2	
	$= 75.408 - 31.17 = 44.24$	1	
	$\text{Luas} = (30\times 6) - (44.24\times 2)$	1	
	$= 91.52 cm^2$	1	**10**
11. (a)	(a) $\mu = 2870,\ X = 3770$ i)  	1	
	$P\left(Z \geq \frac{3770-2870}{\sigma}\right) = 0.1587$	1	
	$P(Z \geq 1) = 0.1587$	1	
	$\sigma = 900\ \ \sigma = 900$		
	ii)  	1	
	$P(-1.189 \leq Z \leq 0.144)$	1	
	$1 - 0.1172 - 0.4427$	1	
	0.4401	1	
	13 orang		
(b)	 		
	$P(Z < -0.674) = 0.25$	1	
	$\frac{y-2870}{900} = -0.674$	1	
	$y = RM\,2263.40$	1	**10**

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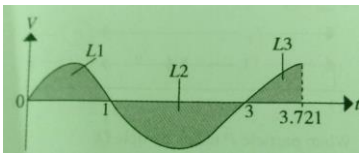
12.	(a)	$a = \frac{dv}{dt} = 3t^2 - 8t + 3$		
		$t = 0, a = 0 + 0 + 3$	1	
		$= 3\,m\,s^{-2}$	1	
	(b)	$a < 6$		
		$3t^2 - 8t + 3 < 6$		
		$(3t + 1)(t - 3) = 0$	1	
		$t = 3 \qquad t = -\frac{1}{3}$ (diabaikan)	1	
	(c)	$v = 0, t^3 - 4t^2 + 3t = 0$	1	
		$t(t^2 - 4t + 3t) = 0$		
		$t = 0, t = 1, t = 3$	1	
	(d)	$s = \int t^3 - 4t^2 + 3t\,dt$		
				
		$3t^2 - 16t + 18 = 0$		
		$t = \frac{16 \pm \sqrt{256 - 4(3)(18)}}{2} \qquad t = 1.613, 3.721$	1	
		$L_1 = \int_0^1 t^3 - 4t^2 + 3t\,dt = \frac{5}{12} m \qquad @$		
		$L_2 = \int_1^3 t^3 - 4t^2 + 3t\,dt = 2\frac{2}{3} m \qquad @$		
		$L_3 = \int_3^{3.721} v\,dt$	1	
		$= 47.9268 - 68.6938 + 20.7688 - \left(-2\frac{1}{4}\right) = 2.2518$		
		Jumlah jarak perjalanan $= \frac{5}{12} + 2\frac{2}{3} + 2.2518$	1	
		$5.335\,m$	1	**10**

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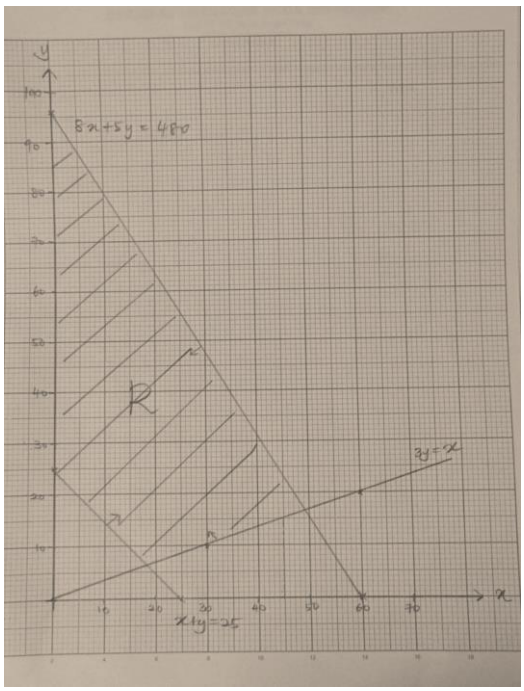
13. (a)	(i) 114.583	1	
	(ii) $\frac{4(114.583)+110(7-y)+150(y)+130}{4+(7-y)+y+1}=120$	1	
	$y=2$	2	
(b)	$I_P=120.312$	1	
	$I_S=126.1$	1	
	$\bar{I}=\frac{4(120.31215)+5(110)+150(2)+126.1}{4+5+2+1}$	1	
	$=121.445$	1	
(c)	$P=\frac{121.45}{100}\times 150$	1	
	$=182.17$	1	**10**
14. (a)	(i) $8x+5y\le 480$	1	
	(ii) $x+y\ge 25$	1	
	(iii) $x\le 3y$ / $3y\ge x$	1	
(b)			
	garis	1+1+1	
	rantau	1	
(c)	$45(8)+15(5)=435$	1	
	Maksimum wang yang tinggal $=480-435$	1	
	$=RM\,45$	1	**10**

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15. (a)	$AC^2 = 4.2^2 + 7.3^2 - 2(4.2)(7.3)kos\ 110$	1	
	$AC = 9.587$	1	
(b)	$\angle ADC = 48^0$	1	
	$\frac{BD}{\sin 62} = \frac{7.3}{\sin 48}$	1	
	$BD = 8.673$	1	
(c)	$\frac{1}{2}(4.2)(7.3)\sin 110 + \frac{1}{2}(8.673)(7.3)\sin 70$	1+1	
	44.15	1	
(d)	$\frac{1}{2}(12.873)(h) = 44.15$	1	
	$h = 6.859$ atau $h = 6.860$	1	**10**

TAMAT