

SULIT
3472/2
Additional Mathematics
Kertas 2
Ogos
2017



**BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN**

**PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2017
PERCUBAAN SIJIL PELAJARAN MALAYSIA**

ADDITIONAL MATHEMATICS

Kertas 2

PERATURAN PEMARKAHAN

Peraturan pemarkahan ini mengandungi 12 halaman bercetak

Number	Solution and Marking Scheme	Sub Marks	Full Marks
1 (a)	$-1 - 4k - 11 = 0$ $k = -3$	K1	
(b)	$m_{OP} = \frac{3}{4} \quad \text{or} \quad m_{PQ} = \frac{-4}{3}$ $m_{OP} \times m_{PQ} = \frac{3}{4} \times \frac{-4}{3} = -1$	N1	
(c)	$TP = 5$ $\sqrt{(x-4)^2 + (y-3)^2} = 5$ $x^2 + y^2 - 8x - 6y = 0$	P1 K1 N1	7
2	$y = 3 + 2x \quad \text{or} \quad x = \frac{y-3}{2}$ $2x + 5(3 + 2x) = -9x(3 + 2x) \quad \text{or}$ $\frac{2}{3+2x} + \frac{5}{x} = -9 \quad \text{or} \quad \frac{2}{y} + \frac{5}{y-3} = -9$ $(3x+5)(2x+1) = 0 \quad \text{or} \quad (3y+1)(y-2) = 0$ $x = -\frac{5}{3}, \quad x = -\frac{1}{2}$ $y = -\frac{1}{3}, \quad y = 2$	P1 K1 K1 N1 N1	5

Number	Solution and Marking Scheme	Sub Marks	Full Marks
<p>3 (a)</p> <p>36 or 36,27,20.25,.....or $r = 0.75$</p> <p>$T_n = 1.52$ or $36(0.75)^{n-1} = 1.52$</p> <p>$(n-1) \log 0.75 = \log \left(\frac{1.52}{36} \right)$ or $n-1 = \frac{\log \left(\frac{1.52}{36} \right)}{\log 0.75}$</p> <p>$n = 12$</p> <p>(b) $\frac{36}{(1-0.75)}$</p> <p>$48 + 2 \left(\frac{36}{1-0.75} \right)$</p> <p>336 cm</p>	<p>K1</p> <p>K1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>N1</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>7</p>
<p>4 (a)</p> <p>(i)</p> <p>$\frac{100.5 + 150.5}{2}$</p> <p>125.5 (accept without working)</p> <p>(ii)</p> <p>$\frac{75.5(10) + 125.5(40) + 175.5(10) + 225.5(30) + 275.5(20)}{110}$</p> <p>180.05</p> <p>(b)</p> <p>200.5 or 60 or 30</p> <p>$200.5 + \left(\frac{82.5 - 60}{30} \right) 50$</p> <p>238</p>	<p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>P1</p> <p>K1</p> <p>N1</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>7</p>

Number	Solution and Marking Scheme	Sub Marks	Full Marks
5 (a)	$\frac{2}{5}x^2 - 12x + 50 = 0$ $(x - 25)(x - 5) = 0$ $x = 25, x = 5$ <p>Width = $25 - 5 = 20$ unit</p>	<p style="text-align: center;">K1</p> <p style="text-align: center;">K1</p> <p style="text-align: center;">N1</p>	
(b)	$\frac{dy}{dx} = \frac{4}{5}x - 12 \quad \text{OR} \quad y = \frac{2}{5}[(x - 15)^2 - 100]$ $x = 15 \quad \text{OR} \quad y = \frac{2}{5}(x - 15)^2 - 40$ <p>$y = -40$ or max depth = 40</p>	<p style="text-align: center;">K1</p> <p style="text-align: center;">N1</p> <p style="text-align: center;">N1</p>	6

Number	Solution and Marking Scheme	Sub Marks	Full Marks
6 (a)	$\frac{\frac{\sin x}{\cos x}}{\frac{\sin 2x}{\cos 2x} - \frac{\sin x}{\cos x}}$ <p>Use $\frac{\sin x}{\cos x}$</p> <p>or $\sin 2x = 2\sin x \cos x$</p> <p>or $\cos 2x = 2\cos^2 x - 1$</p> $= \frac{\sin x}{\cos x} \times \frac{\cos 2x \cos x}{\cos x \sin 2x - \sin x \cos 2x}$ $= \frac{\sin x}{\cos x} \times \frac{\cos 2x \cos x}{\cos x (2\sin x \cos x - \sin x (2\cos^2 x - 1))}$ $= \frac{\sin x}{\cos x} \times \frac{\cos 2x \cos x}{2\sin x \cos^2 x - 2\sin x \cos^2 x + \sin x}$ $= \cos 2x$	K1 N1	
6 (b)	<p>Shape Amplitude or 2 cycles or modulus All correct</p> $y = \frac{x}{2\pi}$ <p>Sketch graph</p> <p>6 number of solution</p>	P1 P1 P1 N1 K1 N1	8

Number	Solution and Marking Scheme	Sub Marks	Full Marks
8	Refer to graph		
9 (a)	$\overrightarrow{AQ} = \overrightarrow{AO} + \overrightarrow{OQ} \quad \text{or} \quad \overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$	K1	
(i)	$\overrightarrow{AQ} = -\underline{a} + \frac{3}{4}\underline{b}$	N1	
(ii)	$\overrightarrow{OP} = \frac{3}{4}\underline{a} + \frac{1}{4}\underline{b}$	N1	
(b)	$\overrightarrow{OS} = m\overrightarrow{OP}$ $= m\left(\frac{3}{4}\underline{a} + \frac{1}{4}\underline{b}\right)$	N1	
	$\overrightarrow{OS} = \underline{a} + n\left(-\underline{a} + \frac{3}{4}\underline{b}\right)$	N1	
	$\frac{3}{4}m = 1 - n \quad \text{or} \quad \frac{1}{4}m = \frac{3}{4}n$	K1	
	$3m + 4n = 4 \quad \text{and} \quad m = 3n \quad \text{shown}$	N1	
	Solve simultaneous linear equations	K1	
	$m = \frac{12}{13}$	N1	
	$n = \frac{4}{13}$	N1	

10

Number	Solution and Marking Scheme	Sub Marks	Full Marks
10 (a)	$\frac{dy}{dx} = 2x - 5$ $2x - 5 = 0 \quad \text{or} \quad x = \frac{5}{2}$ $y = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right)$ $y = -\frac{25}{4}$	K1	
		N1	
	(b)	$A_1 = \left(\frac{25}{4}\right)(5)$ $A_2 = \frac{x^3}{3} - \frac{5x^2}{2}$ $A_1 - A_2 $ $\frac{125}{4} // 10\frac{5}{12} // 10.42$	K1
		K1	
		K1	
		N1	
(c)	$V = \pi \int_0^5 (x^2 - 5x)^2 dx \quad \text{or} \quad \int_0^5 (x^4 - 10x^3 + 25x^2) dx$ $= \left[\pi \right] \left[\frac{x^5}{5} - \frac{10x^4}{4} + \frac{25x^3}{3} \right]$ $= \frac{625}{6} \pi // 104\frac{1}{6} \pi // 104.17 \pi$	K1	
		K1	
		N1	

Number	Solution and Marking Scheme	Sub Marks	Full Marks
11 (a) i)	$P(x=7) = {}^{10}C_7 (0.55)^7 (0.45)^3$ $= 0.1665$	K1 N1	
(ii)	${}^{10}C_0 (0.45)^0 (0.55)^{10} \quad \text{or} \quad {}^{10}C_1 (0.45)^1 (0.55)^9$ <p style="text-align: center;">1 – P(X=0) – P(X=1) equivalent</p> $= 0.9767$	K1 K1 N1	
(b) i)	$\frac{3.6 - 3.56}{0.25}$ 0.4364	K1 N1	
(ii)	<p>Seen - 0.524 or 0.524</p> $\frac{k - 3.56}{0.25} = -0.524$ $k = 3.429$	P1 K1 N1	10

Number	Solution and Marking Scheme	Sub Marks	Full Marks
12 (a)	$6t^2 - 30t + 24$	K1	
	$(t - 4)(t - 1) = 0$	K1	
	$t = 4$ and $t = 1$	N1	
(b)	$12t - 30$	K1	
	$t = \frac{5}{2}$		
	substitute *t into v		
(c)	$v = 6 \left(\frac{5}{2}\right)^2 - 30 \left(\frac{5}{2}\right) + 24$	K1	
	$v = -13\frac{1}{2} \text{ms}^{-1}$ or $13\frac{1}{2} \text{ms}^{-1}$ moves to the left	N1	
	$t < \frac{5}{2}$	N1	
	$S_1 = 2(1)^3 - 15(1)^2 + 24(1)$ or $S_{\frac{5}{2}} = 2\left(\frac{5}{2}\right)^3 - 15\left(\frac{5}{2}\right)^2 + 24\left(\frac{5}{2}\right)$	K1	
	Total distance = $2S_1 + \left *S_{\frac{5}{2}} \right $	K1	
	= 24.5	N1	10

Number	Solution and Marking Scheme	Sub Marks	Full Marks
13 (a)	$\frac{70}{x} \times 100 = 175 \quad \text{or} \quad \frac{y}{20} \times 100 = 100 \quad \text{or} \quad \frac{18}{15} \times 100 = z$ $x = 40, \quad y = 20, \quad z = 120$	K1 N2, 1, 0	10
(b)	$\bar{I} = \frac{175(8) + 150(12) + 125(10) + 100(24) + 120(46)}{100}$ 123.7	K1 N1	
(c)	$P_{06} = \frac{880 \times 100}{*123.7}$ $\text{RM } 711.40$	K1 N1	
(d)	<p>Seen $I_{18/15} = 166.25 \quad \text{or} \quad 165 \quad \text{or} \quad 137.5 \quad \text{or} \quad 110 \quad \text{or} \quad 132$</p> $\bar{I} = \frac{166.25(8) + 165(12) + 137.5(10) + 110(24) + 132(46)}{100}$ 133.97	N1 K1 N1	

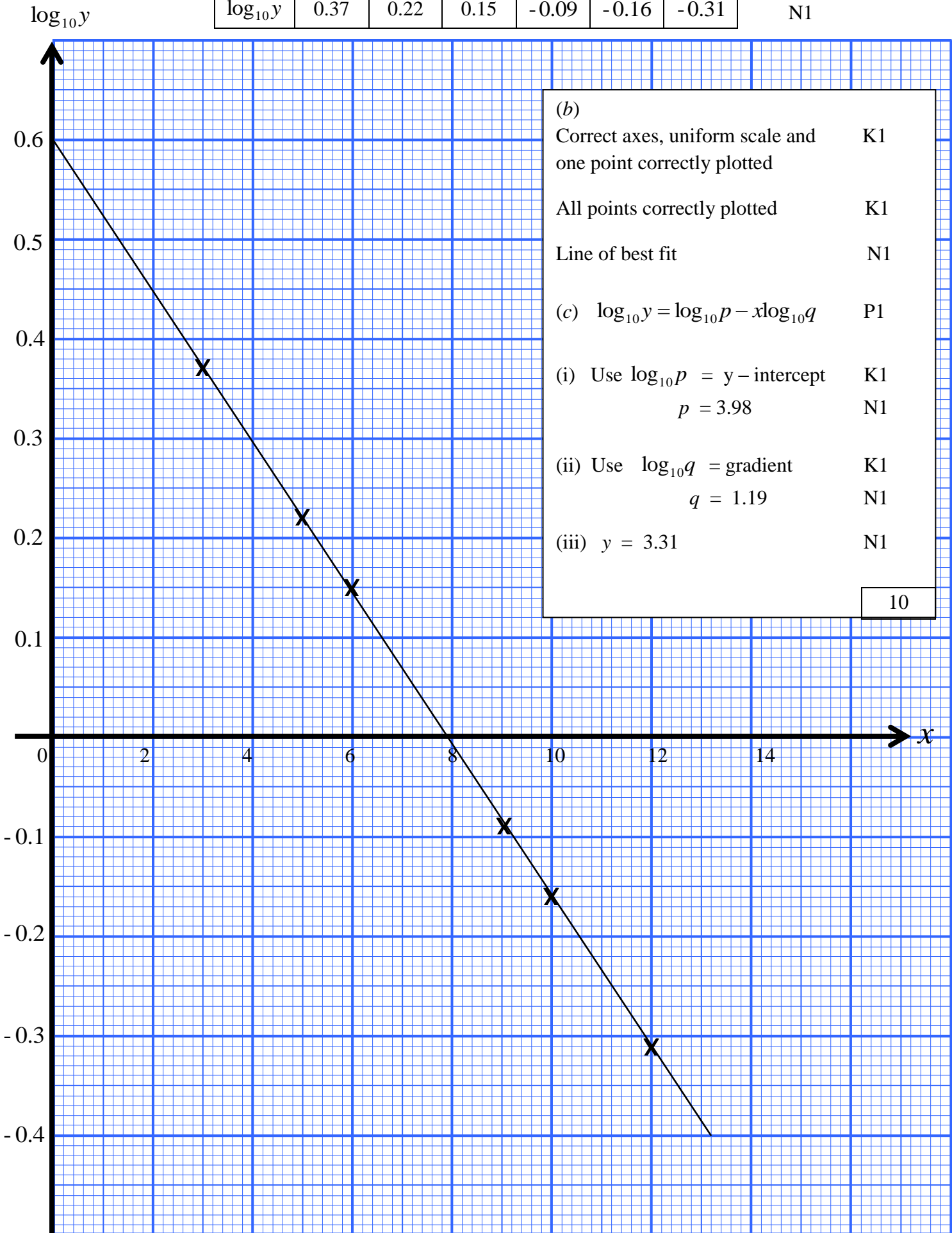
Number	Solution and Marking Scheme	Sub Marks	Full Marks
14	Refer to graph		
15 (a)	<p>(i) $\frac{\sin \angle ADC}{7.71} = \frac{\sin 22.18^\circ}{3.46}$ $\angle ADC = 122.73^\circ$</p> <p>(ii) $7.71^2 = 4.98^2 + 4.07^2 - 2(4.98)(4.07)\cos \angle ABC$ $\angle ABC = 116.49^\circ$</p> <p>Area of triangle ADC $\frac{1}{2}(4.98)(4.07)\sin 116.49^\circ$ $9.070 \text{ cm}^2 // 9.07 \text{ cm}^2$</p> <p>(iii) $\frac{1}{2} \times BE \times 7.71 = 9.07$ $BE = 2.353 \text{ cm}$</p> <p>(b) $BD = \sqrt{2.35^2 + 2.06^2}$ $= 3.125 \text{ cm}$</p>	<p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>P1</p> <p>N1</p>	10

END OF MARKING SCHEME

QUESTION 8

x	3	5	6	9	10	12
$\log_{10}y$	0.37	0.22	0.15	-0.09	-0.16	-0.31

N1



(b)	Correct axes, uniform scale and one point correctly plotted	K1
	All points correctly plotted	K1
	Line of best fit	N1
(c)	$\log_{10}y = \log_{10}p - x\log_{10}q$	P1
(i)	Use $\log_{10}p = y - \text{intercept}$	K1
	$p = 3.98$	N1
(ii)	Use $\log_{10}q = \text{gradient}$	K1
	$q = 1.19$	N1
(iii)	$y = 3.31$	N1
		10

QUESTION 14

- (a) I. $y - x \geq 10$ N1
 II. $x \geq \frac{y}{10}$ or $10x \geq y$ N1
 III. $3000x + 1800y \leq 81\ 000$ N1

Note: Don't accept $x : y = 1 : 10$

- (b) Correct axes with uniform scale **and** 1 graph correct K1
 All graphs correct N1
 Correct shaded region N1
- (c) (i) 33 (From point (3,30)) N1
 (ii) $k = 10y + 25x$, let $k = 250$ **and** K1
 max point (13, 23) N1
 maximum allowance = $10(23) + 25(13)$ K1
 = RM 555 N1

