

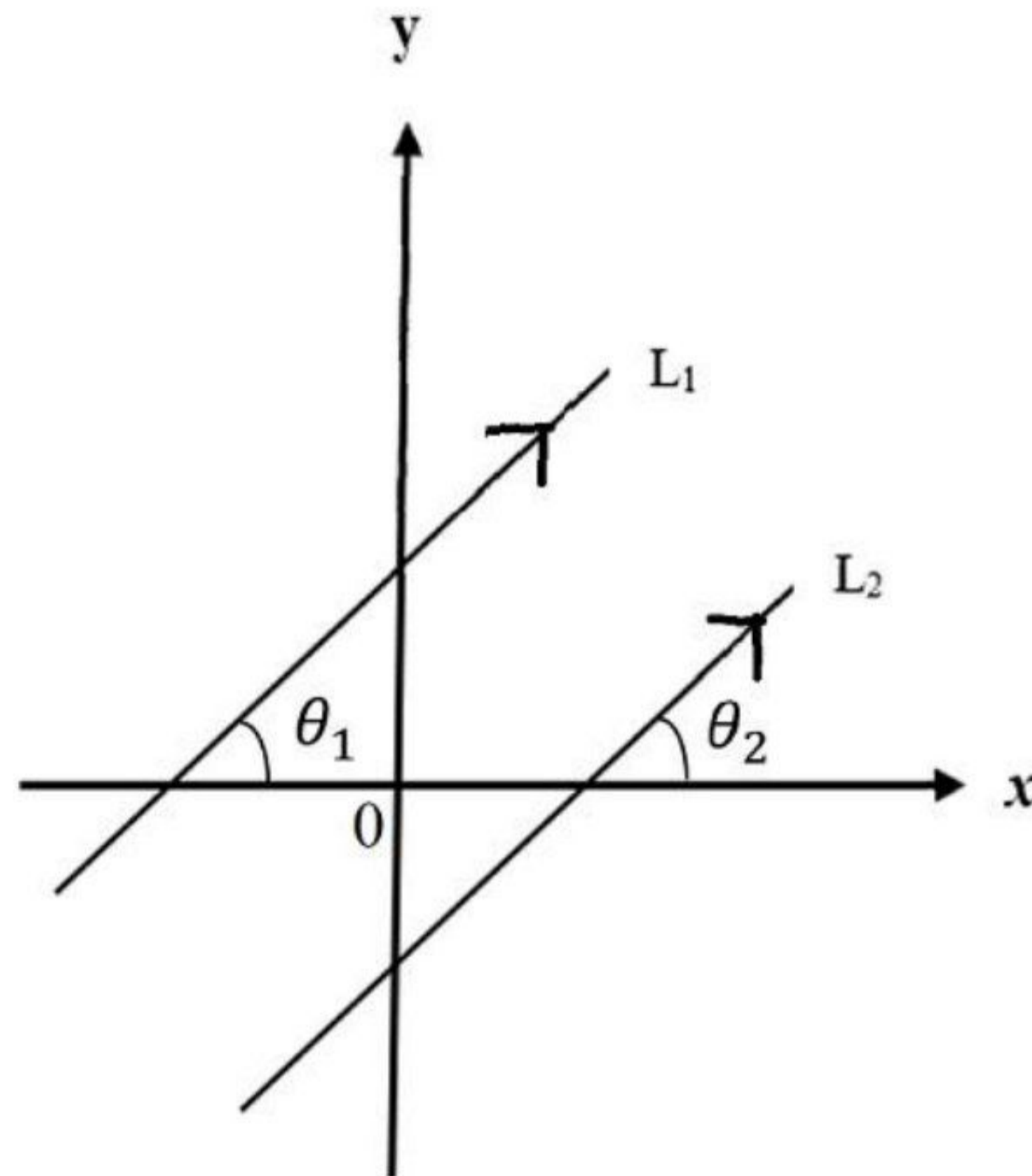
**Bahagian A / Section A**

[64 markah / marks]

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

1. (a) Rajah 1 menunjukkan sudut  $\theta_1$ , sudut  $\theta_2$  dan garis lurus  $L_1$  selari dengan garis lurus  $L_2$ .

*Diagram 1 shows angle  $\theta_1$ , angle  $\theta_2$  and straight line  $L_1$  is parallel to straight line  $L_2$ .*



Rajah 1  
Diagram 1

Dengan menggunakan maklumat di atas, tunjukkan kecerunan kedua-dua garis itu,  $m_1$  dan  $m_2$ , adalah sama.

*By using the above information, show that the gradient of both lines,  $m_1$  and  $m_2$ , are the same.*

[2 markah]

[2 marks]

- (b) Diberi empat titik,  $P(-6, 1)$ ,  $Q(1, -2)$ ,  $R(0, 5)$  dan  $S(-3, h)$ .  
Jika  $PQ$  berserenjang dengan  $RS$ , cari nilai pemalar  $h$ .

*Given four points,  $P(-6, 1)$ ,  $Q(1, -2)$ ,  $R(0, 5)$  and  $S(-3, h)$ .*

*If  $PQ$  is perpendicular to  $RS$ , find the value of  $h$ .*

[3 markah]

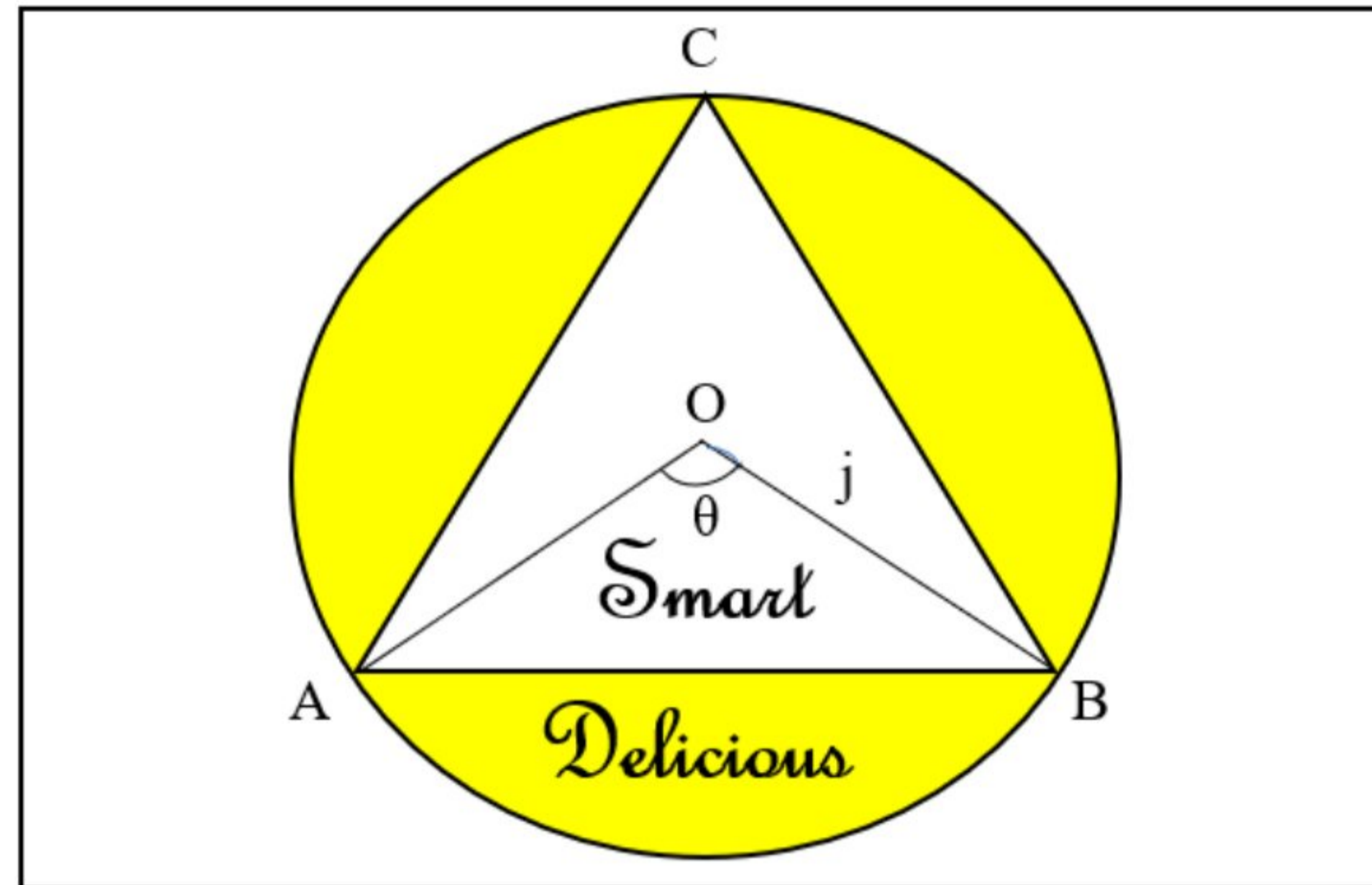
[3 marks]

Jawapan / *Answer*:



2. Rajah 2 menunjukkan draf logo untuk syarikat makanan berbentuk bulatan ABC berpusat di  $O$ .

*Diagram 2 shows food company logo draft of a circle ABC centred at  $O$ .*



Rajah 2  
Diagram 2

Diberi bahawa jejari bulatan itu adalah 6 cm dan segi tiga ABC adalah sebuah segi tiga sama sisi.

*Given that the radius of the sector is 6 cm and triangle ABC is an equilateral triangle.*

- (a) Tunjukkan bahawa luas sektor OAB,  $L$  diungkapkan sebagai  
*Show that the area of sector OAB,  $L$  is expressed as*

$$L = \frac{1}{2}j^2\theta$$

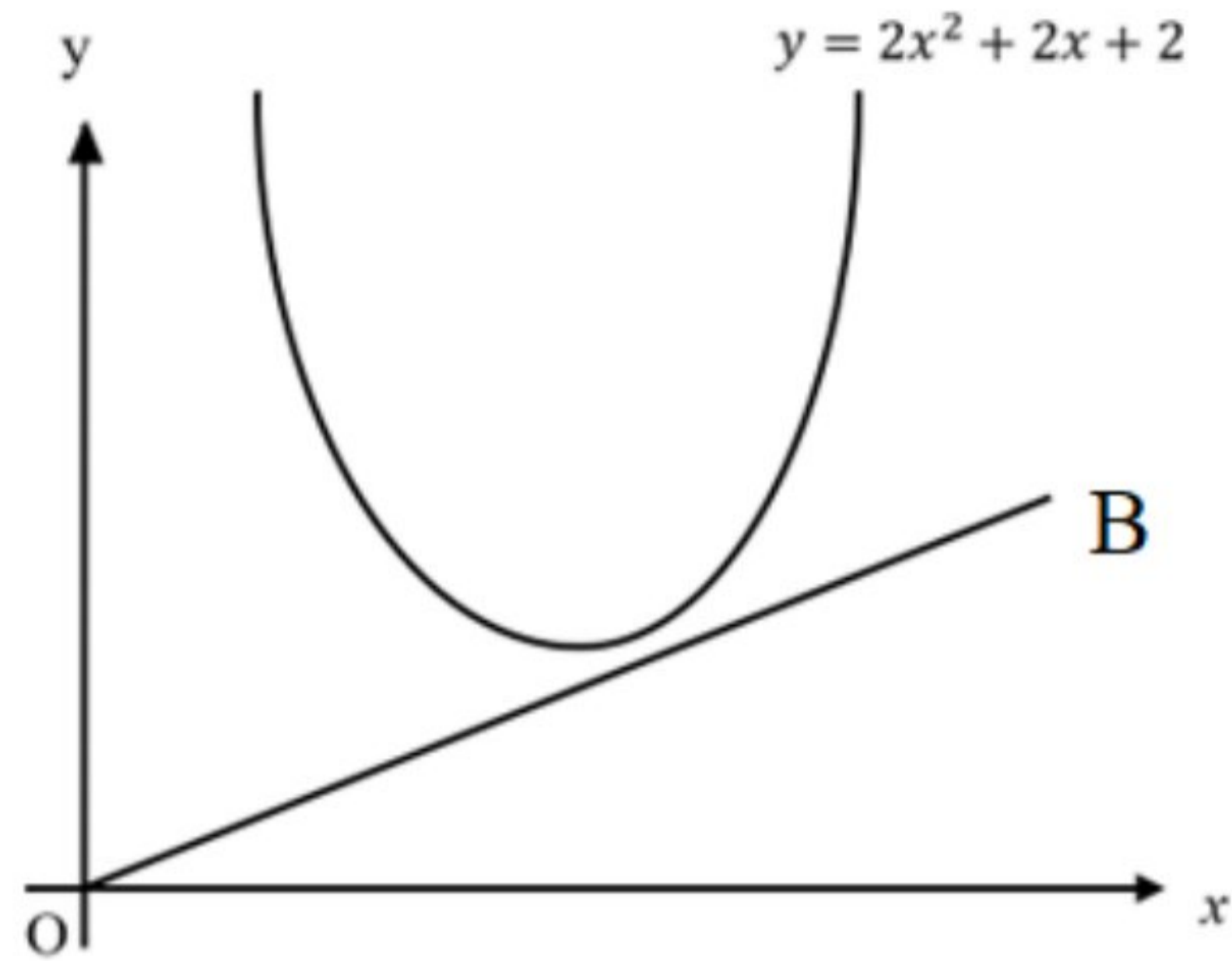
[2 markah]  
[2 marks]

- (b) Seterusnya, ungkapkan luas rantau kuning dalam sebutan  $\pi$  dan  $\sqrt{3}$ .  
*Hence, express the area of yellow region in terms of  $\pi$  dan  $\sqrt{3}$ .*

[3 markah]  
[3 marks]

Jawapan / Answer:

3. (a) Rajah 3 menunjukkan graf bagi  $y = 2x^2 + 2x + 2$ .  
 Diagram 3 shows the graph of  $y = 2x^2 + 2x + 2$ .



Rajah 3  
 Diagram 3

Berdasarkan Rajah 3, cari julat nilai kecerunan,  $m$  bagi garis lurus OB.  
 Based on Diagram 3, find the range of values of the gradient,  $m$  of straight line OB.

[3 markah]

[3 marks]

Jawapan / Answer:



- (b) Fungsi  $T(x) = -5x^2 + 30x$  seperti yang ditunjukkan dalam Rajah 4 mewakili tinggi, dalam m, bunga api,  $x$  saat selepas dilancarkan. Bunga api itu meletup pada titik tertinggi. Dengan menggunakan kaedah penyempurnaan kuasa dua, tentukan

*The function  $T(x) = -5x^2 + 30x$  as shown in diagram 4 represents the height, in metres, of a firework,  $x$  seconds after it was launched. The fireworks exploded at the highest point. By using completing the square method, determine*



Rajah 4  
Diagram 4

- (i) bilakah bunga api itu meletup?  
*when did the firework explode?*
- (ii) pada ketinggian berapakah bunga api itu meletup?  
*what was the height at which the fireworks explode?*

[3 markah]  
[3 marks]

Jawapan / Answer:

4. (a) Terangkan perbezaan antara sistem persamaan linear dalam tiga pemboleh ubah yang mempunyai **penyelesaian tak terhingga** dengan **tiada penyelesaian**?

[1 markah]

*Explain the difference between **infinite solutions** and **no solution** for a system of linear equations with three variables.*

[1 mark]

- (b) Selesaikan sistem persamaan linear yang berikut:  
*Solve the following systems of linear equations:*

$$\begin{aligned}x + y + z &= 2 \\y - 3z &= 1 \\2x + y + 5z &= 0\end{aligned}$$

[4 markah]

[4 marks]

Jawapan / Answer:



5. (a) Selesaikan persamaan :  
*Solve the equation:*

$$16^{2x}(64) = 4^x$$

[2 markah]  
[2 marks]

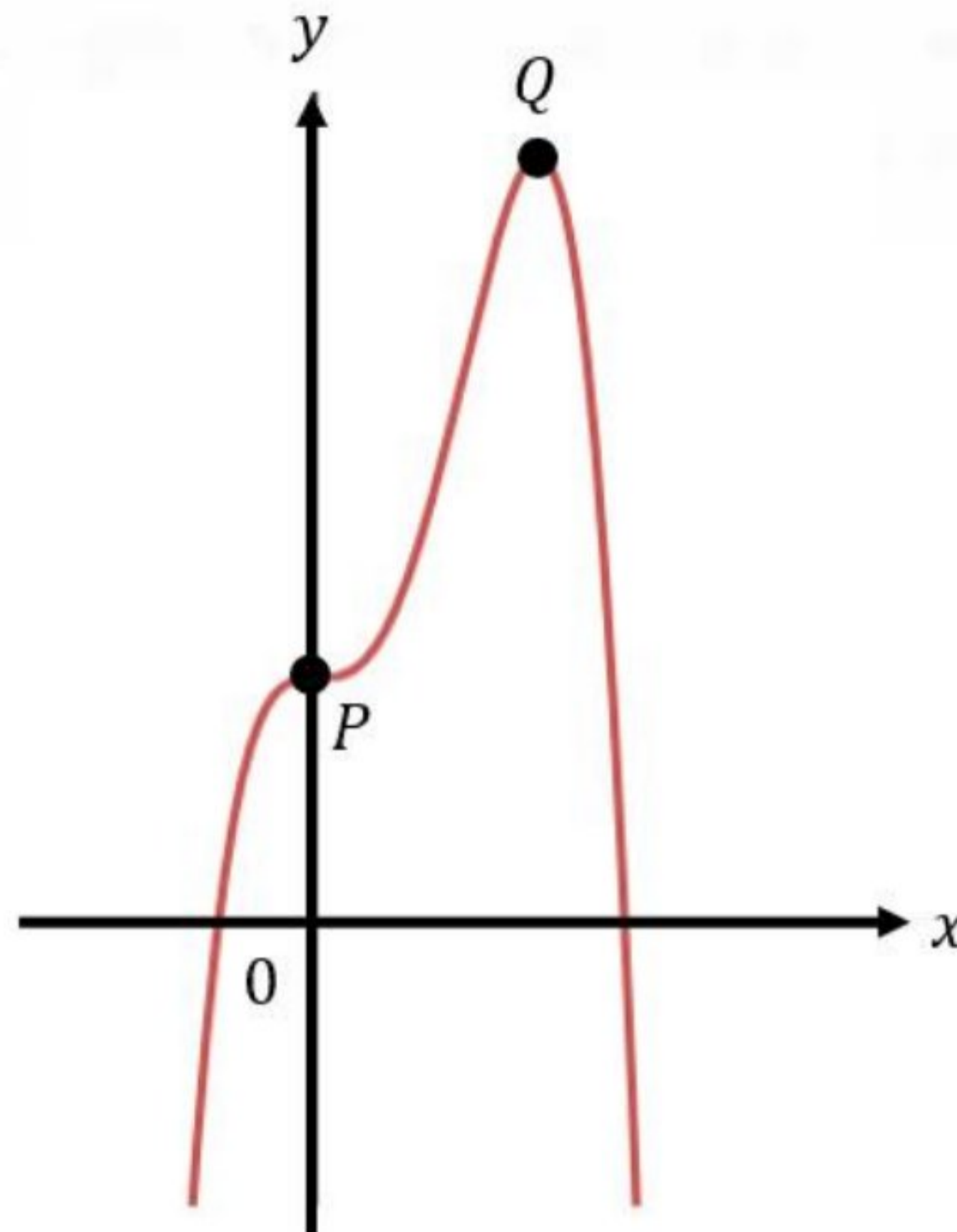
- (b) Diberi bahawa  $\log_3 p + \log_9 k = 3$ , bentukkan satu persamaan dalam sebutan p dan k.  
*Given that  $\log_3 p + \log_9 k = 3$ , form an equation in terms of p and k.*

[3 markah]  
[3 marks]

Jawapan / Answer:



6. (a) Rajah 5 menunjukkan sebahagian daripada lengkung  $y = -x^3(x - 3) + 4$ .  
*Diagram 5 shows a part of the curve  $y = -x^3(x - 3) + 4$ .*



Rajah 5  
 Diagram 5

- (a) Cari koordinat titik bagi dua titik pegun  $P$  dan  $Q$ .  
*Find the coordinates of the two stationary points,  $P$  and  $Q$*
- [2 markah]  
 [2 marks]
- (b) Seterusnya, tentukan sifat bagi titik pegun  $P$  menggunakan kaedah lakaran tangen.  
*Hence, determine the nature of stationary point  $P$  by using the tangent sketching method.*
- [2 markah]  
 [2 marks]

Jawapan / *Answer*:



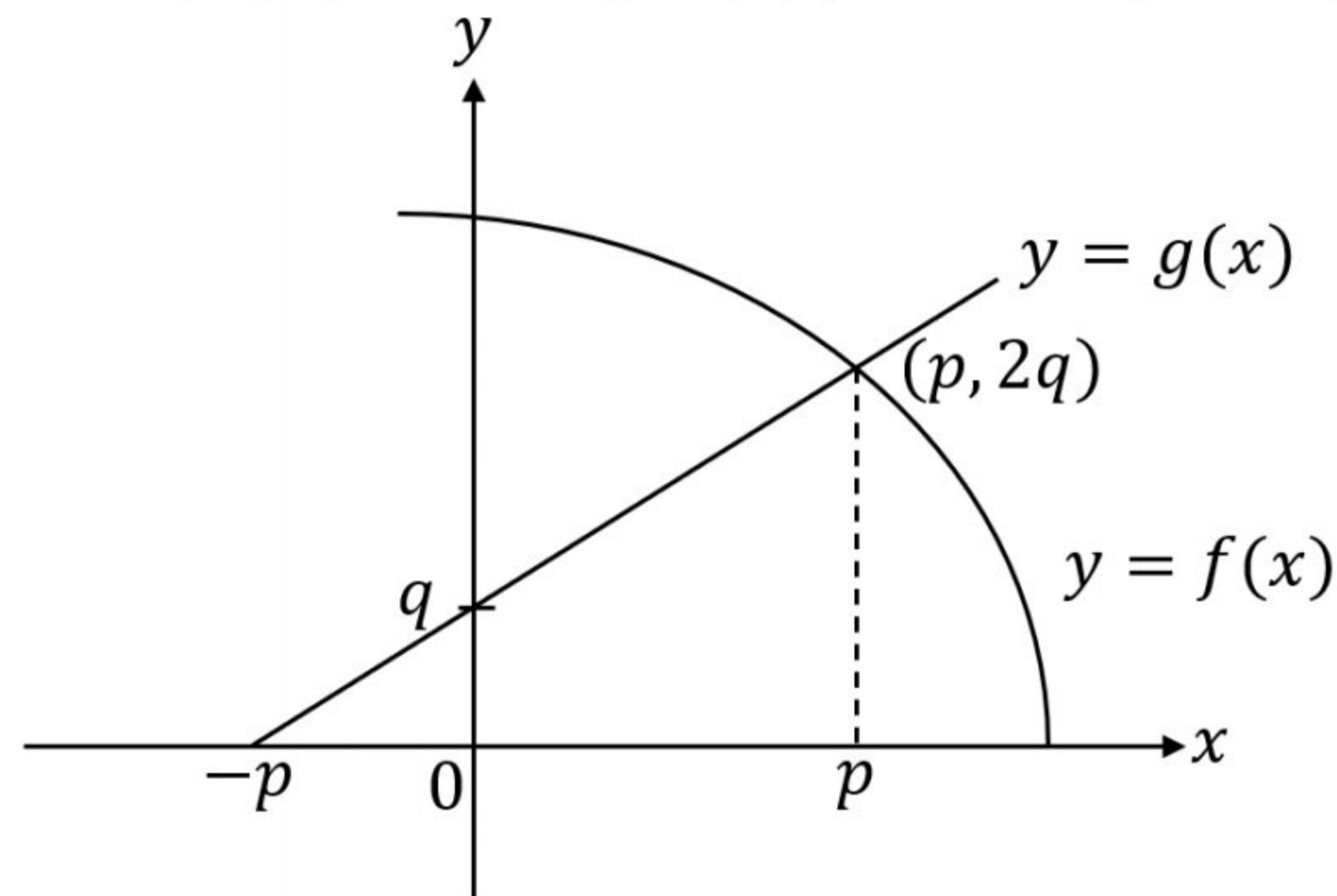
7. (a) Diberi  $\int_{-3}^5 f(x) dx = 7$ , cari  $\int_{-3}^5 [2f(x) - 3x] dx$ .  
 Given that  $\int_{-3}^5 f(x) dx = 7$ , find  $\int_{-3}^5 [2f(x) - 3x] dx$ .

[3 markah]

[3 marks]

- (b) Rajah 6 menunjukkan graf bagi suatu lengkung  $y = f(x)$  dan garis lurus  $y = g(x)$ .

Diagram 6 shows a graph for a curve  $y = f(x)$  and a straight line  $y = g(x)$ .



Rajah 6

Diagram 6

Diberi  $\int_0^p f(x) dx - \int_0^p g(x) dx = 10$ .

Given that  $\int_0^p f(x) dx - \int_0^p g(x) dx = 10$ .

- (i) Pada Rajah 6, lorekkan rantau yang diwakili oleh  $\int_0^p f(x) dx - \int_0^p g(x) dx$ .  
 On Diagram 6, shade the region represented by  $\int_0^p f(x) dx - \int_0^p g(x) dx$ .

[1 markah]

[1 mark]

- (ii) Cari  $\int_0^p f(x) dx$  dalam sebutan  $p$  dan  $q$ .  
 Find  $\int_0^p f(x) dx$  in terms of  $p$  and  $q$ .

[2 markah]

[2 marks]

Jawapan / *Answer*:



8. (a) Tukarkan persamaan bukan linear  $y = p\sqrt{x} - \frac{q}{x}$  kepada bentuk linear  $Y = mX + c$ , di mana  $p$  dan  $q$  ialah pemalar. Seterusnya, nyatakan paksi-Y dan paksi-X bagi persamaan linear tersebut.  
*Convert the non-linear equation  $y = p\sqrt{x} - \frac{q}{x}$  to linear form  $Y = mX + c$ , where  $p$  and  $q$  are constants. Hence, state the Y-axis and X-axis for the linear equation.*

[2 markah]

[2 marks]

- (b) Pemboleh ubah  $x$  dan  $y$  memenuhi persamaan  $y^4 = xe^A$ , dengan keadaan  $A$  ialah pemalar. Graf  $\ln y$  melawan  $\ln x$  ialah garis lurus.  
*The variables  $x$  and  $y$  satisfy the equation  $y^4 = xe^A$ , such that  $A$  is a constant. The graph of  $\ln y$  against  $\ln x$  is a straight line.*

- (i) Cari kecerunan garis lurus tersebut.

*Find the gradient of straight line.*

- (ii) Diberi bahawa garis lurus itu menyilang paksi- $\ln y$  pada  $\ln y = 0.5$ , cari nilai  $A$ .

*Given that the straight line intersects  $\ln y$ -axis at  $\ln y = 0.5$ , find the value of  $A$ .*

[4 markah]

[4 marks]

Jawapan / Answer:

9. Diberi bahawa  $\overrightarrow{PQ} = 4\mathbf{i} - 6\mathbf{j}$ ,  $\overrightarrow{PR} = 2\mathbf{i} + 4\mathbf{j}$  dan  $\overrightarrow{QR} = -2\mathbf{i} + 10\mathbf{j}$ .  
 T berada pada garis QR supaya  $QT = 3TR$ . Cari  
*Given that  $\overrightarrow{PQ} = 4\mathbf{i} - 6\mathbf{j}$ ,  $\overrightarrow{PR} = 2\mathbf{i} + 4\mathbf{j}$  and  $\overrightarrow{QR} = -2\mathbf{i} + 10\mathbf{j}$ .  
 T is on the line QR such that  $QT = 3TR$ . Find*

- (a) vektor  $\overrightarrow{PT}$  dalam sebutan  $\mathbf{i}$  dan  $\mathbf{j}$ ,  
*vector  $\overrightarrow{PT}$  in terms of  $\mathbf{i}$  dan  $\mathbf{j}$ ,*

[3 markah]

[3 marks]

- (b) vektor unit bagi  $\overrightarrow{PT}$ .  
*unit vector of  $\overrightarrow{PT}$ .*

[2 markah]

[2 marks]

Jawapan / Answer:

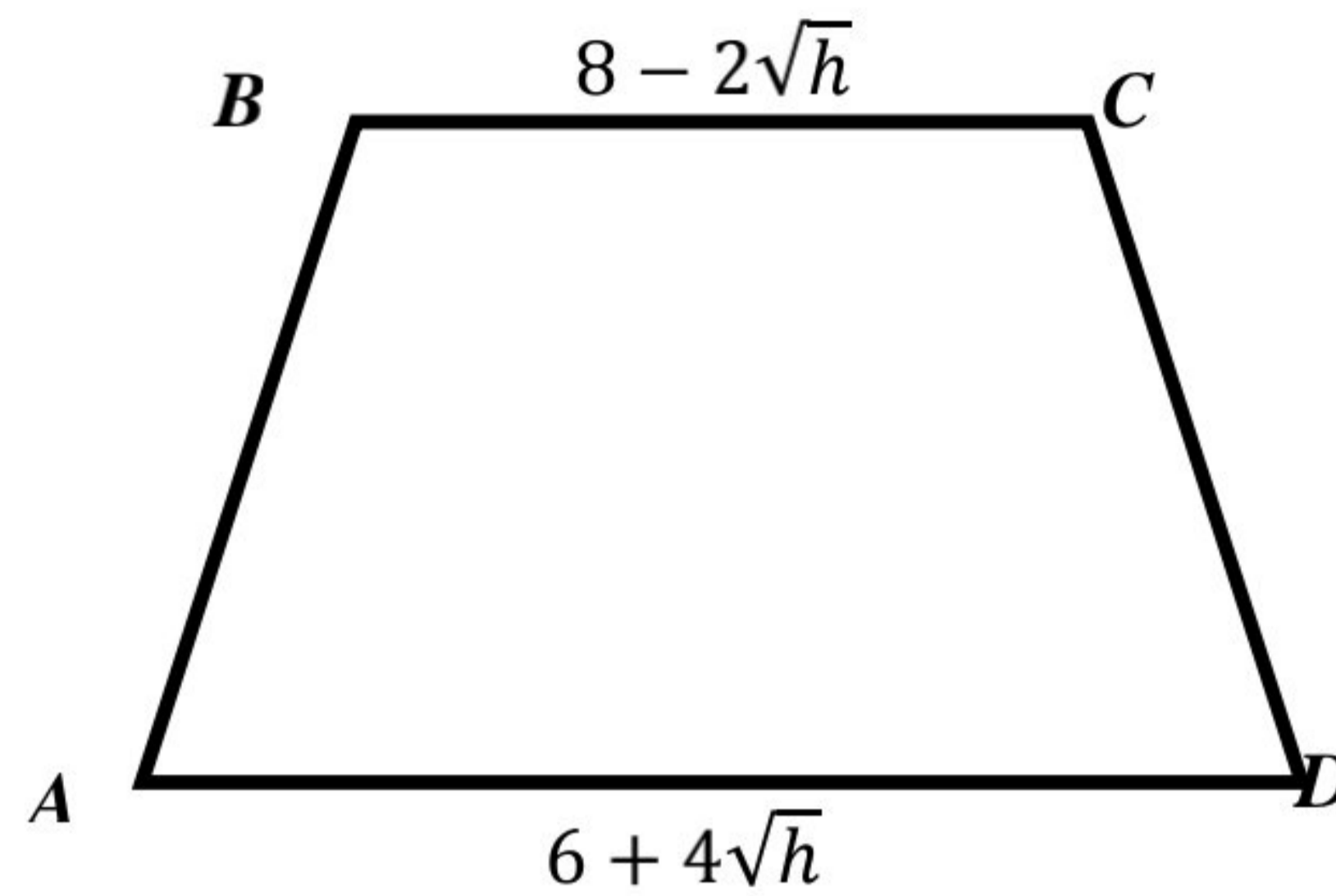


10. (a) Permudahkan  $(3 + 2\sqrt{h})(14 + 2\sqrt{h})$ .  
Simplify  $(3 + 2\sqrt{h})(14 + 2\sqrt{h})$ .

[2 markah]

[2 marks]

- (b) Rajah 7 menunjukkan sebuah trapezium ABCD  
Diagram 7 shows a trapezium ABCD.



Rajah 7  
Diagram 7

Diberi panjang AD dan BC ialah  $6 + 4\sqrt{h}$  dan  $8 - 2\sqrt{h}$  masing-masing. Tinggi trapezium itu ialah separuh daripada panjang AD dan luas trapezium ABCD ialah  $27 + 17\sqrt{h}$ . Cari nilai  $h$ .

[3 markah]

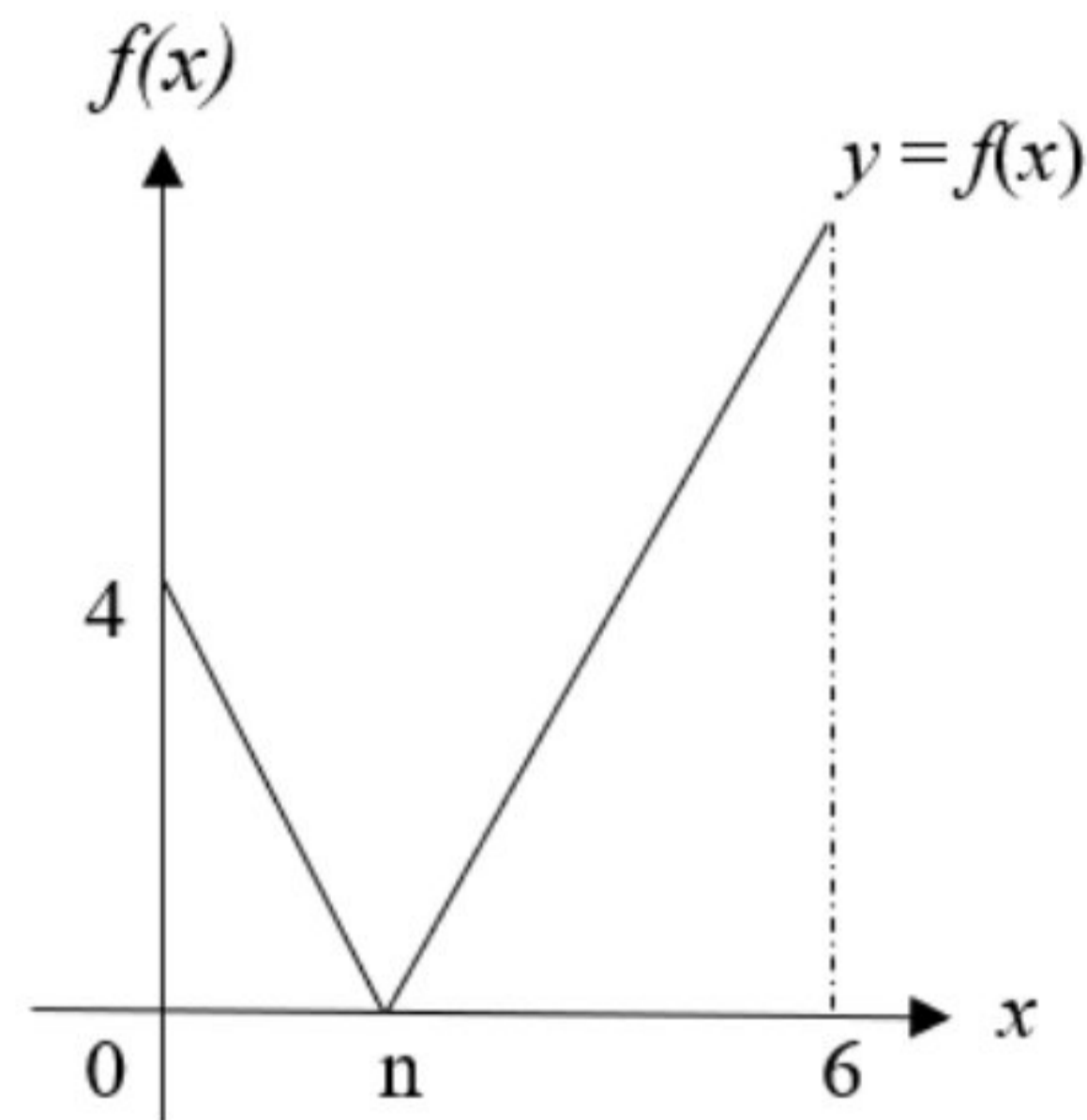
Given the length of AD and BC are  $6 + 4\sqrt{h}$  and  $8 - 2\sqrt{h}$  respectively. The height of the trapezium is half of the length of AD and the area of trapezium ABCD is  $27 + 17\sqrt{h}$ . Find the value of  $h$ .

[3 marks]

Jawapan / *Answer*:



11. Rajah 8 menunjukkan graf bagi fungsi  $f(x) = |m + 2x|$  untuk domain  $0 \leq x \leq 6$ .  
 Diagram 8 shows the graph of the function  $f(x) = |m + 2x|$  for the domain  $0 \leq x \leq 6$ .



Rajah 8  
 Diagram 8

Cari  
 Find

- |  |                         |
|--|-------------------------|
| (a) nilai $m$ dan $n$ .<br><i>the value of <math>m</math> and of <math>n</math>.</i>                         | [3 markah]<br>[3 marks] |
| (b) julat bagi fungsi itu.<br><i>the range of the function.</i>  | [1 markah]<br>[1 mark]  |
| (c) nilai-nilai $x$ jika $f(x) \geq 2$ .<br><i>the values of <math>x</math> if <math>f(x) \geq 2</math>.</i> | [2 markah]<br>[2 marks] |

Jawapan / Answer:

12. (a) Tunjukkan  ${}^n C_1 = n$ .  
*Show that  ${}^n C_1 = n$ .*

[2 markah]

[2 marks]

- (b) Cari bilangan cara sekumpulan 6 pelajar bernama Amin, Amutha, Budi, Ben, Chong dan Danny agar mereka dapat duduk di sebuah meja bulat dengan syarat

*Find the number of ways for six students namely Amin, Amutha, Budi, Ben, Chong and Danny to sit at a round table if*

- (i) Amin dan Amutha mesti duduk bersebelahan,  
*Amin and Amutha must sit side by side,*

- (ii) Amin dan Amutha tidak boleh duduk bersebelahan.  
*Amin and Amutha cannot sit side by side.*

[4 markah]

[4 marks]

Jawapan / Answer:



**Bahagian B**  
**Section B**

[ 16 markah / 16 marks ]

Jawab mana-mana **dua** soalan dari bahagian ini.

*Answer any **two** questions from this section.*

13. (a) Lakar graf  $y = -3\cos 2x$  untuk  $0 \leq x \leq \frac{3}{2}\pi$ . [3 markah]

*Sketch the graph of graf  $y = -3\cos 2x$  for  $0 \leq x \leq \frac{3}{2}\pi$ . [3 marks]*

- (b) Seterusnya, dengan menggunakan paksi yang sama, lakar satu graf yang sesuai untuk mencari bilangan penyelesaian bagi persamaan  $\frac{\pi}{x} + 6\cos 2x = 0$

untuk  $0 \leq x \leq \frac{3}{2}\pi$ . Nyatakan bilangan penyelesaiannya.

[3 markah]

*Hence, using the same axes, sketch a suitable graph to find the number of solutions for the equation  $\frac{\pi}{x} + 6\cos 2x = 0$  for  $0 \leq x \leq \frac{3}{2}\pi$ . State the number of solutions.*

[3 marks]

- (c) Dua penyelesaian diperoleh jika  $y = \frac{3p}{2}$  dilakarkan pada paksi-paksi yang sama di 13(b), dengan keadaan  $p$  ialah pemalar. Cari nilai-nilai  $p$ .

[2 markah]

*There are two solutions obtained if  $y = \frac{3p}{2}$  is sketched at the same axes in 13(b), such that  $p$  is a constant. Find the values of  $p$ .*

[2 marks]

Jawapan / Answer:



14. (a) Jika  $a$  ialah sebutan pertama dan  $r$  ialah nisbah sepunya bagi suatu jangjang geometri, tunjukkan bahawa hasil tambah ketakterhinggaan bagi jangjang itu ialah

*If  $a$  is the first term and  $r$  is the common ratio of a geometric progression, show that the sum to infinity of the progression is*

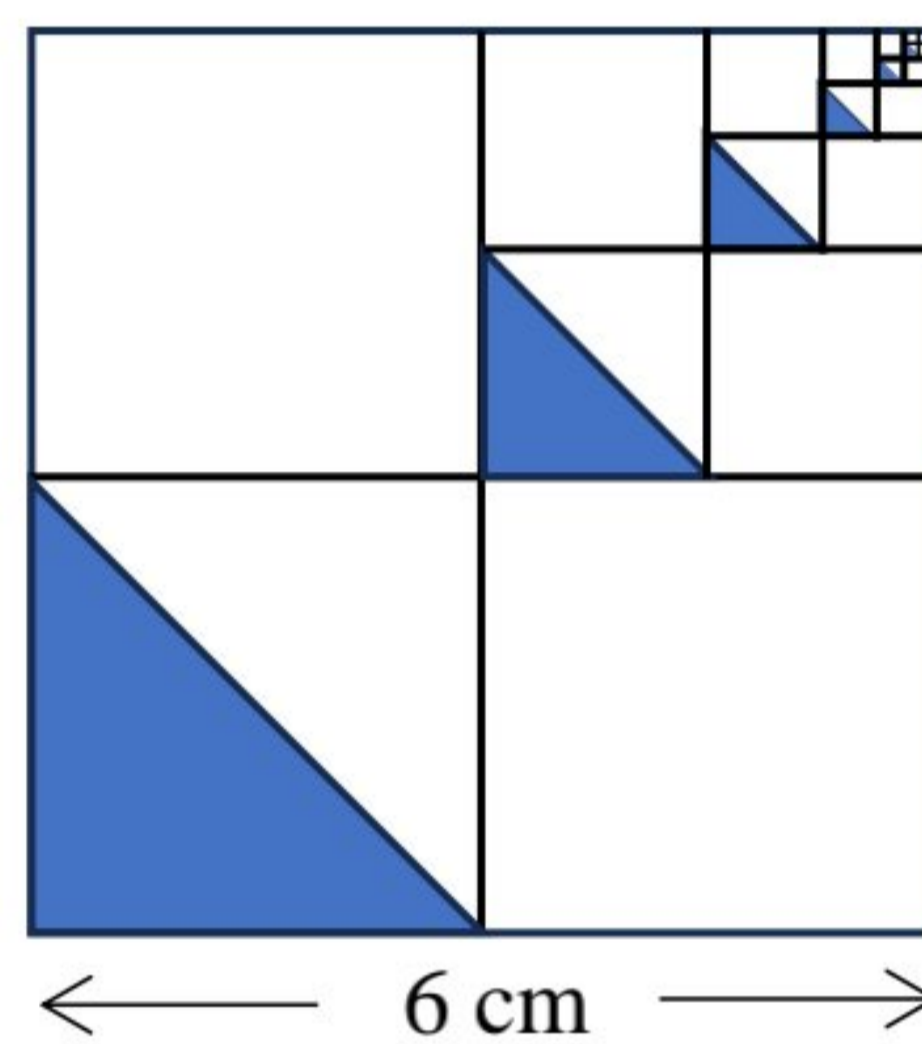
$$S_{\infty} = \frac{a}{1-r}, \quad |r| < 1$$

[2 markah]

[2 marks]

- (b) Rajah 9 menunjukkan satu corak yang berulang sehingga ketakterhinggaan yang terdiri daripada segi empat sama dan segi tiga berlorek. Panjang sisi segi empat sama yang besar ialah 6 cm.

*Diagram 9 shows a pattern that repeats itself to infinity consisting squares and shaded triangles. The length of a side of a big squares is 6 cm.*



Rajah 9  
Diagram 9

Cari  
Find

- (i) panjang tapak bagi segi tiga yang ke-5.  
*the base length of the 5<sup>th</sup> triangle.*

[2 markah]

[2 marks]

- (ii) luas kawasan berlorek, dalam unit  $\text{cm}^2$ .  
*the area of shaded region, in  $\text{cm}^2$ .*

[4 markah]

[4 marks]

Jawapan / Answer:



15. (a) Diberi bahawa  $X$  pemboleh ubah rawak diskrit dengan keadaan  $X \sim B(6, p)$  dan  $P(X = 6) = \frac{1}{64}$ . Cari nilai  $p$ .

*Given that  $X$  is a discrete random variable such that  $X \sim B(6, p)$  and  $P(X = 6) = \frac{1}{64}$ . Find the value of  $p$ .*

[3 markah]

[3 marks]

- (b) Taburan kebarangkalian bagi satu pemboleh ubah rawak diskret  $X = \{0, 1, 2, 3, 4\}$  diberi oleh  $P(X = r) = m(2r + 1)$  bagi setiap nilai  $r$ .  
*The probability distribution for a discrete random variable  $X = \{0, 1, 2, 3, 4\}$  is given by  $P(X = r) = m(2r + 1)$  for each  $r$ .*

- (i) Cari nilai  $m$ .  
*Find the value of  $m$ .*

- (ii) Lukis satu graf bagi taburan kebarangkalian  $X$ .  
*Draw a graph for the probability distribution of  $X$ .*

[5 markah]

[5 marks]

Jawapan / Answer:

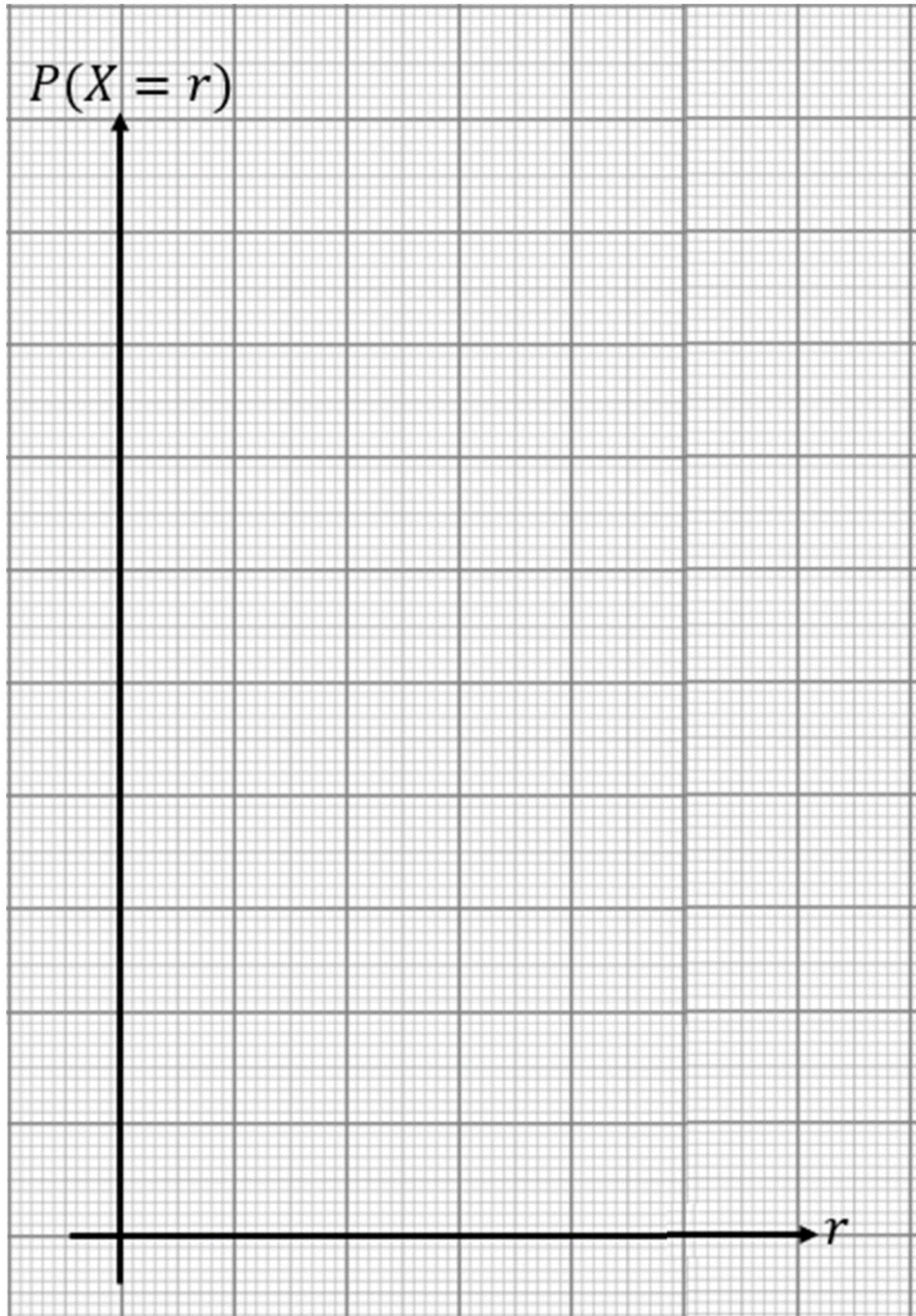
(a)



(b)(i)

(ii)





**KERTAS PEPERIKSAAN TAMAT**  
***END OF QUESTION PAPER***



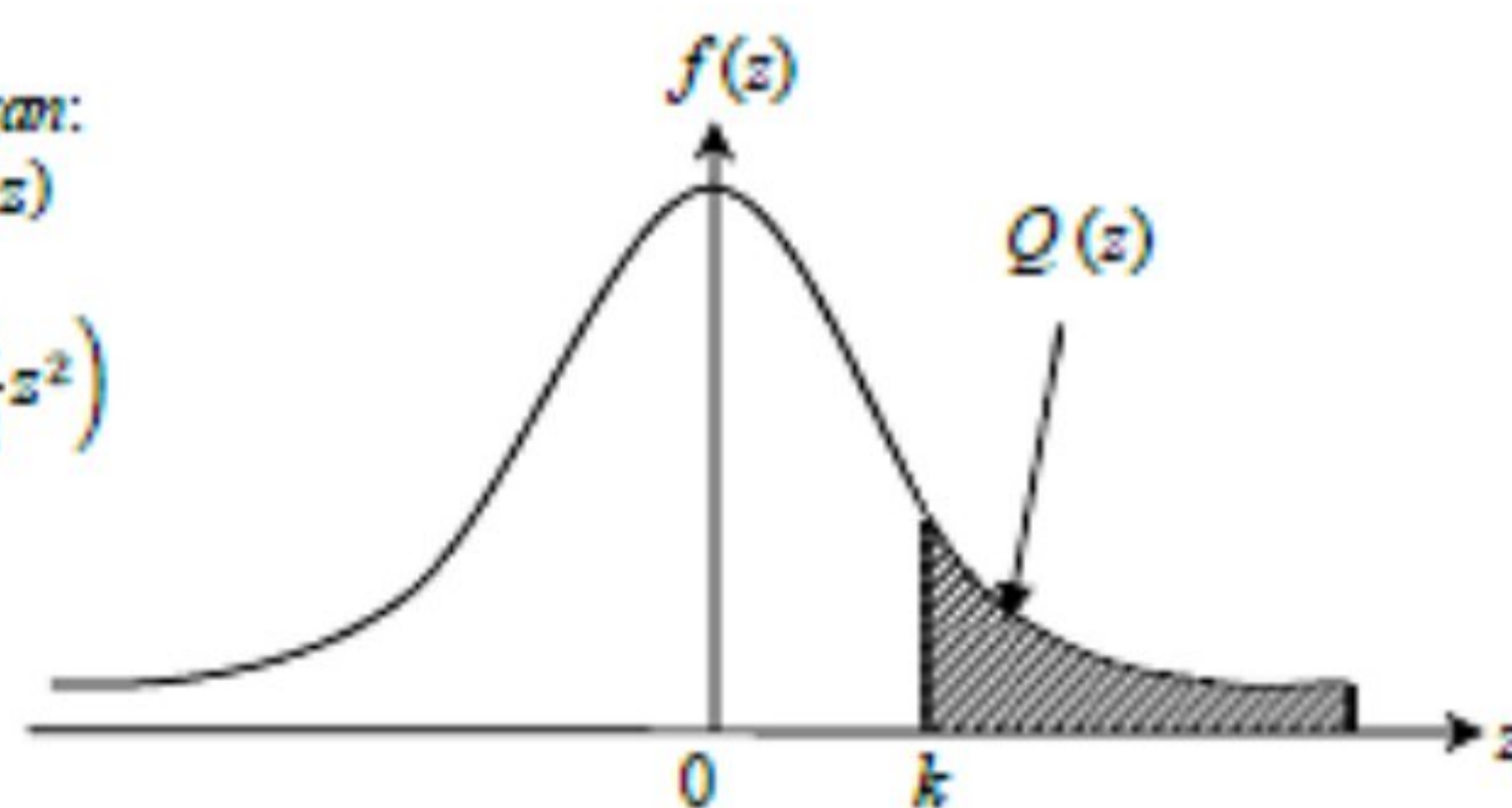
THE UPPER TAIL PROBABILITY  $Q(z)$  FOR THE NORMAL DISTRIBUTION  $N(0, 1)$   
 KEBARANGKALIAN HUJUNG ATAS  $Q(z)$  BAGI TABURAN NORMAL  $N(0, 1)$

z										Mimus / Tolak									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4	8	12	16	20	24	28	32	36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4	8	12	16	20	24	28	32	36
0.2	.4207	.4168	.4219	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4	8	12	15	19	23	27	31	35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4	7	11	15	19	22	26	30	34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4	7	11	15	18	22	25	29	32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3	7	10	14	17	20	24	27	31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3	7	10	13	16	19	23	26	29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3	6	9	12	15	18	21	24	27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3	5	8	11	14	16	19	22	25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3	5	8	10	13	15	18	20	23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2	5	7	9	12	14	16	19	21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2	4	6	8	10	12	14	16	18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2	4	6	7	9	11	13	15	17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2	3	5	6	8	10	11	13	14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1	3	4	6	7	8	10	11	13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1	2	4	5	6	7	8	10	11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1	2	3	4	5	6	7	8	9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1	2	3	4	4	5	6	7	8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1	1	2	3	4	4	5	6	6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1	1	2	2	3	4	4	5	5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0	1	1	2	2	3	3	4	4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0	1	1	2	2	2	3	3	4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0	1	1	1	2	2	2	3	3
2.3	.0107	.0104	.0102								0	1	1	1	1	2	2	2	2
				.02990	.02964	.02939	.02914				3	5	8	10	13	15	18	20	23
								.02889	.02866	.02842	2	5	7	9	12	14	16	16	21
2.4	.02820	.02798	.02776	.02755	.02734						2	4	6	8	11	13	15	17	19
						.02714	.02695	.02676	.02657	.02639	2	4	6	7	9	11	13	15	17
2.5	.02621	.02604	.02587	.02570	.02554	.02539	.02523	.02508	.02494	.02480	2	3	5	6	8	9	11	12	14
2.6	.02466	.02453	.02440	.02427	.02415	.02402	.02391	.02379	.02368	.02357	1	2	3	5	6	7	9	9	10
2.7	.02347	.02336	.02326	.02317	.02307	.02298	.02289	.02280	.02272	.02264	1	2	3	4	5	6	7	8	9
2.8	.02256	.02248	.02240	.02233	.02226	.02219	.02212	.02205	.02199	.02193	1	1	2	3	4	4	5	6	6
2.9	.02187	.02181	.02175	.02169	.02164	.02159	.02154	.02149	.02144	.02139	0	1	1	2	2	3	3	4	4
3.0	.02135	.02131	.02126	.02122	.02118	.02114	.02111	.02107	.02104	.02100	0	1	1	2	2	2	3	3	4

For negative  $z$  use relation:  
 Bagi  $z$  negatif guna hubungan:  
 $Q(z) = 1 - Q(-z) = P(-z)$

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

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



Example / Contoh:  
 If  $X \sim N(0, 1)$ , then  
 Jika  $X \sim N(0, 1)$ , maka  
 $P(X > k) = Q(k)$   
 $P(X > 2.1) = Q(2.1) = 0.0179$