MODUL PENINGKATAN PRESTASI TINGKATAN 5
TAHUN 2024

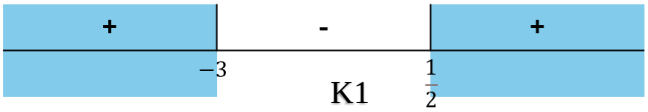
MATEMATIK TAMBAHAN

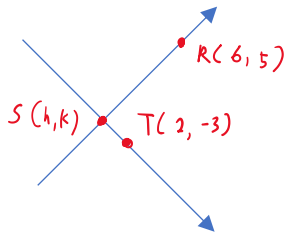
KERTAS 1

PERATURAN PEMARKAHAN

Peraturan Pemarkahan ini mengandungi **14** halaman bercetak

NO	PENYELESAIAN	SUB	JUMLAH
1	$\log_3(x-2)-\log_3 2=\log_3 x^2-\log_3(3x+4)$ $\log_3\left(\frac{x-2}{2}\right)=\log_3\left(\frac{x^2}{3x+4}\right)$ K1 [Guna rumus log] $\frac{x-2}{2}=\frac{x^2}{3x+4}$ K1 $(x-2)(3x+4)=2x^2$ $x^2-2x-8=0$ $(x-4)(x+2)=0$ K1 [x^2-2x-8 dilihat] $x=4,\ x=-2$ [diabaikan] N1	4	4

NO	PENYELESAIAN	SUB	JUMLAH
2 a)	$2x^2+5x-3\geq 0$ $(2x-1)(x+3)\geq 0$ K1 *Titik ujian* $=-4$ $(2(-4)-1)(-4+3)$ $9\geq 0$ *Titik ujian* $=0$ $(2(0)-1)(0+3)$ $-3<0$ *Titik ujian* $=1$ $(2(1)-1)(1+3)$ $4\geq 0$  K1 Julat nilai x ialah $x\leq -3$ atau $x\geq \frac{1}{2}$ N1	3	6
2 b)	$f(x)=2(x^2-6x+5)$ $=2\left[x^2-6x+\left(-\frac{6}{2}\right)^2-\left(-\frac{6}{2}\right)^2+5\right]$ K1 $=2(x-3)^2-8$ Titik minimum $=(3,\ -8)$ N1 Persamaan paksi simetri, $x=3$ N1 Nota: Tidak terima (i) $\frac{f(x)}{2}$ dan $x-3=0$	3	

NO	PENYELESAIAN	SUB	JUMLAH
3	$M_{RS} = \dfrac{5-k}{6-h}$ *K*1 $M_{ST} = \dfrac{k-(-3)}{h-2}$ *K*1 $\left(\dfrac{5-k}{6-h}\right)\left(\dfrac{k-(-3)}{h-2}\right) = -1$ *K*1 $\dfrac{5k+15-k^2-3k}{6h-12-h^2+2h} = -1$ $-k^2+2k+15 = -\left(-h^2+8h-12\right)$ $h^2+k^2-8h-2k-3=0$ *N*1 [semua langkah betul] 	4	4

NO	PENYELESAIAN		SUB	JUMLAH
4 a) (i)	0	N1	1	5
4 a) (ii)	$x = -\dfrac{\pi}{2}; x = -\dfrac{3}{2}\pi$	N1 [dilihat]	1	
4 b) (i)	$y = -\lvert\tan x\rvert$	N1	1	
4 b) (ii)	$-2\pi \le x \le 0$	N1 [terima $-\dfrac{5}{2}\pi \le x \le 0$]	1	
4 b) (iii)	$y \le 0$	N1	1	

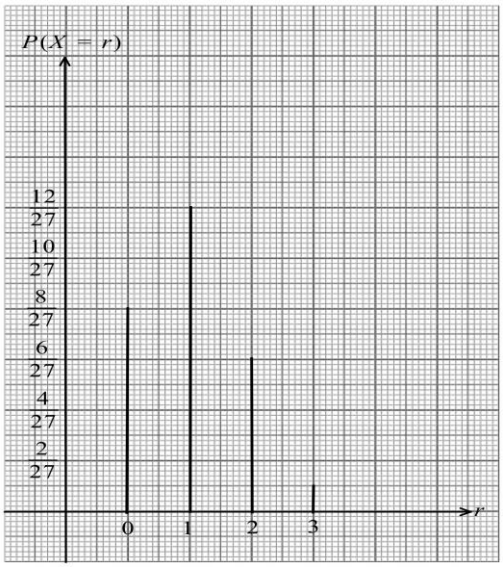
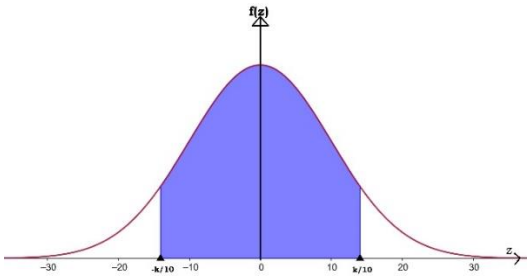
NO	PENYELESAIAN		SUB	JUMLAH
5 a)	Panjang lengkok AC $= 100-30-30 = 40$ Sudut minor AOC: $40 = 30\times\theta$ K1 $\theta = 1.333\text{rad} @ \dfrac{4}{3}\text{rad} @ 1\dfrac{1}{3}\text{rad}$ N1		2	**4**
5 b)	Luas sektor $OAC = \dfrac{1}{2}\times 30^2 \times 1.333$ $= 599.85\ m^2$ atau Luas sektor $OPR = \dfrac{1}{2}\times 40^2 \times 1.333$ K1 $= 1066.4\ m^2$ Luas kawasan berlorek = 1066.40 – 599.85 $466.55 \leftrightarrow 466.67$ @ $\dfrac{1400}{3}$ N1		2	

NO	PENYELESAIAN		SUB	JUMLAH
6. (a) (i)	$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ $= \begin{pmatrix} 12 \\ 0 \end{pmatrix} + \begin{pmatrix} -4 \\ -8 \end{pmatrix}$ $= \begin{pmatrix} 8 \\ -8 \end{pmatrix}$	P1 N1	**2**	**4**
6 a) (ii)	$\left\|\overrightarrow{AC}\right\| = \sqrt{8^2 + (-8)^2} = 8\sqrt{2}$ $\overrightarrow{AC} = \frac{8i - 8j}{8\sqrt{2}} = \frac{\underset{\sim}{i} - \underset{\sim}{j}}{\sqrt{2}}$ $\overrightarrow{AC} = \begin{pmatrix} \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} \end{pmatrix}$	K1 N1	**2**	
6 b)	$\overrightarrow{EB} = \lambda \overrightarrow{BC}$ $\overrightarrow{EO} + \overrightarrow{OB} = \lambda \begin{pmatrix} -4 \\ -8 \end{pmatrix}$ $\begin{pmatrix} -k \\ -6 \end{pmatrix} + \begin{pmatrix} 6 \\ 2 \end{pmatrix} = \lambda \begin{pmatrix} -4 \\ -8 \end{pmatrix}$ $-4 = \lambda(-8)$ $\lambda = \frac{1}{2}$ $-k + 6 = \frac{1}{2}(-4)$ $k = 8$	 K1 [$\overrightarrow{EB} = \lambda \overrightarrow{BC}$ mesti dilihat] N1 N1	**3**	**3**

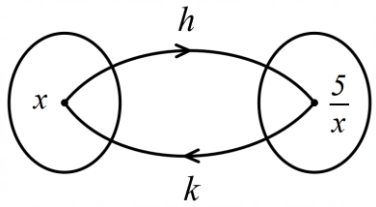
NO	PENYELESAIAN		SUB	JUMLAH
7 a)	**Alternatif A** $g(x) = f^{-1}(x)$ $\frac{15}{2a+7} = x$ $a = \frac{15-7x}{2x}$ $g(x) = \frac{15-7x}{2x},\ x \neq 0$ **Alternatif B**	*P*1 N1 [$x \neq 0$ mesti ditulis]	2	**4**

	$fg(x) = x$ P1 $\frac{15}{2g(x)+7} = x$ $g(x) = \frac{15-7x}{2x}$ $g(x) = \frac{15-7x}{2x},\ x \neq 0$ N1 [$x \neq 0$ mesti ditulis]		
7 b)	$\frac{15}{2x+7} = \left(\frac{15-7x}{2x}\right)^*$ K1 * $g(x)$dari (a) $15(2x) = (15-7x)(2x+7)$ $2x^2 + 7x - 15 = 0$ $(2x-3)(x+5) = 0$ *or* $14x^2 + 49x - 105 = 0$ $7[(2x-3)(x+5)] = 0$ $x = \frac{3}{2},\ x = -5$ N1 [$(2x-3)(x+5)$ mesti dilihat]	2	

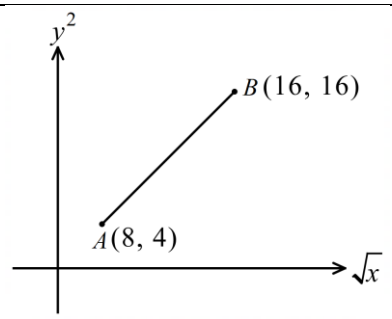
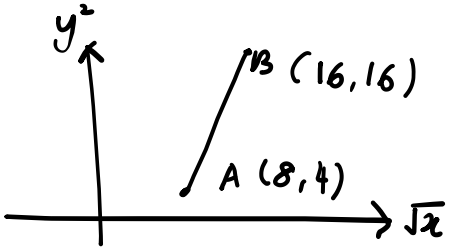
NO	PENYELESAIAN	SUB	JUMLAH
8 a)	<table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$P(X=r)$</td><td>$\frac{8}{27}$</td><td>$\frac{4}{9}$</td><td>$\frac{2}{9}$</td><td>$\frac{1}{27}$</td></tr></table> N1 betul bagi semua 4 data OR <table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$P(X=r)$</td><td>0.2963</td><td>0.4444</td><td>0.2222</td><td>0.0370</td></tr></table> Dengan syarat pembundaran betul kepada 4 titik perpuluhan Rujuk graf pada muka surat 7	3	**8**

			
8 b)	$P((\mu-k)<X<(\mu+k))=0.84$ $P\left(\frac{65-k-65}{10}<Z<\frac{65+k-65}{10}\right)=0.84$ P1 $P\left(-\frac{k}{10}<Z<\frac{k}{10}\right)=0.84$ P1 [Graf dilukis dari sini] *atau* $1-2P\left(Z\geq\frac{k}{10}\right)=0.84$ *atau* $0.5-P\left(Z\geq\frac{k}{10}\right)=0.42$ P1 $P\left(Z\geq\frac{k}{10}\right)=0.08$ $P(Z\geq 1.406)=0.08$ P1 [dilihat 1.406] [1.406 Dibaca dari Jadual Normal Piawai] [tidak terima jawapan dari calculator = -1.4051] $\frac{k}{10}=1.406$ K1 $k=14.06$ N1 [N0 jika tiada lakaran graf]  (i) Guna pembaris / alat tepi lurus (ii) $-\frac{k}{10}$ dan $\frac{k}{10}$ mesti nampak (iii) Betul label paksi $f(z)$ dan z (iv) Lorekkan betul	5	

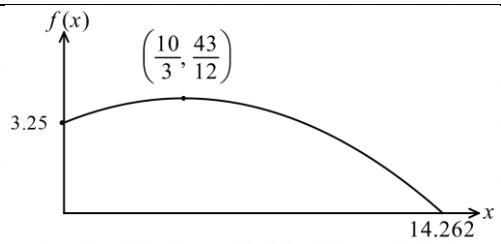
NO	PENYELESAIAN	MARKAH
9. (a)	$\underset{x\to 0^-}{\text{had}}\, f(x) = -1$ $\underset{x\to 0^-}{\text{had}}\, f(x) = 1$ [dilihat] $\underset{x\to 0^-}{\text{had}}\, f(x) \neq \underset{x\to 0+}{\text{had}}\, f(x)$, $\therefore \underset{x\to 0}{\text{had}}(x)$ tidak wujud N1 had dari arah kiri tidak sama dengan had dari arah kanan N1	**2**
9 b)	$y = \dfrac{2}{x+4}$ $\delta y = f(x+\delta x) - f(x)$ $= \dfrac{2}{(x+\delta x)+4} - \dfrac{2}{x+4}$ K1 $= \dfrac{2(x+4)-2(x+\delta x+4)}{(x+\delta x+4)(x+4)}$ $= \dfrac{-2\delta x}{(x+\delta x+4)(x+4)}$ $\dfrac{\delta y}{\delta x} = \dfrac{-2}{(x+\delta x+4)(x+4)}$ K1 $\dfrac{dy}{dx} = \underset{\delta x\to 0}{\text{had}} \dfrac{\delta y}{\delta x}$ $= \underset{\delta x\to 0}{\text{had}} \dfrac{-2}{(x+\delta x+4)(x+4)}$ K1 [$\underset{\delta x\to 0}{\text{had}}$ dilihat dan gantikan $\delta x = 0$] $= \dfrac{-2}{(x+0+4)(x+4)}$ $= \dfrac{-2}{(x+4)(x+4)}$ $= -\dfrac{2}{(x+4)^2}$ N1	**4**
	JUMLAH	**6**

NO	PENYELESAIAN	SUB	JUMLAH
10 a) (i)	$h(x)=\frac{5}{x}$ @ $k\left(\frac{5}{x}\right)=x$ N1 $h(x)=k^{-1}(x)$ @ $k\left(\frac{5}{x}\right)=h^{-1}\left(\frac{5}{x}\right)$ @ $h\left[k\left(\frac{5}{x}\right)\right]=k\left[h\left(\frac{5}{x}\right)\right]$ N1 @ $hk(x)=kh(x)$ * Terima jika murid guna ayat	2	**6**
10 a) (ii)	 [mesti ada anak panah dan titik]	1	
10 b)	$gf(x) = g[2x-1]$ $= \sqrt{2x-1}$ K1 Supaya $gf(x)$ tertakrif, $2x-1\geq 0$ $2x-1\geq 0$ K1 $x\geq\frac{1}{2}$ N1 catatan $2x-1>0$ K1N0	3	

NO	PENYELESAIAN	SUB	JUMLAH
11 a) (i)	$\frac{6!}{2!}=360$ atau setara ; $\frac{{}^{6}P_{6}}{2!}$ / $\frac{{}^{6}C_{6}\times 6!}{2!}$ N1	1	7
11 a) (ii)	$5!=120$ atau $\frac{5!\times 2!}{2!}=120$ N1	1	
11 b)	Pusingan 1: Iriz & Saga [Assuming] = 2C1 x 1C1 x 6C2 x 6C3 x 3C3 = 600 & Tukar Kereta = 1 cara NOTA: 2C1 = Pilih pemandu untuk kereta 1 1C1 = Pilih pemandu untuk kereta 2 6C2 = Pilih dua kereta daripada 6 kereta 6C3 = Pilih 3 penumpang daripada 6 penumpang untuk kereta 1 3C3 = Pilih 3 penumpang daripada 3 penumpang untuk kereta 2 Pusingan 2: x50 & x70 [Assuming] = 2C1 x 1C1 x 4C2 x 6C3 x 3C3 = 240 & Tukar Kereta = 1 cara NOTA: 2C1 = Pilih pemandu untuk kereta 1 1C1 = Pilih pemandu untuk kereta 2 4C2 = Pilih dua kereta daripada 4 kereta 6C3 = Pilih 3 penumpang daripada 6 penumpang untuk kereta 1 3C3 = Pilih 3 penumpang daripada 3 penumpang untuk kereta 2 Pusingan 3: Persona & Exora [Assuming] = 2C1 x 1C1 x 2C2 x 6C3 x 3C3 = 40 & Tukar Kereta = 1 cara NOTA: 2C1 = Pilih pemandu untuk kereta 1 1C1 = Pilih pemandu untuk kereta 2 2C2 = Pilih dua kereta daripada 2 kereta 6C3 = Pilih 3 penumpang daripada 6 penumpang untuk kereta 1 3C3 = Pilih 3 penumpang daripada 3 penumpang untuk kereta 2 Mana-mana satu kiraan di atas betul atau setara [1 m] Bilangan Cara = 600(1) + 240(1) + 40(1) [1 m] = 880 [1 m]	3	
11 c)	$2!$ = Susun x50 dan x70 bersebelahan $(5-1)!=$ Susun keenam-enam model dalam bulatan Bilangan susunan berbeza $=2!(5-1)!$ atau $\frac{5!}{5}\times 2!$ K1 $=48$ N1	2	

NO	PENYELESAIAN	SUB	JUMLAH
12 a)	  N1 • Garis lurus dan paksi dilukis menggunakan pembaris/alat tepi lurus. • Semua koordinat betul dan tajuk paksi betul. • Abaikan pintasan-Y	1	**4**
12 b)	$y^2 = p\sqrt{x} - 8$ P1 $p = \dfrac{16-4}{16-8}$ $p = *\dfrac{3}{2} / 1.5$ K1 $y^2 = \dfrac{3}{2}\sqrt{x} - 8$ N1 [terima $Y = \dfrac{3}{2}X - 8$] [terima murid menjawab (b) dahulu kemudian (a)]	3	

NO	PENYELESAIAN	SUB	JUMLAH
13 a)	$f(x) = -\dfrac{3}{100}\left[x^2 - \dfrac{20}{3}x - \dfrac{325}{3}\right]$ $f(x) = -\dfrac{3}{100}\left[x^2 - \dfrac{20}{3}x + \left(\dfrac{-\frac{20}{3}}{2}\right)^2 - \left(\dfrac{-\frac{20}{3}}{2}\right)^2 - \dfrac{325}{3}\right]$ K1 $f(x) = -\dfrac{3}{100}\left[\left(x - \dfrac{10}{3}\right)^2 - \dfrac{1075}{9}\right]$ $f(x) = -\dfrac{3}{100}\left(x - \dfrac{10}{3}\right)^2 + \dfrac{43}{12}$ N1 setara $f(x) = -0.03\left(x - \dfrac{10}{3}\right)^2 + \dfrac{43}{12}$ Tinggi maksimum = $\dfrac{43}{12}$ @ $3\dfrac{7}{12}$ @ 3.583 N1 *K0 jika $+\left(\dfrac{-\frac{20}{3}}{2}\right)^2 - \left(\dfrac{-\frac{20}{3}}{2}\right)^2$ tidak dilihat Terima guna $f'(x)$	3	**8**

13 b)	$f(9) = -\frac{3}{100}(9)^2 + \frac{1}{5}(9) + \frac{13}{4}$ K1 $= 2.62$ Tinggi bola di atas jaring $= 2.62 - 2.43$ $= 0.19$ N1	2	
13 c)	$x = \frac{-\left(\frac{1}{5}\right) \pm \sqrt{\left(\frac{1}{5}\right)^2 - 4\left(-\frac{3}{100}\right)\left(\frac{13}{4}\right)}}{2\left(-\frac{3}{100}\right)}$ K1 $x = 14.262,\ x = -7.596$ [Diabaikan] Ya, kerana jarak bola mencecah lantai = $14.262 < 18$ N1 *Mesti guna FORMULA	2	
13 d)	 Graf mesti melengkung • Titik 3.25 mesti lebih rendah dari titik maksimum. • 14.262 wajib tulis	1	

NO	PENYELESAIAN	SUB	JUMLAH
14 a)	Adib [9 bahagian] $S_9 = 213.36$ $\frac{9}{2}\left[2k+(9-1)h\right]=213.36$ K1 [@ $\frac{16}{2}\left[2k+(16-1)h\right]$ $9k+36h=213.36$ ...(1) Azim [16 bahagian] $S_{16}=304.80$ $\frac{16}{2}\left[2k+(16-1)h\right]=304.80$ $2k+15h=38.10$ ...(2) $(1)\times 2: 18k+72h=426.72$ ...(3) $(2)\times 9: 18k+135h=342.90$ ...(4) $(4)-(3): 63h=-83.82$ $h=-1.33$ Ganti $h=-1.33$ dalam (1) $9k+36(-1.33)=213.36$ K1 $k=29.03$ Alternatif: Ganti $h=-1.33$ dalam (2) $2k+15(-1.33)=38.10$ $k=29.03$ $\therefore h=-1.33,\ k=29.03$ N1N1	4	**8**
14 b)	$T_n = 15.73$ $29.03+(n-1)(-1.33)=15.73$ K1 $30.36-1.33n=15.73$ $n=11$ N1 $S_{11}=\frac{11}{2}\left[2(29.03)+(11-1)(-1.33)\right]$ K1 @ $S_{11}=\frac{11}{2}\left[29.03+15.73\right]$ $S_{11}=246.18$ $\therefore$ Julat ketinggian Aiman ialah $147.32-160.02$ cm N1	4	

NO	PENYELESAIAN	MARKAH
15. (a)	$6x = 10x - 4$ K1 $x = 1$ $y = 6(1)$ @ $y = 10(1) - 4$ $(1, 6)$ N1	**2**
15. b)	**ALTERNATIF A** $6x = 10x - 4$ K1 $x = 1$ Bila $x = 1 \rightarrow y = 6(1) = 6$, Bila $y = 0 \rightarrow 0 = 10x - 4$ $x = \frac{2}{5} @ 0.4$ $y = 6x + x^2$ dilihat K1 Area $= \left\| \int_{-6}^{0} (6x + x^2) dx \right| + \frac{1}{2}(1)(6) - \frac{1}{2}(6)\left(1 - \frac{2}{5}\right)$ K1 kamiran [abaikan tanda mutlak] $= \left\| \left[\frac{6x^2}{2} + \frac{x^3}{3} \right]_{-6}^{0} \right| + (3 - 1.8)$ K1 jumlah luas $= \left\| \left[\left(\frac{6(0)^2}{2} + \frac{0^3}{3} \right) - \left(\frac{6(-6)^2}{2} + \frac{(-6)^3}{3} \right) \right] \right| + 1.2$ K1 ganti nilai $= \lvert -36 \rvert + 1.2$ $= = 37\frac{1}{5}$ unit^2 / $\frac{186}{5}$ unit^2 / 37.2 unit^2 N1 [N0 jika abaikan tanda mutlak] **ALTERNATIF B** $6x = 10x - 4$ K1 $x = 1$ $y = 6x + x^2$ dilihat K1 $\left\| \left[\frac{6x^2}{2} + \frac{x^3}{3} \right]_{-6}^{0} \right\|$ K1 kamiran betul $\left\| \left[\frac{6x^2}{2} + \frac{x^3}{3} \right]_{-6}^{0} \right\| - \left(\left[\frac{6x^2}{2} \right]_{0}^{1} - \left[\frac{10x^2}{2} - 4x \right]_{\frac{2}{5}}^{1} \right)$ K1 kamiran dan ganti had dengan betul $\left\| \left[\frac{6(0)^2}{2} + \frac{(0)^3}{3} \right] - \left[\frac{6(-6)^2}{2} + \frac{(-6)^3}{3} \right] \right\|$ K1 ganti nilai	**6**

	Atau $\left[\left(\left[\frac{6(1)^2}{2}\right]-\left[\frac{6(0)^2}{2}\right]\right)-\left(\left[\frac{10(1)^2}{2}-4(1)\right]-\left[\frac{10\left(\frac{2}{5}\right)^2}{2}-4\left(\frac{2}{5}\right)\right]\right)\right]$ $36+\left(3-\frac{9}{5}\right)$ $==37\frac{1}{5}\ \text{unit}^2 / \frac{186}{5}\ \text{unit}^2 / 37.2\,\text{unit}^2$ N1	
	JUMLAH	**8**

PERATURAN PERMARKAHAN TAMAT