



**NAMA:** .....

**KELAS:** .....

**MATEMATIK TAMBAHAN**  
**KERTAS 1**  
**2 JAM**

1. *Kertas peperiksaan ini mengandungi **dua** bahagian : **Bahagian A** dan **Bahagian B**.*
2. *Jawapan hendaklah ditulis pada ruang jawapan yang disediakan di dalam kertas peperiksaan ini.*
3. *Kertas peperiksaan ini adalah dalam dwibahasa.*
4. *Jawapan boleh ditulis dalam bahasa Melayu atau bahasa Inggeris.*
5. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
6. *Kerja mengira **mesti** ditunjukkan.*
7. ***Kertas peperiksaan** ini hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

| SOALAN                               | MARKAH<br>PENUH | MARKAH<br>DIPEROLEH |
|--------------------------------------|-----------------|---------------------|
| <b>BAHAGIAN A</b>                    |                 |                     |
| 1                                    | 4               |                     |
| 2                                    | 5               |                     |
| 3                                    | 5               |                     |
| 4                                    | 4               |                     |
| 5                                    | 6               |                     |
| 6                                    | 4               |                     |
| 7                                    | 5               |                     |
| 8                                    | 4               |                     |
| 9                                    | 8               |                     |
| 10                                   | 7               |                     |
| 11                                   | 5               |                     |
| 12                                   | 7               |                     |
| <b>JUMLAH</b>                        | <b>64</b>       |                     |
| <b>BAHAGIAN B</b>                    |                 |                     |
| 13                                   | 8               |                     |
| 14                                   | 8               |                     |
| 15                                   | 8               |                     |
| <b>JUMLAH</b>                        | <b>16</b>       |                     |
| <b>JUMLAH KESELURUHAN<br/>MARKAH</b> |                 |                     |

Kertas peperiksaan ini mengandungi **24** halaman bercetak.

**RUMUS  
FORMULAE**

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{mn}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$$

$$13 \quad S_\infty = \frac{a}{1 - r}, |r| < 1$$

$$14 \quad y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$15 \quad y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$16 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$17 \quad \begin{array}{l} \text{Luas di bawah lengkung} \\ \text{Area under a curve} \\ = \int_b^a y \, dx \text{ atau (or) } \int_b^a x \, dy \end{array}$$

$$18 \quad \begin{array}{l} \text{Isipadu janaan} \\ \text{Volume of generation} \\ = \int_b^a \pi y^2 \, dx \text{ atau (or) } \int_b^a \pi x^2 \, dy \end{array}$$

$$19 \quad I = \frac{Q_1}{Q_0} \times 100$$

$$20 \quad I = \frac{\sum W_i I_i}{\sum W_i}$$

$$21 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$22 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$23 \quad P(X=r) = {}^nC_r p^r q^{n-r}, p+q=1$$

$$24 \quad \text{Min/Mean}, \mu=np$$

$$25 \quad \sigma = \sqrt{npq}$$

$$26 \quad Z = \frac{X - \mu}{\sigma}$$

$$27 \quad \text{Panjang lengkok}, s = j\theta \\ \text{Arc length}, s = r\theta$$

$$28 \quad \text{Luas sektor}, L = \frac{1}{2} j^2 \theta \\ \text{Area of sector}, A = \frac{1}{2} r^2 \theta$$

$$29 \quad \sin^2 A + \cos^2 A = 1 \\ \sin^2 A + \cos^2 A = 1$$

$$30 \quad \sec^2 A = 1 + \tan^2 A \\ \sec^2 A = 1 + \tan^2 A$$

$$31 \quad \csc^2 A = 1 + \cot^2 A \\ \csc^2 A = 1 + \cot^2 A$$

$$32 \quad \sin 2A = 2 \sin A \cos A \\ \sin 2A = 2 \sin A \cos A$$

$$33 \quad \cos 2A = \cos^2 A - \sin^2 A \\ = 2\cos^2 A - 1 \\ = 1 - 2\sin^2 A \\ \cos 2A = \cos^2 A - \sin^2 A \\ = 2\cos^2 A - 1 \\ = 1 - 2\sin^2 A$$

$$34 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$35 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B \\ \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$36 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B \\ \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$37 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$38 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$39 \quad a^2 = b^2 + c^2 - 2bc \cos A \\ a^2 = b^2 + c^2 - 2bc \cos A$$

$$40 \quad \text{Luas segi tiga/ Area of triangle} \\ = \frac{1}{2} ab \sin C$$

$$41 \quad \text{Titik yang membahagi suatu tembereng garis} \\ \text{A point dividing a segment of a line} \\ (x, y) = \left( \frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n} \right)$$

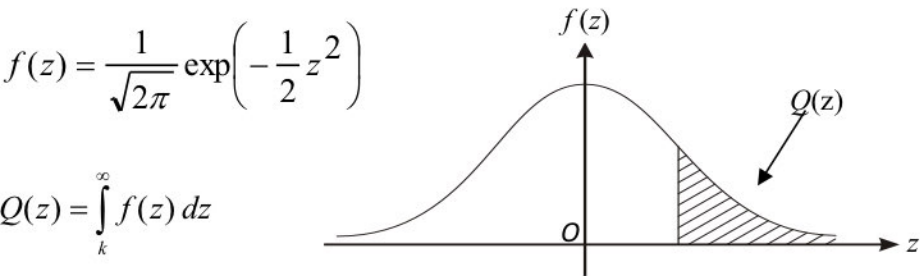
$$42 \quad \text{Luas segi tiga / Area of triangle} \\ = \frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

$$43 \quad |r| = \sqrt{x^2 + y^2}$$

$$44 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0,1)  
KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

| z   | 0       | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | Minus / Tolak |   |    |    |    |    |    |    |    |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------|---|----|----|----|----|----|----|----|
| 0.0 | 0.5000  | 0.4960  | 0.4920  | 0.4880  | 0.4840  | 0.4801  | 0.4761  | 0.4721  | 0.4681  | 0.4641  | 4             | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 0.1 | 0.4602  | 0.4562  | 0.4522  | 0.4483  | 0.4443  | 0.4404  | 0.4364  | 0.4325  | 0.4286  | 0.4247  | 4             | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 0.2 | 0.4207  | 0.4168  | 0.4129  | 0.4090  | 0.4052  | 0.4013  | 0.3974  | 0.3936  | 0.3897  | 0.3859  | 4             | 8 | 12 | 15 | 19 | 23 | 27 | 31 | 35 |
| 0.3 | 0.3821  | 0.3783  | 0.3745  | 0.3707  | 0.3669  | 0.3632  | 0.3594  | 0.3557  | 0.3520  | 0.3483  | 4             | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 34 |
| 0.4 | 0.3446  | 0.3409  | 0.3372  | 0.3336  | 0.3300  | 0.3264  | 0.3228  | 0.3192  | 0.3156  | 0.3121  | 4             | 7 | 11 | 15 | 18 | 22 | 25 | 29 | 32 |
| 0.5 | 0.3085  | 0.3050  | 0.3015  | 0.2981  | 0.2946  | 0.2912  | 0.2877  | 0.2843  | 0.2810  | 0.2776  | 3             | 7 | 10 | 14 | 17 | 20 | 24 | 27 | 31 |
| 0.6 | 0.2743  | 0.2709  | 0.2676  | 0.2643  | 0.2611  | 0.2578  | 0.2546  | 0.2514  | 0.2483  | 0.2451  | 3             | 7 | 10 | 13 | 16 | 19 | 23 | 26 | 29 |
| 0.7 | 0.2420  | 0.2389  | 0.2358  | 0.2327  | 0.2296  | 0.2266  | 0.2236  | 0.2206  | 0.2177  | 0.2148  | 3             | 6 | 9  | 12 | 15 | 18 | 21 | 24 | 27 |
| 0.8 | 0.2119  | 0.2090  | 0.2061  | 0.2033  | 0.2005  | 0.1977  | 0.1949  | 0.1922  | 0.1894  | 0.1867  | 3             | 5 | 8  | 11 | 14 | 16 | 19 | 22 | 25 |
| 0.9 | 0.1841  | 0.1814  | 0.1788  | 0.1762  | 0.1736  | 0.1711  | 0.1685  | 0.1660  | 0.1635  | 0.1611  | 3             | 5 | 8  | 10 | 13 | 15 | 18 | 20 | 23 |
| 1.0 | 0.1587  | 0.1562  | 0.1539  | 0.1515  | 0.1492  | 0.1469  | 0.1446  | 0.1423  | 0.1401  | 0.1379  | 2             | 5 | 7  | 9  | 12 | 14 | 16 | 19 | 21 |
| 1.1 | 0.1357  | 0.1335  | 0.1314  | 0.1292  | 0.1271  | 0.1251  | 0.1230  | 0.1210  | 0.1190  | 0.1170  | 2             | 4 | 6  | 8  | 10 | 12 | 14 | 16 | 18 |
| 1.2 | 0.1151  | 0.1131  | 0.1112  | 0.1093  | 0.1075  | 0.1056  | 0.1038  | 0.1020  | 0.1003  | 0.0985  | 2             | 4 | 6  | 7  | 9  | 11 | 13 | 15 | 17 |
| 1.3 | 0.0968  | 0.0951  | 0.0934  | 0.0918  | 0.0901  | 0.0885  | 0.0869  | 0.0853  | 0.0838  | 0.0823  | 2             | 3 | 5  | 6  | 8  | 10 | 11 | 13 | 14 |
| 1.4 | 0.0808  | 0.0793  | 0.0778  | 0.0764  | 0.0749  | 0.0735  | 0.0721  | 0.0708  | 0.0694  | 0.0681  | 1             | 3 | 4  | 6  | 7  | 8  | 10 | 11 | 13 |
| 1.5 | 0.0668  | 0.0655  | 0.0643  | 0.0630  | 0.0618  | 0.0606  | 0.0594  | 0.0582  | 0.0571  | 0.0559  | 1             | 2 | 4  | 5  | 6  | 7  | 8  | 10 | 11 |
| 1.6 | 0.0548  | 0.0537  | 0.0526  | 0.0516  | 0.0505  | 0.0495  | 0.0485  | 0.0475  | 0.0465  | 0.0455  | 1             | 2 | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| 1.7 | 0.0446  | 0.0436  | 0.0427  | 0.0418  | 0.0409  | 0.0401  | 0.0392  | 0.0384  | 0.0375  | 0.0367  | 1             | 2 | 3  | 4  | 4  | 5  | 6  | 7  | 8  |
| 1.8 | 0.0359  | 0.0351  | 0.0344  | 0.0336  | 0.0329  | 0.0322  | 0.0314  | 0.0307  | 0.0301  | 0.0294  | 1             | 1 | 2  | 3  | 4  | 4  | 5  | 6  | 6  |
| 1.9 | 0.0287  | 0.0281  | 0.0274  | 0.0268  | 0.0262  | 0.0256  | 0.0250  | 0.0244  | 0.0239  | 0.0233  | 1             | 1 | 2  | 2  | 3  | 4  | 4  | 5  | 5  |
| 2.0 | 0.0228  | 0.0222  | 0.0217  | 0.0212  | 0.0207  | 0.0202  | 0.0197  | 0.0192  | 0.0188  | 0.0183  | 0             | 1 | 1  | 2  | 2  | 3  | 3  | 4  | 4  |
| 2.1 | 0.0179  | 0.0174  | 0.0170  | 0.0166  | 0.0162  | 0.0158  | 0.0154  | 0.0150  | 0.0146  | 0.0143  | 0             | 1 | 1  | 2  | 2  | 2  | 3  | 3  | 4  |
| 2.2 | 0.0139  | 0.0136  | 0.0132  | 0.0129  | 0.0125  | 0.0122  | 0.0119  | 0.0116  | 0.0113  | 0.0110  | 0             | 1 | 1  | 1  | 2  | 2  | 2  | 3  | 3  |
| 2.3 | 0.0107  | 0.0104  | 0.0102  |         |         |         |         |         |         |         | 0             | 1 | 1  | 1  | 1  | 2  | 2  | 2  | 2  |
|     |         |         |         | 0.00990 | 0.00964 | 0.00939 | 0.00914 |         |         |         | 3             | 5 | 8  | 10 | 13 | 15 | 18 | 20 | 23 |
|     |         |         |         |         |         |         |         | 0.00889 | 0.00866 | 0.00842 | 2             | 5 | 7  | 9  | 12 | 14 | 16 | 16 | 21 |
| 2.4 | 0.00820 | 0.00798 | 0.00776 | 0.00755 | 0.00734 |         |         |         |         |         | 2             | 4 | 6  | 8  | 11 | 13 | 15 | 17 | 19 |
|     |         |         |         |         |         | 0.00714 | 0.00695 | 0.00676 | 0.00657 | 0.00639 | 2             | 4 | 6  | 7  | 9  | 11 | 13 | 15 | 17 |
| 2.5 | 0.00621 | 0.00604 | 0.00587 | 0.00570 | 0.00554 | 0.00539 | 0.00523 | 0.00508 | 0.00494 | 0.00480 | 2             | 3 | 5  | 6  | 8  | 9  | 11 | 12 | 14 |
| 2.6 | 0.00466 | 0.00453 | 0.00440 | 0.00427 | 0.00415 | 0.00402 | 0.00391 | 0.00379 | 0.00368 | 0.00357 | 1             | 2 | 3  | 5  | 6  | 7  | 9  | 9  | 10 |
| 2.7 | 0.00347 | 0.00336 | 0.00326 | 0.00317 | 0.00307 | 0.00298 | 0.00289 | 0.00280 | 0.00272 | 0.00264 | 1             | 2 | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| 2.8 | 0.00256 | 0.00248 | 0.00240 | 0.00233 | 0.00226 | 0.00219 | 0.00212 | 0.00205 | 0.00199 | 0.00193 | 1             | 1 | 2  | 3  | 4  | 4  | 5  | 6  | 6  |
| 2.9 | 0.00187 | 0.00181 | 0.00175 | 0.00169 | 0.00164 | 0.00159 | 0.00154 | 0.00149 | 0.00144 | 0.00139 | 0             | 1 | 1  | 2  | 2  | 3  | 3  | 4  | 4  |
| 3.0 | 0.00135 | 0.00131 | 0.00126 | 0.00122 | 0.00118 | 0.00114 | 0.00111 | 0.00107 | 0.00104 | 0.00100 | 0             | 1 | 1  | 2  | 2  | 2  | 3  | 3  | 4  |



Example / Contoh:

If  $X \sim N(0, 1)$ , then  $P(X > k) = Q(k)$

Jika  $X \sim N(0, 1)$ , maka  $P(X > k) = Q(k)$

**Bahagian A / Section A**

[64 markah / marks]

Jawab **semua** soalan. / Answer **all** questions.

- 1** Persamaan bukan linear  $\frac{y}{k^{\sqrt{x}}} = p$ , dengan keadaan  $k$  dan  $p$  ialah pemalar ditukarkan kepada bentuk linear  $Y = \log_{10} k(X) + c$ .

The non-linear equation  $\frac{y}{k^{\sqrt{x}}} = p$ , such that  $k$  and  $p$  are constants, is converted to linear form  $Y = \log_{10} k(X) + c$ .

- (a) Nyatakan  $X$ , dan  $Y$  dalam sebutan  $x$  dan / atau  $y$ .

State  $X$ , and  $Y$  in term of  $x$  and / or  $y$ .

- (b) Diberi pintasan  $-Y$  ialah  $-1$ , cari nilai  $p$ .

Given the  $Y$  - intercept is  $-1$ , find the value of  $p$ .

[4 markah]

[4 marks]

Jawapan / Answer :

2 Fungsi  $f$  ditakrifkan sebagai:

A function  $f$  is defined by:

$$f(x) = \begin{cases} 2-x, & x \geq 0 \\ x+2, & x < 0 \end{cases}$$

(a) Cari nilai  $f(-4)$  dan  $f(8)$ .

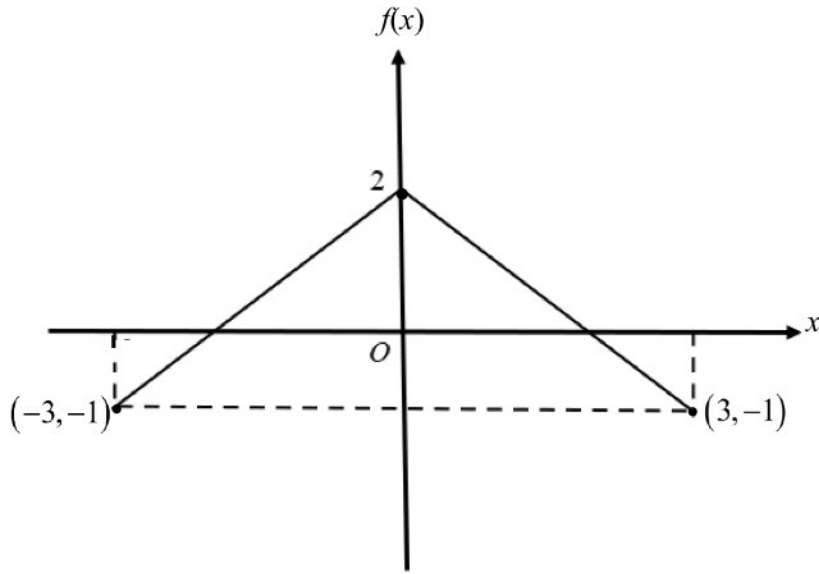
Find the value of  $f(-4)$  and of  $f(8)$ .

[3 markah]

[3 marks]

(b) Rajah 1 menunjukkan graf  $f(x)$ .

Diagram 1 show graph  $f(x)$ .



Rajah 1

Diagram 1

Nyatakan domain dan julat graf  $f$ .

State the domain and range of  $f$ .

[2 markah]

[2 marks]

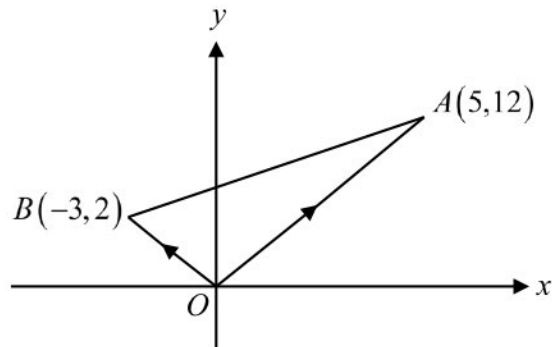
Jawapan / Answer :

- 3 (a) Diberi bahawa vektor  $\vec{p} = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$  dan vektor  $\vec{q} = \begin{pmatrix} h \\ 4 \end{pmatrix}$ , dengan keadaan  $h$  ialah pemalar. Cari nilai positif bagi  $h$  jika  $|\vec{p} + \vec{q}| = \sqrt{277}$ .

*It is given vector  $\vec{p} = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$  and vector  $\vec{q} = \begin{pmatrix} h \\ 4 \end{pmatrix}$ , such that  $h$  is a constant. Find the positive value of  $h$  if  $|\vec{p} + \vec{q}| = \sqrt{277}$ .*

[3 markah]  
[3 marks]

- (b) Rajah 2 menunjukkan dua vektor,  $\vec{OA}$  dan  $\vec{OB}$  pada satah Cartes.  
*Diagram 2 shows two vectors,  $\vec{OA}$  and  $\vec{OB}$  on a Cartesian plane.*



Rajah 2  
Diagram 2

Ungkapkan  $\vec{AB}$  dalam bentuk  $\begin{pmatrix} x \\ y \end{pmatrix}$ .

*Express  $\vec{AB}$  in the form of  $\begin{pmatrix} x \\ y \end{pmatrix}$ .*

[2 markah]  
[2 marks]

Jawapan / Answer :

Jawapan / *Answer* :

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- 4 Diberi  $\alpha$  dan  $\beta$  adalah punca-punca bagi persamaan kuadratik  $3x^2 - 5x - 7 = 0$ .

*Given  $\alpha$  and  $\beta$  are the roots of quadratic equation  $3x^2 - 5x - 7 = 0$ .*

- (a) Cari nilai  $\alpha + \beta$  dan nilai  $\alpha\beta$ .

*Find the value of  $\alpha + \beta$  and of  $\alpha\beta$ .*

[2 markah]

[2 marks]

- (b) Seterusnya, bentukkan persamaan kuadratik dengan punca-punca  $2\alpha$  dan  $2\beta$  dalam bentuk  $ax^2 + bx + c = 0$ .

*Hence, form the quadratic equation with the roots of  $2\alpha$  and  $2\beta$  in the form*

*$ax^2 + bx + c = 0$ .*

[2 markah]

[2 marks]

Jawapan / Answer :

- 5 (a) Rajah 2 menunjukkan tujuh keping kad huruf.

*Diagram 2 shows seven letter cards.*

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| P | E | L | A | N | G | I |
|---|---|---|---|---|---|---|

Rajah 3

*Diagram 3*

Cari bilangan cara yang berlainan untuk menyusun semua huruf dalam satu baris tanpa ulangan jika

*Find the number of different ways to arrange all the letters in a row without repetition if*

- (i) tiada syarat dikenakan,  
*there are no conditions,*
- (ii) huruf vokal dan konsonan berselang-seli, selepas dua kad baharu berlabel E dan P dimasukkan ke dalam set kad tersebut.  
*the vowels and the consonants are arranged alternately, after two new cards labelled E and P are inserted into the set of cards.*

[3 markah]

[3 marks]

- (b) Dalam satu kuiz Matematik, terdapat lapan soalan dalam Bahagian A dan enam soalan dalam Bahagian B. Seorang peserta perlu menjawab 10 soalan dengan syarat sekurang-kurangnya empat soalan daripada Bahagian B. Cari bilangan cara peserta itu dapat menjawab kuiz tersebut.

*In a Mathematics quiz, there are eight questions in Section A and six questions in Section B. A participant needs to answer 10 questions, such that at least four questions are from Section B. Find the number of ways the participant can answer the quiz.*

[3 markah]

[3 marks]

Jawapan / Answer :

- 6 Diberi  $X \sim N(45, 36)$ , dengan keadaan  $X$  ialah pemboleh ubah rawak selanjar. Cari nilai  $k$  jika  $3P(X > k) = 2P(X \leq k)$ .

*Given  $X \sim N(45, 36)$ , such that  $X$  is a continuous random variable. Find the value of  $k$  if  $3P(X > k) = 2P(X \leq k)$ .*

[4 markah]

[4 marks]

Jawapan / Answer :

- 7 (a) Diberi  $y = \frac{4x-1}{x^2-3}$  dan  $\frac{dy}{dx} = 2g(x)$ , dengan keadaan  $g(x)$  ialah fungsi dalam sebutan  $x$ . Cari nilai  $\int_0^2 g(x)dx$ .

*Given that  $y = \frac{4x-1}{x^2-3}$  and  $\frac{dy}{dx} = 2g(x)$ , such that  $g(x)$  is a function in terms of  $x$ .*

*Find the value of  $\int_0^2 g(x)dx$ .*

[3 markah]

[3 marks]

- (b) Diberi bahawa  $\int \frac{24}{(3x-1)^5} dx = \frac{m}{(3x-1)^n} + c$ , dengan keadaan  $m, n$  dan  $c$  ialah pemalar. Cari nilai  $m$  dan nilai  $n$ .

*It is given that  $\int \frac{24}{(3x-1)^5} dx = \frac{m}{(3x-1)^n} + c$ , such that  $m, n$  and  $c$  are constants.*

*Find the value of  $m$  and of  $n$ .*

[2 markah]

[2 marks]

Jawapan / Answer :



- 8 Diberi  $\cos \theta = b$  untuk  $0^\circ \leq \theta \leq 90^\circ$ , ungkapkan dalam sebutan  $b$  bagi

*Given  $\cos \theta = b$  for  $0^\circ \leq \theta \leq 90^\circ$ , express in terms of  $b$  for*

(a)  $\sec \theta$ ,

$\sec \theta$ ,

(b)  $\tan (180^\circ - \theta)$ .

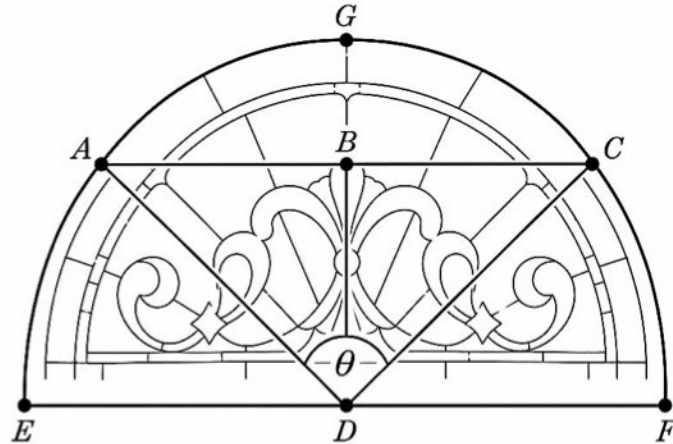
[4 markah]

[4 marks]

Jawapan / Answer :

- 9 Rajah 4 menunjukkan pandangan depan sebuah tingkap separuh bulatan berhias kaca yang dilukis pada satah Cartes mengikut skala 1:10.

*Diagram 4 shows a front elevation of semicircular stained-glass window drawn on a Cartesian plane with the scale of 1:10.*



Rajah 4  
Diagram 4

Diberi bahawa  $B(8,10)$ ,  $D(8,6)$  dan  $F(14,6)$ .

*It is given that  $B(8,10)$ ,  $D(8,6)$  and  $F(14,6)$ .*

[Guna / Use  $\pi = 3.142$ ]

(a) Hitung

*Calculate*

- (i) sudut  $\theta$  dalam radian,  
*angle  $\theta$  in radians,*
- (ii) panjang lengkok AGC, dalam unit<sup>2</sup>.  
*arc length of AGC, in units<sup>2</sup>.*

[4 markah]

[4 marks]

- (b) Tingkap kaca tersebut akan ditampal dengan filem pelekat cermin kecuali kawasan segi tiga ADC. Segulung filem pelekat cermin yang dapat menutup kawasan seluas 18 000 unit<sup>2</sup> telah dibeli. Adakah filem pelekat cemin itu mencukupi untuk menampal 5 tingkap yang serupa? Berikan justifikasi anda.

*The glass sticker film will be applied on the stain-glass window except the region of triangle ADC. A roll of glass sticker film that can cover an area of 18 000 units<sup>2</sup> has been purchased. Is the glass sticker film sufficient to be applied to 5 similar glass windows? Give your justification.*

[4 markah]

[4 marks]

Jawapan / Answer :

Jawapan / *Answer* :

- 10 (a)** Cari persamaan garis lurus yang melalui titik persilangan  $2x + 3y = 5$  dan  $3x - y = 2$  dan selari dengan  $4y - x = 14$ .

*Find the equation of a straight line that passes through the point of intersection of  $2x + 3y = 5$  and  $3x - y = 2$  and is parallel to  $4y - x = 14$ .*

[4 markah]

[4 marks]

- (b)** Diberi  $P(1, 2)$ ,  $Q(2k, 8)$  dan  $R(12, k)$  ialah tiga titik pada segi tiga  $PQR$  yang bersudut tegak, dengan keadaan  $PR$  ialah sisi terpanjang.

*Given  $P(1, 2)$ ,  $Q(2k, 8)$  and  $R(12, k)$  are three points on a right-angled triangle  $PQR$  such that  $PR$  is the longest side.*

Cari nilai – nilai  $k$ .

*Find the values of  $k$ .*

[3 markah]

[3 marks]

Jawapan / Answer :

- 11 Graf fungsi kuadratik  $f(x) = -x^2 + 2hx - 5h$ , dengan keadaan  $h$  ialah pemalar, mempunyai nilai maksimum 6.

*The graph of quadratic function  $f(x) = -x^2 + 2hx - 5h$ , where  $h$  is a constant, has a maximum value of 6.*

- (a) Ungkapkan  $f(x) = -x^2 + 2hx - 5h$  dalam bentuk  $f(x) = a(x - p)^2 + q$ , seterusnya cari nilai-nilai yang mungkin bagi  $h$ .

*Express  $f(x) = -x^2 + 2hx - 5h$  in the form of  $f(x) = a(x - p)^2 + q$ , hence find the possible values of  $h$ .*

[4 markah]

[4 marks]

- (b) Graf  $y = g(x)$  ialah pantulan bagi graf  $y = f(x)$  pada paksi  $-x$ . Dengan menggunakan nilai  $h$  yang positif pada 11(a), tulis fungsi  $g(x)$  dalam bentuk verteks.

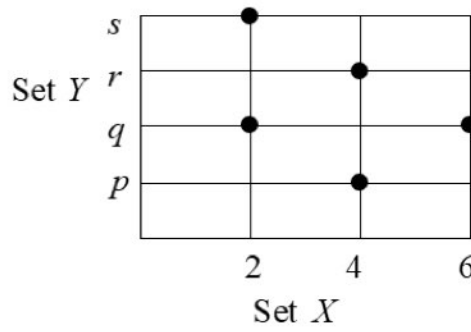
*The graph of  $y = g(x)$  is the reflection of  $y = f(x)$  about the  $x$ -axis. By using the positive value of  $h$  from 11(a), write the function of  $g(x)$  in vertex form.*

[1 markah]

[1 mark]

Jawapan / Answer :

- 12 Rajah 5 menunjukkan hubungan antara set  $X$  dan set  $Y$  dalam bentuk graf.  
*Diagram 5 shows the relation between set  $X$  and set  $Y$  in the graph form.*



Rajah 5  
 Diagram 5

- (a) Nyatakan  
*State*
- hubungan itu dalam bentuk pasangan tertib,  
*the relation in the form of ordered pairs,*
  - jenis hubungan itu,  
*the type of the relation,*
  - julat hubungan itu.  
*the range of the relation.*
- (b) Diberi  $f(x) = \frac{1}{2x+1}, x \neq -\frac{1}{2}$  dan  $g^{-1}(x) = x-1$ .  
*Given  $f(x) = \frac{1}{2x+1}, x \neq -\frac{1}{2}$  and  $g^{-1}(x) = x-1$ .*
- Nyatakan fungsi  $g$ .  
*State the function of  $g$ .*
  - Seterusnya, hitung nilai  $x$  dengan keadaan  $f^2 = gf$ .  
*Hence, calculate the value of  $x$  such that  $f^2 = gf$ .*

[3 markah]  
 [3 marks]

[4 markah]  
 [4 marks]

Jawapan / Answer :



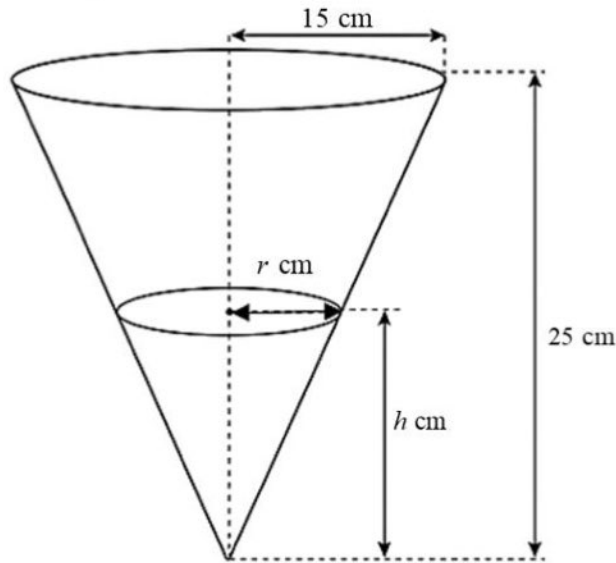
Jawapan / *Answer* :

**Bahagian B / Section B**

[16 markah / marks]

Bahagian ini mengandungi **tiga** soalan. Jawab **dua** soalan.*This part contained **three** questions. Answer any **two** questions.*

- 13 Rajah 6 menunjukkan keratan rentas sebuah bekas berbentuk kon terbalik. Air di dalam bekas itu mempunyai tinggi  $h$  cm dan jejari permukaan air  $r$  cm. Diberi isi padu air di dalam bekas itu ialah  $V$  cm<sup>3</sup>. *Diagram 6 shows the cross-section of an inverted conical container. water in the container has a height of  $h$  cm and a surface radius of  $r$  cm. Given that the volume of water in the container is  $V$  cm<sup>3</sup>.*



Rajah 6  
Diagram 6

- (a) Dengan menggunakan hubungan antara  $r$  dan  $h$ , tunjukkan bahawa  $V = \frac{3}{25} \pi h^3$ .

*By using the relationship between  $r$  and  $h$ , show that  $V = \frac{3}{25} \pi h^3$ .*

[3 markah]

[3 marks]

- (b) Air mengalir keluar daripada kon menyebabkan paras air menyusut daripada 10 cm kepada 9.98 cm. Cari peratus perubahan isi padu air dalam kon itu. *Water flow out from the cone and causes the water level to decrease from 10 cm to 9.98 cm. Find the percentage change in the volume of water in the cone.*

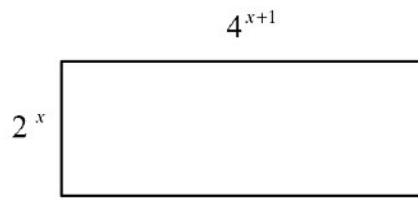
[5 markah]

[5 marks]

Jawapan / Answer :

Jawapan / *Answer* :

- 14 (a) Rajah 7 menunjukkan sebuah segiempat tepat.  
*Diagram 7 shows a rectangle.*



Rajah 7  
 Diagram 7

Cari nilai  $x$  jika luas segiempat tepat ialah  $4^{x+2}$ .  
*Find the value of  $x$  if the area of rectangle is  $4^{x+2}$ .*

[4 markah]  
 [4 marks]

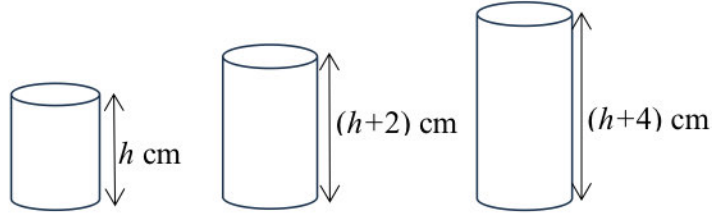
- (b) Diberi  $\frac{t+\sqrt{5}}{4-\sqrt{5}} = x + y\sqrt{5}$ . Ungkapkan  $x$  dalam sebutan  $y$ .  
 Given  $\frac{t+\sqrt{5}}{4-\sqrt{5}} = x + y\sqrt{5}$ . Express  $x$  in terms of  $y$ .

[4 markah]  
 [4 marks]

Jawapan / Answer :

- 15 Rajah 8 menunjukkan susunan beberapa bekas berbentuk silinder yang digunakan oleh seorang pengusaha untuk mengisi cecair kimia di dalam sebuah makmal. Diameter setiap bekas adalah sama iaitu  $b$  cm. Tinggi bekas pertama ialah  $h$  cm dan tinggi setiap bekas berikutnya bertambah 2 cm.

*Diagram 8 shows the arrangement of several cylindrical containers used by an operator to fill chemical liquid in a laboratory. The diameter of each container is the same, which is  $b$  cm. The height of the first container is  $h$  cm and the height of each subsequent container increases by 2 cm.*



Rajah 8  
Diagram 8

- (a) Tunjukkan bahawa isi padu setiap bekas membentuk suatu jangjang aritmetik dan nyatakan beza sepunya dalam sebutan  $\pi$  dan  $b$ .

*Show that the volume of each container forms an arithmetic progression and state the common difference in terms of  $\pi$  and  $b$ .*

[3 markah]

[3 marks]

- (b) Diberi bahawa isi padu bekas ke-6 ialah  $19074\pi \text{ cm}^3$  dan tinggi bekas pertama ialah 56 cm, cari nilai  $b$ .

*Given that the volume of the 6<sup>th</sup> container is  $19074\pi \text{ cm}^3$  and the height of the first container is 56 cm, find the value of  $b$ .*

[2 markah]

[2 marks]

- (c) Bagi tujuan keselamatan, kapasiti maksimum cecair kimia yang dibenarkan di dalam makmal ialah  $145656\pi \text{ cm}^3$ .

Tentukan bilangan maksimum bekas berturutan yang boleh digunakan tanpa melebihi kapasiti tersebut.

*For safety purpose, the maximum chemical liquid capacity allowed in the laboratory is  $145656\pi \text{ cm}^3$ .*

*Determine the maximum number of consecutive containers that can be used without exceeding the capacity.*

[3 markah]

[3 marks]

Jawapan / Answer :

Jawapan / *Answer* :

**KERTAS PEPERIKSAAN TAMAT**

3472/1@2026