SKEMA PEMARKAHAN
MATEMATIK TAMBAHAN – KERTAS 2
PERCUBAAN SPM 2019

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
	BAHAGIAN A **[40 MARKAH]**		
1	(a) 14 – mata Atiya = 7 K1 Mata Chua = 8 dan mata Atiya = 7 N1 (b) $\left(\frac{5^2+^*7^2+7^2+^*8^2+12^2+14^2+17^2}{7}\right)-10^2$ K1 4.071 N1 (c) Min = 20 N1 Varians = 66.29 N1	**2** **2**	
2	$(90-2x+y)2=130$ atau setara P1 $y=2x-25$ P1 $(90\times 45)-(90-2x)y=3300$ atau $750=90y-25$ P1 $750=90(2x-25)-2x(2x-25)$ K1 $4x^2-230x+3000=0$ $x=\frac{-(-230)\pm\sqrt{(-230)^2-4(4)(3000)}}{2(4)}$ K1 $x=20$ dan $x=37.5$ N1 $y=15$ dan $y=50$(abaikan) AD = 50 dan AB = 15 kedua-dua betul N1	**7**	**7**

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3	(a) $A_1 = \pi h^2$ atau $A_1 = \pi h^2$ setara P1 $\frac{a[4^4 - 1]}{4-1} = 1700\pi$ K1 $a = 20\pi$ N1	**3**	
	(b) $20\pi(4)^{n-1} = 320\pi$ atau setara K1 $n = 3$ N1	**2**	
	(c) $\frac{20\pi}{4-1}$ K1 $6\frac{2}{3}\pi$ N1	**2**	**7**
4.	(a) $\overrightarrow{AO} + \overrightarrow{OE} = m(\overrightarrow{AO} + \overrightarrow{OD})$ **K1** $\overrightarrow{OE} = (1 - m)\,\underline{a} + m\,\underline{d}$ N1	**2**	
	(b) (i) $\overrightarrow{OE} = 2n\,\underline{a} + 3n\,\underline{d}$ K1 Selesaikan persamaan serentak K1 $2n = 1 - m$ $m = 3n$ $m = \frac{3}{5}$, $n = \frac{1}{5}$ N1, N1		
	(ii) $\overrightarrow{AE} = \frac{3}{5}\overrightarrow{AD}$ DE : EA = 2 : 3 NI	**5**	**7**

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5	(a) $\sqrt{(h-5)^2+(2h-6)^2}=\sqrt{32}$ K1 $(5h-29)(h-1)=0$ $h=\frac{29}{5}$ (*abaikan*), $h=1$ N1 $\frac{2-0}{1-3}=\frac{k-0}{-2-3}$ *atau* $\frac{2-0}{1-3}=\frac{k-2}{-2-1}$ K1 $k=5$ N1	**4**	
	(b) Gunakan $m_1 \times m_2 = -1$ $m_{AP}\times m_{BP}$ atau $m_{AP}\times m_{BD}$ atau $m_{AP}\times m_{PD}$ K1 $1\times -1=-1$ dan AP adalah jarak terpendek N1 ATAU Kaedah alternatif $\left(\sqrt{32}\right)^2+\left(\sqrt{8}\right)^2$ dan $\left(\sqrt{40}\right)^2$ atau K1 $\left(\sqrt{32}\right)^2+\left(\sqrt{18}\right)^2$ dan $\left(\sqrt{50}\right)^2$ $\left(\sqrt{32}\right)^2+\left(\sqrt{8}\right)^2=\left(\sqrt{40}\right)^2$ atau N1 $\left(\sqrt{32}\right)^2+\left(\sqrt{18}\right)^2=\left(\sqrt{50}\right)^2$	**2**	**6**

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6	(a) $y = x - 1$ pada (x, 0)		
	$x = 1$ P1		
	Luas kawasan berlorek		
	$\int_0^3 11 - x^2 dx = \left[11x - \frac{x^3}{3} \right]_0^3$ atau $\frac{1}{2}(2)(2)$ K1		
	$\left[11x - \frac{x^3}{3} \right]_0^3 - \frac{1}{2}(2)(2)$ K1		
	22 unit^2 N1	**4**	
	(b) **Isipadu janaan**		
	$\pi \int_2^{11} (11 - y) dy = \pi \left[11y - \frac{y^2}{2} \right]_2^{11}$ K1		
	$\pi \left[11(11) - \frac{11^2}{2} \right] - \left[11(2) - \frac{2^2}{2} \right]$ K1	**3**	**7**
	40.5 π		

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	BAHAGIAN B		
7	(a) $\sin\frac{\angle POQ}{2}=\frac{12}{15}$ K1 $\angle POQ=1.855\text{rad}$ N1	**2**	
	(b) $S_{PBQ}=15(1.855)$ K1 $S_{PCQ}=12(3.142)$ K1 $15(1.855)+12(3.142)+20+11+11$ K1 107.5 N1	**4**	
	(c) $\frac{1}{2}(12)^2(3.142)$ K1 $\frac{1}{2}(15)^2(1.855)$ atau $\frac{1}{2}(15)^2\sin 106.26$ atau $\frac{1}{2}(24)(9)$ K1 $\frac{1}{2}(12)^2(3.142)-[\frac{1}{2}(15)^2(1.855)-\frac{1}{2}(15)^2\sin 106.26]+\frac{1}{2}(11)^2(1.818)$ K1 235.5 N1	**4**	**10**

Nombor		Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
8	(a)	(i) $P(X=6)={}^6C_6(p)^6(1-p)^0$ atau $P(X=6)={}^6C_6(p)^6(q)^0$		
		${}^6C_6(p)^6(1-p)^0=0.046656$ K1		
		$p=0.6$ N1		
		(ii) $P(x>4)=P(X=5)+P(X=6)$ P1		
		$={}^6C_5(0.6)^5(0.4)^1+{}^6C_6(0.6)^6(0.4)^0$ K1		
		$=0.2333$ N1	**5**	
	(b)	(i) $P(X>V)=0.409$		
		$P\left(z>\frac{V-900}{17}\right)=0.409$		
		$z=0.23$ N1		
		$\frac{v-900}{17}=0.23$ K1		
		$V=903.91$ N1		
		(ii) $P(866<X<951)$		
		$=P\left(\frac{866-900}{17}<z<\frac{951-900}{17}\right)$ K1		
		$=P(-2<z<3)$		
		$=0.9759$ N1	**5**	**10**

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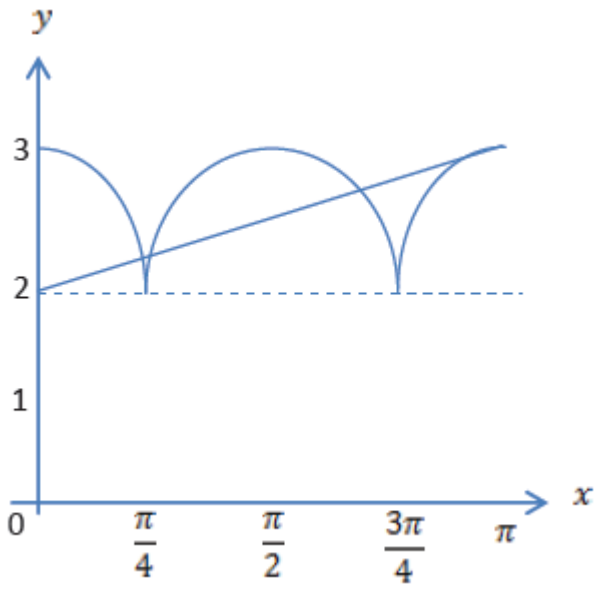
9	(a) $\log_{10}(x+1)$ | 0.30 | 0.48 | 0.60 | 0.70 | 0.78 | 0.85 — N1 $\log_{10} y$ | 0.70 | 0.81 | 0.89 | 0.95 | 1.00 | 1.04 — N1	**2**	
	(b) **RUJUK GRAF** $\log_{10} y = q\log_{10}(x+1)+\log_{10} p$ **P1**	**4**	
	(c) (i) $\log_{10} p = 00.515$ K1 p = 3.27 N1 (ii) $q = \frac{1.04-0.7}{0.85-0.3}$ atau setara K1 q = 0.6 N1	**4**	**10**
10.	(a) (i) $2\cot x \sin^2 x = 2\left(\frac{\cos x}{\sin x}\right)(\sin^2 x)$ **K1** $= 2\sin x\cos x$ **N1** $= \sin 2x$ (ii) $\sin 2x = 0.5$ **K1** $2x = 30^\circ, 150^\circ, 390^\circ, 510^\circ$ $x = 15^\circ, 75^\circ, 195^\circ, 255^\circ$ **N1**	**4**	
	(b) $y = kos\ x$ **atau** $y = kos\ 2x$ **P1** $y = \lvert kos\ 2x \rvert$ **P1** $y = 2 + \lvert kos\ 2x \rvert$ **P1**	**3**	

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
	(c)  $y = \frac{x}{\pi} + 2$ K1 Graf N1 Bilangan penyelesaian = 4 N1	**3**	**10**
11	(a) (i) $2x^2h = 72$ atau $h = \frac{36}{x^2}$ K1 $L = 4x^2 + 6xh$ K1 $L = 4x^2 + 6x\left(\frac{36}{x^2}\right)$ N1 $L = 4x^2 + \frac{216}{x}$ (Shown) (ii) $\frac{dL}{dx} = 8x - \frac{216}{x^2} = 0$ K1 $x = 3$ N1 $L = 108cm^2$ N1	**6**	

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
	(b) (i) $4.2\pi = 8\pi(3)\times\frac{dr}{dt}$ atau setara K1 $\frac{dr}{dt} = 0.175$ N1 (ii) $4\pi(3^2)\times 0.175$ K1 6.3π N1	**4**	**10**
	BAHAGIAN C		
12	(a) (i) $\frac{2}{P_{2013}}\times 100 = 189$ K1 $P_{2013} = RM1.06$ (mesti 2 titik perpuluhan) N1 (ii) $\frac{184\times 84}{100}$ K1K1 = 154.56 N1	**5**	
	(b) (i) $\frac{(84\times 5)+(154\times 40)+(189\times 10)+(45h)}{100} = 154$ K1K1 h = 154 N1 (iii) $\frac{27.10}{P_{2013}}\times 100 = 154$ K1 $P_{2013} = RM17.60$ (mesti 2 titik perpuluhan) N1	**5**	**10**

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
13	(a) $a = \frac{dv}{dt} = -3$ **N1**	**1**	
	(b) Use $v=0$ $12-3t=0$ **K1** $t = 4s$ **N1**	**2**	
	(c) Use $s = \int (12-3t)dt$ **K1** and substitute $t=0, s=0$ $s = 12t - \frac{3t^2}{2}$ Use $s = -30$ **K1** $-30 = 12t - \frac{3t^2}{2}$ $3t^2 - 24t - 60 = 0$ $(t+2)(t-10) = 0$ $t = -2, t = 10$ $t \geq 0, t = 10$ **N1** $velocity, v = 12-3t$ $= 12-3(10)$ $= -18 ms^{-1}$ **N1**	**4**	
	(d) At Q, $t = 4$ $S_{OQ} = 12(4) - \frac{3(4)^2}{2} = 24m$ K1 Total distance = 24 + 24 + 30 **K1** = 78 m **N1**	**3**	**10**

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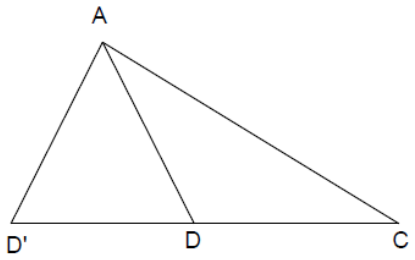
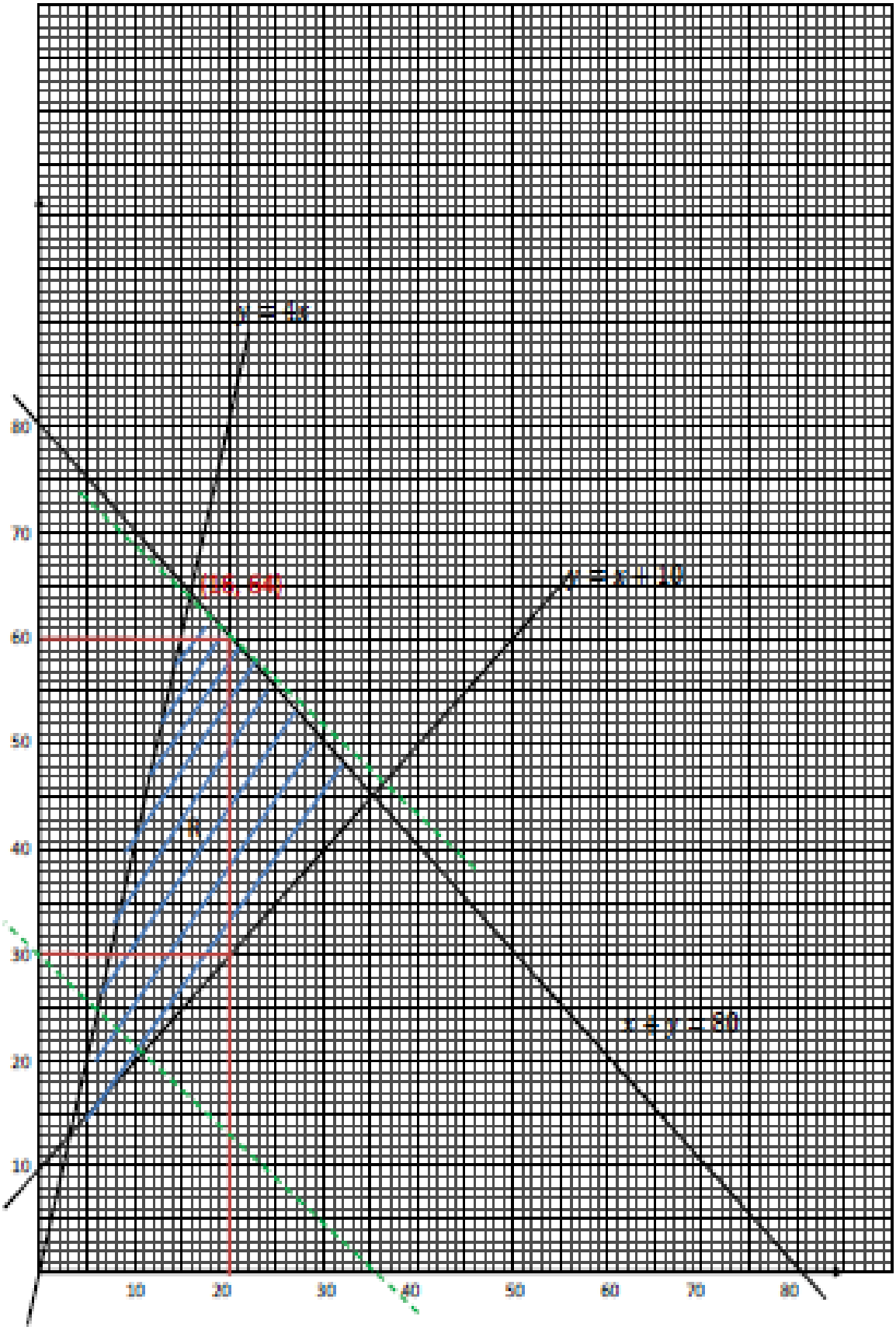
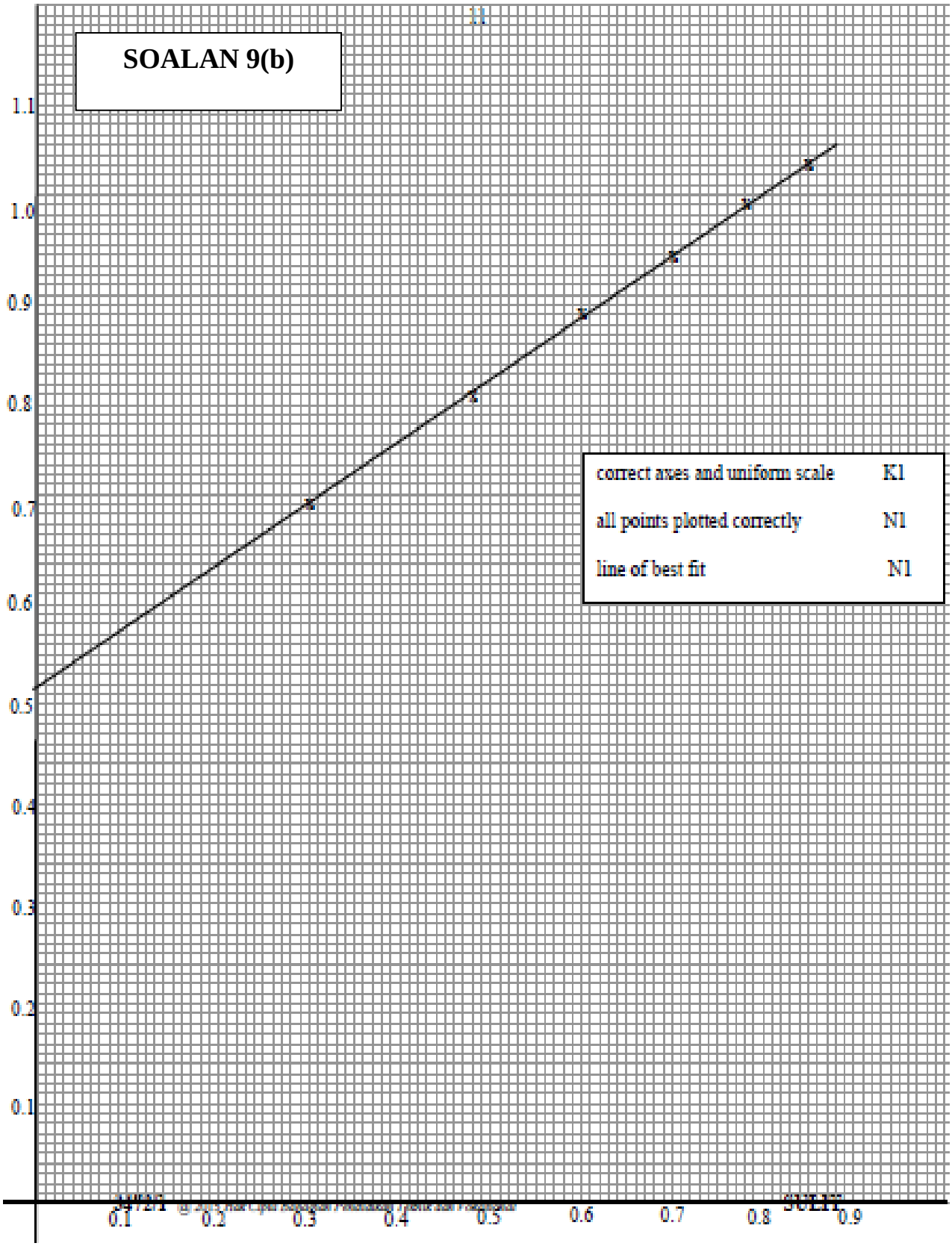
14	(a) I : $x+y\le 80$ **atau** setara N1 II : $y\le 4x$ **atau** setara N1 III : $y-x\ge 10$ **atau** setara N1	**3**	
	(b) Rujuk Graf • Skala & paksi seragam dan satu garisan dilukis betul K1 • Semua garis dilukis betul K1 (terima garis putus – putus) • Rantau R dilorek betul N1	**3**	
	(c) (i) $30\le y\le 60$ N1 (ii) Titik maksimum = (16, 64) N1 Kutipan yuran maksimum $=60(16)+70(64)$ K1 = RM 5440 N1 Note: SS - 1 if in (a), the symbol = is not used at all or more than three inequalities given or x and y are not used at all OR in (b), dies not use the scale given or axis in the reverse direction or does not use the graph paper.	**4**	**10**

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
15	(a) $AC^2 = 6.5^2 + 3.5^2 - 2(6.5)(3.5)\cos 70°$ K1 6.24 cm N1	**2**	
	(b) $\frac{\sin \angle BAC}{3.5} = \frac{\sin 70}{6.24}$ K1 Use $\angle ACD = \angle BAC = 31.81°$ K1 $\angle ADC = 180° - 62.74°$ K1 $117.26°$ N1	**4**	
	(c) (i)  $\angle AD'C$ must acute angle N1		
	(ii) $\angle D'AD = 180° - 2(62.74°)$ K1 $\Delta ADD' = \frac{1}{2}(3.7)(3.7)(\sin 54.52°)$ K1 5.57 cm^2 N1	**4**	**10**
	JUMLAH MARKAH		**100**

KERTAS PEMARKAHAN TAMAT

SOALAN 14 (b)




SOALAN 9(b)
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
correct axes and uniform scale K1
all points plotted correctly N1
line of best fit N1