



i-MODUL KECEMERLANGAN SPM SMKA DAN SABK 2023
SIJIL PELAJARAN MALAYSIA 2023 (SET 1)

MATEMATIK TAMBAHAN
Kertas 2
PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

Peraturan pemarkahan ini **SULIT** dan **Hak Cipta Majlis Pengetua SMKA** dan **Majlis Pengetua SABK**. Kegunaan khusus untuk guru-guru tingkatan 5 di SMKA dan SABK sahaja. Peraturan ini tidak boleh dikeluarkan dalam apa jua bentuk media cetak.

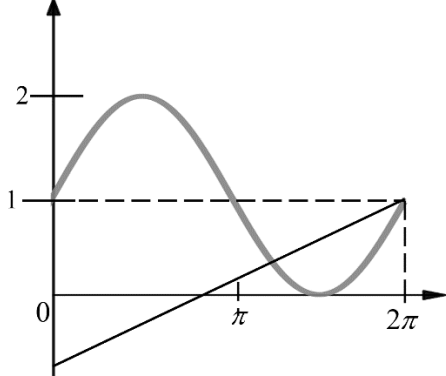
Peraturan pemarkahan ini mengandungi 11 halaman bercetak

CADANGAN PERATURAN PEMARKAHAN (SKEMA)
KERTAS 2
BAHAGIAN A

| Soalan | Skema Pemarkahan | Sub Markah | Markah Penuh |
|----------------|---|------------------------------|--------------|
| 1 (a) | $\frac{1}{2}(x^2 + 10x + 25 + x^2 - 14x + 49)$ $= x^2 - 2x + 37$ $= x^2 - 2x + \left(\frac{-2}{2}\right)^2 - \left(\frac{-2}{2}\right)^2 + 37$ $= (x-1)^2 + 36$ Titik minimum / <i>Minimum point</i> = (1,36) | K1 K1 K1 N1 | 5 |
| 1 (b) | $a < 0$ | P1 | |
| 2 (a) | $\frac{n \times (n-1)(n-2)!}{(n-2)!}$ $n^2 - n$ | K1 N1 | 5 |
| 2(b)(i) | ${}^9C_6 = 84$ | N1 | |
| (b)(ii) | $\left({}^{11}C_5 \times {}^9C_1\right) + \left({}^{11}C_6 \times {}^9C_0\right)$ 4620 | K1 N1 | |

| Soalan | Skema Pemarkahan | Sub Markah | Markah Penuh |
|---------------------|---|---|--------------|
| <p>3 (a)</p> | $a \left[x^2 + \frac{b}{a}x + \left(\frac{\frac{b}{a}}{2}\right)^2 - \left(\frac{\frac{b}{a}}{2}\right)^2 + \frac{c}{a} \right] = 0 \text{ (atau setara)}$ $x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ | <p>K1</p> <p>K1</p> <p>N1</p> | |
| <p>3 (b)</p> | $y = 4x - 6$ $2x^2 + 3(4x - 6)^2 - 8x(4x - 6) = 24$ $18x^2 - 96x + 84 = 0$ $3x^2 - 16x + 14 = 0$ $x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(3)(14)}}{2(3)}$ $x = 1.10 \quad x = 4.23$ $y = -1.60 \quad y = 10.9$ | <p>P1</p> <p>K1</p> <p>K1</p> <p>N1</p> <p>N1</p> | <p>8</p> |
| <p>4 (a)</p> | <p>6000, 6300, 6615</p> $r_1 = \frac{6300}{6000} \quad r_2 = \frac{6615}{6300}$ $r_1 = 1.05 \quad r_2 = 1.05$ $r_1 = r_2$ | <p>P1</p> <p>K1</p> <p>N1</p> | |
| <p>4 (b)</p> | $T_{18} = (6000)(1.05)^{18-1}$ $= 13752.11$ <p>Simpanan RM 15 000 tidak dapat dicapai</p> | <p>K1</p> <p>N1</p> | |
| <p>4 (c)</p> | $T_{10} = (6000)(1.05)^{10-1}$ $= 9307.97$ $T_{11} = 9959.53$ $T_8 = (9959.53)(1.07)^{8-1}$ $= 15992.83$ <p>Maka, wang simpanan mencapai RM 15000</p> | <p>K1</p> <p>K1</p> <p>K1</p> <p>N1</p> | <p>9</p> |

| Soalan | Skema Pemarkahan | Sub Markah | Markah Penuh |
|-------------------|---|--|--------------|
| 5 (a) (i) | $TS + SR @ TQ + QR$ $3\tilde{x} + 3\tilde{y}$ | K1 | |
| 5 (a) (ii) | $QS + SU @ QR + RU$ $\frac{9}{2}\tilde{x} - \frac{3}{2}\tilde{y}$ | N1 K1 | |
| 5 (b) | $PR = \lambda TR$ $7\tilde{x} + 7\tilde{y} = \lambda(3\tilde{x} + 3\tilde{y})$ $PR = \frac{7}{3}TR$ Jalan pintas ke R boleh dilalui daripada P kerana segaris. | K1 K1 N1 | 7 |
| 6 | $20x + 30y + 40z = 68500$ $10x + 15y + 15z = 29750$ $x + y + z = 2350$ <u>Hapus satu anu</u> hapus x : $10y + 20z = 21500 // 5y + 5z = 6250$ atau setara hapus y : $-10x + 10z = -2000$ atau setara hapus z : $x + y = 1450$ atau setara <u>Hapus lagi satu anu kaedah penggantian/penghapusan</u> $x = 1100$ (baju kurung) $y = 350$ (baju kurung moden) $z = 900$ (baju kebaya) | N1 N1 N1 K1 K1 N1 N1 N1 | 8 |

| Soalan | Skema Pemarkahan | Sub Markah | Markah Penuh |
|--------|--|--------------------------|--------------|
| 7 (a) | $\frac{1 - \sin^2 x}{1 - \sin x}$ $\frac{(1 - \sin x)(1 + \sin x)}{(1 - \sin x)}$ | K1 | |
| 7 (b) | $1 + \sin x$  <p style="text-align: right;">Bentuk / <i>Shape</i> 1 kitaran / <i>1 cycle</i> Anjakan 1 unit ke atas / <i>Shift 1 unit upwards</i></p> | N1 P1 P1 P1 | |
| (c) | $y = \frac{x}{\pi} - 1$ <p>Lukis garis lurus / <i>Draw straight line</i> $y = \frac{x}{\pi} - 1$</p> <p>Bilangan penyelesaian / <i>No of solution</i> = 2</p> | K1 K1 N1 | 8 |

BAHAGIAN B
Pilih mana-mana **tiga** soalan

| Soalan | Butiran | Markah | | | | | | | | | | | | | | |
|-------------------|---|----------------------|------|------|------|------|------|------|-------|------|------|------|------|------|------|----------|
| 8(a) | $(2x+7)(x-2) = 0$ $(2, 3)$ | K1 N1 | | | | | | | | | | | | | | |
| 8(b) | $\left[\left(-\frac{(2)^3}{3} + 7(2) \right) - \left(-\frac{(0)^3}{3} + 7(0) \right) \right]$ $\frac{1}{2}(2)(3)$ $\frac{34}{3} - 3$ $\frac{25}{3}$ | K1 K1 K1 N1 | | | | | | | | | | | | | | |
| 8(c) | $\pi \left[\left(\frac{(2)^5}{5} - \frac{14(2)^3}{3} + 49(2) \right) - \left(\frac{(0)^5}{5} - \frac{14(0)^3}{3} + 49(0) \right) \right]$ $\pi(3)^2(2)$ $\frac{1006}{15}\pi - 18\pi$ $\frac{736}{15}\pi$ | K1 K1 K1 N1 | | | | | | | | | | | | | | |
| 9 (a) | <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tbody> <tr> <td>\sqrt{x}</td> <td>0.10</td> <td>0.23</td> <td>0.35</td> <td>0.50</td> <td>0.66</td> <td>0.77</td> </tr> <tr> <td>y^2</td> <td>4.35</td> <td>3.55</td> <td>2.80</td> <td>1.90</td> <td>0.80</td> <td>0.15</td> </tr> </tbody> </table> | \sqrt{x} | 0.10 | 0.23 | 0.35 | 0.50 | 0.66 | 0.77 | y^2 | 4.35 | 3.55 | 2.80 | 1.90 | 0.80 | 0.15 | N1 N1 |
| \sqrt{x} | 0.10 | 0.23 | 0.35 | 0.50 | 0.66 | 0.77 | | | | | | | | | | |
| y^2 | 4.35 | 3.55 | 2.80 | 1.90 | 0.80 | 0.15 | | | | | | | | | | |
| 9 (b) (i) | $y^2 = 2.30$ $\sqrt{x} = 0.43$ | K1 N1 | | | | | | | | | | | | | | |
| 9 (b) (ii) | $y^2 = a\sqrt{x} + b$ $a = -6.2 \leftrightarrow -6.3$ $b = 4.95 \leftrightarrow 5$ | P1 N1 N1 | | | | | | | | | | | | | | |

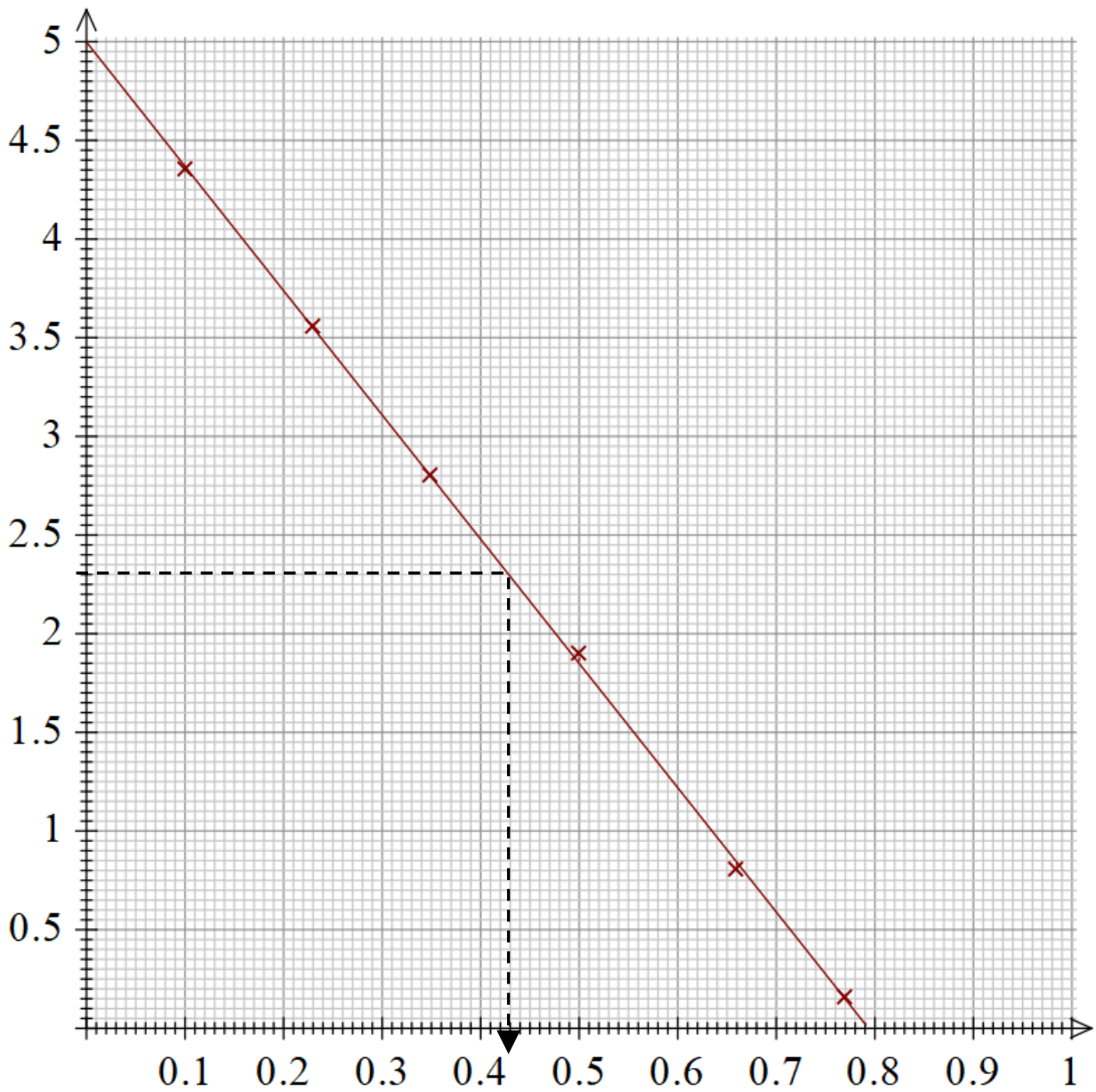
Graf garis lurus y^2 melawan \sqrt{x} dilukis

Paksi-paksi betul dan skala seragam

Sekurang-kurangnya satu *titik diplot betul K1

Enam *titik diplot dengan betul N1

Garis lurus penyuaiian terbaik N1



| Soalan | Butiran | Markah |
|------------|---|--------|
| 10 (a)(i) | Tulis $P\left(\frac{40-40}{12} \leq Z \leq \frac{60-40}{12}\right)$ | P1 |
| | $P(Z \geq 0) - P(Z > 1.667)$ | K1 |
| 10(a)(ii) | 0.4522 | N1 |
| | Tulis $P\left(Z > \frac{m-40}{12}\right)$ & $1 - 0.58$ @ | K1 |
| 10 (b)(i) | Label dan lorek pada lakaran graf normal & 0.42 @ $1 - 0.58$ | N1 |
| | $m = 37.58$ | K1 |
| 10 (b)(ii) | $\sqrt{9(0.8)(0.2)}$ | N1 |
| | $\frac{6}{5}$ @ 1.2 | K1 |
| 10 (b)(ii) | $P(x \geq 1) = 1 - [P(x=0) + P(x=1) + P(x=2) + P(x=3)]$ atau setara | N1 |
| | $P(x \geq 1) = 1 - [({}^9C_0(0.8)^0(0.2)^{9-0}) + ({}^9C_1(0.8)^1(0.2)^{9-1})$ $+ ({}^9C_2(0.8)^2(0.2)^{9-2}) + ({}^9C_3(0.8)^3(0.2)^{9-3}]$ | K1 |
| | 0.9969 | N1 |
| 11 (a) | $0.4x^2$ | P1 |
| | $\cos 45.84 = \frac{OR}{5}$ atau $\sin 45.84 = \frac{SR}{5}$ | K1 |
| 11 (b) | luas ORS = $\frac{1}{2} \times 5 \cos 45.84 \times 5 \sin 45.84$ | K1 |
| | $6.2473 = \frac{1}{5} \times 0.4x^2$ | K1 |
| 11 (c) | $x = 8.837$ | N1 |
| | 8.837 (0.8) | K1 |
| 11 (b) | $3.837 + 7.070 + 5.354 + 5 \sin 45.84^*$ | K1 |
| | 19.85 | N1 |
| 11 (c) | Luas sektor OPQ – luas segitiga OSR | K1 |
| | $= \frac{1}{2} \times (8.837)^2 (0.8) - 6.2473$ | N1 |
| | $= 24.99$ @ 25 | |

| Soalan | Butiran | Markah |
|--------|---|------------------------------|
| 12 (a) | $v = 6ms^{-1}$ | P1 |
| 12 (b) | $v = 0$ $-2t^2 + 4t + 6 = 0$ $t^2 - 2t - 3 = 0$ $(t+1)(t-3) = 0$ $t = 3$ | P1 K1 N1 |
| 12 (c) | $\frac{dv}{dt} = -4t + 4 = 0$ $t = 1$ $v = -2(1)^2 + 4(1) + 6$ $v = 8ms^{-1}$ | P1 K1 N1 |
| 12(d) | $-\frac{2t^3}{3} + \frac{4t^2}{2} + 6t$ $\left[-\frac{2(3)^3}{3} + \frac{4(3)^2}{2} + 6(3) \right] + \left[\left(-\frac{2(6)^3}{3} + \frac{4(6)^2}{2} + 6(6) \right) - \left(-\frac{2(3)^3}{3} + \frac{4(3)^2}{2} + 6(3) \right) \right]$ 72 | K1 K1 N1 |
| 13 (a) | $\frac{\sin 55^\circ}{DF} = \frac{\sin 47^\circ}{14}$ $DF = 15.68$ | K1 N1 |
| 13 (b) | $\frac{\sin 78^\circ}{AD} = \frac{\sin 47^\circ}{14}$, $AD = 18.72$ $BD = \sqrt{14^2 + 18.72^2}$ $BF = \sqrt{14^2 + 14^2}$ $BD = 23.3795$ $= 19.799$ $(23.3795^*)^2 = (15.6807^*)^2 + (19.799^*)^2 - 2(15.6807^*)(19.799^*) \cos DFB$ $\angle DFB = 81.55^\circ$ | K1 K1 K1 N1 |
| 13 (c) | $\frac{1}{2} \times (23.3795) \times t = 153.55$ $t = 13.14$ | K1 N1 |

| Soalan | Butiran | Markah |
|--------------------|--|--------|
| 14 (a) (i) | 140 | P1 |
| 14 (a) (ii) | $y = \frac{100}{140} \times 7$ | K1 |
| | $y = 5$ | N1 |
| 14 (b) | $\frac{180(5) + 140*(2) + 187.5(3)}{5 + 2 + 3}$ | K1 |
| | 174.25 | N1 |
| 14 (c) (i) | $\frac{120}{174.25*} \times 100$ | K1 |
| | 68.87 | N1 |
| 14 (c) (ii) | $\frac{100}{120} \times 90$ | K1 |
| | 75 | N1 |
| | Bilangan maksimum bebola ayam $= \frac{75}{0.2}$ $= 375$ | N1 |
| 15 (a) | I: $x + y > 120$ | N1 |
| | II: $x \leq \frac{3}{5}y$ | N1 |
| | III: $1760y + 660x \leq 211200$ @ $8y + 3x \leq 960$ | N1 |
| 15 (b) | Lukis dengan betul sekurang-kurangnya satu garis lurus dari *ketaksamaan yang melibatkan x dan y . <i>Draw at least one straight line from *inequalities involving x and y Correctly.</i> | K1 |
| | Lukis dengan betul semua garis lurus dari *ketaksamaan yang melibatkan x dan y <i>Draw all straight lines from *inequalities involving x and y correctly</i> | N1 |
| | Rantau dilorek dengan betul <i>Region shaded correctly</i> | N1 |
| 15 (c) (i) | $80 < y \leq 105$ atau $81 \leq y \leq 105$ | K1 |
| 15 (c) (ii) | (48,80) | K1 |
| | $660(48) + 1760(80)$ | K1 |
| | RM 172 480 | N1 |

