

SULIT
3472/2
Additional Mathematics
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PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2021

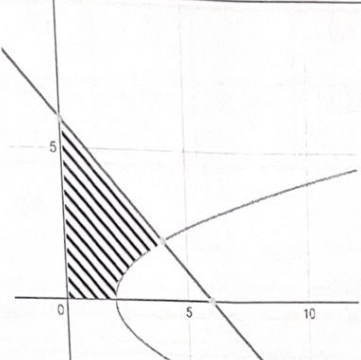
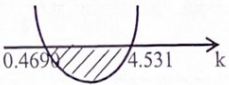
PERATURAN PERMARKAHAN
ADDITIONAL MATHEMATICS PAPER 2

MARKING SCHEME FOR PAPER 2

NO	SCHEME	MARK
1 (a)		
	Graph $\cos x$	P1
	Graph $ \cos x - \frac{1}{2} $	P1
	Label amplitude	P1
	Label $0, 2\pi$	P1
(b)	$y = k - \pi$	K1
	$\pi < k \leq \frac{1}{2} + \pi$	N1
		6 marks
2 (a)	$f(x) = a(x - 150)^2 + 200$	
	$300 = a(-150)^2 + 200$ or $a = \frac{1}{225}$	K1
	$f(x) = \frac{1}{225}(x - 150)^2 + 200$	N1
(b)	$f(x) = \frac{1}{225}(200 - 150)^2 + 200$ or $f(x) = 211.11 \text{ cm}$ or $221\frac{1}{9}$	K1
	$211.11 - 150 = 61.11$ or equivalent	K1
	$\frac{61.11}{20}$	K1
	3	N1
		6 marks
3(a)i)	$\sqrt{(3 - 6)^2 + (2 - 0)^2} = \sqrt{13}$ (Radius of the circle)	P1
	$\sqrt{(x - 3)^2 + (y - 2)^2} = \sqrt{13}$	K1
	$x^2 + y^2 - 6x - 4y = 0$	N1
(a)ii)	$\sqrt{(h - 3)^2 + (4 - 2)^2} = \sqrt{13}$	K1
	$h = 0$ and $h = 6$	N1
(b)	$\frac{0 - y}{6 - 0} = \frac{3}{2}$	
	$N = (0, -9)$	N1
	Area = $\frac{1}{2} (0 + 0 + 0) - (0 + 0 + (-54)) $	K1
	= 27 unit^2	N1
		8 mark

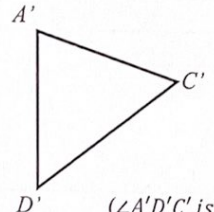
MARKING SCHEME FOR PAPER 2

NO	SCHEME	MAR
1 (a)		
	Graph $\cos x$	PI
	Graph $ \cos x - \frac{1}{2} $	PI
	Label amplitude	PI
	Label $0, 2\pi$	PI
(b)	$y = k - \pi$	KI
	$\pi < k \leq \frac{1}{2} + \pi$	NI
		6 marks
2 (a)	$f(x) = a(x - 150)^2 + 200$	
	$300 = a(-150)^2 + 200$ or $a = \frac{1}{225}$	KI
	$f(x) = \frac{1}{225}(x - 150)^2 + 200$	NI
(b)	$f(x) = \frac{1}{225}(200 - 150)^2 + 200$ or $f(x) = 211.11$ cm or $221\frac{1}{9}$	KI
	$211.11 - 150 = 61.11$ or equivalent	KI
	$\frac{61.11}{20}$	KI
	3	NI
		6 marks
3(a)(i)	$\sqrt{(3 - 6)^2 + (2 - 0)^2} = \sqrt{13}$ (Radius of the circle)	PI
	$\sqrt{(x - 3)^2 + (y - 2)^2} = \sqrt{13}$	KI
	$x^2 + y^2 - 6x - 4y = 0$	NI
(a)(ii)	$\sqrt{(h - 3)^2 + (4 - 2)^2} = \sqrt{13}$	KI
	$h = 0$ and $h = 6$	NI
(b)	$\frac{0 - y}{6 - 0} = \frac{3}{2}$	
	$N = (0, -9)$	NI
	Area = $\frac{1}{2}[(0 + 0 + 0) - (0 + 0 + (-54))]$	KI
	= 27unit ²	NI
		8 mark

NO	SCHEME	MARKS
4 (a)		P1
(b)(i)	$\frac{1}{2} \times 4 \times 4$ or $\int_0^2 \frac{y^2+4}{2} dy$	K1
	$\frac{1}{2} \times 4 \times 4 + \left[\frac{y^3}{6} + 2y \right]_0^2$	K1
	$13\frac{1}{3}$ or $\frac{40}{3}$ or 13.33	N1
(b)(ii)	$\frac{1}{3} \times \pi \times 4^2 \times 4$ or $\pi \int_0^2 \frac{y^4+8y^2+16}{4} dy$ or $\pi \int_2^6 (6-y)^2 dy$	K1
	$\frac{1}{3} \times \pi \times 4^2 \times 4 + \frac{\pi}{4} \left[\frac{y^5}{5} + \frac{8y^3}{3} + 16y \right]_0^2$ or $\pi \left[\frac{(6-y)^3}{3} \right]_2^6$	K1
	$36\frac{4}{15}\pi$ or $\frac{544}{15}\pi$ or 36.27π	N1
		7 marks
5 (a)	$3^x = 2\sqrt{3}$ $27^x = (2\sqrt{3})^3$ $= 24\sqrt{3}$	P1 K1 N1
(b)	$\log_2 \frac{(2500-t^2)}{50-t} = 10$ $t = 974$ min	K1 N1
(c)	$x = e^y - 2$ $f(x) = e^x - 2$	K1 N1
		7 marks
6 (a)	$x = 3 - ky$ $(3 - ky)^2 + y^2 - 2(3 - ky) + 5y = 1$ $(k^2 + 1)y^2 + (5 - 4k)y + 2 = 0$ $(5 - 4k)^2 - 4(k^2 + 1)(2) < 0$ 	P1 K1 K1

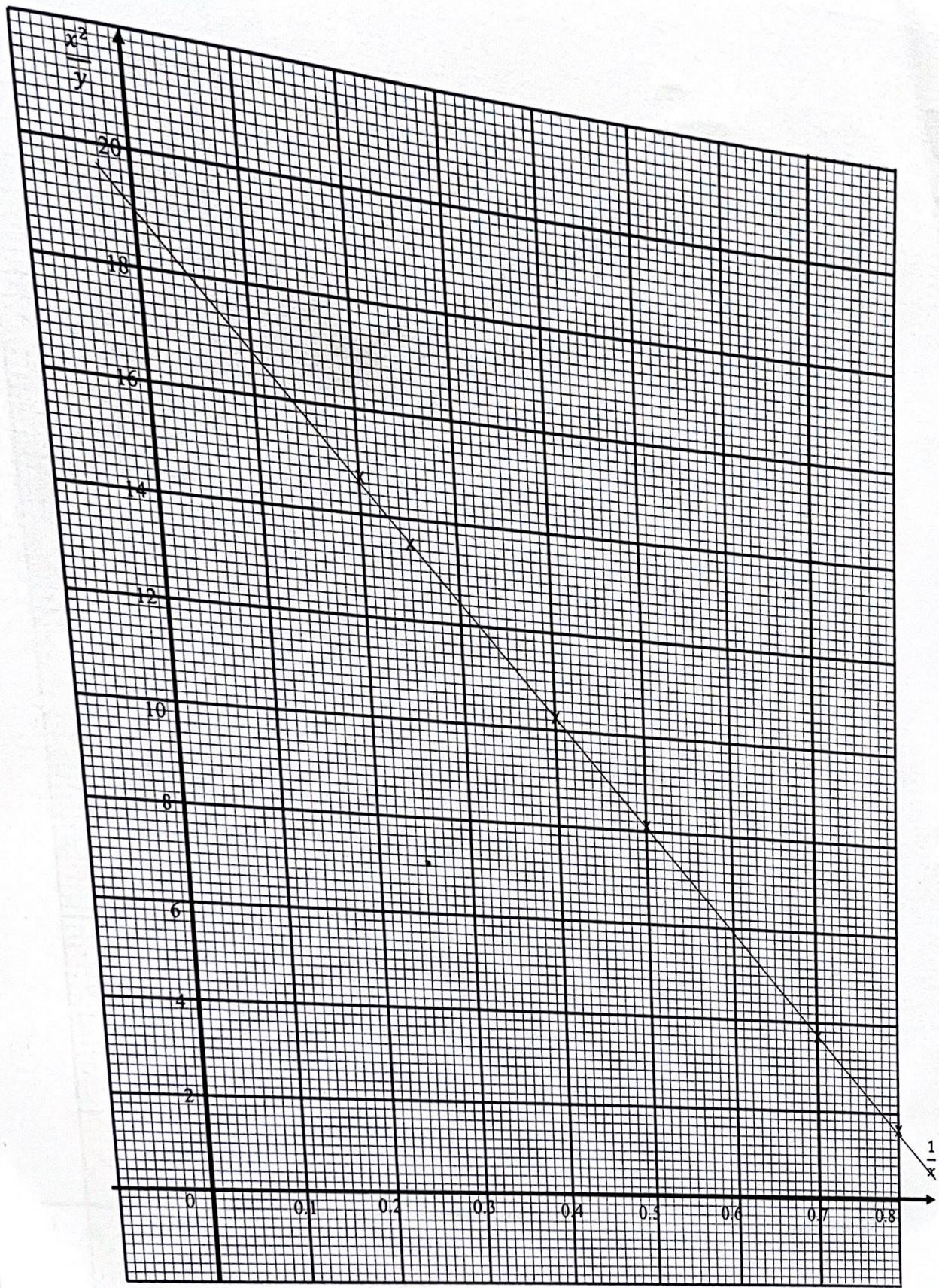
NO	SCHEME	MARKS
(b)	$0.4690 < k < 4.531$ $k = 5$ $26y^2 - 15y + 2 = 0$ $y = \frac{-(-15) \pm \sqrt{(-15)^2 - 4(26)(2)}}{2(26)}$ $y = 0.3678, 0.2092$ $(1.161, 0.3678) \text{ and } (1.954, 0.2092)$	N1 P1 K1 K1 N1 8 marks
7 (a)i)	$7k + (n - 1)(7k) = 1008$	K1
	$n = \frac{144}{k}$	N1
(a) ii)	$\frac{1}{2} \left(\frac{144}{k} \right) [7k + 1008]$	K1
	$504 + \frac{72576}{k}$	N1
(b)	$n = 20$	P1
	$S_{20} = \frac{1(2^{20}-1)}{2-1} = 1048\ 575$	K1
	$1048\ 5.75 - 10000 = 485.75$	K1
	First method. Pay extra RM485.75 for second method	N1
		8 marks
8(a) i)	$\vec{OC} = \vec{OA} + \vec{AC}$ $= \frac{8}{5}\underline{p} + \frac{7}{5}\underline{q}$ $\vec{BC} = -\frac{32}{5}\underline{p} + \frac{7}{5}\underline{q}$	K1 N1 N1
(a) ii)		
(b)	$\vec{DC} = \frac{8}{5}\underline{p} - \frac{3}{5}\underline{q} \text{ or } \vec{DB} = 8\underline{p} - 2\underline{q}$ $\vec{DB} = k\vec{DC}$ $8\underline{p} - 2\underline{q} = k \left(\frac{8}{5}\underline{p} - \frac{3}{5}\underline{q} \right)$	K1 K1
	$8 = \frac{8}{5}k \text{ or } -2 = -\frac{3}{5}k$	K1
	$k = \frac{10}{3} \text{ and } k = 5$	N1
	\therefore Tent B can be seen	N1
(c)	$\vec{BO} = 8(2) = 16 \text{ unit or } \vec{OE} = 7(3) = 21 \text{ unit}$ $ \vec{BE} = \sqrt{16^2 + 21^2} = 26.40 \text{ unit}$	K1 N1
		10 marks

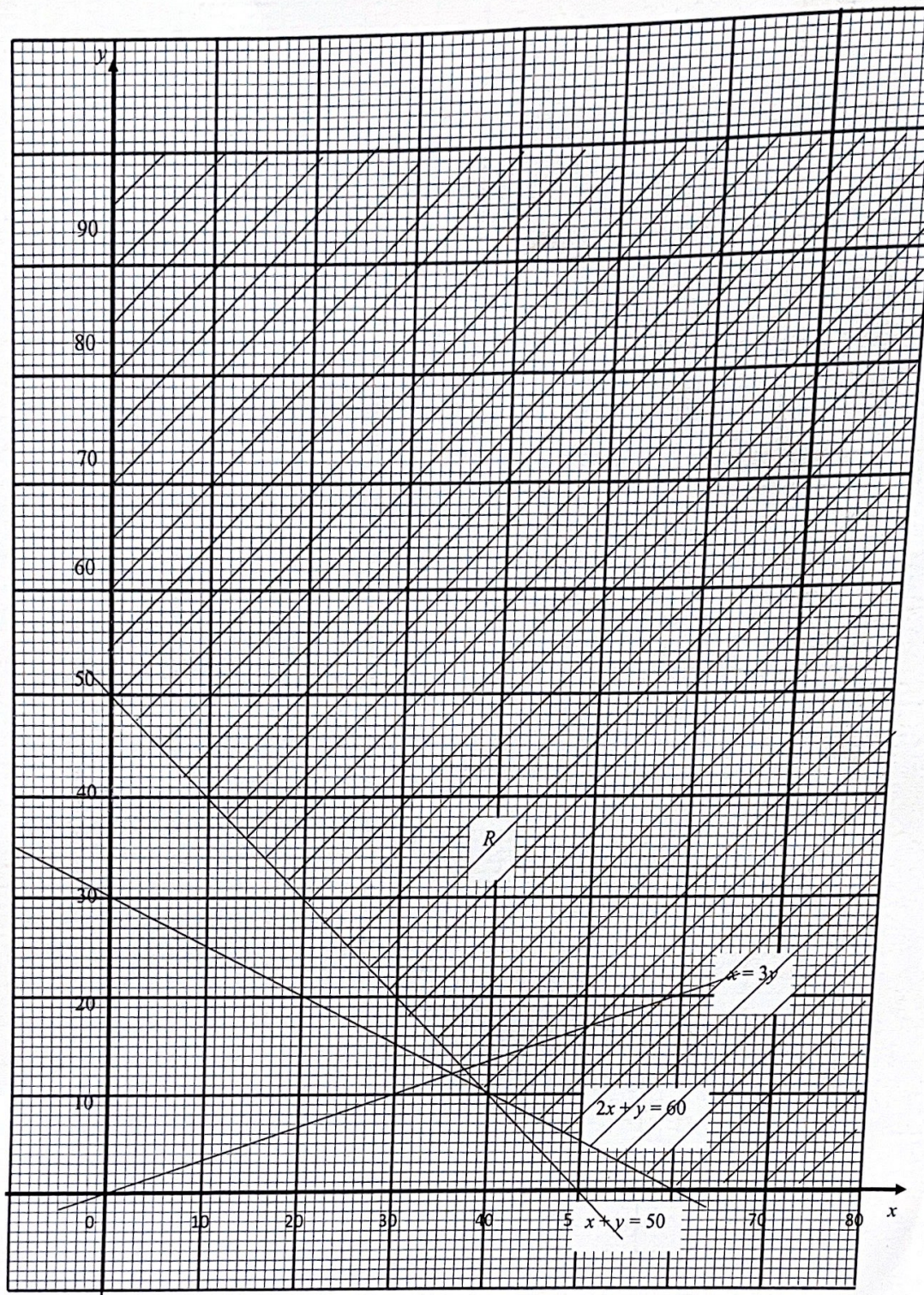
NO	SCHEME							MARKS
9 (a)	$\frac{1}{x}$	0.8	0.70	0.5	0.4	0.25	0.2	P1
	$\frac{x^2}{y}$	1.61	3.79	8.16	10.25	13.56	14.71	P1
(c) i)	$\frac{2.4^2}{y} = *10$							K1
	0.576							N1
(c) ii)	y-intercept = 19 or $m = \frac{19-8.2}{0-0.5} = -\frac{108}{5}$ or equivalent							P1
	$\frac{x^2}{y} = -\frac{108}{5} \left(\frac{1}{x}\right) + 19$							K1
	$y = \frac{5x^3}{95x - 108}$							N1
								10 marks
10.(a)	$np = 40, npq = 15$							P1
(i)	$40q = 15$							K1
	$p = \frac{5}{8}$							N1
(a) ii)	$P(X \geq 2) = 1 - [P(X=1) - P(X=0)]$							K1
	$1 - \left[{}^8C_1 \left(\frac{3}{5}\right)^1 \left(\frac{2}{5}\right)^7 + {}^8C_0 \left(\frac{3}{5}\right)^0 \left(\frac{2}{5}\right)^8 \right]$							N1
	0.9915 or 0.99148							
(b) i)	$P(40 < X < 60) = P\left(\frac{40-45}{12} < Z < \frac{60-45}{12}\right)$							K1
	$= P(-0.417 < Z < 1.25)$							
	$= 1 - P(Z \geq 1.25) - P(Z \leq -0.417)$							
	$= 1 - 0.1056 - 0.3384 = 0.5560$							
	$= 0.5560 \times 90$							K1
	50 orang							N1
(b) ii)	$P(X \geq m) = 0.63$							K1
	$\frac{m-45}{12} = -0.332$							N1
	42							
								10 marks
11(a)	$\frac{3}{7}\pi \times OA = 15$							K1
	$OA = \frac{35}{\pi} / 11.14$							N1
(b)	$\tan \frac{3}{14}\pi = \frac{AB}{\frac{35}{\pi}}$							K1

NO	SCHEME	MARKS
	$AB = \frac{35}{\pi} \tan \frac{3}{14} \pi$	N1
	$15 + \frac{35}{\pi} \tan \frac{3}{14} \pi + \frac{35}{\pi} \tan \frac{3}{14} \pi$	K1
	32.77	N1
(c)	Area OABC = $\frac{35}{\pi} \times \frac{35}{\pi} \tan \frac{3}{14} \pi$	K1
	Area of sector = $\frac{1}{2} \left(\frac{35}{\pi} \right)^2 \left(\frac{3}{7} \pi \right)$	K1
	Area of shaded region = $\frac{35}{\pi} \times \frac{35}{\pi} \tan \frac{3}{14} \pi - \frac{1}{2} \left(\frac{35}{\pi} \right)^2 \left(\frac{3}{7} \pi \right)$	K1
	15.42	N1
		10 marks
12	$AC^2 = 5.73^2 + 7.55^2 - 2(5.73)(7.55)\cos 56^\circ$ AC = 6.438 cm	K1 N1
(a) (i)		
(ii)	$\frac{\sin ACD}{5.41} = \frac{\sin 124^\circ}{6.438}$ $\angle ACD = 44.16^\circ$ $\angle CAD = 11.84^\circ$	K1 N1 N1
(iii)	$\frac{1}{2} \times \text{distance} \times 6.438 = \frac{1}{2} \times 5.73 \times 7.55 \times \sin 56^\circ$ Distance = 5.571	K1 N1
(b)(i)	 <p>($\angle A'D'C'$ is an acute angle)</p>	P1
(ii)	$\frac{C'D'}{\sin 79.84^\circ} = \frac{5.41}{\sin 44.16^\circ}$ $C'D' = 7.644$ cm	K1 N1
		10 marks

NO	SCHEME	MARKS
13 (a)	$a = 3t^2 - 12t + 8$	K1
	$a = 8 \text{ ms}^{-2}$	N1
(b)	$3t^2 - 12t + 8 < 23$	
	$t^2 - 4t - 5 < 0$	
	$(t + 1)(t - 5) < 0$	K1
	$0 \leq t < 5$	N1
(c)	$t^3 - 6t^2 + 8t = 0$	
	$t(t^2 - 6t + 8) = 0$	
	$t(t - 2)(t - 4) = 0$	K1
	$t = 0, t = 2, t = 4$	N1
		K1
(d)	$s = \frac{t^4}{4} - 2t^3 + 4t^2$	
	$\frac{t^4}{4} - 2t^3 + 4t^2 = 0$	
	$t^2(t^2 - 8t + 16) = 0$	
	$t^2(t - 4)(t - 4) = 0$	
	$t = 4$ OR $s = 4$ when $t = 2$ OR $s = 0$ when $t = 4$	K1
	$\int_0^2 (t^3 - 6t^2 + 8t) dt + \left \int_2^4 (t^3 - 6t^2 + 8t) dt \right $ OR $4 + 4 + 0$	K1
	8 m	N1
		10 marks
14		
(a)(i)	130	N1
(a)(ii)	$\frac{3.90}{x} \times 100 = 130$ or $\frac{4.80}{3.20} \times 100$ $x = 3.00, z = 150$	K1 N1
(b)	$\frac{108(6) + 130(5) + 170(3) + 150(1)}{6 + 5 + 3 + 1}$ 130.53	K1 N1
(c)(i)	$\frac{\bar{I}_{2018} \times 130.53}{2016} = 160$ 100 $\bar{I}_{2018} = 122.58$	K1 N1
(c)(ii)	$160 = \frac{P_{2020}}{2.40} \times 100$ $P_{2020} = \text{RM}3.84$ $\frac{195000}{3.84}$ 50 781	K1 K1 N1
		10 marks

NO	SCHEME	MARKS
15 (a)	$x + y \geq 50$	N1
	$600x + 300y \geq 18000$	N1
(c)(i)	$x = 3y$	P1
	$P = 38, Q = 13$	N1
(c)(ii)	(30,20)	P1
	$[600(30) + 300(20)] \times 4\%$	K1
	RM960	N1
		10 marks





SKEMA

4(b)(ii)	$\pi[x^2 - 4x]$	K1
	$\pi[(4^2 - 4(4)) - (2^2 - 4(2))]$	K1
	4π	N1