

NAMA:

TINGKATAN:



MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
NEGERI PERAK

MODUL KECEMERLANGAN
TINGKATAN 5

MATEMATIK TAMBAHAN

KERTAS 2
2 JAM 30 MINIT

JANGAN BUKA MODUL INI SEHINGGA DIBERITAHU

ARAHAN:

1. Tulis nama dan tingkatan anda pada ruang yang disediakan.
2. Modul ini mengandungi 3 bahagian: **Bahagian A, Bahagian B dan Bahagian C.**
3. Jawapan hendaklah ditulis pada ruangan jawapan yang disediakan di dalam modul ini.
4. Modul ini adalah dalam dwibahasa.
5. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.
6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. Kerja mengira perlu ditunjukkan.
8. Modul ini hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	7	
	2	5	
	3	9	
	4	7	
	5	7	
	6	7	
	7	8	
B	8	10	
	9	10	
	10	10	
	11	10	
C	12	10	
	13	10	
	14	10	
	15	10	
Jumlah		100	

Kertas modul ini mengandungi 38 halaman bercetak.

[Lihat halaman sebelah
SULIT

SENARAI RUMUS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$17 \quad \text{Luas di bawah lengkung} \\ \text{Area under a curve}$$

$$= \int_a^b x \, dy \\ \text{atau (or)} \\ = \int_a^b y \, dx$$

$$18 \quad \text{Isi padu kisanan} \\ \text{Volume of revolution}$$

$$= \int_a^b \pi y^2 dx \\ \text{atau (or)} \\ = \int_a^b \pi x^2 dy$$

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

$$20 \quad \bar{I} = \frac{\sum I_i w_i}{\sum w_i}$$

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

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

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

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

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

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

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

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

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

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

$$31 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A \\ \operatorname{cosec}^2 A = 1 + \cot^2 A$$

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

$$\sin 2A = 2 \sin A \cos A$$

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

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

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

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

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

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

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

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

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

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

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

$$40 \quad \text{Luas segi tiga / Area of triangle}$$

$$= \frac{1}{2} ab \sin C$$

$$41 \quad \text{Titik yang membahagi suatu tembereng garis}$$

$$A \text{ point dividing a segment of a line}$$

$$(x, y) = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n} \right)$$

$$42 \quad \text{Luas segi tiga / Area of triangle}$$

$$= \frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

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

$$44 \quad \hat{r} = \frac{x\vec{i} + y\vec{j}}{\sqrt{x^2 + y^2}}$$

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

z	0	1	2	3	4	5	6	7	8	9	Tolak / Minus								
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

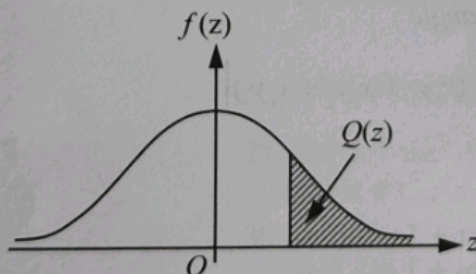
Bagi z negatif guna hubungan:

For negative z use relation:

$$Q(z) = 1 - Q(-z) = P(-z)$$

$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

$$Q(z) = \int_k^{\infty} f(z) dz$$



Contoh / Example:

Jika $X \sim N(0, 1)$, maka

If $X \sim N(0, 1)$, then

$$P(X > k) = Q(k)$$

$$P(X > 2.1) = Q(2.1) = 0.0179$$

Bahagian A
Section A

[50 markah/marks]

Jawab semua soalan.
Answer all questions.

- 1 (a) Dalam suatu jangjang geometri, sebutan pertama ialah a dan nisbah sepunya ialah r .

Tunjukkan bahawa hasil tambah n sebutan pertama bagi jangjang itu ialah $S_n = \frac{a(r^n - 1)}{r - 1}$.

In a geometric progression, the first term is a and the common ratio is r . Show that the

sum of the first n terms of the progression is $S_n = \frac{a(r^n - 1)}{r - 1}$.

[3 markah]

[3 marks]

Jawapan / Answer:

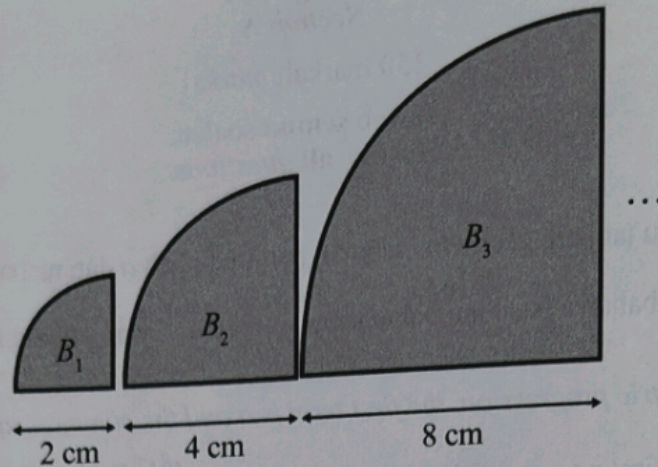
1. (a) Dalam suatu jangjang geometri, sebutan pertama ialah a dan nisbah sepunya ialah r .
Tunjukkan bahawa hasil tambah n sebutan pertama bagi jangjang itu ialah $S_n = \frac{a(r^n - 1)}{r - 1}$.

In a geometric progression, the first term is a and the common ratio is r . Show that the sum of the first n terms of the progression is $S_n = \frac{a(r^n - 1)}{r - 1}$.

[3 markah]

[3 marks]

(b)



Rajah 1
Diagram 1

Rajah 1 menunjukkan tiga sukuan bulatan pertama untuk suatu siri tak terhingga bagi sukuan bulatan. Panjang jejari sukuan bulatan pertama ialah 2 cm dan luasnya diwakili oleh B_1 . Panjang jejari sukuan bulatan kedua ialah dua kali panjang jejari sukuan bulatan pertama dan luasnya diwakili oleh B_2 . Panjang jejari sukuan bulatan ketiga ialah dua kali panjang jejari sukuan bulatan kedua dan luasnya diwakili oleh B_3 . Jejari sukuan bulatan yang berikutnya adalah dua kali ganda ukuran jejari sukuan bulatan sebelumnya. Hitung hasil tambah luas dari sukuan bulatan keempat hingga sukuan bulatan ketujuh dalam sebutan π .

Diagram 1 shows the first three of an infinite series of quadrants. The radius of the first quadrant is 2 cm and its area is represented by B_1 . The radius of the second quadrant is twice the radius of the first quadrant and its area is represented by B_2 . The radius of the third quadrant is twice the radius of the second quadrant and its area is represented by B_3 . The radius of each subsequent quadrant is double the measurements of its previous one. Calculate the sum of the area from the fourth quadrant to the seventh quadrant, in terms of π .

[4 markah]

[4 marks]

Jawapan / Answer:

- 2 Selesaikan persamaan serentak berikut:
Solve the following simultaneous equations:

$$\begin{aligned} 4x + 2y &= 10 \\ 2x^2 + xy - 2y^2 - 37x + 98 &= 0 \end{aligned}$$

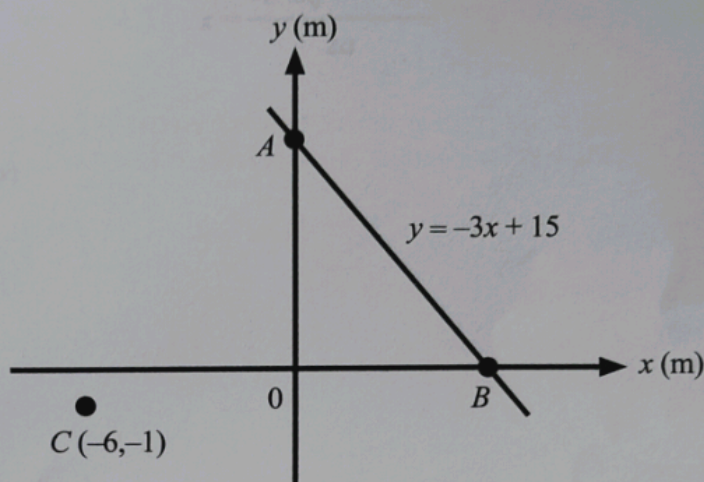
[5 markah]

[5 marks]

Jawapan / Answer:

- 3 Rajah 2 di bawah menunjukkan kedudukan tiga buah pondok rehat A , B dan C di sebuah taman yang dilukis pada suatu satah Cartes. Garis lurus AB adalah garisan sempadan taman tersebut yang bersilang pada paksi- x dan paksi- y pada titik B dan titik A dihubungkan dengan persamaan $y = -3x + 15$.

Diagram 2 below shows the positions of three rest huts A , B and C in a park drawn on a Cartesian plane. Straight line AB is the boundary line for the park lies on x -axis and y -axis at point B and point A are related by the equation $y = -3x + 15$.



Rajah 2
Diagram 2

- (a) Satu laluan lurus akan dibina dari pondok C ke garisan sempadan AB . Cari jarak terdekat, dalam m, bagi laluan yang dibina itu. Beri jawapan anda betul kepada empat angka bererti.
A straight path will be built from the hut C to the boundary line AB . Find the shortest distance, in m, of the build path. Give your answer correct to four significant figures.

[5 markah]

[5 marks]

- (b) Satu titik P bergerak dengan keadaan jaraknya dari pondok rehat A sentiasa setengah jaraknya dari pondok rehat B . Cari persamaan lokus bagi P .
A point P moves such that its distance from rest hut A is always half of its distance from rest hut B . Find the equation of the locus P .

[4 markah]

[4 marks]

Jawapan / Answer:

RUANGAN JAWAPAN SOALAN 3 / ANSWER SPACE FOR QUESTION 3:

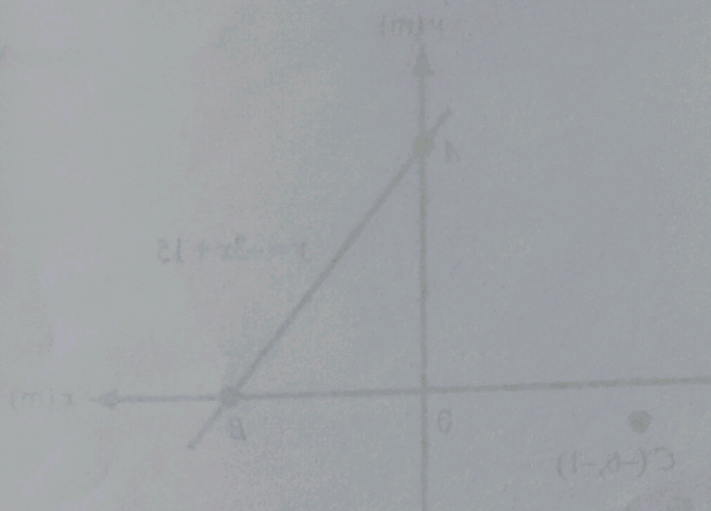


Diagram 2

(a) Satu laluan lurus akan dibina dari pondok C ke garisan sempadan AB. Cari jarak terpendek dalam m, bagi laluan yang dibina itu. Beri jawapan anda dalam kesatuan terpendek. A straight path will be built from the hut C to the boundary line AB. Find the shortest distance in m, of the build path. Give your answer correct to four significant figures.

[5 marks]

[5 marks]

(b) Satu titik P bergerak dengan kelajuan tetap dari pondok tepat 1 kilometer sepanjang laluan dari pondok tepat B. Cari persamaan locus bagi P.

A point P moves such that its distance from rest hut B is always half of its distance from rest hut A. Find the equation of the locus P.

[4 marks]

[4 marks]

- 4 (a) Diberi persamaan kuadratik $ax^2 + bx + c = 0$, dengan keadaan a, b dan c adalah pemalar dan $a \neq 0$. Terbitkan rumus kuadratik berikut dengan menggunakan kaedah penyempurnaan kuasa dua.

Given that the quadratic equation $ax^2 + bx + c = 0$, where a, b and c are constant and $a \neq 0$. Derive the quadratic formula as follows by using completing the square method.

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

[3 markah]

[3 marks]

Jawapan / Answer:

3472/2

- (b) Sebuah taman berbentuk segi empat tepat mempunyai luas 24 m^2 . Panjang taman itu adalah 5 meter lebih daripada lebar taman tersebut.
A rectangular garden has an area of 24 m^2 . The length of the garden is 5 metres more than its width.

Cari / Find

- (i) persamaan kuadratik yang sesuai berdasarkan situasi yang diberikan.
a suitable quadratic equation based on the given situation.

[1 markah]

[1 mark]

- (ii) lebar dan panjang taman tersebut dengan menggunakan kaedah rumus.
the width and length of the garden by using the formula method.

[3 markah]

[3 marks]

Jawapan / Answer:

- 5 (a) Selesaikan persamaan berikut:

Solve the following equation:

$$3^{2n} - 10(3^{n+1}) + 81 = 0$$

[4 markah]

[4 marks]

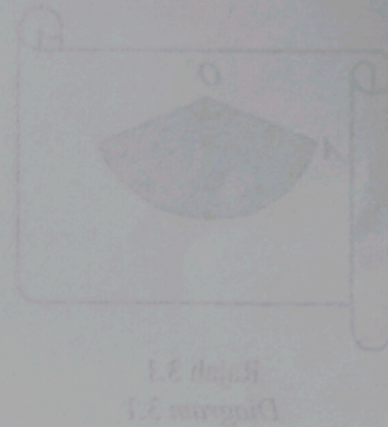
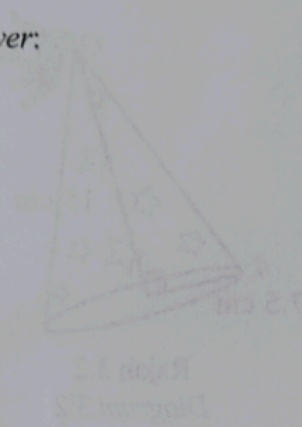
- (b) Diberi $3 \log_{10}(pq^2) = 4 + 2 \log_{10}q - \log_{10}p$, cari nilai bagi $\log_{10}pq$.

Given that $3 \log_{10}(pq^2) = 4 + 2 \log_{10}q - \log_{10}p$, find the value of $\log_{10}pq$.

[3 markah]

[3 marks]

Jawapan / Answer:



[4 markah]

[4 marks]

(b) Diberi $3 \log_{10}(pq^2) = 4 + 2 \log_{10}q - \log_{10}p$, cari nilai bagi $\log_{10}pq$.

Given that $3 \log_{10}(pq^2) = 4 + 2 \log_{10}q - \log_{10}p$, find the value of $\log_{10}pq$.

Find the value of $\log_{10}pq$.

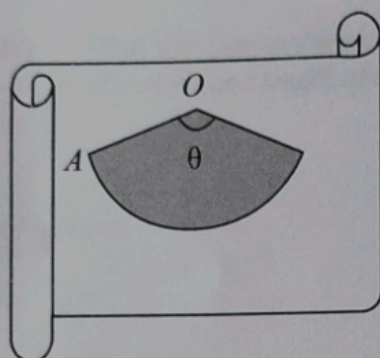
Find the value of $\log_{10}pq$.

[3 markah]

[3 marks]

Jawapan / Answer:

- 6 Emilia menggunting satu sektor bulatan berpusat O dengan jejari OA daripada sehelai kertas seperti dalam Rajah 3.1. Sudut terangkum sektor itu ialah θ radian. Selepas itu, Emilia menggunakan sektor itu untuk membuat topi parti. Topi itu berbentuk kon seperti dalam Rajah 3.2. Tinggi topi itu ialah 15 cm dan berjejari 7.5 cm.
- Emilia cuts out a sector of a circle with centre O and radius OA from a piece of paper as shown in Diagram 3.1. The angle subtended by the sector is θ radians. She then uses the sector to make a party hat. The hat is in the shape of a cone as shown in Diagram 3.2. The height of the hat is 15 cm and the radius is 7.5 cm.*



Rajah 3.1
Diagram 3.1



Rajah 3.2
Diagram 3.2

(Guna / use $\pi = 3.142$)

(a) Cari / Find

- (i) jejari OA , dalam cm, sektor itu,
the radius OA , in cm, of the sector,
- (ii) sudut θ , dalam radian, sektor itu.
the subtended angle θ , in radian, of the sector.

[4 markah]

[4 marks]

- (b) Jika luas kertas ialah 1300 cm^2 , cari bilangan maksimum topi parti yang serupa dapat dihasilkan oleh Emilia.

If the area of the paper is 1300 cm^2 , find the maximum number of identical party hats that Emilia can produce.

[3 markah]

[3 marks]

Jawapan / Answer:

RUANGAN JAWAPAN SOALAN 6 / ANSWER SPACE FOR QUESTION 6:

[Mark 5]

[Mark 5]

(i)

Samanya, tentukan bilangan penyelesaian bagi persamaan trigonometri

$$\sin 2x + \frac{x}{\pi} = 1 \text{ dalam domain } [0, \pi]$$

hence, determine the number of solutions to the trigonometric equation

$$\sin 2x + \frac{x}{\pi} = 1 \text{ for the domain } [0, \pi]$$

[2 mark]

[2 mark]

Jawapan / Answer:

- 7 (a) Buktikan $\cot x + \tan x = \sec x \operatorname{cosec} x$.
 Prove that $\cot x + \tan x = \sec x \operatorname{cosec} x$.

[2 markah]

[2 marks]

Jawapan / Answer:

- (b) (i) Lakarkan graf bagi fungsi $y = \sin 2x + 2$ dan $y = -\frac{x}{\pi} + 3$ pada paksi yang sama untuk domain $0 \leq x \leq 2\pi$.

Sketch the graph of the function $y = \sin 2x + 2$ and $y = -\frac{x}{\pi} + 3$ on the same axes for the domain $0 \leq x \leq 2\pi$.

[4 markah]

[4 marks]

- (ii) Seterusnya, tentukan bilangan penyelesaian bagi persamaan trigonometri $\sin 2x + \frac{x}{\pi} = 1$ dalam domain ini.

Hence, determine the number of solutions to the trigonometric equation

$\sin 2x + \frac{x}{\pi} = 1$ for this domain.

[2 markah]

[2 marks]

Jawapan / Answer:

Bahagian B
Section B

[30 markah/marks]

Jawab mana-mana **tiga** soalan daripada bahagian ini.
*Answer any **three** questions from this section.*

- 8 (a) Pemboleh ubah rawak binomial $X \sim B(n, p)$ mempunyai min 20 dan sisihan piawai 2.
The binomial random variable $X \sim B(n, p)$ has a mean of 20 and a standard deviation of 2.

- (i) Cari nilai n dan p .
Find the values of n and p .

[3 markah]

[3 marks]

- (ii) Seterusnya, cari $P(X = 16)$.
Then, find $P(X = 16)$.

[1 markah]

[1 mark]

Jawapan / Answer:

(b) Markah ujian Matematik bagi 150 orang murid di sebuah sekolah adalah bertaburan normal dengan min 55 markah dan sisihan piawai 20 markah.
The Mathematic test scores of 150 students at a school are normally distributed with a mean of 55 marks and a standard deviation of 20 marks.

- (i) Tentukan bilangan murid yang lulus ujian itu jika markah lulus ialah 40 markah.
Find the number of students who pass the test if the passing mark is 40.

[3 markah]

[3 marks]

- (ii) Didapati 15 orang murid mendapat markah kurang daripada k markah.
 Cari nilai k .

It is found that 15 students scored less than k marks. Find the value of k .

[3 markah]

[3 marks]

Jawapan / Answer:

- 9 Jadual 1.1 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y , yang diperoleh daripada suatu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y - \frac{q}{\sqrt{x}} = p\sqrt{x}$, dengan keadaan p dan q ialah pemalar.

Table 1.1 shows the values of two variables, x and y , obtained from an experiment. The variables x and y are related by the equation $y - \frac{q}{\sqrt{x}} = p\sqrt{x}$, where p and q are constant.

x	1	2	3	4	5
y	1.6	3.4	4.9	6.1	7.1

Jadual 1.1
Table 1.1

- (a) Berdasarkan Jadual 1.1, lengkapkan Jadual 1.2.
Based on Table 1.1, complete the Table 1.2.

[1 markah]
[1 mark]

- (b) Plotkan $y\sqrt{x}$ melawan x , menggunakan skala 2 cm kepada 1 unit pada paksi- x dan 2 cm kepada 2 unit pada paksi- $y\sqrt{x}$. Seterusnya, lukis garis lurus penyuaian terbaik.

Plot $y\sqrt{x}$ against x , using a scale of 2 cm to 1 unit on the x -axis and 2 cm to 2 units on the $y\sqrt{x}$ - axis. Hence, draw the line of the best fit.

[3 markah]
[3 marks]

- (c) Menggunakan graf di 9(b),
Using the graph in 9(b),

- (i) cari nilai y bila $x = 2.7$,
find the value of y when $x = 2.7$,
(ii) cari nilai p dan q .
find the value of p and q .

[5 markah]
[5 marks]

- (d) Hitung nilai y apabila $x = 3.5$.
Calculate the value of y when $x = 3.5$.

[1 markah]
[1 mark]

Jawapan / Answer:

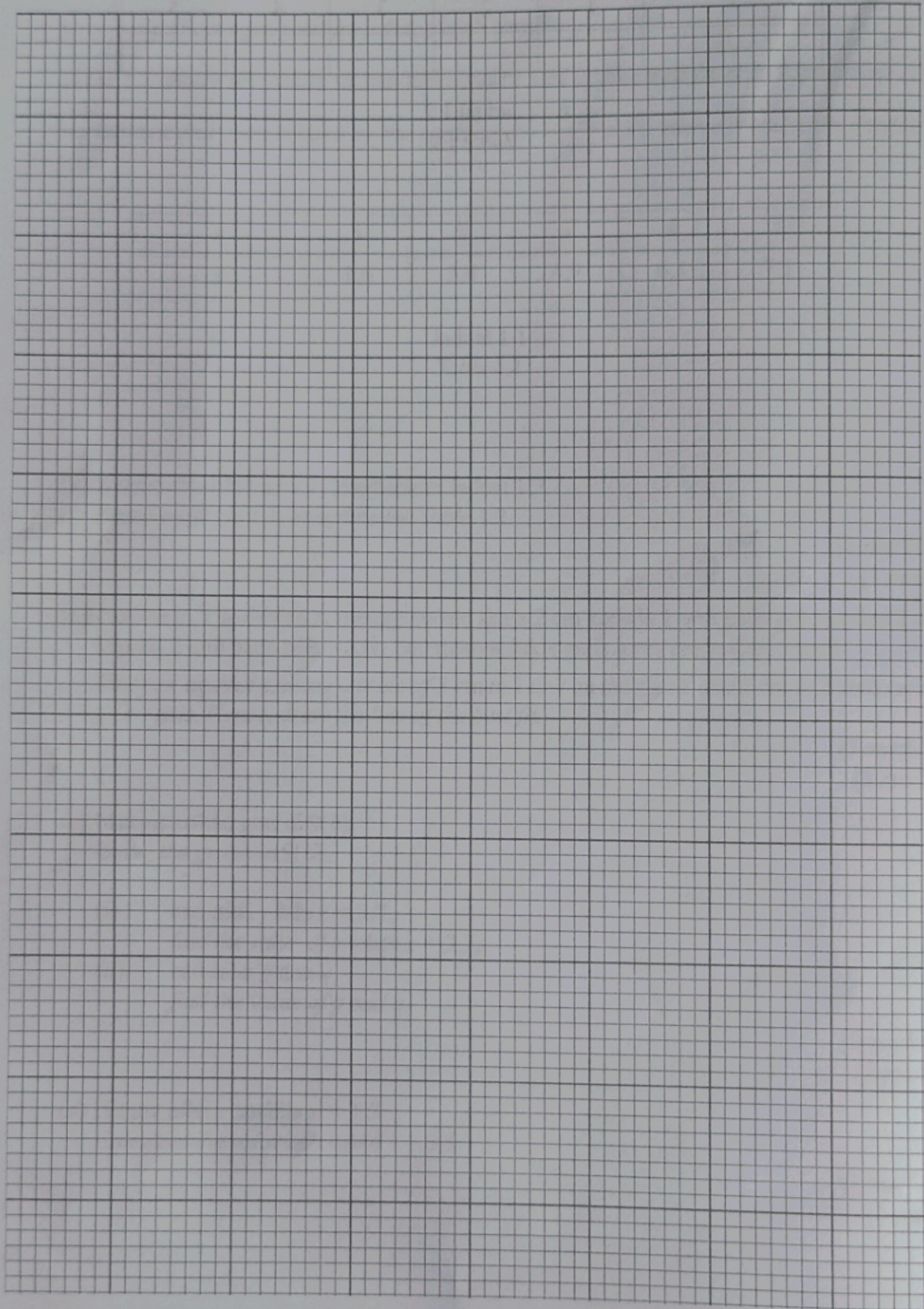
(a)

x	1	2	3	4	5
$y\sqrt{x}$					

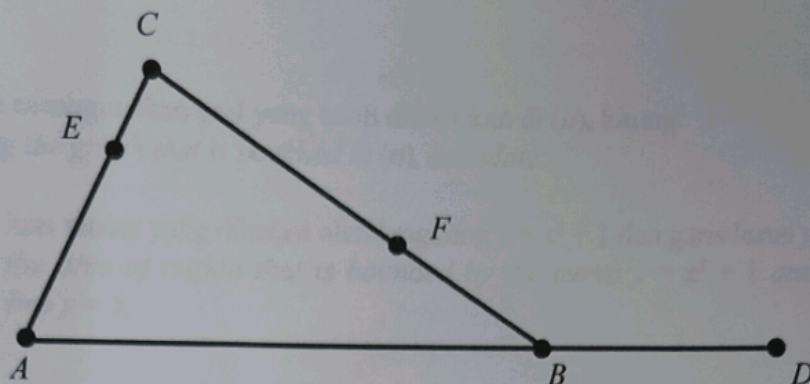
Jadual 1.2

Table 1.2

KERTAS GRAF UNTUK SOALAN 9(b)
GRAPH PAPER FOR QUESTION 9(b)



- 10 Rajah 4 menunjukkan sebuah segitiga ABC .
Diagram 4 shows a triangle ABC .



Rajah 4
Diagram 4

- (a) Diberi bahawa $AE : AC = 2 : 3$, $CF : CB = 3 : 5$, $\vec{AC} = 4\vec{x}$ dan $\vec{AB} = 3\vec{y}$.

Given that $AE : AC = 2 : 3$, $CF : CB = 3 : 5$, $\vec{AC} = 4\vec{x}$ and $\vec{AB} = 3\vec{y}$.

Ungkapkan dalam sebutan $\vec{x}$ dan/atau $\vec{y}$.

Express in terms of $\vec{x}$ and/ or $\vec{y}$.

(i) $\vec{AF}$

(ii) $\vec{EF}$

[4 markah]

[4 marks]

- (b) (i) Gunakan $\vec{AB} = h\vec{AD}$, dengan keadaan h ialah pemalar, cari nilai h jika E , F dan D adalah segaris.

Using $\vec{AB} = h\vec{AD}$, where h is a constant, find the value of h if E , F and D are collinear.

(ii) Seterusnya, cari $\frac{\vec{EF}}{\vec{ED}}$.

Hence, find $\frac{\vec{EF}}{\vec{ED}}$.

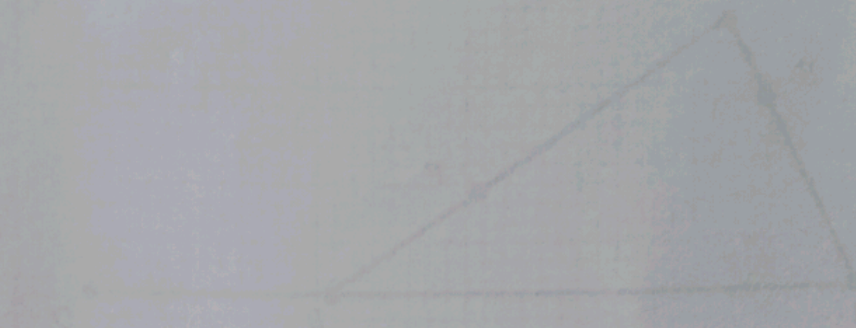
[6 markah]

[6 marks]

Jawapan / Answer:

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RUANGAN JAWAPAN SOALAN 10 / ANSWER SPACE FOR QUESTION 10:



- 11 (a) Pada Rajah 5, lakarkan graf bagi fungsi kuadratik $y = x^2 + 1$.
 On Diagram 5, sketch the graph of quadratic function $y = x^2 + 1$.

[2 markah]

[2 marks]

- (b) Dengan menggunakan graf yang telah dilakarkan di (a), hitung:
 By using the graph that is sketched in (a), calculate:

- (i) luas rantau yang dibatasi oleh lengkung $y = x^2 + 1$ dan garis lurus $y = 5$,
 the area of region that is bounded by the curve $y = x^2 + 1$ and the straight line $y = 5$,

[4 markah]

[4 marks]

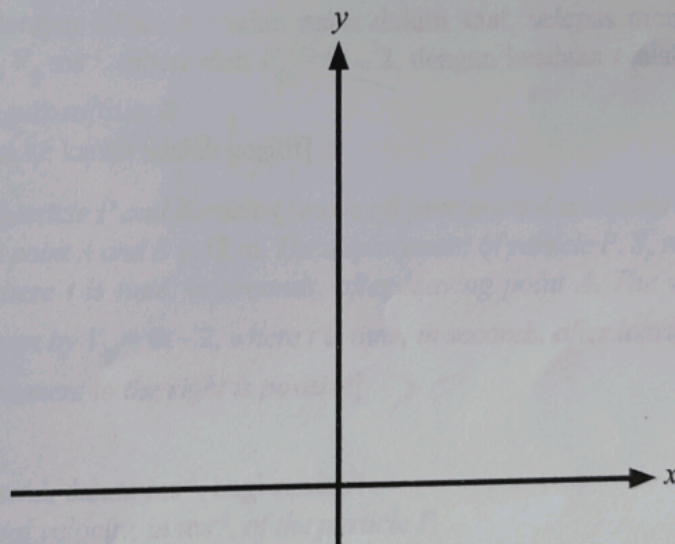
- (ii) isi padu janaan, dalam sebutan π , apabila rantau yang dibatasi oleh lengkung $y = x^2 + 1$ dan garis lurus $y = 5$ dikisarkan melalui 360° pada paksi- x .
 the generated volume, in terms of π , when the region bounded by the curve $y = x^2 + 1$ and the straight line $y = 5$ is revolved through 360° about x -axis.

[4 markah]

[4 marks]

Jawapan / Answer:

(a)



Rajah 5
 Diagram 5

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RUANGAN JAWAPAN SOALAN 11 / ANSWER SPACE FOR QUESTION 11:

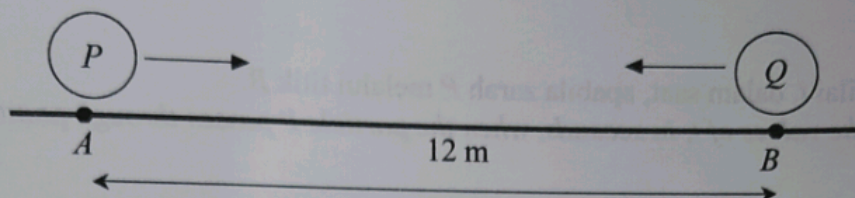
$s \rightarrow v \rightarrow a$
 $\leftarrow \leftarrow$
 integration

Bahagian C
Section C

[20 markah/marks]

Jawab mana-mana **dua** soalan daripada bahagian ini.
Answer any **two** questions from this section.

- 12 Rajah 6 menunjukkan dua zarah, P dan Q , bergerak di sepanjang suatu garis lurus.
Diagram 6 shows two particles, P and Q , move on a straight line.



Rajah 6
Diagram 6

Pada ketika $t = 0$, zarah P dan zarah Q masing-masing meninggalkan titik A dan titik B . Jarak di antara titik A dan B ialah 12 m. Sesaran zarah P , S_p m, dari titik A diberi oleh $S_p = 3t^2 + 9t$, dengan keadaan t ialah masa dalam saat, selepas meninggalkan titik A . Halaju zarah Q , $V_Q \text{ ms}^{-1}$, diberi oleh $V_Q = 8t - 2$, dengan keadaan t ialah masa dalam saat, selepas meninggalkan titik B .

[Anggap gerakan ke kanan adalah positif]

At instant $t = 0$, particle P and particle Q move off from point A and point B respectively. The distance between point A and B is 12 m. The displacement of particle P , S_p m, from A is given by $S_p = 3t^2 + 9t$, where t is time, in seconds, after leaving point A . The velocity of particle Q , $V_Q \text{ ms}^{-1}$, is given by $V_Q = 8t - 2$, where t is time, in seconds, after leaving point B .

[Assume the movement to the right is positive] > 0

- (a) Cari halaju awal, dalam ms^{-1} , bagi zarah P .
Find the initial velocity, in ms^{-1} , of the particle P .

[2 markah]

[2 marks]

$\checkmark -2$

- (b) Cari julat nilai t , dalam saat, apabila zarah Q bergerak ke kanan.
Find the range of the values of t , in seconds, when the particle Q moves to the right.

[2 markah]

[2 marks]

$\checkmark > 0$

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- (c) (i) Ungkapkan sesaran bagi zarah Q , S_p m, dari titik A , dalam sebutan t dengan keadaan t ialah masa dalam saat, selepas meninggalkan titik B .
Express the displacement of particle Q , S_p m, from point A , in terms of t where t is time, in seconds, after leaving point B .

[2 markah]

[2 marks]

- (ii) Seterusnya, tentukan sama ada zarah Q pernah melalui titik A .
Hence, determine whether particle Q ever passes through A .

[2 markah]

[2 marks]

- (d) Cari nilai t , dalam saat, apabila zarah P melalui titik B .
Find the values of t , in seconds, when the particle P passes through point B .

[2 markah]

[2 marks]

Jawapan / Answer:

RUANGAN JAWAPAN SOALAN 12 / ANSWER SPACE FOR QUESTION 12:



Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

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Diagram 7.1

Diagram 7.1

Diagram 7.1

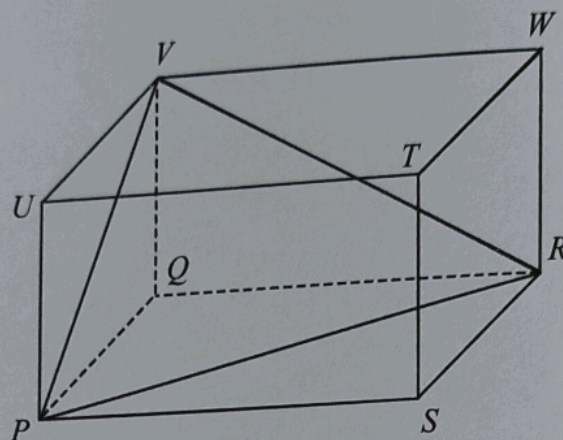
Diagram 7.1

Diagram 7.1

Diagram 7.1

Diagram 7.1

- 13 Rajah 7.1 menunjukkan sebuah kotak hadiah berbentuk kuboid.
Diagram 7.1 shows a gift box in the shape of a cuboid.



Rajah 7.1
 Diagram 7.1

Diberi bahawa panjang $VP = m$ cm dan $VR = n$ cm.
Given that the length of $VP = m$ cm dan $VR = n$ cm.

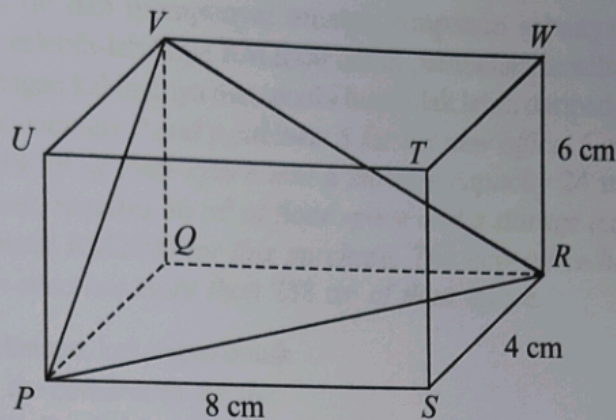
- (a) Tunjukkan luas segitiga satah PVR adalah
Show that the area of the plane PVR is

$$A = \frac{1}{2} mn \sin V$$

[3 markah]
 [3 marks]

Jawapan / Answer:

(b)



Rajah 7.2

Diagram 7.2

Berdasarkan Rajah 7.2 di atas, diberi panjang $SR = 4$ cm, $PS = 8$ cm dan $WR = 6$ cm.

Based on the Diagram 7.2 above, it is given that the length of $SR = 4$ cm, $PS = 8$ cm and $WR = 6$ cm.

- (i) cari $\angle PVR$.
find $\angle PVR$.

[3 markah]

[3 marks]

- (ii) dengan menggunakan sudut di (b)(i), cari luas satah PVR .
using the angle in (b)(i), find the area of the plane PVR .

[2 markah]

[2 marks]

- (c) Cari jarak terdekat dari V ke PR .

Find the shortest distance from V to PR .

[2 markah]

[2 marks]

Jawapan / Answer:

RUANGAN JAWAPAN SOALAN 13 / ANSWER SPACE FOR QUESTION 13:



Rajah 13

Figure 13

Based on the Diagram 13 above, find the length of the edge PY and the area of the triangle PYV .
 Berdasarkan Rajah 13 di atas, dapati panjang PY dan luas segi tiga PYV .

- (i) Find the length of the edge PY .
 Dapati panjang sisi PY .
- (ii) Find the area of the triangle PYV .
 Dapati luas segi tiga PYV .
- (c) Find the shortest distance from P to UV .
 Cari jarak terdekat dari P ke UV .

- 14 Encik Kelvin membeli x kabinet P dan y kabinet S untuk pejabat baharunya. Kabinet P berharga RM400 seunit, memerlukan ruang lantai sebanyak 48 m^2 dan mempunyai muatan simpanan sebanyak 24 m^3 fail. Kabinet S pula berharga RM200 seunit, memerlukan ruang lantai sebanyak 36 m^2 dan mempunyai muatan simpanan sebanyak 16 m^3 fail. Encik Kelvin mempunyai selebih-lebihnya RM2000 untuk pembelian tersebut. Pejabat baharu itu mempunyai bilik dengan kabinetnya memenuhi luas tidak lebih daripada 288 m^2 ruang lantai. *Mr. Kelvin bought x cabinets P and y cabinets S for his new office. Cabinet P costs RM400 per unit, requires 48 m^2 of floor space and a storage capacity 24 m^3 of files. Cabinet S costs RM200 per unit, requires 36 m^2 of floor space and a storage capacity 16 m^3 of files. Mr. Kelvin has at most RM2000 for this purchase. The new office has a room where the cabinets occupy an area not more than 288 m^2 of floor space.*

(a) Tulis dalam perkataan, kekangan untuk

Write in words, the constraints for the

- (i) kos pembelian kabinet-kabinet.
cost of purchasing the cabinets.
- (ii) ruang lantai yang diperlukan oleh kabinet-kabinet.
floor space required by the cabinets.

[2 markah]

[2 marks]

(b) Tulis dua ketaksamaan, selain $x \geq 0$ dan $y \geq 0$, yang memenuhi dua kekangan di (a).

Write the inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfies the two constraints in (a).

[2 markah]

[2 marks]

(c) Dengan menggunakan skala 2 cm kepada 1 unit pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di (b).

By using a scale of 2 cm to 1 unit on both axes, construct and shade the region R that satisfies all the constraints in (b).

[3 markah]

[3 marks]

(d) Diberi bahawa jumlah muatan penyimpanan fail bagi kabinet P dan kabinet S ialah $k \text{ m}^3$. Ungkapkan k dalam sebutan x dan y . Seterusnya, lukis fungsi objektif itu.

Given that total for the storage capacity of files of the cabinets P and cabinet S is $k \text{ m}^3$.

Express k in terms of x and y . Hence, draw the objective function.

[1 markah]

[1 mark]

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(e) Daripada graf di (c), cari

From the graph in (c), find

(i) bilangan setiap jenis kabinet yang patut dibeli oleh Encik Kelvin untuk muatan penyimpanan yang optimum,
the number of each type of cabinet that should be purchased by Mr. Kelvin for optimum capacity storage,

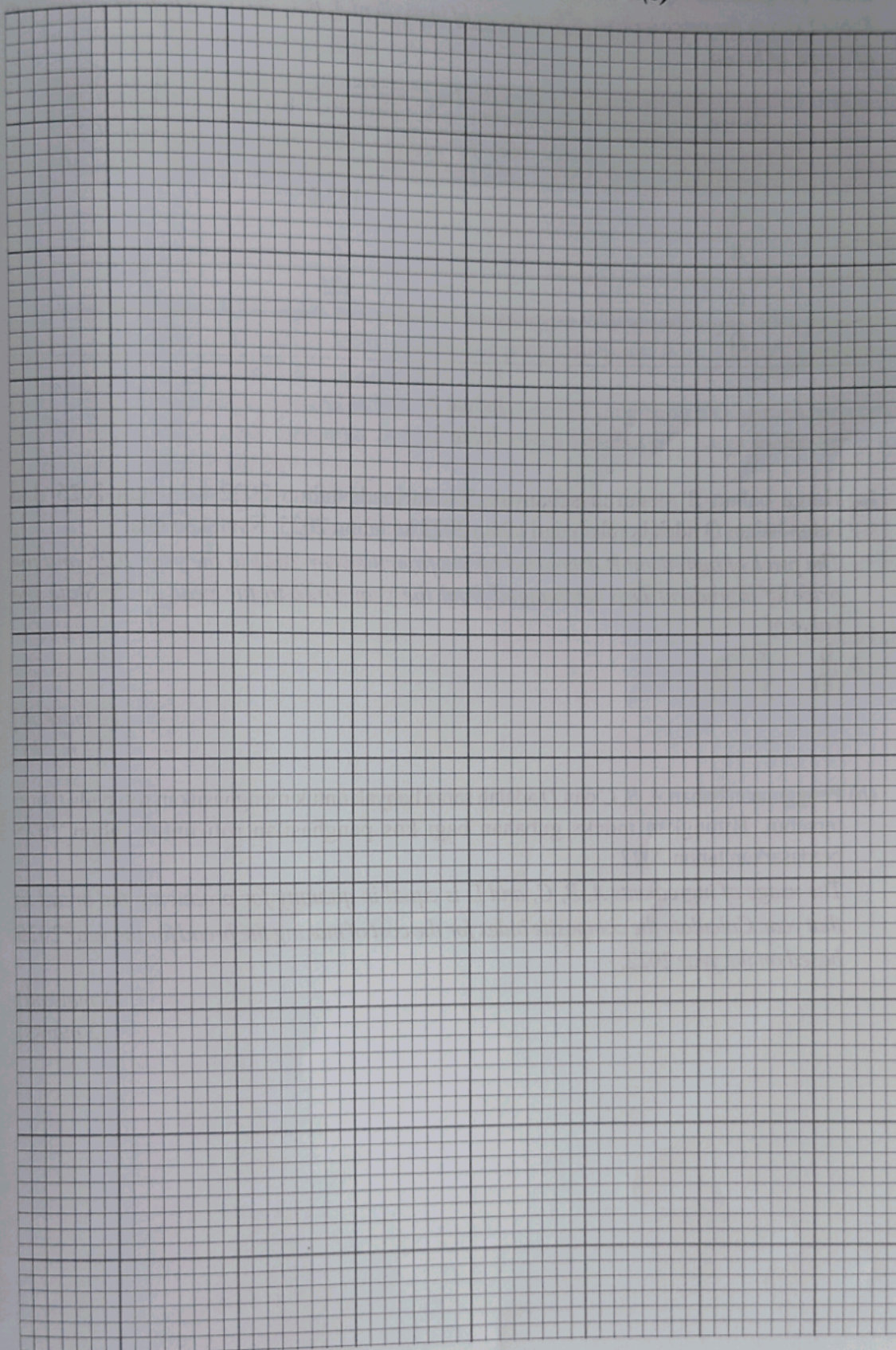
(ii) kapasiti penyimpanan maksimum, dalam m^3 .
the maximum capacity of storage, in m^3 .

[2 markah]

[2 marks]

Jawapan / Answer:

KERTAS GRAF UNTUK SOALAN 14(b)
GRAPH PAPER FOR QUESTION 14(b)



- 15 Jadual 2 menunjukkan indeks harga bagi empat jenis bahan, A, B, C dan D yang digunakan dalam penghasilan sejenis roti.
Table 2 shows the price indices of four types of ingredient A, B, C and D used in the production of a type of bread.

Bahan <i>Ingredient</i>	Indeks harga pada tahun 2025 berasaskan tahun 2022 <i>Price index for the year 2025 based on the year 2022</i>
A	132.6
B	x
C	125
D	y

Jadual 2
 Table 2

- (a) Harga bahan B menurun sebanyak 5% daripada tahun 2022 ke tahun 2025 dan harga bahan D tidak berubah dari tahun 2022 ke tahun 2025. Nyatakan nilai
The price of ingredient B decreased by 5% from the year 2022 to the year 2025 and the price of ingredient D is unchanged from the year 2022 to the year 2025. State the value of

- (i) x
 (ii) y

[2 markah]

[2 marks]

- (b) Penggunaan bahan A, B, C dan D adalah sama banyak untuk menghasilkan roti pada tahun tersebut. Hitungkan indeks gubahan bagi kos penghasilan roti untuk tahun 2025 berdasarkan tahun 2022.

The usage of ingredients A, B, C, and D is equal in quantity for producing the bread in that year. Calculate the composite index for the cost of making the bread for the year 2025 based on the year 2022.

[2 markah]

[2 marks]



- (c) Diberikan bahawa indeks gubahan bagi kos penghasilan roti meningkat sebanyak 35% dari tahun 2020 ke tahun 2025.

It is given that composite index for the cost of making the bread increased by 35% from the year 2020 to the year 2025.

- (i) Hitungkan indeks gubahan bagi kos penghasilan roti pada tahun 2022 berdasarkan tahun 2020.

Calculate the composite index for the cost of making the bread in the year 2022 based on the year 2020.

[2 markah]

[2 marks]

- (ii) Encik Amir ingin menyasarkan keuntungan tahunan sebanyak 30% pada tahun 2025. Pada tahun 2020, jumlah kos penghasilan roti ialah RM400. Cari jumlah harga jualan roti itu pada tahun 2025.

Seterusnya, berapakah bilangan minimum roti yang perlu dikeluarkan pada tahun 2025 untuk mencapai sasaran keuntungan tersebut jika harga jualan sebiji roti ialah RM2.50?

Mr. Amir aims to achieve a 30% annual profit in 2025. In 2020, the total production cost of the bread was RM400. Find the total selling price of the bread in 2025.

Hence, what is the minimum number of breads that can be produced in 2025 to achieve the targeted profit if the selling price of each bread is RM2.50?

[4 markah]

[4 marks]

Jawapan / Answer:

TAMAT JUDUL TAMAT
END OF MODULE QUESTION

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RUANGAN JAWAPAN SOALAN 15 / ANSWER SPACE FOR QUESTION 15:

[2 marks]

[2 marks]

Each firm in the industry has a marginal cost of RM100. The industry is perfectly competitive. The demand curve is given by $Q = 1000 - 10P$. The industry is in long-run equilibrium. Calculate the number of firms in the industry.

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[4 marks]

[4 marks]

(a) Calculate the number of firms in the industry.

(b) Calculate the profit of each firm.

(c) Calculate the total profit of the industry.

(d) Calculate the deadweight loss of the industry.

(e) Calculate the consumer surplus of the industry.

(f) Calculate the producer surplus of the industry.

(g) Calculate the total surplus of the industry.

**SOALAN MODUL TAMAT
END OF MODULE QUESTION**