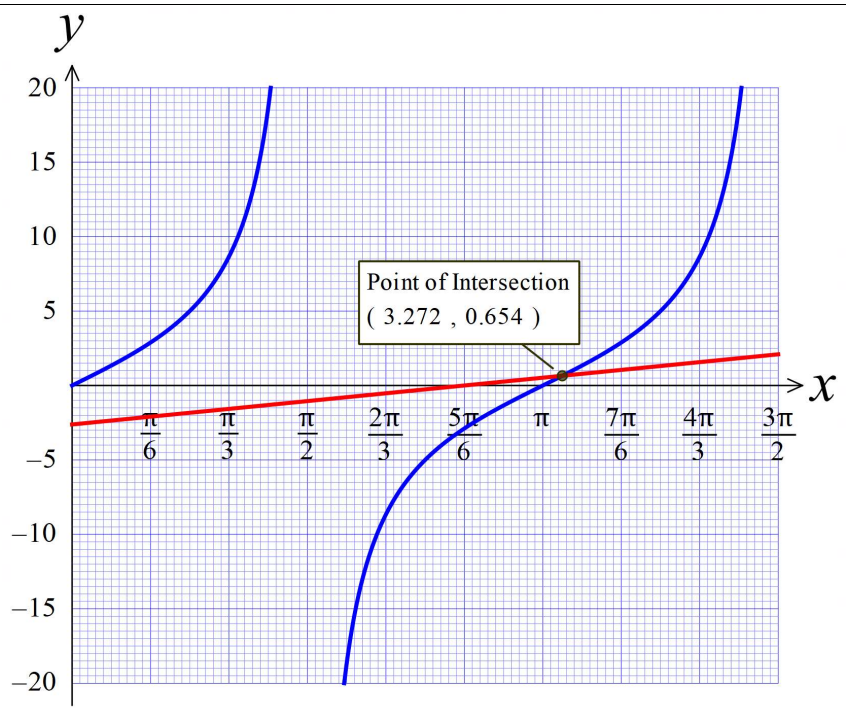
PERATURAN PEMARKAHAN

MATEMATIK TAMBAHAN

KERTAS 2 SET 02
3472/2 (PP)

PEPERIKSAAN PERCUBAAN SPM 2021
JABATAN PELAJARAN NEGERI KEDAH

No.	Solution and Mark Scheme	Sub Marks	Total Marks
1 (a)	$9\pi h,\ 9\pi h+18\pi,\ 9\pi h+36\pi,...$ $d_1 = 9\pi h+18\pi-9\pi h$ $= 18\pi$ *or* K1 $d_2 = 9\pi h+36\pi-(9\pi h+18\pi)$ $= 18\pi$ Since $d_1 = d_2 = 18\pi$, therefore the sequence is an Arithmetic Progression N1	2	7
1 (b)	$T_{13} = 9\pi h + (13-1)(18\pi)$ $9\pi\,(h+24) = 252\pi$ K1 $h = 4$ cm N1	2	
1 (c)	...., T_n, T_{n+1}, T_{n+2}, ... $T_n + (T_n+18\pi) + (T_n+36\pi) = 1620\pi$ K1 or equivalent $T_n = 522\pi$ $h(9\pi) = 522\pi$ K1 58 cm, 60 cm, 62 cm. N1 * T_n is the n^{th} Volume		
2 (a)	$\frac{1}{2}\lvert(4a+15-2b)-(-5b-8-3a)\rvert = 29.5$ K1 $7a+3b=36$ or $7a+3b=-82$ K1 $8b-a=37$ Use simultaneous equation method K1 $D(3,5)$ N1	4	6
2 (b)	$2ND = NF$ $2\sqrt{(x-3)^2+(y-5)^2} = \sqrt{(x+2)^2+(y+3)^2}$ K1 $3x^2+3y^2-28x-46y+123=0$ N1	2	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
3		8	8

All values calculated correctly for the Table of values N1

x	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$
y	2.89	8.66	A	-8.66	-2.89	0	2.89	8.66	A

Asimptote at $\frac{\pi}{2}@\frac{3\pi}{2}$ P1

Scale P1

Correct shape of tan graph P1

Complete cycle within 0 – 3/2π P1

Equation of straight line $y = x - \frac{5\pi}{6}$ K1

Correct plotting of the straight line graph K1

Value of x-coordinates is 3.25 N1

(* Accept answer in the range of 3.15 – 3.30)

No.	Solution and Mark Scheme	Sub Marks	Total Marks
4 (a)	$\mu = 76$ or 0.2236 seen P1 $P\left(Z > \frac{80-76}{\sigma}\right) = 0.2236$ K1 $\frac{80-76}{\sigma} = 0.76$ K1 $\sigma = 5.263$ N1	4	7
4 (b)	$P\left(Z < \frac{k-76}{5.263}\right) = 0.1$ K1 $\frac{k-76}{5.263} = -1.281$ K1 $k = 69.26$ N1	3	
5 (a) (i)	$-\frac{3}{2(2)(8)^{\frac{3}{2}}}$ K1 –0.03315 N1	2	8
5 (a) (ii)	$3x(6)(-5)(2-5x)^5 + 3(2-5x)^6$ K1 $3(2-5x)^5(-30x+2-5x)$ $3(2-5x)^5(2-35x)$ N1	2	
5 (b) (i)	$\lim_{x\to 3}\frac{(2x-1)(x+1)}{(x+1)(x-3)} = \infty$ K1 Does not exist because the limit is undefined N1	2	
5 (b) (ii)	$\lim_{x\to 3}\frac{(2x+1)(x-3)}{(x+1)(x-3)} = \frac{7}{4}$ K1 Exist because limit is $\frac{7}{4}$ N1	2	
6	$a+2b+c=92$ P1 for any correct equation formed $a+b+2c=101$ $2a+b+c=92$ $-b+c=9$ K1 or equivalent $3b+c=92$ $4b=83$ K1 $b=20.75$ $c=29.75$ $a=20.75$ T-shirt = RM20.75 N1 Track suit = RM20.75 N1 White shoes = RM29.75 N1	6	6

No.	Solution and Mark Scheme	Sub Marks	Total Marks
7 (a) (i)	0 or undefined P1	1	8
7 (a) (ii)	$\log_m m^{\frac{1}{3}} + \log_n n^{\frac{1}{2}} + \dfrac{\log_3 3}{\log_3 81}$ $\dfrac{1}{3}\log_m m + \dfrac{1}{2}\log_n n + \dfrac{1}{\log_3 3^4}$ K1 $\dfrac{1}{3} + \dfrac{1}{2} + \dfrac{1}{4}$ K1 $\dfrac{13}{12}$ N1	3	
7 (b) (i)	$H = 96(0.45)^t$ $t = 0,\ H = 96(0.45)^0$ K1 $H = 96$ N1	2	
7 (b) (ii)	$H = 10,$ $10 = 96(0.45)^t$ K1 $\log_{10} \dfrac{10}{96} = t \log_{10} 0.45$ $t = 2.83$ N1	2	

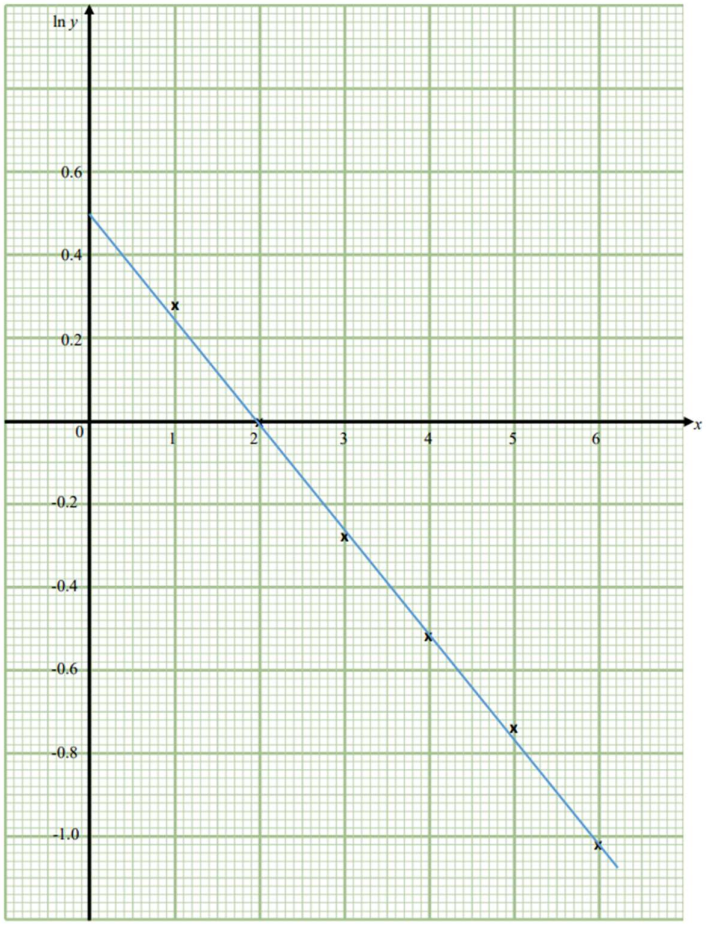
No.	Solution and Mark Scheme	Sub Marks	Total Marks
8 (a)(i)	$\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ K1 using triangle law $\overrightarrow{PQ} = -\underline{a} + \underline{b}$ N1	2	10
8(a)(ii)	$\overrightarrow{OR} = \overrightarrow{OQ} + \overrightarrow{QR}$ K1 $\overrightarrow{OR} = \underline{b} + \left(\frac{m}{3+m}\right)\overrightarrow{QP}$ K1 $\overrightarrow{OR} = \underline{b} + \left(\frac{m}{3+m}\right)(\underline{a} - \underline{b})$ K1 $\overrightarrow{OR} = \left(\frac{m}{3+m}\right)\underline{a} + \left(\frac{3}{3+m}\right)\underline{b}$ N1	4	
8 (b)	$\overrightarrow{OR} = \lambda\overrightarrow{RS}$ P1 $\left(\frac{m}{3+m}\right)\underline{a} + \left(\frac{3}{3+m}\right)\underline{b} = \lambda(8\underline{a} + 6\underline{b})$ $\frac{m}{3+m} = 8\lambda$ or $\frac{3}{3+m} = 6\lambda$ $m = \frac{24\lambda}{1-8\lambda}$ K1 (Solve using simultaneous equation) $\lambda = \frac{1}{14}$ K1 $m = 4$ N1 *K0N0 jika menggunakan vektor lajur **K0N0 if using column vector*	4	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
9 (a)		4	

x	1	2	3	4	5	6
$\ln y$	0.28	0.00	– 0.27	– 0.53	– 0.76	– 1.02

N1

Graf



K1 for correct axes and scales
K1 for all correct points
N1 for line of best fit

9 (b) (i)	$\ln y = \ln q(x) + \ln p - 3$	P1	6
	$\ln p - 3 = 0.5$	K1	
	$p = 33.12$ N1		
	$\ln q = \left(\frac{-1.02 - 0}{6 - 2}\right)$	K1	
	$q = 0.775$	N1	
9 (b) (ii)	$\ln y = -0.64$ K1		
	y=0.53 N1		

No.	Solution and Mark Scheme	Sub Marks	Total Marks
10 (a) (i)	B is a minimum point $f'(x) = 0$ $0 = x^2 - 4x$ K1 $0 = x(x-4)$ $x = 0, x = 4$ $B(4,0)$ N1	6	10
10 (a)(ii)	$f(x) = \int x^2 - 4x \; dx$ $f(x) = \frac{x^3}{3} - \frac{4x^2}{2} + c$ K1 $(4,0)$ $0 = \frac{(4)^3}{3} - \frac{4(4)^2}{2} + c$ K1 $c = \frac{32}{3}$ $f(x) = \frac{x^3}{3} - 2x^2 + \frac{32}{3}$ N1		
10 (a)(iii)	$C\left(x, \frac{32}{3}\right)$ $\frac{32}{3} = \frac{x^3}{3} - \frac{4x^2}{2} + \frac{32}{3}$ $x = 6$ $C\left(6, \frac{32}{3}\right)$ N1		
10 (b)	Area of rectangular - area under the curve $\left(6 \times \frac{32}{3}\right) - \left(\int_0^6 \frac{x^3}{3} - \frac{4x^2}{2} + \frac{32}{3} \; dx\right)$ K1 (area of rectangle) $64 - \left(\left[\frac{x^4}{12} - \frac{2x^3}{3} + \frac{32x}{3}\right]_0^6\right)$ K1 (integrate) $64 - \left(\left[\frac{(6)^4}{12} - \frac{2(6)^3}{3} + \frac{32(6)}{3}\right] - \left[\frac{(0)^4}{12} - \frac{2(0)^3}{3} + \frac{32(0)}{3}\right]\right)$ K1 (substitute limit) $64 - 28$ 36 unit^2 N1	4	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
11 (a)	$\angle OAC = \left(\frac{180-40}{2}\right)^{\circ}$ K1 $\angle OAC = 1.222$ rad N1 (Accept at least 4 significant figures)	2	10
11 (b)	Perimeter of sector $ACDE$ $= (2\times 8.89) + (8.89\times 1.222)$ K1(length of arc) K1(AE+AC) $= 28.64$ cm N1	3	
11 (c)	$\frac{1}{2}(8.89)^2(1.222)$ seen K1 $\frac{1}{2}(13)^2\left(40\times\frac{\pi}{180}-\sin 40\right)$ seen K1K1 OR $\frac{1}{2}(13)^2\left(40\times\frac{\pi}{180}\right)-\frac{1}{2}(13)^2\sin 40$ K1K1 Area of shaded region $=\frac{1}{2}(8.89)^2(1.222)+\frac{1}{2}(13)^2\left(40\times\frac{\pi}{180}-\sin 40\right)$ K1 (Sector+Segment) $= 52.97$ cm^2 N1	5	
12 (a)	$s = 7.555$ *Accept s = 7.56 Luas $ABE = \sqrt{7.555(7.555-5.32)(7.555-4.27)(7.555-5.52)}$ K1 $= 10.62$ cm^2 N1 *Accept answer 10.62 - 10.66	2	10
12 (b)	$\frac{1}{2}(5.52)(4.27)\sin\angle ABE = 10.62$ K1 $\angle ABE = 64.31°$ $BD^2 = 4.27^2 + 3.35^2 - 2(4.27)(3.35)\cos 64.31°$ K1 $BD = 4.13$ cm $\frac{\sin\angle EBD}{3.35} = \frac{\sin 64.31°}{4.13}$ / COSINE RULE K1 (or equivalent) $\angle EBD = 46.97°$ $\angle CBD = 68.72°$ $CD^2 = 4.13^2 + 5.52^2 - 2(4.13)(5.52)\,\text{kos}\,68.72°$ K1 $CD = 5.57$ cm N1	5	
12 (c)	$\frac{1}{2}(4.27)(3.35)\sin 64.31°$ *or* $\frac{1}{2}(4.13)(5.52)\sin 68.72°$ K1 $\frac{1}{2}(4.27)(3.35)\sin 64.31° + \frac{1}{2}(4.13)(5.52)\sin 68.72°$ K1 (Add) 17.07 cm^2 N1	3	

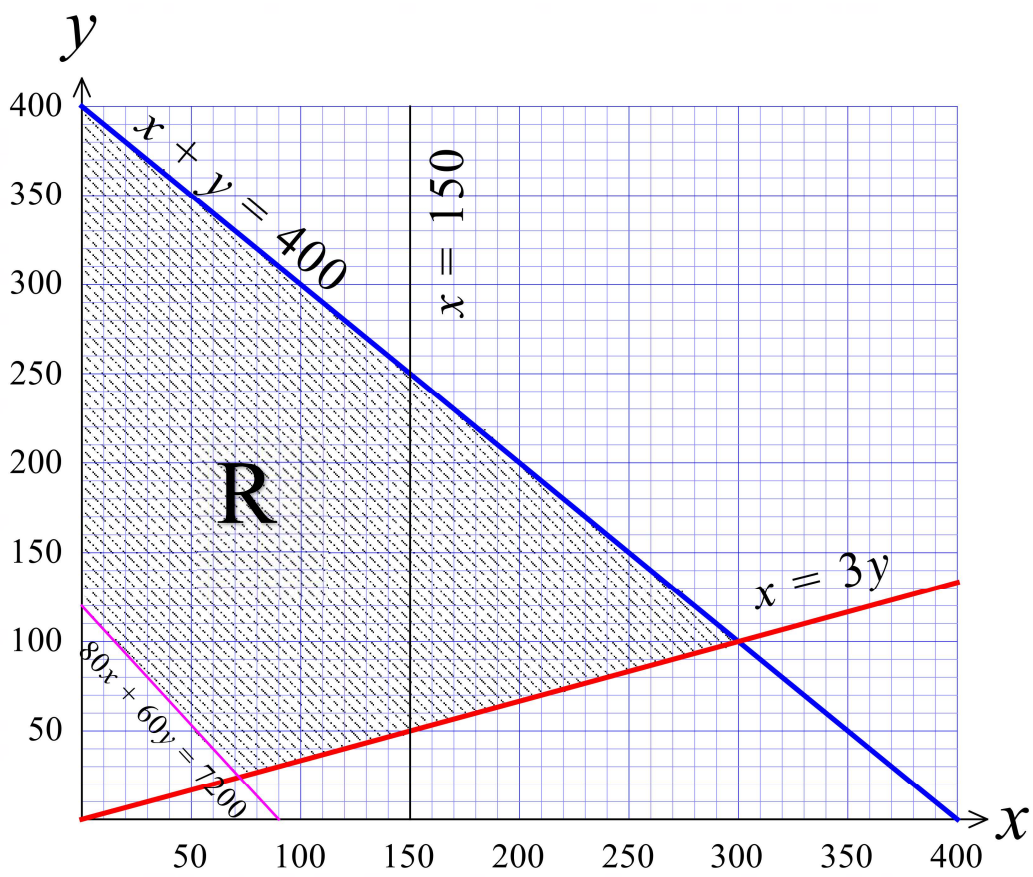
No.	Solution and Mark Scheme	Sub Marks	Total Marks
13 (a)	$\frac{0.70}{x}\times 100 = 175$ *or* K1 $\frac{5.50}{4.00}\times 100 = y$ $\frac{z}{2.50}\times 100 = 120$ (i) $x = \text{RM}0.40$ N1 (ii) $y = 137.50$ N1 (iii) $z = \text{RM}3.00$ N1	4	10
13 (b)	$\frac{(175\times 15)+(125\times 30)+(137.5\times 25)+(150\times 35)+(120\times 10)}{(15+30+25+35+10)}$ K1 $= 141.41$ N1	2	
13 (c)	$\frac{C_{2021}}{456}\times 100 = 141.41$ K1 $C_{2021} = RM\,644.83$ N1	2	
13 (d)	$\frac{120\times 141.41}{100}$ K1 $= 169.69$ N1	2	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
14 (a)	$V_\alpha = 0, 0 = 2t - 6$ $t = 3$ $S_\alpha = \left[t^2 - 6t\right]_0^3$ OR $S_\beta = \left[5t - \frac{t^2}{2}\right]_0^3$ OR equivalent K1 $S_\alpha = -9$ m $S_\beta = \frac{21}{2} / 10.5$ m Distance between particles α and β $\alpha \bullet — \leftarrow - - \bullet - - - - - - - - - - - - - \bullet - - - \rightarrow - - - \bullet \beta$ 9 m 8 m $\frac{21}{2}$ m $= 9+8+\frac{21}{2}$ K1 $= \frac{55}{2} / 27.5$ m N1	3	
14 (b)	Jarak antara zarah α dan β $S_{\alpha\beta} = S_\alpha - S_\beta + 8$ $S_{\alpha\beta} = 5t^2 - \frac{1}{2}t^2 - \left(t^2 - 6t\right) + 8$ $S_{\alpha\beta} = -\frac{3}{2}t^2 + 11t + 8$ $\therefore S_{\alpha\beta}$ maksimum , maka $V_{\alpha\beta} = 0$ $V_{\alpha\beta} = -3t + 11$ $0 = -3t + 11$ K1 $t = \frac{11}{3}s$ N1	2	
14 (c)	$(c)\ S_\alpha = S_\beta + 8$ $t^2 - 6t = 5t - \frac{1}{2}t^2 + 8$ K1 $3t^2 - 22t + 8 = 0$ $\left(3t + 2\right)\left(t - 8\right) = 0$ $\therefore t = 8$ N1 Jarak bertemu dari titik A $S_\alpha = (8)^2 - 6(8)$ $= 16$ m	5	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
15 (a)	I $x + y \leq 400$ N1 II $x \leq 3y$ N1 III $80x + 60y \geq 7200$ N1 OR equivalent	3	10
15 (b)	Refer graph Draw at least one *straight lines correctly from *inequalities involving x and y *only* K1 Notes: Accept dotted lines or solid lines N1 Correct shaded region N1	3	
15 (c) (i)	From graph, coordinates (300, 100) N1 Substitute any points from the *shaded region into the objective function $80x + 60y$ K1 RM30 000 N1	4	
15 (c) (ii)	From graph, 50 N1		

Jawapan/Answer:

No. 15 b)



GRAF HUKUM LINEAR SOALAN 9