MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI KEDAH DARUL AMAN

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2015

MATEMATIK TAMBAHAN
KERTAS 2
MODUL 2

$2\frac{1}{2}$ **jam** **Dua jam tiga puluh minit**

JANGAN BUKA MODUL INI SEHINGGA DIBERITAHU

1. *This module consists of three sections* : **Section A, Section B** *and* **Section C.**
2. *Answer* **all** *questions in* **Section A, four** *questions from* **Section B** *and* **two** *questions from* **Section C**.
3. *Give only* **one** *answer/solution to each question.*
4. *Show your working. It may help you to get your marks.*
5. *The diagrams provided are not drawn according to scale unless stated.*
6. *The marks allocated for each question and sub - part of a question are shown in brackets.*
7. *The Upper Tail Probability Q(z) For The Normal Distribution N(0,1) Table is provided on Page* ***20****.*
8. *You may use a* ***non-programmable*** *scientific calculator.*
9. *A list of formulae is provided in page* 2 *and* 3.

Modul ini mengandungi **20** halaman bercetak.

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

ALGEBRA

1. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2. $a^m \times a^n = a^{m+n}$
3. $a^m \div a^n = a^{m-n}$
4. $(a^m)^n = a^{mn}$
5. $\log_a mn = \log_a m + \log_a n$
6. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \dfrac{\log_c b}{\log_c a}$
9. $T_n = a + (n-1)d$
10. $S_n = \dfrac{n}{2}[2a + (n-1)d]$
11. $T_n = ar^{n-1}$
12. $S_n = \dfrac{a(r^n - 1)}{r - 1} = \dfrac{a(1 - r^n)}{1 - r}$, $r \neq 1$
13. $S_\infty = \dfrac{a}{1 - r}$, $|r| < 1$

CALCULUS

1. $y = uv$, $\dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$
2. $y = \dfrac{u}{v}$, $\dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$
3. $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$
4. Area under a curve
   $= \int_a^b y\,dx$ or
   $= \int_a^b x\,dy$
5. Volume of revolution
   $= \int_a^b \pi y^2\,dx$ or
   $= \int_a^b \pi x^2\,dy$

GEOMETRY

1. Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2. Mid point
   $(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$
3. Division of line segment by a point
   $(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$
4. Area of triangle
   $= \dfrac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$
5. $\left|\underline{r}\right| = \sqrt{x^2 + y^2}$
6. $\hat{r} = \dfrac{x\underset{\sim}{i} + y\underset{\sim}{j}}{\sqrt{x^2 + y^2}}$

STATISTICS

1. $\bar{x} = \dfrac{\sum x}{N}$

2. $\bar{x} = \dfrac{\sum fx}{\sum f}$

3. $\sigma = \sqrt{\dfrac{\sum (x - \bar{x})^2}{N}} = \sqrt{\dfrac{\sum x^2}{N} - \bar{x}^2}$

4. $\sigma = \sqrt{\dfrac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\dfrac{\sum fx^2}{\sum f} - \bar{x}^2}$

5. $m = \text{L} + \left(\dfrac{\frac{1}{2}N - F}{f_m} \right) C$

6. $I = \dfrac{Q_1}{Q_0} \times 100$

7. $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

8. ${}^n P_r = \dfrac{n!}{(n-r)!}$

9. ${}^n C_r = \dfrac{n!}{(n-r)!r!}$

10. $\text{P}(\text{A} \cup \text{B}) = \text{P}(\text{A}) + \text{P}(\text{B}) - \text{P}(\text{A} \cap \text{B})$

11. $\text{P}(X = r) = {}^n C_r \, p^r \, q^{n-r}$, $p + q = 1$

12. Mean, $\mu = np$

13. $\sigma = \sqrt{npq}$

14. $\text{Z} = \dfrac{X - \mu}{\sigma}$

TRIGONOMETRY

1. Arc length, $s = r\theta$

2. Area of sector, $\text{A} = \dfrac{1}{2} r^2 \theta$

3. $\sin^2 A + \cos^2 A = 1$

4. $\sec^2 A = 1 + \tan^2 A$

5. $\text{cosec}^2 A = 1 + \cot^2 A$

6. $\sin 2A = 2 \sin A \cos A$

7. $\cos 2A = \cos^2 A - \sin^2 A$
   $= 2 \cos^2 A - 1$
   $= 1 - 2 \sin^2 A$

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

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

10. $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

11. $\tan 2A = \dfrac{2 \tan A}{1 - \tan^2 A}$

12. $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

14. Area of triangle $= \dfrac{1}{2} ab \sin C$

Section A
Bahagian A

[40 *marks*]
[40 *markah*]

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

1 Solve the simultaneous equations $2x + y = 5$ and $3x^2 - 2y = 3$.

Give your answer correct to three decimal places [5 *marks*]

Selesaikan persamaan serentak $2x + y = 5$ *dan* $3x^2 - 2y = 3$.

Beri jawapan anda betul kepada tiga tempat perpuluhan. [5 *markah*]

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

(*a*) Find the value of *n* and of *p*. [3 *marks*]

(*b*) Sketch the graph of the function $f(x)$. [2 *marks*]

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

[2 *marks*]

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

(*a*) *Cari nilai n dan p.* [3 *markah*]

(*b*) *Lakar graf fungsi* $f(x)$. [2 *markah*]

(*c*) *Seterusnya, cari julat bagi nilai h jika fungsi* $f(x) = h$ *mempunyai dua punca yang berbeza.*

[2 *markah*]

3 (*a*) Show that

$$\frac{\log_n 27 + \log_n 64}{\log_n 3 + \log_n 4} = 3$$ [3 *marks*]

(*b*) Given that $y = a^m$ and $x = a^n$. Express

$\log_a\left(\frac{x^3 y}{\sqrt{y}}\right)$ in terms of *m* and *n*. [3 *marks*]

(*a*) *Tunjukkan*

$$\frac{\log_n 27 + \log_n 64}{\log_n 3 + \log_n 4} = 3$$ [3*markah*]

(*b*) *Diberi* $y = a^m$ *dan* $x = a^n$. *Ungkapkan*

$\log_a\left(\frac{x^3 y}{\sqrt{y}}\right)$ *dalam sebutan m dan n*. [3*markah*]

4 (*a*) Prove that $\left(\cos^2 x\right)\left(1 - \tan^2 x\right) = \cos 2x$. [2 *marks*]

(*b*) (i) Sketch the graph of $y = -3\cos 2x$ for $0 \le x \le \pi$. [3 *marks*]

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{x}{3\pi} - \left(\cos^2 x\right)\left(1 - \tan^2 x\right) = \frac{1}{6}$ for $0 \le x \le \pi$.

State the number of solutions. [3 *marks*]

(*a*) *Buktikan* $\left(\text{kos}^2 x\right)\left(1 - \tan^2 x\right) = kos\ 2x$. [2 *markah*]

(*b*) (i) *Lakar graf bagi* $y = -3\cos 2x$ *untuk* $0 \le x \le \pi$. [3 *markah*]

(ii) *Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan* $\frac{x}{3\pi} - \left(\cos^2 x\right)\left(1 - \tan^2 x\right) = \frac{1}{6}$ *untuk* $0 \le x \le \pi$.

Nyatakan bilangan penyelesaian itu. [3 *markah*]

5

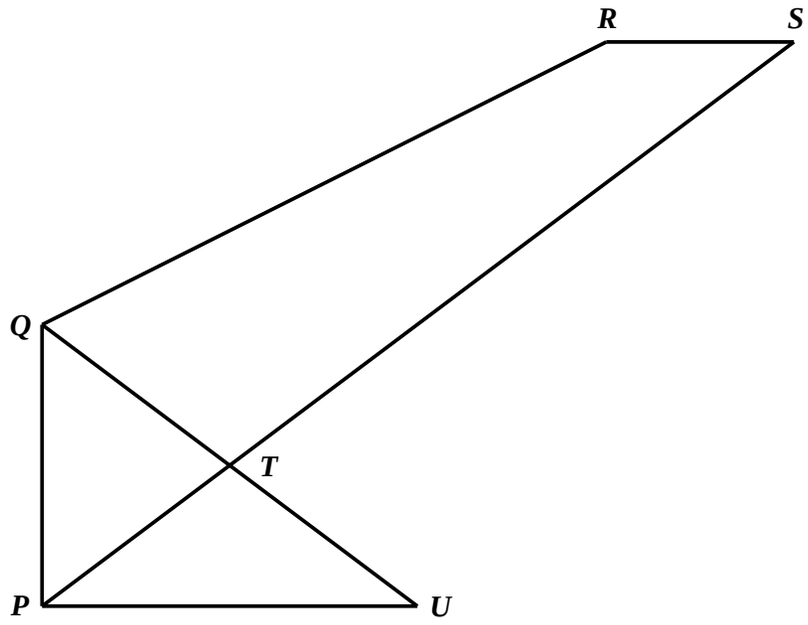


Diagram 5 / *Rajah* 5

In Diagram 5, PQU is right angled triangle and $PQRS$ is a quadrilateral. The straight lines PS and QU intersect at point T. It is given $\overrightarrow{PU} = 10\underset{\sim}{x}$, $\overrightarrow{PQ} = 6\underset{\sim}{y}$, $\overrightarrow{RS} = \frac{1}{2}\overrightarrow{PU}$, $\overrightarrow{QR} = 15\underset{\sim}{x} + 6\underset{\sim}{y}$, $QT : QU = 1 : 2$, $PT : TS = m : n$, $|\underset{\sim}{x}| = 4$ units and $|\underset{\sim}{y}| = 5$ units.

(*a*) Find $|\overrightarrow{QU}|$.

(*b*) Express in terms of $\underset{\sim}{x}$ and / or $\underset{\sim}{y}$

(i) $\overrightarrow{UT}$

(ii) $\overrightarrow{PS}$

(*c*) Find $m : n$.

[8 *marks*]

Dalam Rajah 5, *PQU ialah sebuah segitiga tegak dan PQRS ialah sebuah sisi empat. Garis lurus PS dan QU bersilang di titik T. Diberi bahawa* $\overrightarrow{PU} = 10\underset{\sim}{x}$, $\overrightarrow{PQ} = 6\underset{\sim}{y}$, $\overrightarrow{RS} = \frac{1}{2}\overrightarrow{PU}$, $\overrightarrow{QR} = 15\underset{\sim}{x} + 6\underset{\sim}{y}$, $QT : QU = 1 : 2$, $PT : TS = m : n$, $|\underset{\sim}{x}| = 4 unit$ *dan* $|\underset{\sim}{y}| = 5 unit$.

(*a*) *Cari* $|\overrightarrow{QU}|$.

(*b*) *Ungkapkan dalam sebutan* $\underset{\sim}{x}$ *dan / atau* $\underset{\sim}{y}$

(i) $\overrightarrow{UT}$

(ii) $\overrightarrow{PS}$

(*c*) *Cari* $m : n$.

[8 *markah*]

6

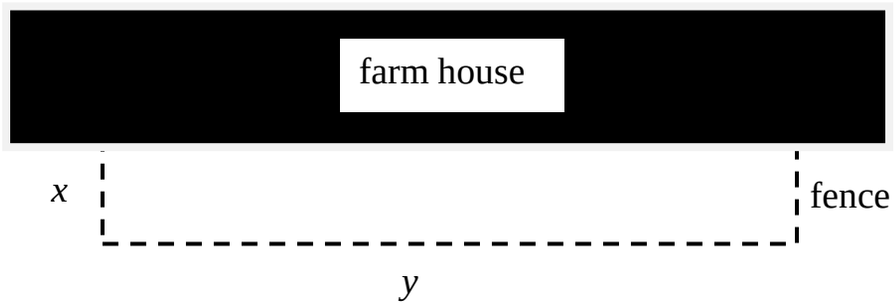


Diagram 6 / *Rajah* 6

A farmer needs to build security fence along the remaining 3 sides of front compound of the farm house as shown in Diagram 6. Find the maximum area of compound that can be enclosed if the farmer has only 220 m of fencing.

[6 *marks*]

Seorang penternak perlu membina pagar keselamatan sepanjang 3 *sempadan bagi halaman hadapan rumah ternakan seperti ditunjuk dalam Rajah* 6. *Cari luas maksimum halaman yang boleh dikelilingi jika penternak itu hanya mempunyai* 220 m *pagar*.

[6 *markah*]

Section B
Bahagian B

[40 *marks*]
[40 *markah*]

Answer **four** questions from this section.

*Jawab **empat** soalan daripada bahagian ini.*

7 Use graph paper to answer this question.

Guna kertas graf untuk menjawab soalan ini.

x	1·0	1·5	2·0	2·5	3·0	3·5
y	5·01	3·55	2·50	1·77	1·26	0·88

Table 7/ *Jadual* 7

Table 7 shows the values of two variables, x and y, obtained from an experiment.

(*a*) Based on Table 7, construct a table for the values of $\log_{10} y$. [1 *mark*]

(*b*) Plot $\log_{10} y$ against x, using a scale of 2 cm to 0.5 unit on the $x-$axis and 2 cm to 0.1 unit on the $\log_{10} y$-axis. Hence, draw the line of best fit. [3 *marks*]

(*c*) Use the graph in **7** (*b*),

(i) express y in terms of x,

(ii) find the value of x when y = 2. [6 *marks*]

Jadual 7 *menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen.*

(*a*) *Berdasarkan Jadual* 7, *bina satu jadual untuk nilai-nilai* $\log_{10} y$.

[1 *markah*]

(*b*) *Plot* $\log_{10} y$ *melawan* x, *dengan menggunakan skala* 2 cm *kepada* 0.5 unit *pada paksi* $-x$ *dan* 2 cm *kepada* 0.1 unit *pada paksi-*$\log_{10} y$. *Seterusnya, lukis garis lurus penyuaian terbaik.*

[3 *markah*]

(*c*) *Gunakan graf di* **7**(*b*),

(i) *ungkapkan y dalam sebutan x,*

(ii) *cari nilai x apabila y*=2. [6 *markah*]

8

Diagram 8 / *Rajah* 8

Retapy Sdn Bhd wants to build a tunnel with a curved top. The curve is an arc of circle from the bottom of the tunnel. The width of the tunnel is 6 m and the height of the vertical wall is $8 \cdot 24$ m.
[Use $\pi = 3 \cdot 142$]

(*a*) What is the length of the curved top of the tunnel?

[6 *marks*]

(*b*) Find the area of the cross section of the tunnel.

[4 *marks*]

Retapy Sdn Bhd ingin membina sebuah terowong yang melengkung di atas. Lengkungan itu ialah suatu lengkok bulatan daripada dasar terowong. Lebar terowong itu ialah 6 m *dan tinggi dinding mencancang ialah* $8 \cdot 24$ m.
[*Guna* $\pi = 3 \cdot 142$]

(*a*) *Apakah panjang lengkungan atas terowong itu*?

[6 *markah*]

(*b*) *Cari luas keratan rentas terowong itu*.

[4 *markah*]

9 Diagram 9 shows a quadrilateral *OPQR* . Point *S* lies on the line *PQ*.
Rajah 9 *menunjukkan sebuah sisi empat OPQR. Titik S terletak pada garis PQ.*

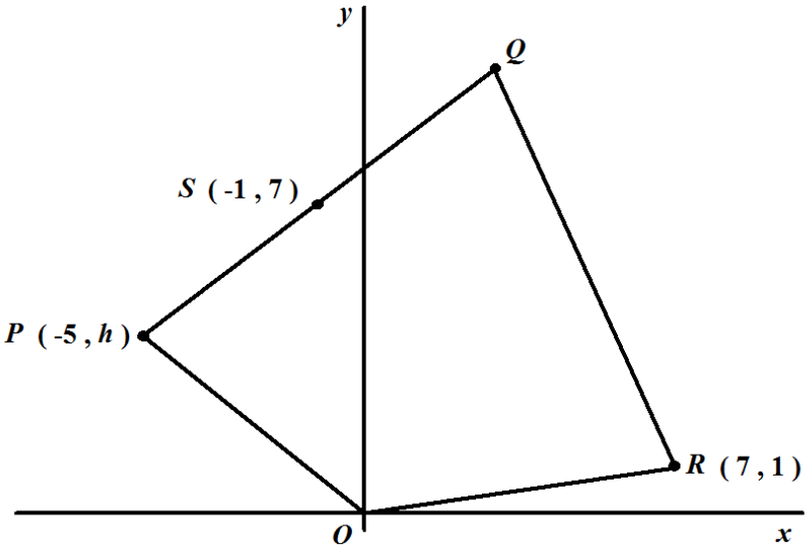


Diagram 9 / *Rajah* 9

(*a*) Find the distance of *RS*.

[2 *marks*]

(*b*) Point $T(x, y)$ moves such that its distance from point *S* is always 5 units. Find the equation of the locus of point *T*.

[2 *marks*]

(*c*) Given that point *P* and point *Q* lies on the locus *T*, calculate
(i) the value of *h*,
(ii) the coordinates of *Q*.

[4 *marks*]

(*d*) Find the area, in unit^2, of the quadrilateral *OPQR*.

[2 *marks*]

(*a*) *Cari jarak RS.*

[2 *markah*]

(*b*) *Titik* $T(x, y)$ *bergerak dengan keadaan jaraknya dari titik S sentiasa* 5 *unit. Cari persamaan locus bagi titik T.*

[2 *markah*]

(*c*) *Diberi titik P dan titik Q terletak pada lokus T, hitungkan*
(i) *nilai h,*
(ii) *koordinat bagi Q.*

[4 *markah*]

(*d*) *Cari luas, dalam* unit^2, *sisiempat OPQR.*

[2 *markah*]

10 Diagram 10 shows part of the curve $y = \frac{16}{x^2}$. The straight line $y = 2x$ intersects the curve at point *A*.

Rajah 10 *menunjukkan sebahagian daripada lengkung* $y = \frac{16}{x^2}$. *Garis lurus* $y = 2x$ *meyilang lengkung itu pada titik A.*

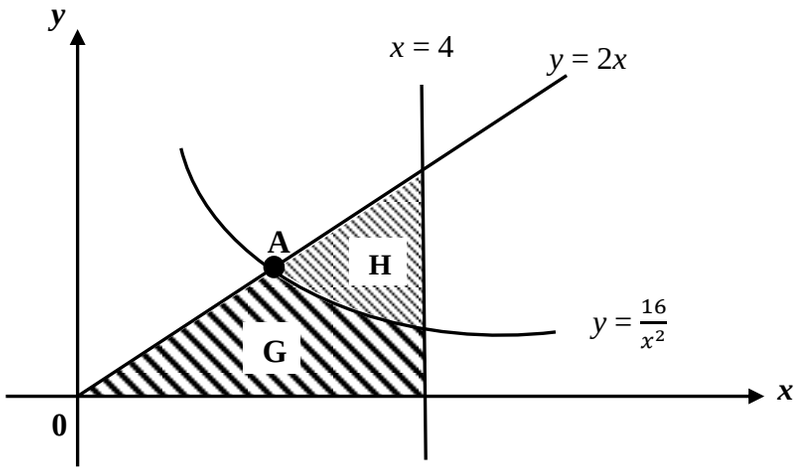


Diagram 10/ *Rajah* 10

(*a*) Find the coordinates of point *A*. [2 *marks*]

(*b*) Find the area of shaded region *H*. [4 *marks*]

(*c*) Calculate the volume generated, in terms of π, when the shaded area *G* rotated through 360^0 about the *x*-axis.

[4 *marks*]

(*a*) *Cari koordinat titik A.* [2 *markah*]

(*b*) *Hitung luas rantau berlorek H.* [4 *markah*]

(c) *Hitung isipadu yang dijanakan, dalam sebutan π, apabila rantau G dikisarkan melalui* 360^0 *pada paksi-x.*

[4 *markah*]

11 (*a*) In a survey, it is found that 65% of households in Malaysia have internet at home. A sample of 20 households is chosen at random.

(i) What is the standard deviation of the household?

(ii) Find the probability that exactly 12 households have internet at home.

[5 *marks*]

(*b*) The mass of durians from a farm have a normal distribution with a mean of 2 kg and a standard deviation of 0.8 kg. Calculate

(i) the probability that a durian chosen at random from this farm has a mass of more than 1 kg.

(ii) the value of *m* if 68% of the durian have masses less than *m* kg.

[5 *marks*]

(*a*) *Dalam satu kajian, didapati bahawa* 65% *penghuni rumah di Malaysia mempunyai internet di rumah. Satu sample* 20 *penghuni rumah dipilih secara rawak.*

(i) *Apakah sisihan piawai penghuni rumah* ?

(ii) *Cari kebarangkalian tepat* 12 *penghuni rumah mempunyai internet di rumah.*

[5 *markah*]

(*b*) *Jisim bagi buah durian dari sebuah ladang mempunyai taburan normal dengan min* 2 kg *dan sisihan piawai* 0.8 kg. *Hitung*

(i) *kebarangkalian bahawa sebiji durian yang dipilih secara rawak dari ladang ini mempunyai jisim lebih daripada* 1 kg.

(ii) *nilai m jika* 68% *daripada durian mempunyai jisim kurang daripada m* kg.

[5 *markah*]

Section C
Bahagian C
[20 marks]
[20 *markah*]

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

12 A particle moves along a straight line from a fixed point *O*. Its velocity, v ms^{-1}, is given by $v = 22 + 7t - 2t^2$, where t is the time, in seconds, after leaving the point *O*.

[Assume motion to the right is positive.]

Find

(*a*) the velocity of the particle when the acceleration is zero, [3 *marks*]

(*b*) the time, in seconds, when the particle stops instantaneously, [2 *marks*]

(*c*) the distance from *O* when the particle is stop instantaneously, [2 *marks*]

(*d*) the total distance travelled, in m, by the particle in the first 7 seconds. [3 *marks*]

Suatu zarah bergerak di sepanjang suatu garis lurus dari satu titik tetap O. Halajunya, v ms^{-1}, *diberi oleh $v = 22 + 7t - 2t^2$, dengan t ialah masa, dalam saat, selepas meninggalkan titik O.*

[*Anggapkan gerakan ke arah kanan sebagai positif.*]

Cari

(*a*) *halaju zarah apabila pecutannya sifar,* [3 *markah*]

(*b*) *masa, dalam saat, apabila zarah berhenti seketika,* [2 *markah*]

(*c*) *jarak dari O apabila zarah itu berhenti seketika,* [2 *markah*]

(*d*) *jumlah jarak yang dilalui, dalam* m, *oleh zarah itu dalam* 7 *saat pertama.* [3 *markah*]

13 Diagram 13 is a bar chart indicating the weekly cost of the items *P*, *Q*, *R*, *S* and *T* for the year 2005. Table 13 shows the prices and the price indices for the items.

Rajah 13 *ialah carta bar yang memaparkan kos mingguan bagi bahan-bahan P, Q, R, S dan T bagi tahun* 2005. *Jadual* 13 *menunjukkan harga-harga dan harga indeks untuk bahan-bahan.*

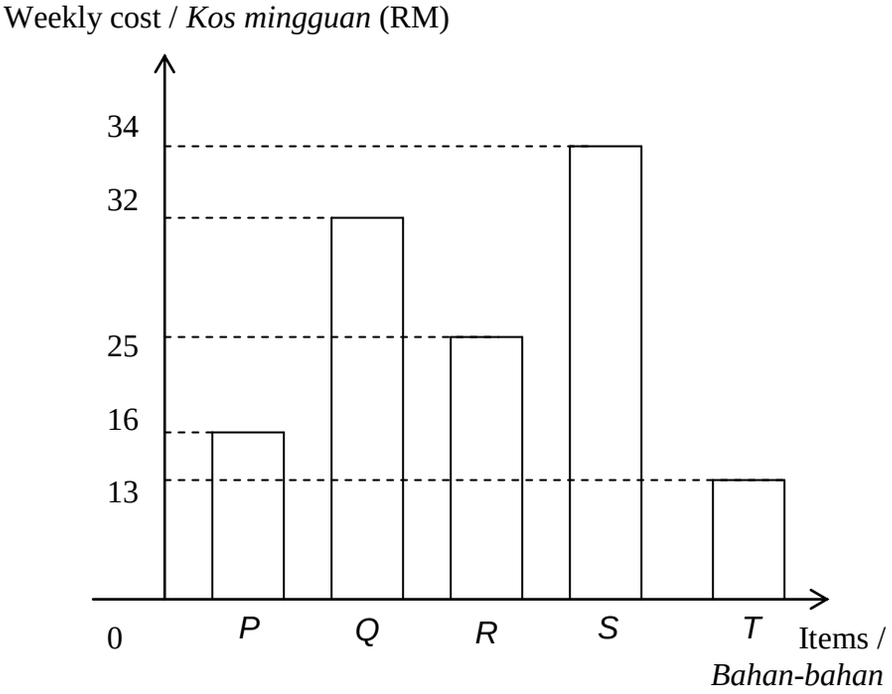


Diagram 13 / *Rajah* 13

Items *Bahan-bahan*	Price in / *Harga pada* 2005(RM)	Price in / *Harga pada* 2010(RM)	Price Index in 2010 based on 2005 *Indeks harga pada* 2010 *berasaskan* 2005
P	*x*	0·70	175
Q	2·00	2·50	125
R	4·00	5·50	*y*
S	6·00	9·00	150
T	2·50	3·00	120

Table 13 / *Jadual* 13

(*a*) Find the value of

(i) *x*,
(ii) *y*.

[3 *marks*]

(*b*) Calculate the composite index for the items in the year 2010 based on the year 2005.

[3 *marks*]

(*c*) The total monthly cost of the items in the year 2005 is RM456.
Calculate the corresponding total monthly cost for the year 2010.

[2 *marks*]

(*d*) The cost of the items increases by 20% from the year 2010 to the year 2014.
Find the composite index for the year 2014 based on the year 2005.

[2 *marks*]

(*a*) *Cari nilai bagi*

(i) *x*,

(ii) *y*.

[3 *markah*]

(*b*) *Hitung indeks gubahan bagi bahan-bahan pada tahun* 2010 *berasaskan tahun* 2005.

[3 *markah*]

(*c*) *Jumlah kos bulanan bahan-bahan pada tahun* 2005 *ialah* RM456.
Hitung jumlah kos bulanan yang sepadan pada tahun 2010.

[2 *markah*]

(*d*) *Kos bahan-bahan meningkat* 20% *dari tahun* 2010 *ke tahun* 2014.
Cari indeks gubahan bagi tahun 2014 *berasaskan tahun* 2005.

[2 *markah*]

14 Use graph paper to answer this question.

A factory produces two types of electronic devices P and Q by using machines A and B. Table 14 shows the time taken to produce devices P and Q respectively.

Device *Peranti*	Time taken (minutes) *Masa diambil* (minit)	
	Machine A *Mesin A*	Machine B *Mesin B*
P	50	20
Q	25	40

Table 14/ *Jadual* 14

In any given week, the factory produces $\boldsymbol{x}$ units of device P and $\boldsymbol{y}$ units of device Q.
The production of the electronic devices per week is based on the following constraints:

I : Machine A operates not more than 2500 minutes.

II : Machine B operates at least 1600 minutes.

III : The number of device Q produced is not more than three times the number of device P produced.

(a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints.

[3 *marks*]

(b) Using a scale of 2 cm to 10 units on both axes, construct and shade the region $\boldsymbol{R}$ which satisfies all of the above constraints.

[3 *marks*]

(c) Use your graph in **14**(b) to find

(i) the maximum number of device P that could be produced, if the factory plans to produce only 30 units of device Q,

(ii) the maximum profit per week if the profit from a unit of device P is RM20 and from a unit of device Q is RM30.

[4 *marks*]

Guna kertas graf untuk menjawab soalan ini.

Sebuah kilang menghasilkan dua peranti elektronik P dan Q dengan menggunakan mesin A dan B. Jadual 14 *menunjukkan masa yang diambil untuk menghasilkan peranti P dan Q.*

Dalam mana-mana satu minggu, kilang tersebut menghasilkan x unit bagi peranti P dan y unit bagi peranti Q. Penghasilan peranti-peranti tersebut adalah berdasarkan kekangan berikut:

I : *Mesin A beroperasi tidak melebihi* 2500 *minit.*

II : *Mesin B beroperasi sekurang-kurangnya* 1600 *minit.*

III : *Bilangan peranti Q yang dihasilkan tidak melebihi tiga kali ganda bilangan peranti P yang dihasilkan.*

(*a*) *Tuliskan tiga ketaksamaan, selain* $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.*

[3 *markah*]

(*b*) *Menggunakan skala* 2 cm *kepada* 10 *unit pada kedua-dua paksi, bina dan lorek rantau* ***R*** *yang memenuhi semua kekangan di atas.*

[3 *markah*]

(*c*) *Gunakan graf anda di* **14**(*b*) *untuk mencari*

(i) *bilangan maksimum bagi peranti P yang boleh dihasilkan jika kilang tersebut bercadang untuk menghasilkan* 30 *unit peranti Q sahaja,*

(ii) *keuntungan maksimum seminggu jika keuntungan yang diperoleh dari satu unit peranti P ialah* RM20 *dan dari satu unit peranti Q ialah* RM30.

[4 *markah*]

15 Diagram 15 shows a quadrilateral *PQRS* such that $\angle PQR$ is acute.

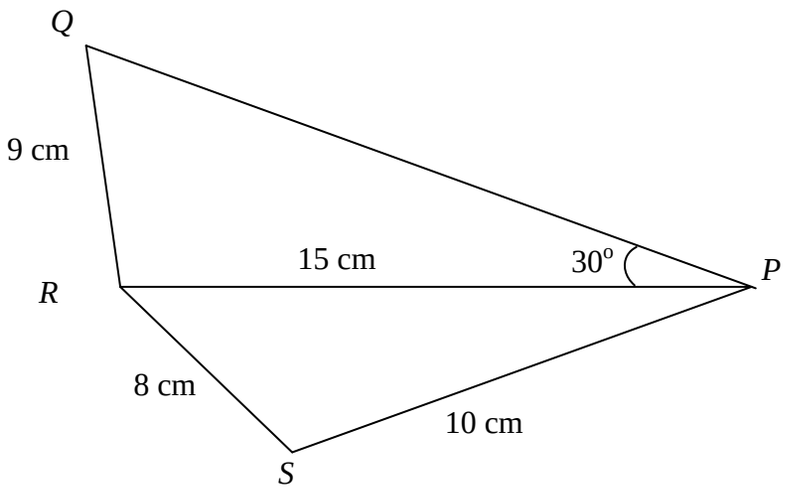


Diagram 15 / *Rajah* 15

(*a*) Calculate

(i) $\angle PQR$ [2 *marks*]

(ii) $\angle RSP$. [2 *marks*]

(iii) the area, in cm^2, of quadrilateral *PQRS*. [4 *marks*]

(*b*) A triangle *PQ'R* has the same measurement as triangle *PQR*, that is *PR* = 15 cm, *RQ'* = 9 cm and $\angle Q'PR = 30^o$, but is different in shape to triangle *PQR*.

(i) Sketch the triangle *PQ'R*,

(ii) State the size of $\angle PQ'R$. [2 *marks*]

Rajah 15 *menunjukkan sebuah sisiempat PQRS dengan* $\angle PQR$ *ialah sudut tirus.*

(*a*) *Hitungkan*

(i) $\angle PQR$, [2 *markah*]

(ii) $\angle RSP$ [2 *markah*]

(iii) *luas, dalam* cm^2, *bagi sisiempat PQRS.* [4 *markah*]

(*b*) *Satu segi tiga PQ'R mempunyai sukatan yang sama dengan segitiga PQR, dengan* $PR = 15$ cm, $RQ' = 9$ cm *dan* $\angle Q'PR = 30^\circ$, *tetapi mempunyai bentuk yang berbeza dengan segitiga PQR.*

(i) *Lakarkan segitiga PQ'R,*

(ii) *Nyatakan saiz* $\angle PQ'R$. [2 *markah*]

END OF QUESTION PAPER

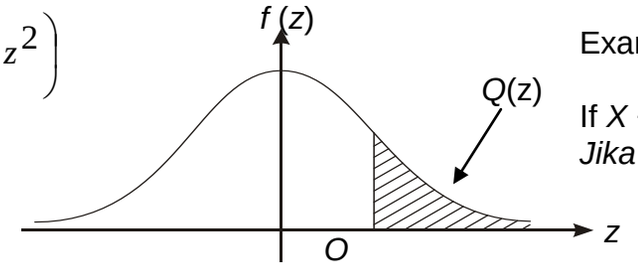
KERTAS SOALAN TAMAT

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	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

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

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



Example / *Contoh*:

If X ~ N(0, 1), then $P(X > k) = Q(k)$
Jika X ~ N(0, 1), *maka* $P(X > k) = Q(k)$