

NAMA: Laif Syaufig Bin Rohman TINGKATAN: 5 Arif

PEPERIKSAAN PERCUBAAN SPM 2025

MATEMATIK TAMBAHAN

TINGKATAN 5

Kertas 1

Ogos 2025

2 Jam

3472/1

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis nama, tingkatan dan kad pengenalan pada ruang yang disediakan.
2. Kertas peperiksaan ini mengandungi dua bahagian: Bahagian A dan Bahagian B.
3. Jawapan hendaklah ditulis pada ruang jawapan yang disediakan di dalam kertas peperiksaan ini.
4. Kertas peperiksaan ini adalah dalam dwibahasa.
5. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
6. Kerja mengira mesti ditunjukkan.
7. Jadual Kebarangkalian Hujung Atas $Q(z)$ Bagi Taburan Normal $N(0, 1)$ disediakan di halaman 4.
8. Kertas peperiksaan ini hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	4	4
	2	6	6
	3	5	5
	4	7	7
	5	6	6
	6	4	4
	7	4	4
	8	6	6
	9	4	4
	10	5	5
	11	5	5
	12	8	8
B	13	8	8
	14	8	8
	15	8	8
Jumlah		88%	100% Tahniah!

Kertas soalan ini mengandungi 28 halaman bercetak.

[Lihat halaman sebelah]

Bahagian A

[64 markah]

Jawab semua soalan.

1. **Selesaikan** persamaan $\log_3(x-2) - \log_3 2 = \log_3 x^2 - \log_3(3x+4)$

Solve the equation $\log_3(x-2) - \log_3 2 = \log_3 x^2 - \log_3(3x+4)$

[4 markah/marks]

Jawapan / Answer:

$$\log_3\left(\frac{x-2}{2}\right) = \log_3\left(\frac{x^2}{3x+4}\right)$$

$$\frac{x-2}{2} = \frac{x^2}{3x+4}$$

$$(x-2)(3x+4) = 2x^2$$

$$3x^2 + 4x - 6x - 8 = 2x^2$$

$$x^2 - 2x - 8 = 0$$

$$(x-4)(x+2) = 0$$

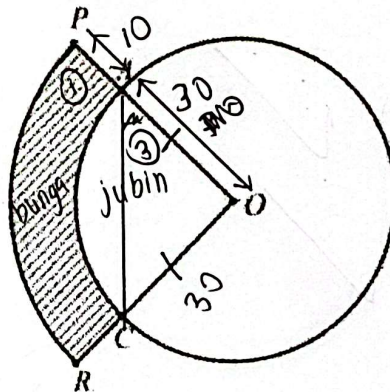
$$x = 4, \quad x = -2 \text{ (rejected)}$$

$$\therefore x = 4$$

4

2. Rajah 5 menunjukkan sebuah laman berbentuk bulatan yang berpusat di O dengan jejari 30 m. Seorang pekebun ingin menanam bunga di kawasan berlorek, $APRC$. Sektor minor OAC dipasang jubin supaya kawasan menjadi kiosk foto. Diberi $OA:AP = 3:1$
- Diagram 5 shows a circular shaped garden with centre O with radius 30 m. A gardener wishes to plant flowers at the shaded region, $APRC$. Minor sector OAC will be installed with tiles so that the area will become the photo booth. Given that $OA:AP = 3:1$

[Guna/use $\pi = 3.142$]



- a) Jika perimeter kawasan yang dipasang jubin ialah 100 m, hitung sudut minor sektor OAC , dalam radian.

If the perimeter of the tiles area is 100 m, find the minor angle of sector OAC , in radians.

[4 markah/marks]

- b) Hitung luas, dalam m^2 , kawasan (tanaman bunga) tersebut.

Find the area, in m^2 , of the flowers' area.

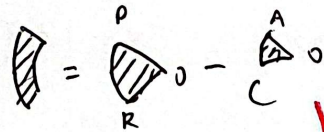
[2 markah/marks]

Jawapan / Answer:

a) *

$$100 = 2(30) + 30(\angle AOC)$$

$$\angle AOC = \frac{40}{30} = 1.333 \text{ rad}$$

b) $OP = 40$ 

$$= \frac{1}{2} (40)^2 (1.333) - \frac{1}{2} (30)^2 (1.333)$$

$$= 466.55 \text{ m}^2$$

- (a) Tentukan sama ada kuantiti di bawah adalah kuantiti **skalar** atau kuantiti **vektor**.
Berikan justifikasi anda.

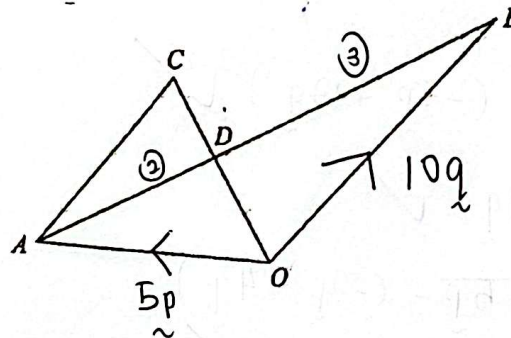
Determine whether the quantity below is a scalar quantity or a vector quantity. Give your justification.

Air mempunyai ketumpatan sekitar 1000 kg/m^3 .
Water has a density of around 1000 kg/m^3 .

[1 markah/marks]

- (b) Rajah menunjukkan dua garis lurus **ODC** dan **ADB**.

Diagram shows two straight lines **ODC** and **ADB**.



Diberi
Ungkapkan $\vec{OA} = 5\vec{p}$, $\vec{OB} = 10\vec{q}$, $\vec{AD}:\vec{DB} = 2:3$, $\vec{AC} = m\vec{OB}$ dan $\vec{OD} = n\vec{OC}$.

Given $\vec{OA} = 5\vec{p}$, $\vec{OB} = 10\vec{q}$, $\vec{AD}:\vec{DB} = 2:3$, $\vec{AC} = m\vec{OB}$ and $\vec{OD} = n\vec{OC}$.

- (i) Ungkapkan $\vec{OC}$ dalam sebutan m , p dan q .
Express $\vec{OC}$ in terms of m , p and q .

- (ii) Ungkapkan $\vec{OC}$ dalam sebutan n , p dan q .
Express $\vec{OC}$ in terms of n , p and q .

- (iii) Seterusnya, cari nilai bagi m dan n .

Hence, find the value m and n .

$$\begin{aligned} 5\vec{p} + 10m\vec{q} &= \frac{3}{n}\vec{p} + \frac{4}{n}\vec{q} \\ 5\vec{p} &= \frac{3}{n}\vec{p} \quad 10m\vec{q} = \frac{4}{n}\vec{q} \\ n &= \frac{3}{5} \quad 10m = \frac{4}{\frac{3}{5}} \\ m &= \frac{2}{3} \end{aligned}$$

$$\begin{aligned} \vec{OC} &= \frac{1}{n}\vec{OD} \quad \vec{AD} = \frac{2}{5}\vec{AB} \\ \vec{AB} &= \vec{AO} + \vec{OB} = -5\vec{p} + 10\vec{q} \\ \vec{AD} &= \frac{2}{5}(-5\vec{p} + 10\vec{q}) = -2\vec{p} + 4\vec{q} \\ \vec{OD} &= \vec{OA} + \vec{AD} \\ &= 5\vec{p} - 2\vec{p} + 4\vec{q} = 3\vec{p} + 4\vec{q} \\ \vec{OC} &= \frac{1}{n}(3\vec{p} + 4\vec{q}) = \frac{3}{n}\vec{p} + \frac{4}{n}\vec{q} \end{aligned}$$

[6 markah/marks]

Jawapan / Answer :

10

a) Kuantiti skalar kerana ketumpatan tidak mempunyai arah

$$\begin{aligned} \text{bi) } \vec{OC} &= \vec{OA} + \vec{AC} \\ &= 5\vec{p} + m(10\vec{q}) \\ &= 5\vec{p} + 10m\vec{q} \end{aligned}$$

$$\text{ii) } \vec{OC} = \frac{1}{n}\vec{OD}$$

$$\vec{AB} = \vec{AO} + \vec{OB} = -5\vec{p} + 10\vec{q}$$

$$\begin{aligned} \vec{AD} &= \frac{2}{5}\vec{AB} = \frac{2}{5}(-5\vec{p} + 10\vec{q}) \\ &= -2\vec{p} + 4\vec{q} \end{aligned}$$

$$\begin{aligned} \vec{OD} &= \vec{OA} + \vec{AD} = 5\vec{p} + (-2\vec{p} + 4\vec{q}) \\ &= 3\vec{p} + 4\vec{q} \end{aligned}$$

$$\vec{OC} = \frac{1}{n}(3\vec{p} + 4\vec{q}) = \frac{3}{n}\vec{p} + \frac{4}{n}\vec{q}$$

$$\text{iii) } 5\vec{p} + 10m\vec{q} = \frac{3}{n}\vec{p} + \frac{4}{n}\vec{q}$$

$$\begin{aligned} 5\vec{p} &= \frac{3}{n}\vec{p} & 10m\vec{q} &= \frac{4}{\frac{3}{5}}\vec{q} \\ n &= \frac{3}{5} & m &= \frac{2}{3} \end{aligned}$$

$$\therefore m = \frac{2}{3}, n = \frac{3}{5}$$

5. (a) Selesaikan persamaan kuadratik $3x^2 - 5x + 3 = 0$. Beri jawapan dalam bentuk $(a + bi)$.

Solve the quadratic equation $3x^2 - 5x + 3 = 0$. Give the answer in the form of $a + bi$.

$$hx^2 + (2h-k)x + h+k = 0$$

$$hx^2 + (k-2h)x + h+k = 0$$

$$(k-2h)^2 - 4(h)(h+k) = 0$$

[3 markah/ marks]

- (b) Persamaan kuadratik $(x^2 + 1)h + k = (2h - k)x$ mempunyai dua punca nyata yang sama, tentukan nisbah $h : k$.

The quadratic equation $(x^2 + 1)h + k = (2h - k)x$ has two equal real roots, determine the ratio $h : k$.

[3 markah/marks]

Jawapan / Answer :

a) $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(3)}}{2(3)}$

$x = \frac{5 \pm \sqrt{-11}}{6} = \frac{5 \pm \sqrt{11} i}{6}$

$x = \frac{5}{6} + \frac{\sqrt{11}}{6} i, x = \frac{5}{6} - \frac{\sqrt{11}}{6} i$

b) $hx^2 + h + k - (2h - k)x = 0$

$hx^2 + (k - 2h)x + h + k = 0$

$(k - 2h)^2 - 4(h)(h + k) = 0$

$k^2 - 4hk + 4h^2 - 4h^2 - 4hk = 0$

$k^2 - 8hk = 0$

$k(k - 8h) = 0$

$k = 0 \quad k = 8h$

(ignore)

$\frac{h}{k} = \frac{1}{8}$

$\therefore h : k = 1 : 8$

6. Diberi fungsi $h: x \rightarrow 3x + 1$ dan $kh: x \rightarrow 9x^2 + 6x + 5$, cari
 Given that the function $h: x \rightarrow 3x + 1$ and $kh: x \rightarrow 9x^2 + 6x + 5$, find

(a) Nilai m jika $h^{-1}(m-1) = 3$, $h(3) = m-1$
 Value of m if $h^{-1}(m-1) = 3$, $m-1 = 3(3) + 1 = 10$
 $h^{-1}(x) = \frac{x-1}{3}$ $m = 11$

[2 markah/marks]

(b) $k(x+1)$ $kh^{-1}(x) = 9\left(\frac{x-1}{3}\right)^2 + 6\left(\frac{x-1}{3}\right) + 5$
 $= x^2 - 2x + 1 + 2x - 2 + 5$
 $= x^2 + 4$

[2 markah/ marks]

Jawapan / Answer :

a) $h(3) = m-1$

$m-1 = 3(3) + 1$

$m = 11$

$k(x+1) = (x+1)^2 + 4$
 $= x^2 + 2x + 5$

b) $y = h(x) = 3x + 1$

$x = \frac{y-1}{3}$

$\therefore h^{-1}(x) = \frac{x-1}{3}$

$k(x) = kh^{-1}(x) = 9\left(\frac{x-1}{3}\right)^2 + 6\left(\frac{x-1}{3}\right) + 5$

$= x^2 - 2x + 1 + 2x - 2 + 5$

$= x^2 + 4$

$\therefore k(x+1) = (x+1)^2 + 4$

$= x^2 + 2x + 1 + 4$

$= x^2 + 2x + 5$

Diberi fungsi kuadratik $f(x) = -2(x-3)^2 - 3$.

Diberi that the quadratic function $f(x) = -2(x-3)^2 - 3$.

(a) Cari nilai $\int_p^p f(x) dx$.

Find the value $\int_p^p f(x) dx$.

[1 markah/marks]

(b) Cari nilai m jika $\int_1^2 f(x) dx = 2m - 1$

Find the value of m , if $\int_1^2 f(x) dx = 2m - 1$.

[3 markah/ marks]

Jawapan / Answer :

a) 0

$$b) 2m - 1 = \int_1^2 f(x) dx = \left[-\frac{2(x-3)^{2+1}}{1(2+1)} - 3x \right]_1^2$$

$$2m - 1 = \left[\left(-\frac{2(2-3)^3}{3} - 3(2) \right) - \left(-\frac{2(1-3)^3}{3} - 3(1) \right) \right]$$

$$2m - 1 = -\frac{23}{3}$$

$$2m = -\frac{20}{3}$$

$$m = -\frac{10}{3}$$

8. (a) Cari bilangan cara huruf-huruf daripada perkataan 'PARU' dan 'PARA' yang boleh disusun jika tiada pengulangan huruf dibenarkan. Adakah bilangan huruf yang boleh dibentuk adalah sama? Jelaskan.)

Find the number of ways to arrange each word 'PARU' and 'PARA' if no repetition is allowed. Are the number of the ways the same? Explain.

[3 markah/marks]

- (b) Satu pasukan yang terdiri daripada lima orang ahli akan dipilih untuk ekspedisi ke sebuah pulau daripada empat orang perenang dan tiga orang pendaki gunung. Cari bilangan cara pasukan itu boleh dibentuk jika

A team of five members will be selected for an expedition to an island from a group of four swimmer and three mountain climber. Find the number of ways in which the team can be formed if

- (i) tiada syarat,

there is no condition,

- (ii) bilangan perenang mesti melebihi bilangan pendaki gunung.

swimmers must be more than mountain climber.

[3 markah/ marks]

Jawapan / Answer :

a) Bilangan susunan;

'PARU' = $4P_4 = 24$

'PARA' = $\frac{4P_4}{2!} = 12$

b) ${}^7C_5 = 21$

ii) (4)P

B.H.	(3)G	B.I.
2		3x
3		2✓
4		1✓

jumlah = 5

Bilangan cara

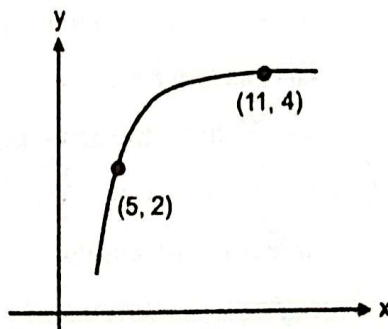
$= {}^4C_3 \times {}^3C_2 + {}^4C_4 \times {}^3C_1$
 $= 15$

24 $\neq$ 12; Tidak sama kerana 'PARA' mempunyai objek secam, iaitu A, A monokala tiada objek secam bagi 'PARU'

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Rajah menunjukkan suatu lengkung. Pemboleh ubah x dan y dihubungkan oleh persamaan linear $y^2 = Mx + N$, dengan keadaan M dan N ialah pemalar.

Diagram shows a curve. The variables x dan y are connected by the linear equation $y^2 = Mx + N$, where the states M and N are constants.



(a) Cari nilai M dan N .

Find the value of M and the value N .

[2 markah/marks]

(b) Lakarkan graf linear y^2 melawan x .

Sketch a linear graph of y^2 against x .

[2 markah/ marks]

Jawapan / Answer :

a) $y^2 = Mx + N$, $(5, 2) \Rightarrow (2)^2 = M(5) + N$ ✓
 $4 = 5M + N$ — (1) ✓

$(11, 4) \Rightarrow (4)^2 = M(11) + N$ ✓
 $16 = 11M + N$ — (2) ✓

(2) - (1); $11M + N = 16$

$(-) 5M + N = 4$

$6M = 12$

$M = 2$ ✓

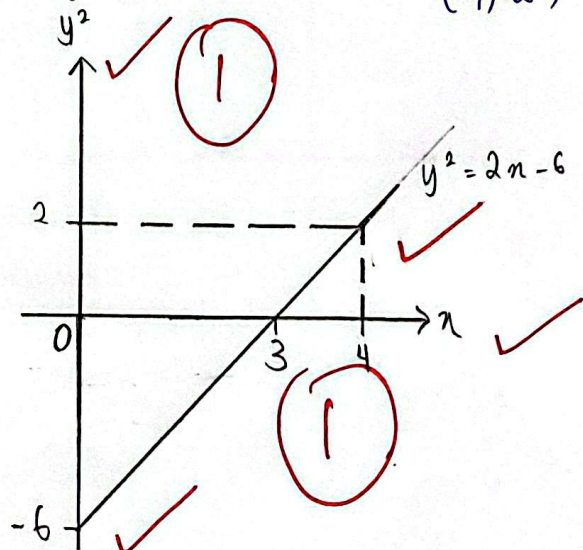
$4 = 5(2) + N$

$N = -6$

$\therefore M = 2$

$N = -6$ ✓

b) $y^2 = 2x - 6$, $(0, -6)$
 $(4, 2)$



10. Syahmi melakukan tinjauan tentang peratus murid di sekolahnya yang menaiki bas sekolah. Didapati bahawa 42% daripada murid di sekolahnya menaiki bas sekolah. Jika 3 orang murid dipilih secara rawak dan X mewakili bilangan murid yang menaiki bas sekolah. Syahmi did a survey on the percentage of pupils in her school who use school buses to come to school. It is found that 42% of pupils from her school use school buses. A sample of 3 pupils is randomly selected from the school,

- (a) Pemboleh ubah rawak diskret X ini bertaburan Binomial atau diwakili sebagai $X \sim B(3, p)$. Nyatakan (nilai p).
This discrete random variable X is Binomially distributed or represented as $X \sim B(3, p)$. State the value of p .

[1 markah/marks]

- (b) Lengkapkan jadual taburan kebarangkalian binomial bagi bilangan murid yang menaiki bas sekolah dalam Jadual 1.

Complete a binomial probability distribution table for the number of pupils who use school buses in the Table 1.

[2 markah/ marks]

- (c) Bina graf bagi taburan ini dalam Rajah 1.

Construct the graph for this distribution in the Diagram 1.

[2 markah/markah]

Jawapan/Answer:

(a) $p = 0.42$

(b)

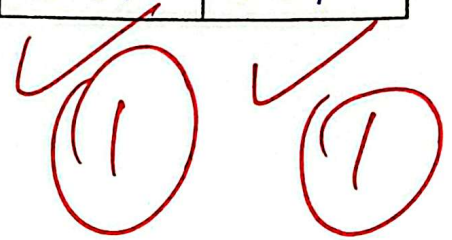
$$p = 0.42, q = 0.58$$

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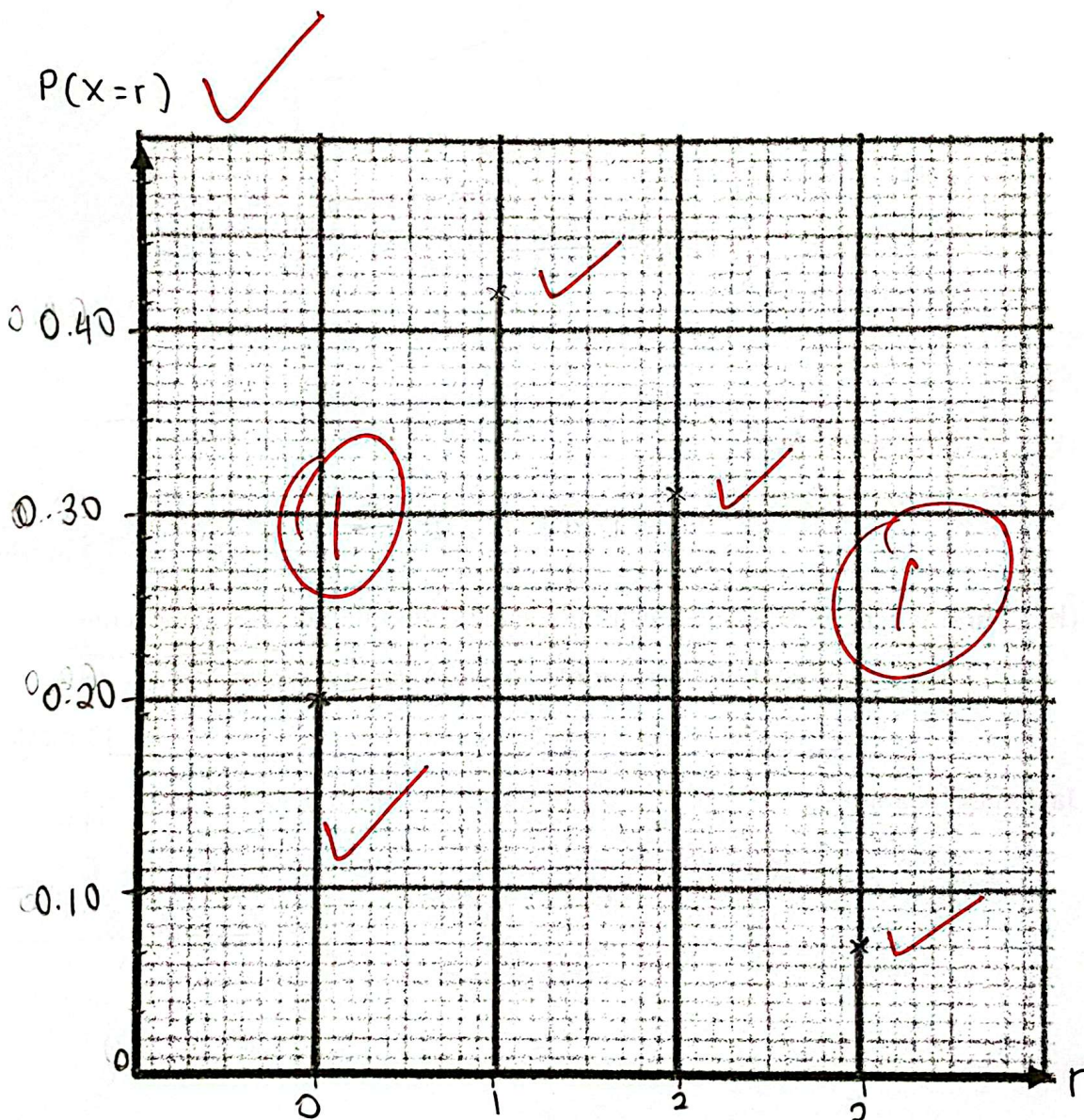
$X = r$	0	1	2	3
$P(X = r)$	0.20	0.42	0.31	0.07

Jadual 1

Table 1



(c)



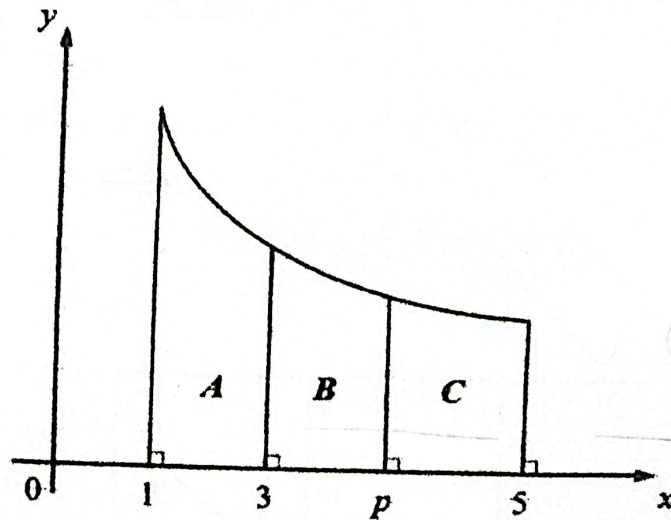
Rajah 1

Diagram 1



11. Rajah menunjukkan sebahagian daripada lengkung $y = \frac{12}{x^2}$

Diagram shows a part of the curve $y = \frac{12}{x^2}$



Cari

Find

- (a) Luas kawasan A,

The area of region A

[2 markah/marks]

- (b) Nilai p dengan keadaan kawasan B dan C mempunyai luas yang sama.

The value of p such that the regions B and C have the same area.

[3 markah/ marks]

Jawapan / Answer :

$$a) y = 12x^{-2}$$

$$A: \int_1^3 12x^{-2} dx = \left[\frac{12x^{-2+1}}{-2+1} \right]_1^3 = \left[-\frac{12}{x} \right]_1^3$$

$$= \left[\left(-\frac{12}{(3)} \right) - \left(-\frac{12}{(1)} \right) \right] = 8$$

$$b) B = C$$

$$\int_3^p 12x^{-2} dx = \int_p^5 12x^{-2} dx$$

$$\left[-\frac{12}{x} \right]_3^p = \left[-\frac{12}{x} \right]_p^5$$

$$\left[\left(-\frac{12}{(p)} \right) - \left(-\frac{12}{(3)} \right) \right] = \left[\left(-\frac{12}{(5)} \right) - \left(-\frac{12}{(p)} \right) \right]$$

$$4 - \frac{12}{p} = \frac{12}{p} - \frac{12}{5}$$

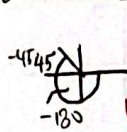
$$\frac{32}{5} = \frac{24}{p}$$

$$p = \frac{24}{\frac{32}{5}} = \frac{15}{4}$$

- 12 (a) Dengan menggunakan nisbah trigonometri bagi sudut-sudut khas tanpa menggunakan kalkulator, cari nilai bagi setiap yang berikut
Using trigonometric ratios for special angles without using a calculator, find the value for each of the following

(i) $\cos(-225^\circ)$

$\cos(-225^\circ)$



(ii) $\cot\left(\frac{5}{3}\pi\right)$

$\cot\left(\frac{5}{3}\pi\right)$



- (b) Selesaikan persamaan trigonometri $\sin x (\sin x - 2) = \cos 2x$ untuk julat $0 \leq x \leq 2\pi$. Berikan jawapan dalam sebutan π . [4 markah/marks]

Solve the trigonometric equation $\sin x (\sin x - 2) = \cos 2x$ for the range

$0 \leq x \leq 2\pi$. Give the answers in terms of π .

[4 markah/ marks]

Jawapan / Answer :

ai)

$\cos(-225) = \cos(180 - 45) = -\cos 45$

$-\cos 45 = -\frac{\sqrt{2}}{2}$

ii) $\cot\left(\frac{5}{3}\pi\right) = \frac{1}{\tan\left(\frac{5}{3}\pi\right)} = \frac{1}{(-\tan(2\pi - \frac{5}{3}\pi))} = -\frac{1}{\tan\frac{\pi}{3}} = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

b) $\sin^2 x - 2\sin x = 1 - 2\sin^2 x$

$3\sin^2 x - 2\sin x - 1 = 0$

$(\sin x - 1)(3\sin x + 1) = 0$

$\sin x = -\frac{1}{3}$ (III, IV)

$\sin x = 1$
 $x = \sin^{-1}(1) = 90^\circ = \frac{\pi}{2}$

$x = \sin^{-1}\left(-\frac{1}{3}\right) = 19.47^\circ = 0.1082\pi$

$x = \frac{\pi}{2}$

$x = 1.1082\pi, 1.8918\pi$

$\therefore x = \frac{\pi}{2}, 1.1082\pi, 1.8918\pi$

Bahagian B
[16 markah]

Jawab mana-mana dua soalan.

13.

Diberi suatu persamaan lengkung ialah $y = x^2 \left(3 - \frac{2}{3}x \right) + \frac{1}{2}$

Given the equation of a curve is $y = x^2 \left(3 - \frac{2}{3}x \right) + \frac{1}{2}$

- (a) Cari koordinat titik – titik pegun. [3 markah]
Find the coordinates of the stationary points. [3 marks]
- (b) Seterusnya, tentukan sama ada setiap titik pegun itu (maksimum atau minimum). [2 markah]
Hence, determine whether each of stationary points is a maximum or a minimum. [2 marks]
- (c) Jika x meningkat dari 2 ke 2.01, cari nilai hampir bagi y . [3 markah]
If x increase from 2 to 2.01, find the approximate value in y . [3 marks]

Jawapan / Answer :

$$\begin{aligned} \text{a) } y &= 3x^2 - \frac{2}{3}x^3 + \frac{1}{2} \\ \frac{dy}{dx} &= 3(2)x^{2-1} - \frac{2}{3}(3)x^{3-1} \\ &= 6x - 2x^2 \\ \frac{dy}{dx} &= 0 = 6x - 2x^2 \\ 0 &= x(3 - x) \\ x &= 0, x = 3 \end{aligned}$$

Apabila;
 $x = 0; y = 3(0)^2 - \frac{2}{3}(0)^3 + \frac{1}{2} = \frac{1}{2}$
 $x = 3; y = 3(3)^2 - \frac{2}{3}(3)^3 + \frac{1}{2} = \frac{19}{2}$
 $\therefore (0, \frac{1}{2})$ dan $(3, \frac{19}{2})$

$$\begin{aligned} \text{b) } \frac{d^2y}{dx^2} &= 6(1)x^{1-1} - 2(2)x^{2-1} \\ &= 6 - 4x \end{aligned}$$

Apabila;
 $x = 0; \frac{d^2y}{dx^2} = 6 - 4(0) = 6 (> 0)$
 $x = 3; \frac{d^2y}{dx^2} = 6 - 4(3) = -6 (< 0)$

$\therefore (0, \frac{1}{2})$ ialah titik minimum,
 $(3, \frac{19}{2})$ ialah titik maksimum

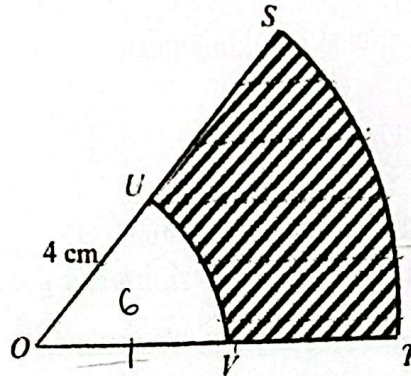
$$\text{c) } \delta x = 2.01 - 2 = 0.01$$

Apabila $x = 2$;
 $y = 3(2)^2 - \frac{2}{3}(2)^3 + \frac{1}{2} = \frac{43}{6}$

$$\frac{dy}{dx} = 6(2) - 2(2)^2 = 4$$

$$\begin{aligned} \therefore y + \delta y &= \frac{43}{6} + 0.04 \\ \frac{\delta y}{(0.01)} &= 4 \\ \delta y &= 0.04 \end{aligned}$$

14. (a) Dalam Rajah 4, OST dan OUV ialah sektor bagi dua bulatan berpusat O . Nisbah bagi luas sektor OUV kepada luas kawasan berlorek ialah 1:8. In diagram 4, OST dan OUV are sector of two circle with centre O . The ratio of the area of sector OUV to the area of shaded region is 1:8.



Rajah 4
Diagram 4

Diberi $OU = 4$ cm dan luas sector OUV ialah 6 cm^2 , cari
Given that $OU = 4$ cm and the area sector OUV is 6 cm^2 , find

- (i) $\angle SOT$ dalam radian,
 $\angle SOT$ in radians,
(ii) panjang SU
the length of SU

[4 markah]

[4 marks]

i) $\angle SOT = \angle UOV$

$$6 = \frac{1}{2} (4)^2 (\angle SOT)$$

$$\angle SOT = 0.7500 \text{ rad}$$

ii) Luas $\triangle OST = \frac{9}{1} (6) = 54$

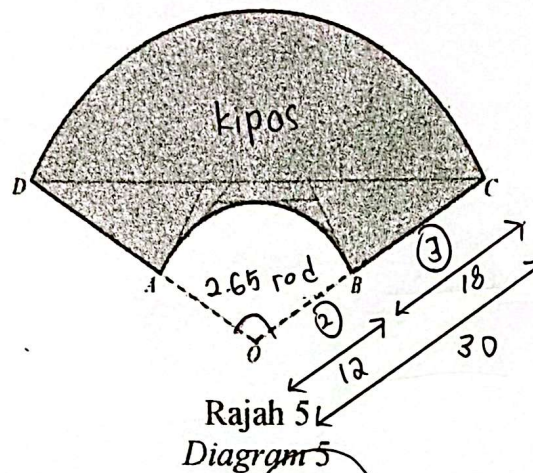
$$54 = \frac{1}{2} (4 + SU)^2 (0.7500)$$

$$144 = (4 + SU)^2 = 12^2$$

$$4 + SU = 12$$

$$SU = 8$$

- (b) Rajah 5 menunjukkan sekeping kertas $ABCD$ yang berbentuk kipas. O ialah pusat bagi lengkok AB dan CD .
Diagram 5 shows a piece of fan-shaped paper $ABCD$. O is the centre of arc AB and CD .



Diberi bahawa $\angle COD = 2.65$ radian, $3OB = 2BC$ dan $OC = 30$ cm. Cari
It is given that $\angle COD = 2.65$ radian, $3OB = 2BC$ and $OC = 30$ cm. Find

- (i) **luas kertas yang berbentuk kipas, dalam cm^2 .**
the area of the fan-shaped paper, in cm^2 .
- (ii) **bilangan maksimum kertas berbentuk kipas boleh dibentuk daripada sehelai kertas dengan luasnya 8000 cm^2 .**
the maximum number of fan-shaped paper can be made by using a piece of paper with the area of 8000 cm^2 .

i) = - [4 markah]
 [4 marks]

$$= \frac{1}{2} (30)^2 (2.65) - \frac{1}{2} (12)^2 (2.65)$$

$$= 1001.70$$

ii) $\frac{8000}{1001.70} = 7.986$
 $= 7$

15.

Diberi bahawa fungsi $f(x) = 2x^2 - nx + p$ mempunyai titik minimum pada $(1, -7)$.

Given that the function $f(x) = 2x^2 - nx + p$ has a minimum point at $(1, -7)$.

- (a) Cari nilai n dan p . [4 markah]
Find the value of n and of p . [4 marks]
- (b) Lakarkan graf fungsi $f(x)$. [2 markah]
Sketch the graph of the function $f(x)$. [2 marks]
- (c) Seterusnya, cari julat nilai h jika fungsi $f(x) = h$ mempunyai dua punca berbeza. [2 markah]

Hence, find the range of the value of h if the function $f(x) = h$ has two distinct roots.

[2 marks]

a) $f(1) = -7 = 2(1)^2 - n(1) + p$
 $-7 = 2 - n + p$
 $p - n = -9$ (1)
 $f'(x) = 2(2)x^{2-1} - n(1)x^{1-1} = 4x - n$
 $f'(1) = 0 = 4(1) - n$
 $n = 4$ (1)
 $p - (4) = -9$
 $p = -5$ (1)
 $\therefore p = -5, n = 4$ (1)

c) $2x^2 - 4x - 5 = h$
 $2x^2 - 4x - 5 - h = 0$ (1)
 $(-4)^2 - 4(2)(-5 - h) > 0$
 $16 + 40 + 8h > 0$
 $8h > -56$
 $h > -7$ (1)

