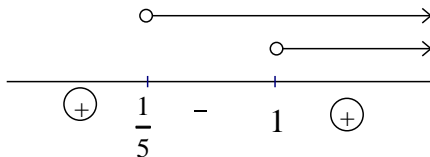**SKEMA JAWAPAN PENTAKSIRAN SUMATIF AKHIR TAHUN 2021 JPN SABAH**
MATEMATIK TAMBAHAN KERTAS 1

Bil	Penyelesian dan Skema markah	Sub Markah	Jumlah Markah
1.	(a) $\dfrac{8(2)-1}{2}$ $= 7.5 \;/\; 7\dfrac{1}{2} \;/\; \dfrac{15}{2}$ (b) $\dfrac{8y-1}{y} = x \;\;/\;\; y = \dfrac{8x-1}{x}$ $g(x) = \dfrac{1}{8-x}$ $x = 8$	N1 K1 N1 N1	4
2.	(a) $a = 3, \quad b = -6p, \quad c = p$ $\qquad b^2 - 4ac = 0$ $(-6p)^2 - 4(3)(p) = 0$ $\qquad 36p^2 - 12p = 0$ $\qquad p(36p - 12) = 0$ $\qquad\qquad p = 0, \;\; p = \dfrac{1}{3}$ (both) (b) $\quad x^2 + x - 3kx + k^2 = 0$ $x^2 + (1 - 3k)x + k^2 = 0$ $a = 1, \quad b = 1, \quad c = k^2$ $\qquad b^2 - 4ac > 0$ $(1 - 3k)^2 - 4(1)(k^2) > 0$ $\quad 1 - 6k + 9k^2 - 4k^2 > 0$ $\qquad\quad 1 - 6k + 5k^2 > 0$ $\qquad (5k - 1)(k - 1) > 0$ Only "> 0" correct can obtain K1 or graph correct or equivalent graph From graph, $k < \dfrac{1}{5}$ or $k > 1$	K1 N1 K1 K1 N1	5

3.	(a) (i) $h(x) = -x^2 + 6x + 1$ $\quad = -(x^2 - 6x - 1)$ $\quad = -\left[x^2 - 6x + \left(\dfrac{-6}{2}\right)^2 - \left(\dfrac{-6}{2}\right)^2 - 1\right]$ $\quad = -[x^2 - 6x + (-3)^2 - (-3)^2 - 1]$ $\quad = -[(x-3)^2 - 10]$ $\quad = -(x-3)^2 + 10$ $\quad$ Maka, tinggi maksimum ialah 10 m.	K1 N1	5
	(ii) 3 m	N1	
	(b) $-(x-3)^2 + 10 = 0$ $(x-3)^2 = 10$ $\quad x = \pm\sqrt{10} + 3$ $\quad x = -0.162, 6.162,$ $\quad x = 6.162 \, \text{m}$	K1 N1	
4.	(a) $\log_2 x - \log_2(x-3) - 2 = 0$ $\log_2 x - \log_2(x-3) = 2$ $\qquad \log_2 \dfrac{x}{x-3} = 2$ $\qquad \dfrac{x}{x-3} = 2^2$ $\qquad x = 4x - 12$ $\qquad 12 = 3x$ $\qquad x = 4$	K1 K1 N1	6
	(b) $2\sqrt{2} + \dfrac{2}{1-\sqrt{2}}$ $= 2\sqrt{2} + \dfrac{2}{1-\sqrt{2}} \times \dfrac{1+\sqrt{2}}{1+\sqrt{2}}$ $= 2\sqrt{2} + \dfrac{2(1+\sqrt{2})}{1-2}$ $= 2\sqrt{2} - (2 + 2\sqrt{2})$ $= 2\sqrt{2} - 2 - 2\sqrt{2}$ $= -2$	P1 K1 N1	

5.	(a)		
	$\left(y = px^2 - qx\right) \div x$		
	$\dfrac{y}{x} = px - q$	K1	
	$Y = \dfrac{y}{x},\ X = x,\ m = p,\ c = -q$		
	$\quad p = \dfrac{5-3}{7-2} = \dfrac{2}{5}\ /$	N1	5
	$\quad (2, 3)$		
	$3 = \dfrac{2}{5}(2) - q$	N1	
	$q = -\dfrac{11}{5}$ / ATAU kaedah setara / OR other valid method		
	(b) $\ 0 = \dfrac{2}{5}x + \dfrac{11}{5}$	K1	
	$\quad x = -\dfrac{11}{2}$	N1	
6.	(a) $\overrightarrow{FG} // \overrightarrow{GH}$ $\overrightarrow{FG} = \lambda \overrightarrow{GH}$ $6\underset{\sim}{p} - 4\underset{\sim}{q} = \lambda\left(4\underset{\sim}{p} - (2u-1)\underset{\sim}{q}\right)$ $6\underset{\sim}{p} - 4\underset{\sim}{q} = \lambda 4\underset{\sim}{p} - \lambda(2u-1)\underset{\sim}{q}$ Bandingkan $6 = 4\lambda$	K1	
	$\lambda = \dfrac{3}{2}$ and $-4 = -\lambda(2u-1)$	K1	
	$4 = \dfrac{3}{2}(2u-1)$ $\quad u = \dfrac{11}{6}$	N1	5
	(b) $\ |FH| = \dfrac{6}{3} \times 5$	K1	
	$\quad$ 10 unit / units	N1	

7.	(a) $$(p,t) = \left(\frac{2h(3) + 2p(2)}{2+3}, \frac{h(3) + 3t(2)}{2+3} \right)$$	P1	
	$$p = \frac{6h + 4p}{5} \text{ or } t = \frac{3h + 6t}{5} \text{ or } h = -\frac{t}{3} \text{ or } p = \frac{6(-\frac{t}{3}) + 4p}{5}$$ $$p = -2t$$	K1 N1	5
	(b) $m_2 = -\frac{1}{3}$, $B(-2, 1)$		
	$$y - 1 = -\frac{1}{3}(x + 2)$$	K1	
	$$y = -\frac{1}{3}x - \frac{2}{3} + 1$$		
	$$y = -\frac{1}{3}x + \frac{1}{3}$$ / ATAU kaedah setara /	N1	
	OR other valid method		
8.	(a) $$\frac{d}{dx}\left[\frac{x^3 - 8}{x} - \boxed{3x^2} \right]$$	K1K1	
	$$= \frac{d}{dx}\left[x^2 - 8x^{-1} - 3x^2 \right]$$		
	$$= \frac{d}{dx}\left[-2x^2 - 8x^{-1} \right]$$		
	$$= \frac{8}{x^2} - 4x$$	N1	
	(b) $$y = x + m^2(x - 3)^2$$		6
	$$\frac{dy}{dx} = 1 + 2m^2(x - 3)$$	K1	
	Turning point (k, h)		
	$$1 + 2m^2(k - 3) = 0$$	K1	
	$$1 + 2m^2 k - 6m^2 = 0$$		
	$$2m^2 k = 6m^2 - 1$$		
	$$k = \frac{6m^2 - 1}{2m^2}$$	N1	

9.	a) $\int_0^1 h(x)dx + \int_1^2 h(x)dx = \int_0^2 h(x)dx = 4$	N1	
	b) $2\int_0^2 h(x)dx + \int_1^u f(x)dx + \int_1^u xdx = \dfrac{37}{2}$		
	$\qquad 2(4) + 3 + \left[\dfrac{x^2}{2}\right]_1^u = \dfrac{37}{2}$	K1	
	$\qquad 11 + \left[\dfrac{u^2}{2} - \dfrac{1}{2}\right] = \dfrac{37}{2}$	K1	4
	$\qquad \dfrac{u^2}{2} = \dfrac{37}{2} - 11 + \dfrac{1}{2}$		
	$\qquad u^2 = 8(2)$		
	$\qquad u = 4$	N1	
10.	(a) (i) $2 \times (5-1)!$	K1	
	$\qquad = 48$	N1	
	(ii) $(6-1)! - 48$	K1	
	$\qquad = 72$	N1	
	(b) $\boxed{^6C_4 \times {}^7C_6} + \boxed{^6C_5 \times {}^7C_5} + \boxed{^6C_6 \times {}^7C_4}$	K1K1	7
	$\qquad = 266$	N1	
11.	(a) $p = 0.8, q = 0.2$		
	$P(X = n) = 0.1342$	K1	
	$^nC_n (0.8)^n (0.2)^0 = 0.1342$		
	$(0.8)^n = 0.1342$		
	$n \log_{10}(0.8) = \log_{10} 0.1342$	K1	
	$\qquad n = \dfrac{\log_{10} 0.1342}{\log_{10}(0.8)}$	N1	
	$\qquad n = 9$		4
	(b) $P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$		
	$\quad = \boxed{^9C_0 (0.8)^0 (0.2)^9} + \boxed{^9C_1 (0.8)(0.2)^8} + \boxed{^9C_2 (0.8)^2 (0.2)^7}$	K1K1	
	$\quad = 0.0003139$	N1	

12.	(a) $$\frac{3m+n}{15m+n} = \frac{n-m}{3m+n}$$ $(3m+n)^2 = (n-m)(15m+n)$ $8m(3m-n) = 0$ $8m = 0$ (rejected as m $\neq 0$) $3m-n = 0$ $m = \frac{1}{3}n$ (b) $$r = \frac{n-(\frac{1}{3}n)}{3(\frac{1}{3}n)+n}$$ $$= \frac{1}{3}$$ (c) $6 = \frac{1}{3}n$ $n = 18$ $a = 108$ $$S_\infty = \frac{108}{1-\frac{1}{3}}$$ $$= 162$$	K1 N1 N1 K1 N1 K1 N1	7
13.	$x+y+z = 2150$ ----① $2x+3y+4z = 6850$ ----② $x+1.5y+1.5z = 2975$ ---- ③ ①×2 $2x+2y+2z = 4300$ ② $2x+3y+4z = 6850$ 　　　　　　$-y-2z = 2550$ -----④ ① $x+y+z = 2150$ ③ $x+1.5y+1.5z = 2975$ 　　　　$-0.5y-0.5z = -825$ -----⑤ ④ × 0.5 $-0.5y-z = -1275$ ⑤ $-0.5y-0.5z = -825$ 　　　　　　　$-0.5z = -450$ 　　　　　　　　$z = 900$ 　　　　$-y-2(900) = -2550$ 　　　　　　　　$y = 750$	P1 P1 P1 K1 K1 N1 N1	8

	$y = 750$, $z = 900 \rightarrow \textcircled{1}$ $$x + 750 + 900 = 2150$$ $$x = 500$$ Only x, y, z correct can give N1N1N1	N1	
14.	(i) $\quad 12 = 6\theta$ $\quad\quad\quad \theta = 2$	N1	
	(ii) $PQ = 2(6)\sin\dfrac{{*}2}{2}$ or equivalent Perimeter = Lengkok PQ + PQ $\quad\quad\quad\quad = 22.10$ cm	K1 N1	8
	(iii) Luas segitiga $= \dfrac{1}{2}(6)^2 \sin {*} 2 = 16.367$ Luas sektor $= \dfrac{1}{2}(6)^2({*}2) = 36$ Luas tembereng $= \dfrac{1}{2}(6)^2({*}2) - \dfrac{1}{2}(6)^2 \sin {*} 2$ $\quad\quad\quad\quad = 19.63$ cm^2	K1 K1 K1 N1	
15	(a) $y = a \tan bx$ $b = \dfrac{1}{2}$ $y = a \tan\dfrac{1}{2}x$ $\left(\dfrac{\pi}{2}, \dfrac{3}{2}\right)$ $\dfrac{3}{2} = a \tan\left(\dfrac{1}{2} \times \dfrac{\pi}{2}\right)$ $a = \dfrac{3}{2}$ $y = \left|\dfrac{3}{2}\tan\dfrac{1}{2}x\right|$ / $y = \dfrac{3}{2}\left|\tan\dfrac{1}{2}x\right|$ / $y = \left|-\dfrac{3}{2}\tan\dfrac{1}{2}x\right|$	P1 P1 K1 N1	8
	(b) $3 \, kos \, 2x = 8 \, sin \, x - 5$ $\quad 3(1 - 2 \, sin^2 x) = 8 \, sin \, x - 5$ $\quad 3 - 6 \, sin^2 x = 8 \sin x - 5$ $\quad 6 \, sin^2 x + 8 \sin x - 8 = 0$ $\quad 3 \, sin^2 x + 4\sin x - 4 = 0$ $\quad (3 \, sin \, x - 2)(sin \, x + 2) = 0$ $\quad \sin x = \dfrac{2}{3}, \sin x = -2 \text{ (rejected)}$ $\quad x = 41.81°, \ 138.19°$ or equivalent	K1 K1 K1 N1	