SPM
2021

SOALAN RAMALAN 2021 ADD MATH KERTAS 2

SIR VEN

SIR VEN

SOALAN 1

SIMULATENOUS EQUATION/ PERSAMMAN SERENTAK

QUESTION 1

Solve the following simultaneous equations:

Selesaikan persamaan serentak berikut:

$$2x - y - 3 = 0 \quad , \quad 2x^2 - 10x + y + 9 = 0$$

[5 *marks*]
[5 *markah*]

QUESTION 2

Solve the following simultaneous equations:
Selesaikan persamaan serentak yang berikut:

$$3p - m = -6 \quad , \quad m^2 + 2p^2 = 11$$

[5 *marks*/5 *markah*]

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QUESTION 3

Solve the simultaneous equations $3x - y = 14$ and $x^2 - y^2 = 1$. Give the answers correct to three decimal places.

Selesaikan persamaan serentak $3x - y = 14$ *dan* $x^2 - y^2 = 1$. *Beri jawapan betul kepada tiga tempat perpuluhan.*

[5 *marks*/5 *markah*]

QUESTION 4

Solve the following simultaneous equations:

Selesaikan persamaan serentak yang berikut:

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

[5 marks]

[5 markah]

QUESTION 5

Solve the following simultaneous equations:
Selesaikan persamaan serentak yang berikut:

$$m + 2n = 1$$
$$m^2 - 3m + 2n^2 = 2$$

[5 *marks*]
[5 *markah*]

QUESTION 6

Solve the following simultaneous equations:
Selesaikan persamaan serentak berikut:

$$x + 5y = 2 \quad , \quad x^2 + 4xy + 3y^2 = 8$$

Give the answers correct to three significant figures.
Beri jawapan betul kepada tiga angka bererti.

[5 *marks*/5 *markah*]

QUESTION 7

Solve the following simultaneous equations.
Selesaikan persamaan serentak berikut.

$$m - 2n - 1 = 0 \quad , \quad mn + n + 3m^2 = 0$$

Give your answer correct to three decimal places.
Berikan jawapan anda betul kepada tiga tempat perpuluhan.

[5 marks/ *markah*]

QUESTION 8

Solve the simulataneous equation $4x + y + 1 = 0$ and $6x^2 - y^2 = xy$.
Selesaikan persamaan serentak $4x + y + 1 = 0$ *dan* $6x^2 - y^2 = xy$.

[5 marks/ *markah*]

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FUNCTION/ FUNGSI

SOALAN 2

QUESTION 9

Given the functions $f(x) = 2x + 1$ and $g(x) = 5x + p$, where p is a constant. Find

Diberi fungsi $f(x) = 2x + 1$ dan $g(x) = 5x + p$, dengan keadaan p ialah pemalar. Cari

(a) $f^{-1}(x)$, [2 *marks / markah*]

(b) the value of k and of p if $fg(x) = kx - 7$, where k is a constant,

nilai k dan nilai p jika $fg(x) = kx - 7$, dengan keadaan k ialah pemalar, [3 *marks / markah*]

(c) the function $h(x)$ if $hg(x) = 10x$.

fungsi $h(x)$ jika $hg(x) = 10x$. [3 *marks / markah*]

QUESTION 10

Diagram 1 shows the function f maps set P to set Q and the function g maps set Q to set R.

Rajah 1 menunjukkan fungsi f yang memetakan set P kepada set Q dan fungsi g yang memetakan set Q kepada set R.

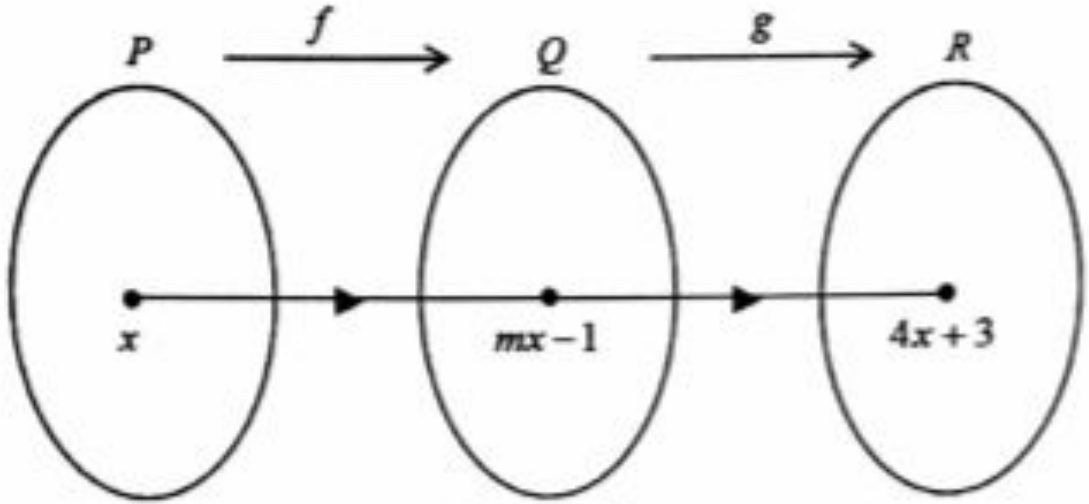


Diagram 1
Rajah 1

Find
Cari

(a) the value of m if $f^{-1}(3)=2$, [2 marks]
nilai bagi m jika $f^{-1}(3)=2$, [2 markah]

(b) $g(x)$. [3 marks]
[3 markah]

QUESTION 11

Diagram 5 shows the function f and g.

Rajah 5 menunjukkan fungsi f dan g.

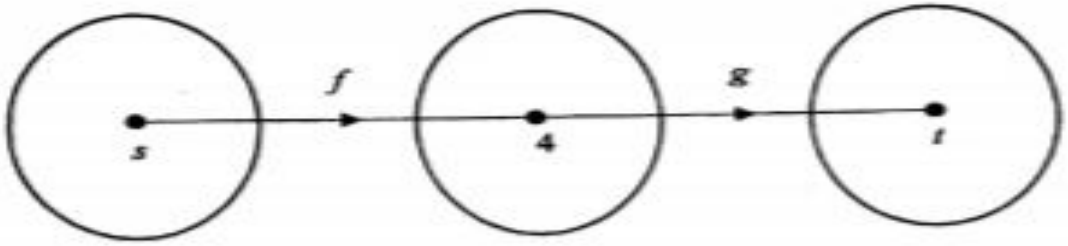


Diagram 5

Rajah 5

It is given that $f^{-1}(x) = 2x - 1$ and $g(x) = 4x - 20$.

Diberi bahawa $f^{-1}(x) = 2x - 1$ dan $g(x) = 4x - 20$.

(a) Find the value of

Cari nilai

(i) s,

(ii) t.

[2 marks]

[2 markah]

(b) Find $fg(x)$.

Cari $fg(x)$.

[3 marks]

[3 markah]

(c) Hence, find the value of x such that $fg(x) = g(x)$.

Seterusnya, kira nilai x dengan keadaan $fg(x) = g(x)$.

[2 marks]

[2 markah]

SIR VEN

QUADRATIC EQUATION/ PERSAMAAN KUADRATIK

QUESTION 12

The root of the quadratic equation $x^2 + 3(4x + h) = 0$, where h is a constant, are k and $3k$.

Punca-punca persamaan kuadratik $x^2 + 3(4x + h) = 0$, *dengan keadaan* h *ialah pemalar, ialah* k *dan* $3k$.

(*a*) Find the value of k and of h. [5 *marks*]

Cari nilai k *dan nilai* h. [5 *markah*]

(*b*) Hence, form the quadratic equation with the roots $k - 2$ dan $k + 5$. [3 *marks*]

Seterusnya, bentukkan persamaan kuadratik yang mempunyai $k - 2$ *dan* $k + 5$. [3 *markah*]

SIR VEN

DIFFERENTIATION/ PEMBEZAAN

QUESTION 13

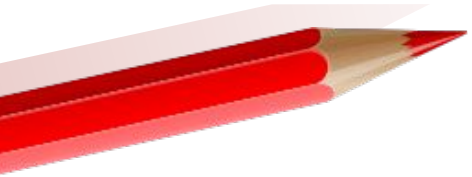
It is given that the equation of a curve is $y = 4x^3 - 3x + 5$.
Diberi bahawa persamaan suatu lengkung ialah $y = 4x^3 - 3x + 5$.

(a) Express in terms of x, $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4$. [3 *marks*]

Ungkapkan dalam sebutan x, $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4$. [3 *markah*]

(b) Find the values of x if $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4 = -29$. [2 *marks*]

Cari nilai-nilai x *jika* $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4 = -29$. [2 *markah*]



QUESTION 14

Given the equation of a curve is $y = \frac{7}{x^2}$.

Diberi persamaan suatu lengkung ialah $y = \frac{7}{x^2}$.

(a) Find the value of $\frac{dy}{dx}$ when $x = 2$.

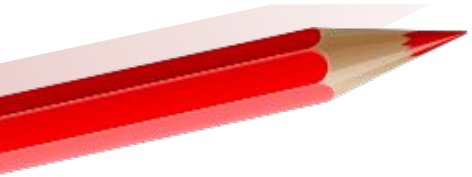
Cari nilai $\frac{dy}{dx}$ *apabila* $x = 2$.

[3 *marks / markah*]

(b) Hence, estimate the value of $\frac{7}{(1.97)^2}$.

Seterusnya, anggarkan nilai bagi $\frac{7}{(1.97)^2}$.

[4 *marks / markah*]



QUESTION 15

Air in the spherical balloon leak out through tiny holes. The volume of the balloon decreases at a rate of $x\ \text{cm}^3\text{s}^{-1}$. The rate of change in the radius of the balloon is $\frac{1}{4}\ \text{cms}^{-1}$ when the volume of the balloon is $288\pi\ \text{cm}^3$.

[Volume of sphere , $V = \frac{4}{3}\pi r^3$; Area of sphere , $A = 4\pi r^2$]

Udara di dalam sebuah belon sfera terlepas melalui bocoran kecil. Isipadu belon itu menyusut dengan kadar $x\ \text{cm}^3\text{s}^{-1}$. *Kadar perubahan jejari belon ialah* $\frac{1}{4}\ \text{cms}^{-1}$ *apabila isipadu belon ialah* $288\pi\ \text{cm}^3$.

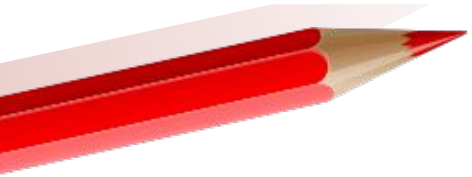
[Isi padu sfera , $V = \frac{4}{3}\pi j^3$; Luas permukaan sfera , $A = 4\pi j^2$]

Find
Cari

(*a*) the value of x, in terms of π, [3 *marks*]
nilai bagi x, *dalam sebutan* π, [3 *markah*]

(*b*) the rate of change of the surface area of the balloon, by using the value of radius in (*a*), [2 *marks*]
kadar perubahan dalam luas permukaan bagi belon itu, dengan menggunakan jejari dalam (*a*), [2 *markah*]

(*c*) the percentage of decreasement in the volume of the balloon, if the radius of the balloon decreased to 10%. [3 *marks*]
Peratus penyusutan dalam isi padu belon itu, jika jejari belon menyusut sebanyak 10%. [3 *markah*]



SIR VEN

COMPLETING THE SQUARE/ KAEDAH PENYEMPURNAAN KUASA DUA

QUESTION 16

The quadratic function $f(x) = x^2 - 2px - q$ has a minimum value of $-7 - p^2$, where p and q are constants. The graph of the function is symmetrical about $x = q - 4$.

Fungsi kuadratik $f(x) = x^2 - 2px - q$ *mempunyai nilai minimum* $-7 - p^2$, *dengan keadaan p dan q ialah pemalar. Graf fungsi tersebut bersimetri pada* $x = q - 4$.

(a) By using the method of completing the square, find the value of p and of q.

[4 marks]

Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai p dan nilai q.

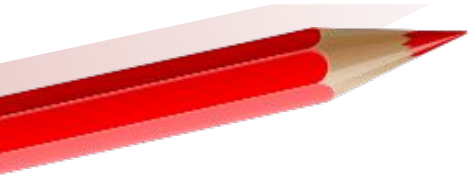
[4 markah]

(b) Sketch the graph of the quadratic function.

[2 marks]

Lakar graf fungsi kuadratik tersebut.

[2 markah]



QUESTION 17

Diagram 3 shows the curve of a quadratic function $f(x) = -x^2 + mx + 3$. The curve has a maximum point $B(1, n)$ and intersects the $f(x)$-axis at point A.

Rajah 3 menunjukkan lengkung bagi fungsi kuadratik $f(x) = -x^2 + mx + 3$. *Lengkung itu mempunyai titik maksimum* $B(1, n)$ *dan memotong paksi-*$f(x)$ *pada titik A.*

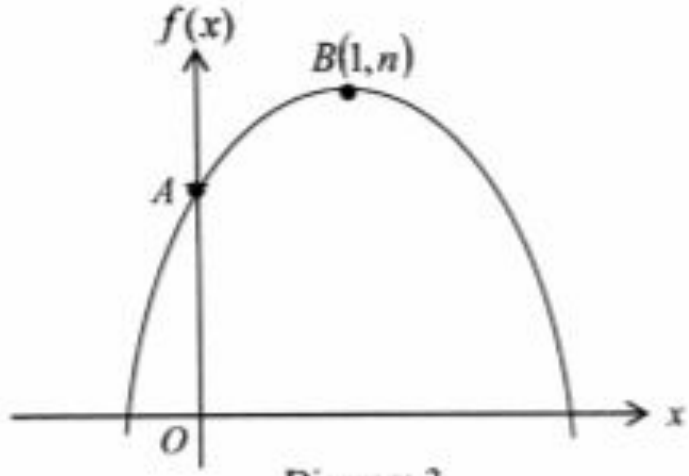
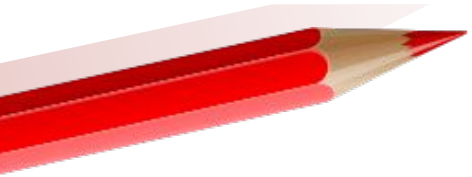


Diagram 3
Rajah 3

(a) State the coordinates of A. [1 mark]
Nyatakan koordinat A. [1 markah]

(b) Find the value of m and of n. [4 marks]
Cari nilai m dan nilai n. [4 markah]

(c) Find the equation of the curve when the graph is reflected at the x-axis. [2 marks]
Cari persamaan lengkung apabila graf tersebut dipantulkan pada paksi-x. [2 markah]



SIR VEN

TRIGONOMETRY FUNCTION/ FUNGSI TRIGONOMETRI

QUESTION 3

QUESTION 18

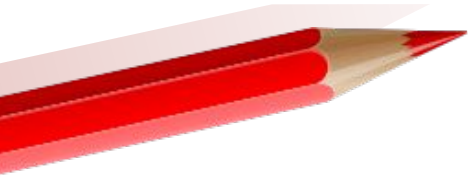
(a) Sketch the graph of $y = 3 \sin 2x$ for $0 \leqslant x \leqslant 2\pi$.
Lakar graf bagi $y = 3 \sin 2x$ *untuk* $0 \leqslant x \leqslant 2\pi$.

[3 *marks*/3 *markah*]

(b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions to the equation $3 \sin 2x + 1 = \frac{2x}{\pi}$ for $0 \leqslant x \leqslant 2\pi$. State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $3 \sin 2x + 1 = \frac{2x}{\pi}$ *untuk* $0 \leqslant x \leqslant 2\pi$. *Nyatakan bilangan penyelesaian itu.*

[3 *marks*/3 *markah*]



QUESTION 19

(a) Prove that $\frac{2\sin x\cos x}{1-2\sin^2 x} = \tan 2x$.

Buktikan bahawa $\frac{2\sin x\cos x}{1-2\sin^2 x} = \tan 2x$.

[2 marks]
[2 markah]

(b) (i) Sketch the graph of $y = \tan 2x + 1$ for $0 \le x \le \pi$.

Lakar graf $y = \tan 2x + 1$ *untuk* $0 \le x \le \pi$.

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{6\sin x\cos x}{1-2\sin^2 x} - \frac{5x}{\pi} = 0$ for $0 \le x \le \pi$.

State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\frac{6\sin x\cos x}{1-2\sin^2 x} - \frac{5x}{\pi} = 0$ *untu* $0 \le x \le \pi$. *Nyatakan bilangan penyelesaian itu.*

[6 marks]
[6 markah]

QUESTION 20

(a) Sketch the graph of $y = 1 - 2\tan x$ for $0 \le x \le 2\pi$. [3 marks]

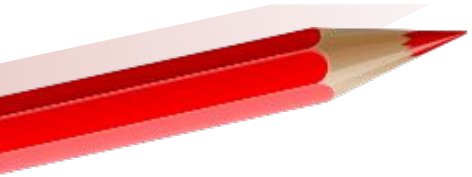
Lakarkan graf bagi $y = 1 - 2\tan x$ *untuk* $0 \le x \le 2\pi$. [3 markah]

(b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $2\pi \tan x = -x$.

State the number of solutions. [3 marks]

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $2\pi \tan x = -x$.

Nyatakan bilangan penyelesaian itu. [3 markah]



QUESTION 21

(a) Prove that $\frac{\sin 2x}{1-\cos 2x} = \cot x$ [2 marks]

Buktikan bahawa $\frac{\sin 2x}{1-\cos 2x} = \cot x$ [2 *markah*]

(b) (i) Sketch the graph of $y = 2\sin\frac{3}{2}x + 1$ for $0 \le x \le 2\pi$.

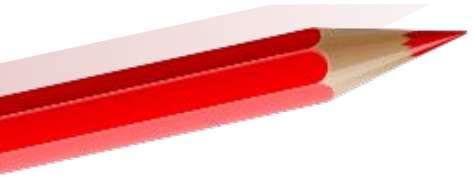
Lakarkan graf $y = 2\sin\frac{3}{2}x + 1$ *untuk* $0 \le x \le 2\pi$.

(ii) Determine the equation of a suitable straight line to find the number of solutions to equation $2\sin\frac{3}{2}x = \frac{3}{4\pi}x - 2$ for $0 \le x \le 2\pi$.

Tentukan persamaan garis lurus yang berssuaian untuk mencari bilangan penyelesaian bagi persamaan $2\sin\frac{3}{2}x = \frac{3}{4\pi}x - 2$ *untuk* $0 \le x \le 2\pi$.

[6 marks]

[6 *markah*]



QUESTION 22

(a) Prove that $\dfrac{2\sin x}{2\cos x - \sec x} = \tan 2x$. [2 marks]

Buktikan bahawa $\dfrac{2\sin x}{2\cos x - \sec x} = \tan 2x$. [2 markah]

(b) (i) Sketch the graph of $y = |\tan 2x|$ for $0 \le x \le \pi$.

Lakar graf $y = |\tan 2x|$ *untuk* $0 \le x \le \pi$.

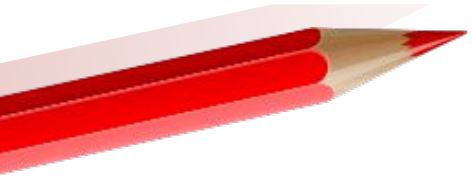
(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\left|\dfrac{2\sin x}{2\cos x - \sec x}\right| - \dfrac{2x}{\pi} = 1$ for $0 \le x \le \pi$.

State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\left|\dfrac{2\sin x}{2\cos x - \sec x}\right| - \dfrac{2x}{\pi} = 1$ *untuk* $0 \le x \le \pi$.

Nyatakan bilangan penyelesaian itu.

[6 marks]
[6 markah]



QUESTION 23

(a) Prove that $\frac{\tan 2x \cos 2x}{\sin x} = 2\cos x$. [2 marks]

Buktikan bahawa $\frac{\tan 2x \ kos\, 2x}{\sin x} = 2 kos\, x$. [2 markah]

(b) (i) Sketch the graph of $y = 5\cos x - 2$ for $0 \le x \le 2\pi$. [3 marks]

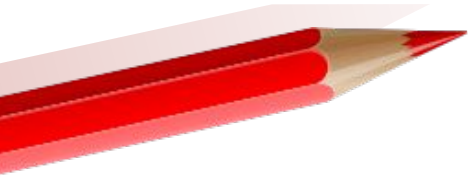
Lakar graf bagi $y = 5\, kos\, x - 2$ *untuk* $0 \le x \le 2\pi$. [3 markah]

(ii) Hence, using the same axes, sketch the suitable straight line to find the number of solutions for the equation $\frac{\tan 2x \cos 2x}{\sin x} + \frac{6}{5} = \frac{x}{\pi}$ for $0 \le x \le 2\pi$.

State the number of solutions. [3 marks]

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\frac{\tan 2x\, kos 2x}{\sin x} + \frac{6}{5} = \frac{x}{\pi}$ *untuk* $0 \le x \le 2\pi$. *Nyatakan bilangan penyelesaian itu.*

[3 markah]



QUESTION 24

a) Prove that $\frac{2\tan x}{2-\sec^2 x} = \tan 2x$. [2 marks]

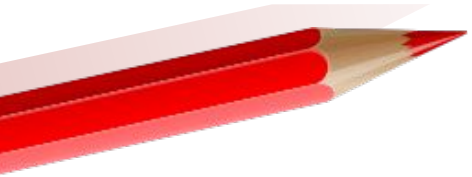
Buktikan $\frac{2\tan x}{2-\text{sek}^2 x} = \tan 2x$. [2 *markah*]

b) Sketch the graph of $y = \tan 2x - 1$ for $0 \le x \le \pi$.

Lakar graf bagi $y = \tan 2x - 1$ *untuk* $0 \le x \le \pi$.

Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{3x}{\pi} + \frac{2\tan x}{2-\sec^2 x} = 2$ for $0 \le x \le \pi$. State the number of solutions. [6 marks]

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\frac{3x}{\pi} + \frac{2\tan x}{2-\text{sek}^2 x} = 2$ *untuk* $0 \le x \le \pi$. *Nyatakan bilangan penyelesaian itu.* [6 *markah*]



QUESTION 25

(a) Prove that $\cot x + \tan x = \dfrac{2}{\sin 2x}$.

Buktikan kot $x + \tan x = \dfrac{2}{\sin 2x}$.

[2 *marks*]
[2 *markah*]

(b) (i) Sketch the graph of $y = -\sin 2x$ for $0 \le x \le 2\pi$.

Lakarkan graf bagi $y = -\sin 2x$ *untuk* $0 \le x \le 2\pi$.

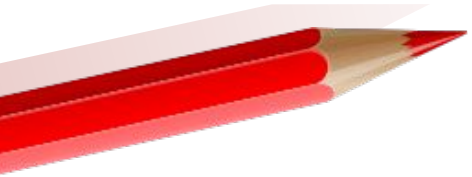
[3 *marks*]
[3 *markah*]

(ii) Hence, using the same axis, sketch a suitable graph to find the number of solutions for the equation $\dfrac{2}{\cot x + \tan x} = \dfrac{\pi}{2x}$ for $0 \le x \le 2\pi$.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu graf yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$\dfrac{2}{\text{kot } x + \tan x} = \dfrac{\pi}{2x}$ *untuk* $0 \le x \le 2\pi$.

[3 *marks*]
[3 *markah*]



QUESTION 26

(a) Prove that $\dfrac{6\sin x\cos x}{\cos^2 x-\sin^2 x}=3\tan 2x$. [2 *marks*]

Buktikan bahawa $\dfrac{6\sin x\text{kos}x}{\text{kos}^2 x-\sin^2 x}=3\tan 2x$. [2 *markah*]

(b) (i) Sketch the graph of $y=3\tan 2x$, for $0\le x\le\pi$.

Lakarkan graf bagi $y=3\tan 2x$, *untuk* $0\le x\le\pi$.

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

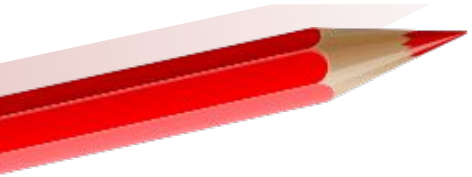
State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakarkan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\dfrac{6\sin x\text{kos}x}{\text{kos}^2 x-\sin^2 x}-1=\dfrac{2x}{\pi}-2$ *untuk* $0\le x\le\pi$.

Nyatakan bilangan penyelesaian itu.

[5 *marks*]
[5 *markah*]

SIR VEN



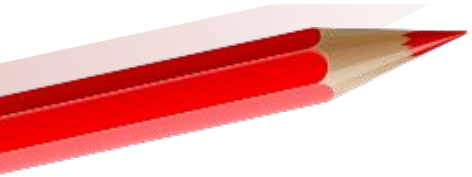
QUESTION 27

(a) Sketch the graph of $y = 3\sin x - 1$ for $0 \le x \le 2\pi$. [3 marks]

Lakarkan graf bagi $y = 3\sin x - 1$ *untuk* $0 \le x \le 2\pi$. [3 markah]

(b) By using the same axes, sketch a suitable straight line to find the number of solutions for the equation $3\pi\sin x + 2x = 3\pi$ for $0 \le x \le 2\pi$. [3 marks]

Dengan menggunakan paksi yang sama, lakarkan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $3\pi\sin x + 2x = 3\pi$ *untuk* $0 \le x \le 2\pi$. [3 markah]



QUESTION 28

(a) Sketch the graph of $y = 2\cos\frac{3}{2}x$ for $0 \le x \le 2\pi$. [3 *marks*]

Lakar graf bagi $y = 2\,\text{kos}\,\frac{3}{2}x$ *untuk* $0 \le x \le 2\pi$. [3 *markah*]

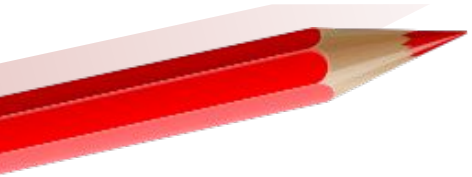
(b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions to the equation $\cos\frac{3}{2}x = \frac{3}{4\pi}x - 1$ for $0 \le x \le 2\pi$.

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

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$\text{kos}\,\frac{3}{2}x = \frac{3}{4\pi}x - 1$ *untuk* $0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian itu. [3 *markah*]



SIR VEN

GRADIENT FUNCTION/ FUNGSI KECERUNAN

QUESTION 4

QUESTION 29

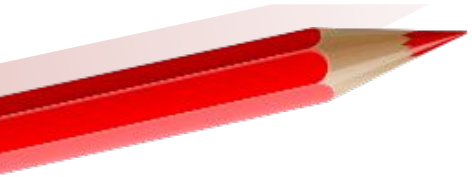
A curve with gradient function $2x - \frac{2}{x^2}$ has a turning point at $(k, 8)$.

Suatu lengkung dengan fungsi kecerunan $2x - \frac{2}{x^2}$ *mempunyai titik pusingan di* $(k, 8)$.

(*a*) Find the value of k. [3 *marks*]
Cari nilai k. [3 *markah*]

(*b*) Determine whether the turning point is a maximum or a minimum point. [2 *marks*]
Tentukan sama ada titik pusingan ini adalah titik maksimum atau titik minimum. [2 *markah*]

(*c*) Find the equation of the curve. [3 *marks*]
Cari persamaan lengkung itu. [3 *markah*]



QUESTION 30

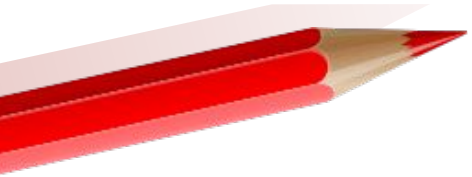
A curve has a gradient function of $kx^3 - 1$, where k is a constant. The tangent to the curve at the point $(1, -5)$ is perpendicular to the straight line $x + 11y - 5 = 0$. Find

Suatu lengkung mempunyai fungsi kecerunan $kx^3 - 1$, *dengan keadaan* k *ialah pemalar. Garis tangen kepada lengkung itu pada titik* $(1, -5)$ *berserenjang dengan garis lurus* $x + 11y - 5 = 0$. *Cari*

(i) the value of k.
nilai k.

(ii) the equation of the curve.
persamaan bagi lengkung itu.

[5 marks/5 markah]



QUESTION 31

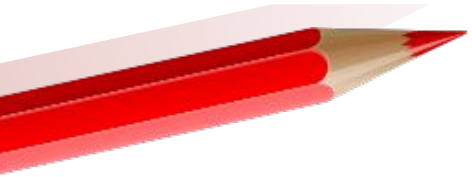
The gradient function of a curve which passes through the point (2, 1) is $3x^2 + 2x - 5$.
Fungsi kecerunan satu lengkung yang melalui titik (2, 1) *ialah* $3x^2 + 2x - 5$.

(a) Find the equation of the curve.
Cari persamaan bagi lengkung itu.

[3 *marks*/3 *markah*]

(b) Find the coordinates of the turning points of the curve and determine whether each of the turning points is a maximum or a minimum point.
Cari koordinat titik-titik pusingan bagi lengkung itu dan tentukan sama ada setiap titik pusingan itu titik maksimum atau titik minimum.

[5 *marks*/5 *markah*]



QUESTION 32

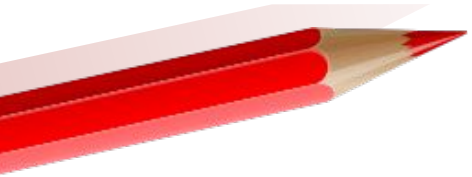
A curve has a gradient function of $kx^3 - 1$, where k is a constant. The tangent to the curve at the point $(1, -5)$ is perpendicular to the straight line $x + 11y - 5 = 0$. Find

Suatu lengkung mempunyai fungsi kecerunan $kx^3 - 1$, *dengan keadaan* k *ialah pemalar. Garis tangen kepada lengkung itu pada titik* $(1, -5)$ *berserenjang dengan garis lurus* $x + 11y - 5 = 0$. *Cari*

(i) the value of k.
nilai k.

(ii) the equation of the curve.
persamaan bagi lengkung itu.

[5 marks/5 markah]



QUESTION 33

A curve has a gradient function $px^3 - 32x$, where p is a constant. The tangent to the curve at the point $(1, 5)$ is perpendicular to the straight line $4y = x + 8$.

Suatu lengkung mempunyai fungsi kecerunan $px^3 - 32x$, dengan keadaan p ialah pemalar. Tangen kepada lengkung itu pada titik $(1, 5)$ adalah berserenjeng dengan garis lurus $4y = x + 8$.

Find

Cari

(a) the value of p,

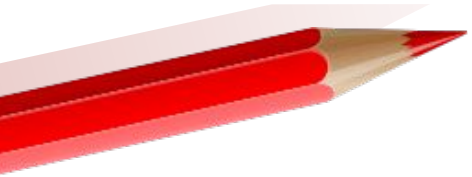
nilai p,

[3 *marks*]
[3 *markah*]

(b) the equation of the curve.

persamaan lengkung itu.

[3 *marks*]
[3 *markah*]



QUESTION 34

Given that $3x^2 - px$ is a gradient function of a curve where p is a constant. The straight line $7y - x - 13 = 0$ is normal to the curve at point $A(1,2)$.

Diberi fungsi kecerunan bagi suatu lengkung ialah $3x^2 - px$ *dengan keadaan p adalah pemalar. Garis lurus* $7y - x - 13 = 0$ *ialah normal kepada lengkung itu pada titik* $A(1,2)$.

Find

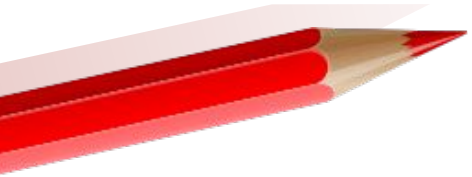
Cari

(a) the value of p, [3 marks]

nilai p, [3 markah]

(b) the value of x when the curve is maximum. [4 marks]

nilai bagi x apabila lengkung itu adalah maksimum. [4 markah]



QUESTION 35

The gradient function of a curve is given by $\frac{dy}{dx} = 1 + \frac{1}{2x^2}$.

The equation of the tangent at the point P on the curve is $y = 3x + 1$, where the x-coordinate of point P is positive.

Fungsi kecerunan suatu lengkung diberi oleh $\frac{dy}{dx} = 1 + \frac{1}{2x^2}$.

Persamaan tangen kepada lengkung pada titik P ialah $y = 3x + 1$, *dengan keadaan koordinat-x bagi P ialah positif.*

Find

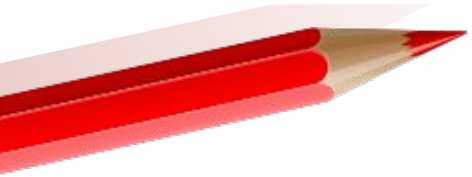
Cari

(*a*) the equation of the normal to the curve at point P, [4 marks]

persamaan normal kepada lengkung pada titik P, [4 markah]

(*b*) the equation of the curve. [3 marks]

persamaan lengkung itu. [3 markah]



SIR VEN

STATISTIC/STATISTIK

QUESTION 5

QUESTION 36

The mass of students in class Five Arif is given by $x_1, x_2, x_3, ..., x_{20}$. The mean mass of the students is 50 kg and the standard deviation is 4 kg.
Jisim murid di dalam kelas Lima Arif diberi oleh $x_1, x_2, x_3, ..., x_{20}$. *Min jisim bagi murid-murid itu ialah* 50 kg *dan sisihan piawai ialah* 4 kg.

(a) Find
Cari

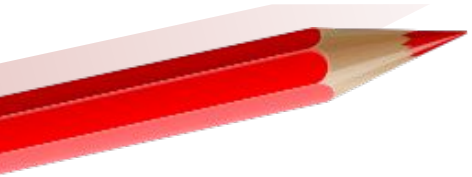
(i) the sum of the masses of the students, $\sum x$.
hasil tambah jisim murid-murid itu, $\sum x$.

(ii) the sum of the squares of the masses of the students, $\sum x^2$.
hasil tambah kuasa dua jisim murid-murid itu, $\sum x^2$.

[3 *marks*/3 *markah*]

(b) When a new student is transferred to the class Five Arif, the mean mass of the students remain unchanged. Calculate the standard deviation of the mass of the students in class Five Arif.
Apabila seorang murid baharu dipindahkan ke kelas Lima Arif, min jisim bagi murid-murid itu kekal tidak berubah. Hitung sisihan piawai bagi jisim murid-murid di dalam kelas Lima Arif.

[3 *marks*/3 *markah*]



QUESTION 37

The mass of students in class Five Arif is given by $x_1, x_2, x_3, ..., x_{20}$. The mean mass of the students is 50 kg and the standard deviation is 4 kg.
Jisim murid di dalam kelas Lima Arif diberi oleh $x_1, x_2, x_3, ..., x_{20}$. *Min jisim bagi murid-murid itu ialah* 50 kg *dan sisihan piawai ialah* 4 kg.

(a) Find
Cari

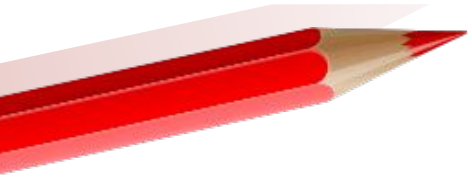
(i) the sum of the masses of the students, Σx.
hasil tambah jisim murid-murid itu, Σx.

(ii) the sum of the squares of the masses of the students, Σx^2.
hasil tambah kuasa dua jisim murid-murid itu, Σx^2.

[3 *marks*/3 *markah*]

(b) When a new student is transferred to the class Five Arif, the mean mass of the students remain unchanged. Calculate the standard deviation of the mass of the students in class Five Arif.
Apabila seorang murid baharu dipindahkan ke kelas Lima Arif, min jisim bagi murid-murid itu kekal tidak berubah. Hitung sisihan piawai bagi jisim murid-murid di dalam kelas Lima Arif.

[3 *marks*/3 *markah*]



38

It is given that the mean mass of 5 workers at Syarikat Ali is 42 kg and the standard deviation is 1.2 kg.
Diberi bahawa min berat bagi 5 pekerja di Syarikat Ali ialah 42 kg dan sisihan piawai ialah 1.2 kg.

(*a*) Find/ *Cari*

(i) the sum of the masses of the workers concerned,
hasil tambah berat bagi pekerja-pekerja yang terlibat,

(ii) the sum of the squares of the masses of the workers.
hasil tambah kuasa dua bagi berat pekerja-pekerja itu.

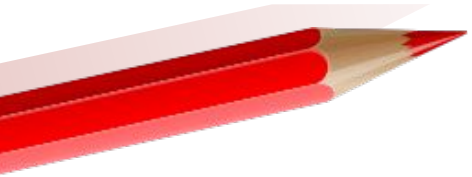
[3 marks/ *markah*]

(*b*) The mass of each worker is divided by 2 and then added 25. Find
Berat bagi setiap pekerja itu dibahagi dengan 2 dan ditambah 25. Cari

(i) the new mean,
purata baharu,

(ii) the new variance.
varians baharu.

[4 marks/ *markah*]



QUESTION 39

Table 6 shows the marks obtained by a group of students in a class.
Jadual 6 menunjukkan markah yang diperoleh oleh sekumpulan murid dalam sebuah kelas.

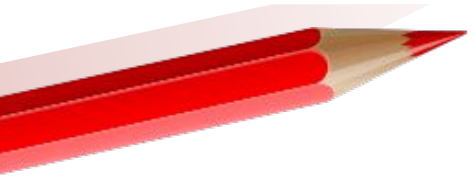
Marks ***Markah***	**Number of students** ***Bilangan murid***
20 – 29	13
30 – 39	7
40 – 49	9
50 – 59	5
60 – 69	16
70 – 79	r

Table 6 / *Jadual 6*

(a) Given the median mark of a student is 54.5, find the value of r.
Diberi markah median murid ialah 54.5, cari nilai r.
[3 *marks / markah*]

(b) Calculate the standard deviation of the distribution.
Hitung sisihan piawai bagi taburan tersebut.
[3 *marks / markah*]

(c) If each mark of the students in the class is multiplied by 4 and then added by 5, find the variance for the new set of marks.
Jika setiap markah murid dalam kelas itu didarab dengan 4 dan kemudian ditambah dengan 5, cari varians bagi set markah baharu.
[2 *marks / markah*]



QUESTION 40

(a) Saiful collected five pieces of leaves from a mango tree in his orchard. The lengths, in cm, are 12, 13, 21, 10 and 23. For the lengths of the leaves, find

Saiful mengumpul lima helai daun daripada sepohon pokok mangga dari kebunnya. Panjang, dalam cm, adalah 12, 13, 21, 10 dan 23. Untuk panjang daun-daun itu, cari

(i) mean, / *min*,

(ii) the standard deviation. / *sisihan piawai.*

[4 *marks* / *markah*]

(b) The mean of a set of data $2k - 5, 2, k + 6$ is 8. Find

Min untuk suatu set data $2k - 5, 2, k + 6$ *ialah* 8. *Cari*

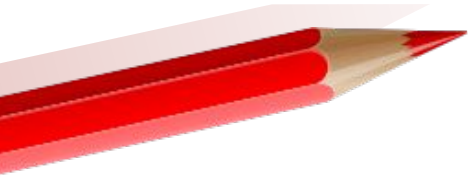
(i) the value of k,

nilai k,

(ii) the new mean if each of the data is multiplied by 3.

min baru jika setiap data itu didarab dengan 3.

[3 *marks* / *markah*]



QUESTION 41

Mass (g) *Jisim (g)*	Number of parcels *Bilangan bungkusan*
11 – 20	5
21 – 30	x
31 – 40	y
41 – 50	8
51 – 60	6

Table 5/*Jadual 5*

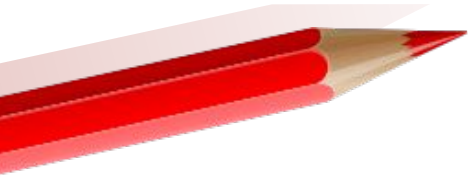
Table 5 shows the distribution of the masses of 40 parcels. Given the median mass of all the parcels is 35.5 g.
Jadual 5 menunjukkan taburan jisim bagi 40 buah bungkusan. Diberi jisim median bagi semua bungkusan itu ialah 35.5 g.

(a) Find the values of x and y.
Cari nilai x dan nilai y.

[6 *marks*/6 *markah*]

(b) Hence, state the modal class.
Seterusnya, nyatakan kelas modnya.

[1 *mark*/1 *markah*]



QUESTION 42

Table 5 shows times recorded, t minutes, for a group of 200 students to complete a Mathematics Quiz.

Jadual 5 menunjukkan masa yang dicatatkan, t minit, bagi sekumpulan 200 murid untuk menyiapkan suatu Kuiz Matematik.

Times / *Masa* (minute/*minit*) *t*	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45
Number of student / *Bilangan murid*	62	88	16	13	11	10

Table 5
Jadual 5

(*a*) Find the mean and the standard deviation of these data. [6 ***marks***]

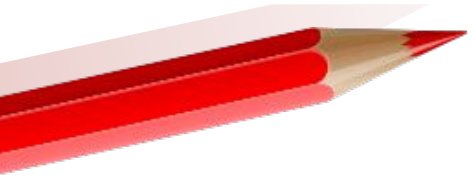
Cari min dan sisihan piawai bagi data tersebut. [6 ***markah***]

(*b*) Due to the technical error, all students took 5 minutes less than the times recorded in Table 5.

Explain the effect this would have on each of the value found in **5**(*a*). [1 ***mark***]

Oleh sebab masalah teknikal, semua murid mengambil masa 5 minit kurang daripada masa dicatatkan di dalam Jadual 5.

Terangkan kesan yang akan berlaku kepada setiap nilai di **5**(*a*). [1 ***markah***]



QUESTION 43

Table 4 shows a frequency distributions of the outcome of a power consumption study of 100 houses in a residential park.

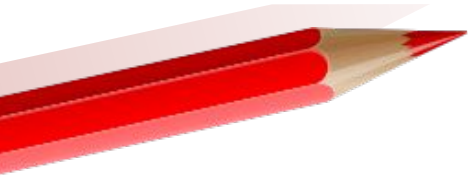
Jadual 4 menunjukkan taburan kekerapan bagi hasil daripada satu kajian penggunaan kuasa bagi 100 buah rumah di suatu taman perumahan.

Power Consumption *Penggunaan kuasa* (kWh)	80 - 89	90 - 99	100 - 109	110 - 119	120 - 129	130 - 139	140 - 149
Number of houses *Bilangan rumah*	7	14	17	19	21	13	9

Diagram 4
Jadual 4

(a) Find the interquartile range. [4 marks]
Cari julat antara kuartil. [4 *markah*]

(b) During the festive season, the power consumption per household increased by 2 times the original use. Does the interquartile range will change? Give your reasons. [2 marks]
Pada musim perayaan, penggunaan kuasa bagi setiap rumah didapati meningkat sebanyak 2 kali ganda daripada penggunaan asal. Adakah nilai julat antara kuartil akan berubah? Berikan alasan anda . [2 *markah*]



QUESTION 44

Table 1 shows the frequency distribution of the mass of a group of students in a class.
Jadual 1 menunjukkan taburan kekerapan bagi jisim sekumpulan pelajar dalam suatu kelas.

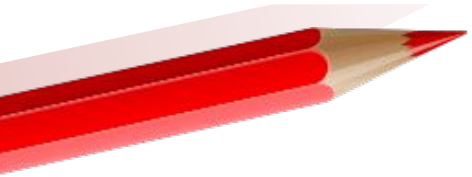
Mass (kg) *Jisim (kg)*	Number of students *Bilangan pelajar*
40 – 49	6
50 – 59	h
60 – 69	18
70 – 79	16
80 – 89	6

Table 1
Jadual 1

(a) It is given that the third quartile mass of the distribution is 74.5 kg.
Calculate the value of h. [3 *marks*]
Diberi kuartil ketiga jisim bagi taburan ialah 74.5 kg.
Kirakan nilai bagi h. [3 *markah*]

(b) Using a scale of 2 cm to 10 kg on the horizontal axis and 2 cm to 2 students on the vertical axis, draw a histogram to represent the frequency distribution of the mass. Hence, estimate the mode of the mass. [3 *marks*]
Dengan menggunakan skala 2 cm *kepada* 10 kg *pada paksi mengufuk dan* 2 cm *kepada* 2 *orang pelajar pada paksi mencancang, lukis histogram untuk mewakilkan taburan kekerapan bagi jisim itu. Seterusnya, anggarkan nilai mod bagi jisim itu.* [3 *markah*]

(c) What is the mode mass if the mass of each student is increased by 4 kg? [1 *mark*]
Berapakah mod jisim jika jisim setiap pelajar bertambah sebanyak 4 kg? [1 *markah*]



QUESTION 45

Table 3 shows the data of 50 workers of Syarikat Maju Jaya in year 2014.

Jadual 3 menunjukkan data bagi taburan umur 50 orang pekerja Syarikat Maju Jaya pada tahun 2014.

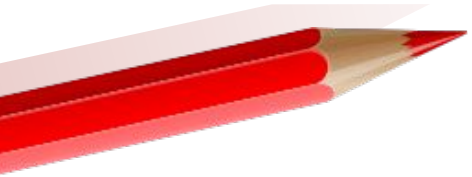
Age *Umur*	Number of workers *Bilangan pekerja*
26 – 30	11
31 – 35	5
36 – 40	10
41 – 45	10
46 – 50	6
51 – 55	4
56 – 60	4

Table 3
Jadual 3

(a) It is given that, 50% of the workers is older than n year. Calculate the value of n.
[3 *marks*]
Diberi bahawa, 50% pekerja di syarikat tersebut berumur melebihi n tahun. Hitungkan nilai n.
[3 *markah*]

(b) At the end of the year 2014, some of the workers in group 41 – 45 years old have transferred to another company while 3 workers from group 56 – 60 years old have retired. Given that the mean of the remaining workers at the end of the year 2014 is 39.
Find the number of workers that have transferred to another company.
[4 *marks*]

Pada hujung tahun 2014, beberapa orang pekerja dari kumpulan 41 – 45 tahun telah berpindah ke syarikat lain manakala 3 orang pekerja dari kumpulan umur 56 – 60 tahun telah bersara. Diberi min umur pekerja yang tinggal pada akhir tahun 2014 ialah 39 tahun.
Cari bilangan pekerja yang telah berpindah ke syarikat lain.
[4 *markah*]



SIR VEN

VECTOR/ VEKTOR

QUESTION 6

QUESTION 46

Diagram 2 sbows a triangle ABC.

Rajah 2 menunjukkan segi tiga ABC.

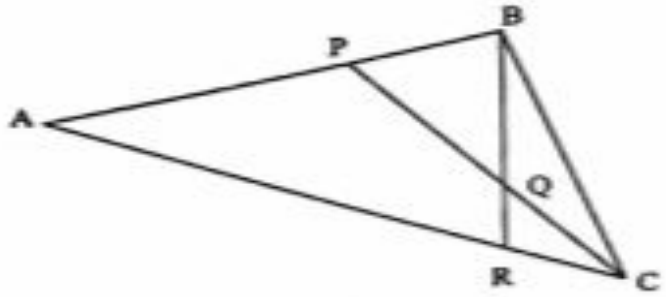


Diagram 2

Rajah 2

It is given that $AR : RC = 4 : 1$, $BP : PA = 1 : 2$, $\overrightarrow{AC} = 15\underline{a}$ and $\overrightarrow{BC} = 6\underline{b}$.

Diberi bahawa $AR : RC = 4 : 1$, $BP : PA = 1 : 2$, $\overrightarrow{AC} = 15\underline{a}$ *dan* $\overrightarrow{BC} = 6\underline{b}$.

(*a*) Express in terms of $\underline{a}$ and $\underline{b}$:

Ungkapkan dalam sebutan $\underline{a}$ *dan* $\underline{b}$:

(i) $\overrightarrow{RB}$,

(ii) $\overrightarrow{AP}$.

[3 marks]

[3 *markah*]

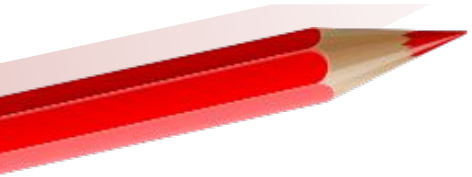
(*b*) It is given that $\overrightarrow{RQ} = m\overrightarrow{RB}$ and $\overrightarrow{QP} = n\overrightarrow{CP}$, where m and n are constants.

Find the values of m and n.

Diberi bahawa $\overrightarrow{RQ} = m\overrightarrow{RB}$ *dan* $\overrightarrow{QP} = n\overrightarrow{CP}$, *dengan keadaan* m *dan* n *adalah pemalar. Cari nilai* m *dan nilai* n.

[5 marks]

[5 *markah*]



QUESTION 47

Diagram 9 shows a triangle OAB. The point P lies on AB and the point Q lies on OB.
Rajah 9 menunjukkan segitiga OAB. Titik P terletak pada AB dan titik Q terletak pada OB.

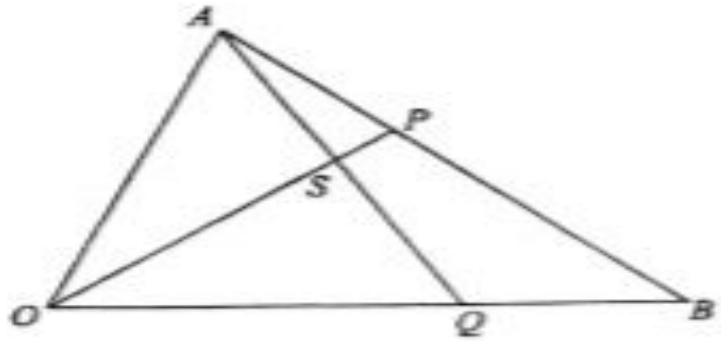


Diagram 9
Rajah 9

It is given that $3AP = PB$, $4OQ = 3OB$, $\overrightarrow{OA} = \underline{a}$ and $\overrightarrow{OB} = \underline{b}$.
Diberi bahawa $3AP = PB$, $4OQ = 3OB$, $\overrightarrow{OA} = \underline{a}$ dan $\overrightarrow{OB} = \underline{b}$.

(a) Express in terms of $\underline{a}$ and/of $\underline{b}$:
Ungkapkan dalam sebutan $\underline{a}$ dan/atau $\underline{b}$:

(i) $\overrightarrow{AQ}$,

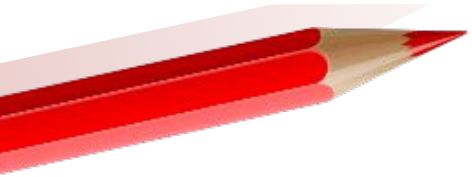
(ii) $\overrightarrow{OP}$.

[3 marks]
[3 markah]

(b) Using $\overrightarrow{OS} = m\overrightarrow{OP}$ and $\overrightarrow{AS} = n\overrightarrow{AQ}$, where m and n are constants, show that $m = 3n$ and $3m + 4n = 4$.
Dengan menggunakan $\overrightarrow{OS} = m\overrightarrow{OP}$ dan $\overrightarrow{AS} = n\overrightarrow{AQ}$, dengan keadaan m dan n ialah pemalar, tunjukkan bahawa $m = 3n$ dan $3m + 4n = 4$.

Hence, find the value of m and of n.
Seterusnya, cari nilai m dan nilai n.

[7 marks]
[7 markah]



QUESTION 48

In Diagram 10, $OABC$ is a trapezium such that OA is parallel to CB.
Dalam Rajah 10, $OABC$ ialah sebuah trapezium dengan keadaan OA selari dengan CB.

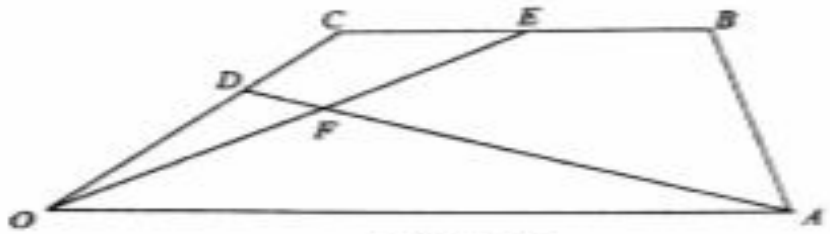


Diagram 10
Rajah 10

E is the midpoint of CB and D is a point on OC such that $OD : DC = 2 : 1$. The straight lines AD and OE intersect at F. It is given that $OA = 2CB$, $\overrightarrow{OA} = 4\underline{u}$ and $\overrightarrow{OC} = 3\underline{v}$.

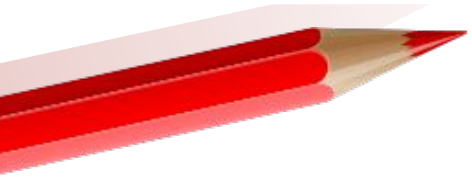
E ialah titik tengah CB dan D ialah satu titik pada OC dengan keadaan $OD : DC = 2 : 1$. Garis lurus-garis lurus AD dan OE bersilang di F. Diberi bahawa $OA = 2CB$, $\overrightarrow{OA} = 4\underline{u}$ dan $\overrightarrow{OC} = 3\underline{v}$.

(a) Express in terms of $\underline{u}$ and $\underline{v}$
Ungkapkan dalam sebutan $\underline{u}$ dan $\underline{v}$
(i) $\overrightarrow{OE}$,
(ii) $\overrightarrow{AD}$. [3 marks]
[3 markah]

(b) Given that $\overrightarrow{OF} = h\overrightarrow{OE}$ and $\overrightarrow{AF} = k\overrightarrow{AD}$, where h and k are constant, express $\overrightarrow{OF}$ in terms of
Diberi $\overrightarrow{OF} = h\overrightarrow{OE}$ dan $\overrightarrow{AF} = k\overrightarrow{AD}$, dengan keadaan h dan k ialah pemalar, ungkapkan $\overrightarrow{OF}$ dalam sebutan

(i) h, $\underline{u}$ and $\underline{v}$,
h, $\underline{u}$ *dan* $\underline{v}$,
(ii) k, $\underline{u}$ and $\underline{v}$. [3 marks]
k, $\underline{u}$ *dan* $\underline{v}$. [3 markah]

(c) Hence, find the value of h and of k. [4 marks]
Seterusnya, cari nilai h dan nilai k. [4 markah]



SIR VEN

LINEAR LAW/ HUKUM LINEAR

SOALAN 7

QUESTION 49

Use a graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Table 2 shows the values of two variables, x and y, obtained from an experiment. The variables x and y are related by the equation $y = \frac{2k}{p^x}$, where k and p are constants.

Jadual 2 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada suatu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = \frac{2k}{p^x}$, dengan keadaan k dan p ialah pemalar.

x	1	3	4	5	6.5	8
y	4.17	2.95	2.4	2.14	1.62	1.26

Table 2
Jadual 2

(a) Based on Table 2, construct a table for the values of $\log_{10} y$. **[1 marks]**
Berdasarkan Jadual 2, bina satu jadual bagi nilai-nilai $\log_{10} y$. **[1 markah]**

(b) Plot $\log_{10} y$ against x, using a scale of 2 cm to 1 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]**
Plot $\log_{10} y$ melawan x, menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2 cm kepada 0.1 unit pada paksi-$\log_{10} y$. Seterusnya, lukis garis lurus penyuaian terbaik. **[3 markah]**

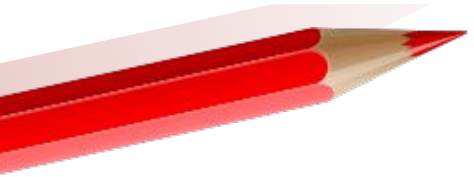
(c) Using the graph in 7(b), find the value of
Menggunakan graf di 7(b), cari nilai

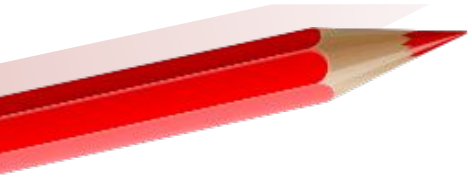
(i) x when $y = 2$,
x *apabila* $y = 2$,

(ii) k,

(iii) p.

[6 marks]
[6 markah]





QUESTION 50

Use graph paper to answer this question
Gunakan kertas graf untuk menjawab soalan ini.

Table 7 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related from an experiment by $y = \frac{h}{x} + \frac{k}{x^2}$, where h and k are constants.
Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y, dihubungkan oleh persamaan, $y = \frac{h}{x} + \frac{k}{x^2}$, dengan keadaan h dan k adalah pemalar.

x	2.0	4.0	6.0	8.0	10.0
y	0.25	0.31	0.25	0.20	0.17

Diagram 7
Rajah 7

(a) Based on above table, construct a table for the values of x^2y. [1 mark]
Berdasarkan jadual diatas, bina satu jadual bagi nilai-nilai x^2y. [1 markah]

(b) Plot x^2y against x, using a scale of 2 cm to 1 unit on the x–axis and 2 cm to 2 units on the x^2y –axis. Hence, draw the line of best fit.
[3 marks]
Plot x^2y melawan x, dengan menggunakan skala 2 cm kepada 1 unit pada paksi–x dan 2 cm kepada 2 unit pada paksi– x^2y. Seterusnya, lukis garis lurus penyuaian terbaik.
[3 markah]

(c) Use your graph to find the value of
Gunakan graf anda untuk mencari nilai

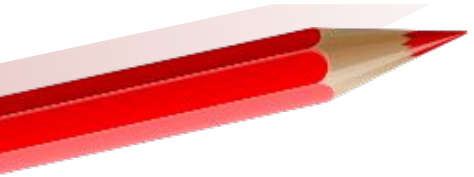
(i) y when $x = 2.5$,
y *apabila* $x = 2.5$,

(ii) h,

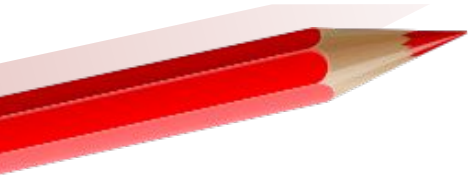
(iii) k

[6 marks]
[6 markah]

SIR VEN



SIR VEN



QUESTION 51

Use the graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Table 1 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = px + kx^2$, where p and k are constants.

Jadual 1 menunjukkan nilai-nilai bagi dua pembolehubah ,x and y, yang diperolehi daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = px + kx^2$, *dengan keadaan p dan k ialah pemalar.*

x	1	2	3	5	6	7.4
y	3·8	11·2	20·5	50·6	70·8	103.6

Table 1
Jadual 1

(a) Plot $\frac{y}{x}$ against x, using a scale of 2 cm to 1 units on the x-axis and 2 cm to 2 unit on the $\frac{y}{x}$-axis. Hence, draw the line of best fit. [4 marks]

Plot $\frac{y}{x}$ *melawan x, dengan menggunakan skala* 2 cm *kepada* 1 *unit pada paksi-x dan* 2 cm *kepada* 2 *unit pada paksi-* $\frac{y}{x}$. *Seterusnya, lukis garis lurus penyuaian terbaik.* [4 markah]

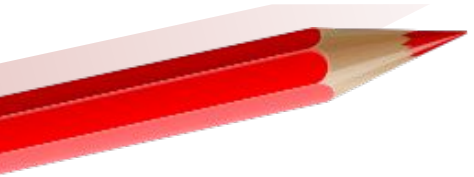
(b) Use the graph in 7(a) to find the value of
Gunakan graf anda di 7(a) untuk mencari nilai

(i) p,

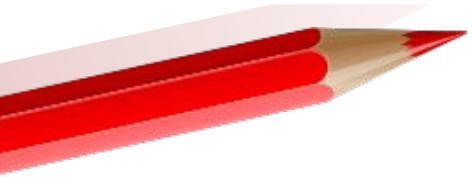
(ii) k,

(iii) x when $y = 5x$.
x *bila* $y = 5x$.

[6 marks]
[6 markah]



SIR VEN



SIR VEN

INTEGRATION/ PENGAMIRAN

SOALAN 8

QUESTION 52

Diagram 3 shows the curve $y = 9 - x^2$ intersects the straight line $2y = -5x$ at point A.
Rajah 3 menunjukkan lengkung $y = 9 - x^2$ *bersilang dengan garis lurus* $2y = -5x$ *di titik A.*

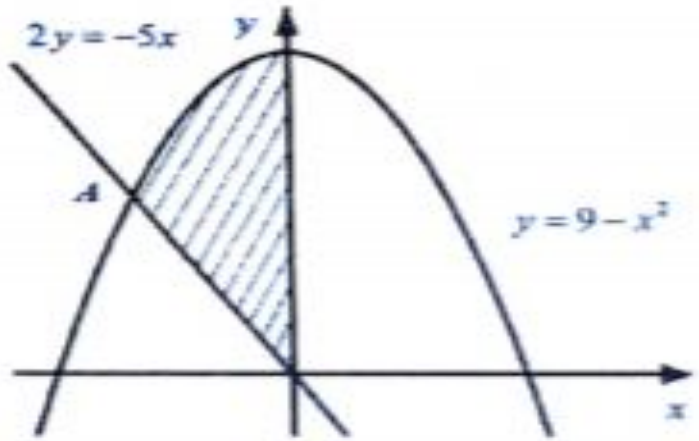


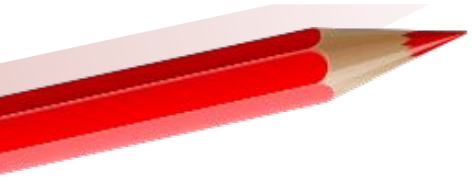
Diagram 3
Rajah 3

Find
Cari

(a) the coordinates of A,
koordinat A, [2 marks] [2 markah]

(b) the area of shaded region,
luas rantau berlorek, [4 marks] [4 markah]

(c) the volume generated, in terms of π, when the shaded region is revolved through 360° about the y-axis.
isi padu yang dijanakan, dalam sebutan π, *apabila rantau berlorek diputarkan melalui* 360° *pada paksi-y.* [4 marks] [4 markah]



QUESTION 53

Diagram 5 shows the curve $y = 16 - x^2$ and the straight line AB. The straight line AB is a tangent to the curve at point P. The straight line PQ is parallel to y-axis.
Rajah 5 menunjukkan lengkung $y = 16 - x^2$ dan garis lurus AB. Garis lurus AB ialah tangen kepada lengkung pada titik P. Garis lurus PQ adalah selari dengan paksi-y.

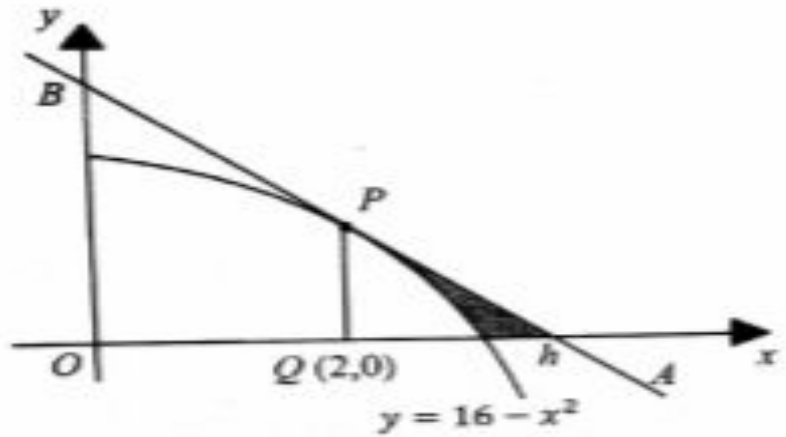


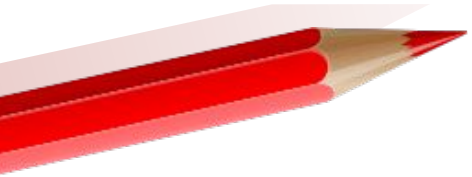
Diagram 5
Rajah 5

Find
Cari

a) the value of h,
nilai h,
[3 marks]
[3 markah]

b) the area of shaded region,
luas kawasan berlorek,
[4 marks]
[4 markah]

c) the volume of revolution, in terms of π, when the region bounded by the curve, the y-axis and the straight line $y = 12$ is revolved through 360° about the y-axis.
[3 marks]
isi padu kisaran, dalam sebutan π, apabila rantau yang dibatasi oleh lengkung, paksi-y dan garis lurus $y = 12$ diputarkan melalui 360° pada paksi-y.
[3 markah]



QUESTION 54

Diagram 8 shows the straight line $y = 4x - 20$ intersects a curve at point $A(2, -12)$.
The gradient function of the curve at point A is $2x$.
Rajah 8 menunjukkan garis lurus $y = 4x - 20$ *bersilang dengan lengkung pada titik* $A(2, -12)$. *Fungsi kecerunan lengkung itu pada titik A ialah* $2x$.

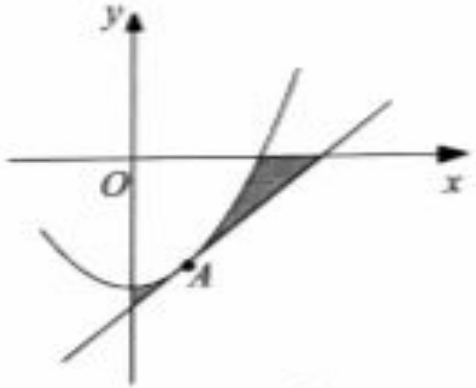


Diagram 8
Rajah 8

(a) Find the equation of the curve.
Cari persamaan lengkung itu.

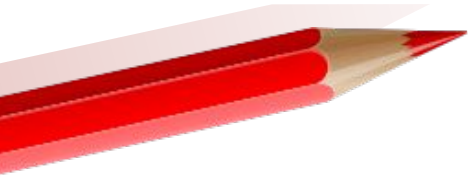
[3 *marks*]
[3 *markah*]

(b) Calculate
Hitung

(i) the area of the shaded region,
luas kawasan berlorek.

(ii) the volume of revolution, in terms of π, when the region bounded by the curve, x-axis and y-axis is rotated through 360° about the y-axis.
isi padu yang dijanakan, dalam sebutan π, *apabila rantau yang dibatasi oleh lengkung, paksi-x dan paksi-y dikisarkan melalui* 360° *pada paksi-y.*

[7 *marks*]
[7 *markah*]



QUESTION 55

Diagram 6 shows the straight line $y = 2x$ intersecting the curve $y = f(x)$ at point A.

Rajah 6 menunjukkan garis lurus $y = 2x$ *menyilang lengkung* $y = f(x)$ *pada titik* A.

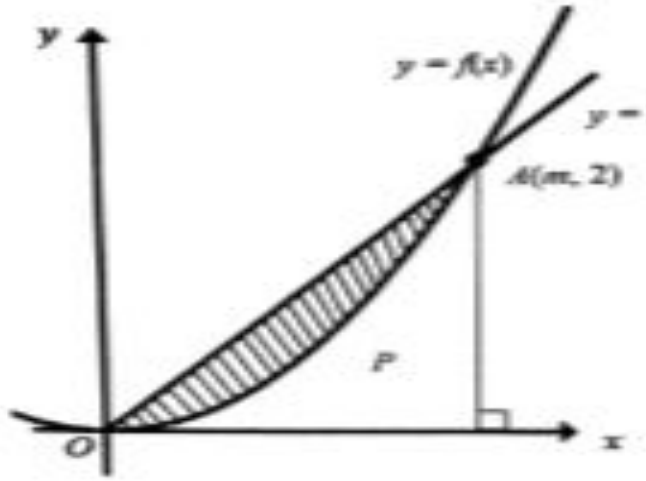


Diagram 6
Rajah 6

The curve has a gradient function of $4x$.
Lengkung itu mempunyai fungsi kecerunan $4x$.

Find
Cari

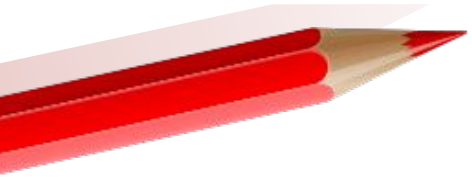
(a) the value of m,
nilai m,
[1 mark]
[1 markah]

(b) the equation of the curve,
persamaan lengkung itu,
[2 marks]
[2 markah]

(c) the area of the region P,
luas rantau P,
[3 marks]
[3 markah]

(d) the volume of revolution, in terms of π, when the shaded region is rotated through $360°$ about x-axis.
isipadu kisaran, dalam sebutan π, *apabila rantau berlorek diputarkan melalui* $360°$ *pada paksi-*x.
[4 marks]
[4 markah]

SIR VEN



QUESTION 56

Diagram 8 below shows part of the curve $y = f(x)$ which passes through point M (4,0) and the straight line $x + y = 20$.

Rajah 8 menunjukkan sebahagian daripada lengkung $y = f(x)$ yang melalui titik M (4,0) dan garis lurus $x + y = 20$.

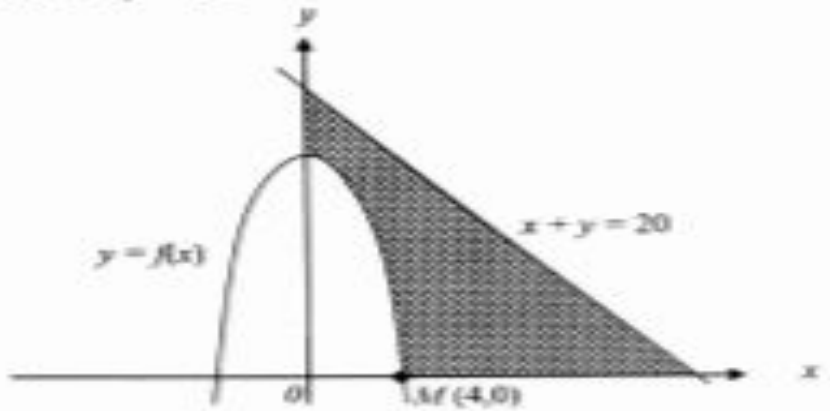


Diagram 8
Rajah 8

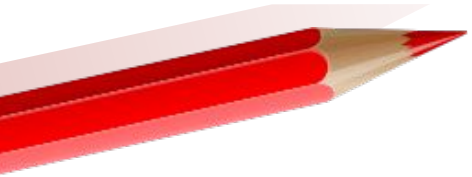
The curve has a gradient function $-2x$.
Lengkung itu mempunyai fungsi kecerunan $-2x$.

Find
Cari

(a) the equation of the curve,
persamaan lengkung itu, [3 marks] [3 markah]

(b) the area of shaded region.
luas rantau berlorek. [4 marks] [4 markah]

(c) the volume of revolution, in terms of π, when the region bounded by the curve and the x-axis is revolved through 180° about the y-axis.
isi padu kisaran, dalam sebutan π, apabila rantau yang dibatasi oleh lengkung dan paksi-x dikisar 180° pada paksi-y. [3 marks] [3 markah]



QUESTION 57

Diagram 6 shows a curve, $y = f(x)$ intersecting a straight line at point $(-2, 3)$.

Rajah 6 menunjukkan satu lengkung, $y = f(x)$ yang bersilang dengan satu garis lurus pada titik $(-2, 3)$.

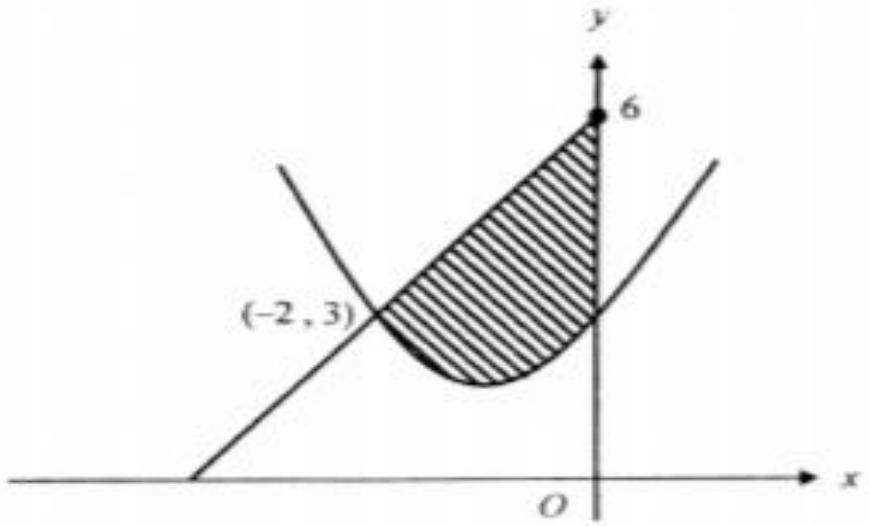


Diagram 6
Rajah 6

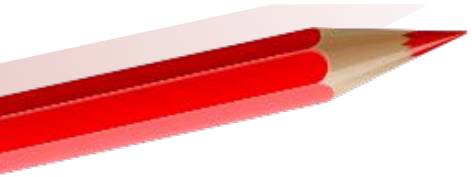
Given the gradient function of the curve is $2x + 2$, find

Diberi fungsi kecerunan bagi lengkung ialah $2x + 2$, *cari*

(a) the equation of the curve, [4 marks]
persamaan lengkung itu. [4 markah]

(b) the area of the shaded region. [3 marks]
luas kawasan yang berlorek. [3 markah]

SIR VEN



SIR VEN

COORDINATE GEOMETRY/ GEOMETRI KOORDINAT

SOALAN 9

QUESTION 58

Solution by scale drawing is not accepted.
Penyelesaian secara lukisan berskala tidak diterima.

Diagram 2 shows the triangle ABC.
Rajah 2 menunjukkan segitiga ABC.

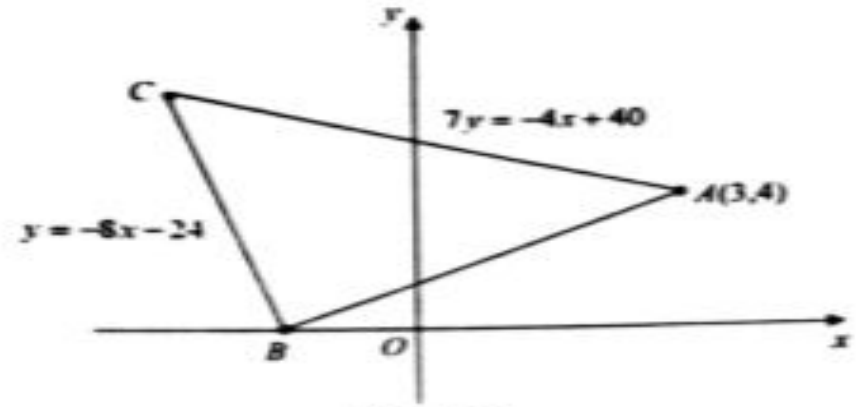


Diagram 2
Rajah 2

(a) **Calculate**
Hitung

(i) **the coordinates C.**
koordinat C.

(ii) **the area, in unit^2, of triangle ABC.**
luas, dalam unit^2, bagi segitiga ABC.

[5 marks]
[5 markah]

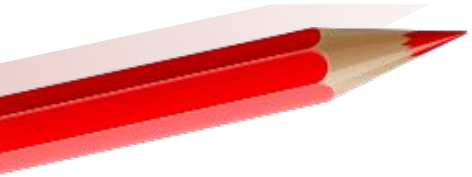
(b) **The straight line AB is extended to a point D such that $AB : BD = 2 : 3$. Find the coordinates D.**
Garis lurus AB dipanjangkan ke suatu titik D dengan keadaan $AB : BD = 2 : 3$. Cari koordinat D.

[2 marks]
[2 markah]

(c) **Given point $E(-8,1)$ is midpoint of straight line CD. Point $P(x,y)$ moves such that $\angle CPD = 90^\circ$. Find the equation of the locus P.**

Diberi titik $E(-8,1)$ ialah titik tengah bagi garis lurus CD. Titik $P(x,y)$ bergerak dengan keadaan $\angle CPD = 90^\circ$. Cari persamaan lokus P.

[3 marks]
[3 markah]



QUESTION 59

(b) A point W moves such that its distance from point K is always half its distance from point J.

Suatu titik W bergerak dengan keadaan jaraknya dari titik K adalah sentiasa separuh jaraknya dari titik J.

(i) Find the equation of the locus of W.

Cari persamaan lokus bagi W,

(ii) Hence, determine whether this locus intersect the y-axis.

Give your reason.

Seterusnya, tentukan sama ada lokus itu memotong paksi-y.

Berikan alasan anda.

[4 *marks*]

[4 *markah*]

1. Solution by scale drawing is not accepted.

Penyelesaian secara lukisan berskala tidak diterima.

Diagram 4 shows a straight line JK perpendicular with the straight line KL. where point L lies on the y-axis.

Rajah 4 menunjukkan garis lurus JK berserenjang dengan garis lurus KL dengan keadaan titik L terletak pada paksi-y.

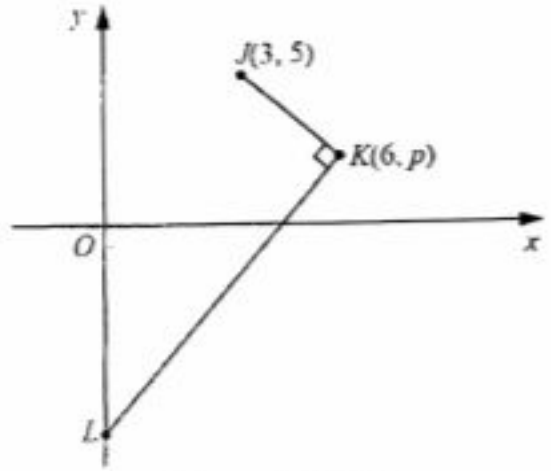


Diagram 4 / *Rajah 4*

The equation of the straight line KL is $3x - y = 14$.

Persamaan garis lurus KL ialah $3x - y = 14$.

(a) Find / *Cari*

(i) the value of p, [2 *marks*]

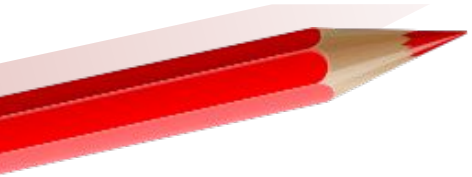
nilai p, [2 *markah*]

(ii) the equation of the straight line JK, [2 *marks*]

persamaan garis lurus JK, [2 *markah*]

(iii) the area, in unit^2, of triangle JKL. [2 *marks*]

luas, dalam unit^2, *segi tiga JKL.* [2 *markah*]



QUESTION 60

Solution to this question by scale drawing will not be accepted.
Penyelesaian soalan ini secara lukisan tidak akan diterima.

Diagram 10 shows a straight line AB intersect straight line BD at point B. Straight line BD intersect $y-$axis at point C and O is the origin.

Rajah 10 menunjukkan garis lurus AB bersilang dengan garis lurus BD pada titik B. Garis lurus BD menyilang paksi–y di titik C dan O ialah asalan.

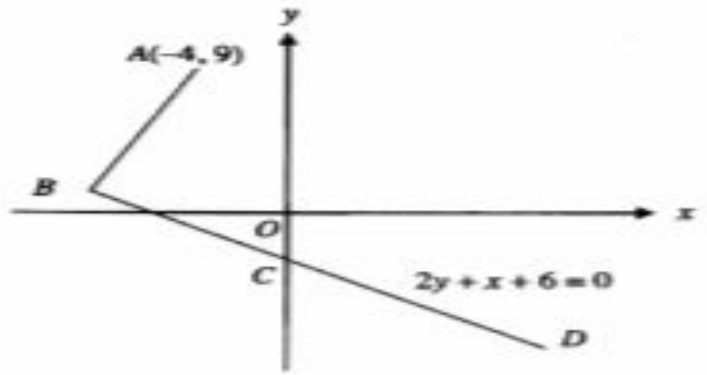


Diagram 10
Rajah 10

Given $\angle ABC = 90°$ and the equation of straight line BD is $2y + x + 6 = 0$.
Diberi $\angle ABC = 90°$ dan persamaan garis lurus BD ialah $2y + x + 6 = 0$.

(a) Find
Cari

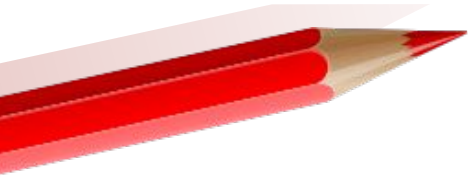
(i) the equation of the straight line AB,
persamaan garis lurus AB,
[2 marks]
[2 markah]

(ii) the coordinates of B,
koordinat B,
[2 marks]
[2 markah]

(iii) the coordinates of D if $3BC = 2CD$,
koordinat D jika $3BC = 2CD$,
[2 marks]
[2 markah]

(iv) the area of triangle BOD.
luas segi tiga BOD.
[2 marks]
[2 markah]

(b) Point P moves such that it is equidistant from point A and B. Find the equation of the locus P.
[2 marks]
Titik P bergerak dengan supaya jaraknya dari titik A dan B adalah sama. Cari persamaan lokus P.
[2 markah]



SIR VEN

PROBABILITY DISTRIBUTION/ TABURAN KEBARANGKALIAN

SOALAN 10

QUESTION 61

(a) **Probability Iqbal gets a fish from each throw is 40%. Calculate**
Kebarangkalian Iqbal mendapat ikan dari setiap balingan adalah 40%. Hitungkan

(i) **the probability Iqbal will catch exactly 6 fishes from 8 throws,**
kebarangkalian Iqbal mendapat tepat 6 ekor ikan daripada 8 balingan,

(ii) **the standard deviation of the distribution if Iqbal make 30 throws.**
sisihan piawai taburan itu jika Iqbal membuat 30 balingan.

[4 marks]
[4 markah]

(b) **The mass of the fish caught by Iqbal follows a normal distribution with mean 300g and a standard deviation of 50g.**

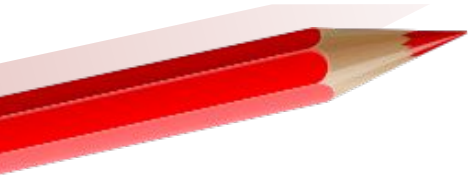
Berat ikan yang ditangkap oleh Iqbal adalah mengikut taburan normal dengan min 300g dan sisihan piawai 50g.

Find
Carikan

(i) **the probability that a fish caught Iqbal has a mass of not more than 400g.**
kebarangkalian ikan yang ditangkap oleh Iqbal berjisim tidak melebihi 400g.

(ii) **the value of *h* if 35.2% of the fishes caught by Iqbal has mass of less than *h* g.**
nilai h jika 35.2% daripada ikan yang ditangkap oleh Iqbal mempunyai jisim kurang dari h g.

[6 marks]
[6 markah]



QUESTION 62

(a) A box contains two types of oranges, M and N in the ratio of 3 : 4. If 7 oranges are picked at random from the box, find the probability that

Sebuah kotak mengandungi dua jenis oren, M dan N dengan nisbah 3 : 4. Jika 7 biji oren dipilih secara rawak daripada kotak itu, cari kebarangkalian bahawa

(i) 6 chosen oranges are type N,

6 biji oren yang dipilih adalah jenis N,

(ii) at least 2 oranges of type M are picked.

sekurang-kurangnya 2 biji oren jenis M dipilih.

[5 marks]
[5 markah]

(b) The time taken to answer the formative test of Additional Mathematics Form 5 follows a normal distribution with a mean of 90 minutes and a standard deviation of 12 minutes.

Masa yang diambil untuk menjawab ujian formatif Matematik Tambahan Tingkatan 5 mengikut taburan normal dengan min 90 minit dan sisihan piawai 12 minit.

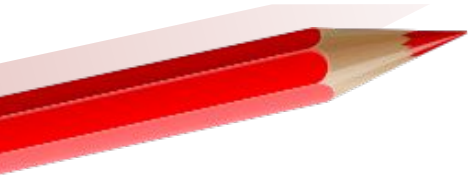
(i) If a student is randomly selected, find the probability that he takes less than 81 minutes or more than 108 minutes to answer the test.

Jika seorang pelajar dipilih secara rawak, cari kebarangkalian bahawa pelajar tersebut mengambil masa kurang daripada 81 minit atau lebih daripada 108 minit untuk menjawab ujian tersebut.

(ii) It is found that 5% of students take less than t minutes to answer the test, find the value of t.

Didapati bahawa 5% daripada pelajar itu mengambil masa kurang daripada t minit untuk menjawab ujian tersebut, cari nilai t.

[5 marks]
[5 markah]



QUESTION 63

(a) A survey is carried out in Kangar. The result shows that 2 out of every 5 houses owned home internet connection. If 8 houses in Kangar are chosen at random. Find the probability that

Dalam suatu kajian yang dijalankan di Kangar. Keputusan menunjukkan 2 daripada setiap 5 rumah memiliki sambungan internet rumah. Jika 8 buah rumah di Kangar dipilih secara rawak. Cari kebarangkalian bahawa

(i) exactly 3 houses owned home internet connection,
tepat 3 buah rumah memiliki sambungan internet rumah,

(ii) more than 5 houses owned home internet connection.
lebih daripada 5 buah rumah memiliki sambungan internet rumah.

[5 marks/5 *markah*]

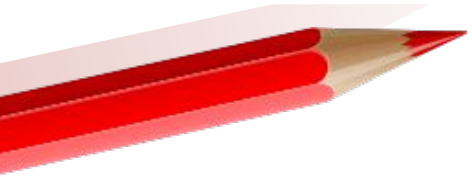
(b) A study on the body mass of a group of teachers is conducted and it is found that the mass of the teachers is normally distributed with a mean of 70 kg and a variance of 256 kg^2.

Suatu kajian ke atas jisim badan sekumpulan guru dijalankan dan didapati bahawa jisim guru bertabur secara normal dengan min 70 kg *dan varians* 256 kg^2.

(i) If a teacher is selected randomly, calculate the probability that his mass is more than 80 kg.
Jika seorang guru dipilih secara rawak, hitungkan kebarangkalian bahawa jisimnya lebih daripda 80 kg.

(ii) Given that 28% of the teachers weight less than m kg, find the value of m.
Diberi bahawa 28% daripada jumlah guru mempunyai jisim kurang daripada m kg, *cari nilai m.*

[5 marks/5 *markah*]



QUESTION 64

(a) The result of a survey shows that 60% of the students in a certain college ride motorcycle to the college. If 12 students from the college are chosen at random, calculate the probability that

Keputusan suatu kaji selidik menunjukkan bahawa 60% pelajar di sebuah kolej tertentu menunggang motosikal ke kolej. Jika 12 orang pelajar dari kolej itu dipilih secara rawak, hitung kebarangkalian bahawa

(i) exactly 8 of them ride motocycle to the college,
tepat 8 orang menunggang motosikal ke kolej,

(ii) less than 3 of them ride motocycle to the college.
kurang daripada 3 orang menunggang motosikal ke kolej.

[5 marks]
[5 markah]

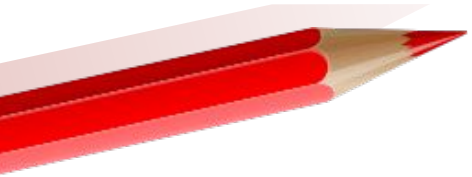
(b) The mass of cempedak obtained from an orchard follow a normal distribution with a mean of 4.2 kg and a standard deviation of 0.8 kg.
Jisim cempedak yang diperoleh dari sebuah kebun adalah mengikut taburan normal dengan min 4.2 kg *dan sisihan piawai* 0.8 kg.

Find
Cari

(i) the probability that a cempedak chosen randomly from the orchard has a mass of not more than 4.5 kg.
kebarangkalian sebiji cempedak yang dipilih secara rawak dari kebun itu yang mempunyai jisim tidak melebihi 4.5 kg.

(ii) the value of m, if 60% of the cempedak from the orchard have a mass of more than *m* kg.
nilai m, jika 60% cempedak dari kebun itu mempunyai jisim melebihi m kg.

[5 marks]
[5 markah]



QUESTION 65

(a) It is found that 55% of the students from a certain class attended tuition classes during school holidays.
Didapati bahawa 55% murid dari sebuah kelas tertentu menghadiri kelas tuisyen semasa cuti sekolah.

If 10 students from the class are selected at random, find the probability that
Jika 10 orang murid dari kelas itu dipilih secara rawak, cari kebarangkalian bahawa

(i) exactly 7 students attended tuition classes,
tepat 7 orang murid menghadiri kelas tuisyen,

(ii) at least 2 students **did not** attend the tuition classes.
*sekurang-kurangnya 2 orang murid **tidak** menghadiri kelas tusyen.*

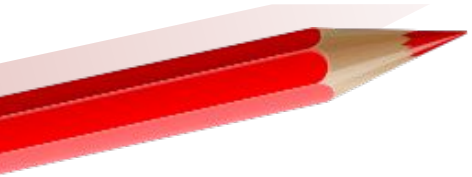
[5 marks]
[5 markah]

(b) The Grade Point Average (GPA) of Additional Mathematics subject of a class follows a normal distribution with a mean of 3.56 and a standard deviation of 0.25.
Purata Nilai Gred (PNG) bagi mata pelajaran Matematik Tambahan bagi suatu kelas adalah mengikut taburan normal dengan min 3.56 dan sisihan piawai 0.25.

(i) If one student is randomly selected, find the probability that the GPA of the student is more than 3.60.
Jika seorang murid dipilih secara rawak, cari kebarangkalian bahawa PNG murid itu lebih daripada 3.60.

(ii) The subject teacher will give token of appreciation to student who obtained GPA more than k.
If 70% of students manage to get the token, find the value of k.
Guru mata pelajaran akan memberi hadiah penghargaan kepada murid yang mendapat PNG lebih dari k.
Jika 70% daripada murid berjaya mendapat hadiah tersebut, cari nilai k.

[5 marks]
[5 markah]



QUESTION 66

(a) A survey on ex-MRSM students shows that 70% of them furthered their study at local institutions.
Kajian ke atas bekas pelajar MRSM menunjukkan bahawa 70 % daripada mereka melanjutkan pelajaran di institusi tempatan.

(i) If 10 ex-MRSM students are chosen at random, find the probability that not more than 2 students further their study at local institutions.
Jika 10 orang bekas pelajar MRSM dipilih secara rawak, cari kebarangkalian tidak lebih daripada 2 orang pelajar melanjutkan pelajaran di institusi tempatan.

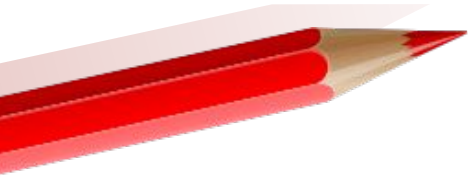
(ii) It is found that 280 students furthered their study at local institutions. Find the total number of students involved in the survey.
Didapati bahawa seramai 280 pelajar melanjutkan pelajaran mereka di institusi tempatan. Cari jumlah bilangan pelajar yang terlibat dalam kajian tersebut.
[5 marks]
[5 markah]

(b) The mass of students in a university is normally distributed with a mean of m kg and variance of 25 kg.
Jisim pelajar sebuah universiti adalah bertaburan secara normal dengan min m kg *dan varians* 25 kg.

Find
Cari

(i) the value of m, if 8 % of the students have mass more than 70 kg.
nilai m, *jika* 8 % *daripada pelajar-pelajar itu mempunyai jisim melebihi* 70 kg.

(ii) the probability that a student choosen at random from the university will has a mass less than 50 kg.
kebarangkalian bahawa seorang pelajar yang dipilih secara rawak dari universiti itu mempunyai jisim kurang daripada 50 kg.
[5 marks]
[5 markah]



SIR VEN

INDEX NUMBER/NOMBOR INDEX

SOALAN 13

QUESTION 67

(b) (i) Find the composite index for the cost of making a kind of food in the year 2019 based on 2016.

Cari indeks gubahan bagi kos membuat sejenis makanan itu pada tahun 2019 berasaskan tahun 2016.

(ii) Hence, calculate the cost of making a kind of food in the year 2019 if the corresponding cost in the year 2016 is RM18.

Seterusnya, hitung kos membuat sejenis makanan pada tahun 2019 jika kos sepadan pada tahun 2016 ialah RM18.

[5 marks]
[5 markah]

Table 3 shows the price indices, changes in price indices and weightages of four ingredients, *R*, *S*, *T* and *U*, used in the making of a kind of food.
Jadual 3 menunjukkan indeks harga, perubahan indeks harga dan pemberat bagi empat bahan R, S, T and U untuk membuat sejenis makanan.

Ingredient *Bahan*	Price Index for the year 2018 based on the year 2016 *Indeks harga pada tahun 2018 berasaskan tahun 2016*	Change in price index from the year 2018 to the year 2019 *Perubahan indeks harga dari tahun 2018 ke tahun 2019*	Weightage *Pemberat*
R	180	10% increase *Menokok 10%*	5
S	116	5% decrease *Menyusut 5%*	4
T	*p*	No change *Tidak berubah*	2
U	125	No change *Tidak berubah*	1

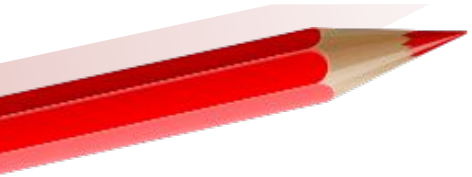
Table 3
Jadual 3

(a) Calculate
Hitung

(i) the price of ingredient *S* in the year 2016 if its price in the year 2018 is RM13.50,
harga bahan S pada tahun 2016 jika harganya pada tahun 2018 ialah RM13.50,

(ii) the value of *p* when the composite index for the cost of making a kind of food in the year 2018 based on the year 2016 is 146.
nilai p apabila indeks gubahan bagi kos membuat sejenis makanan pada tahun 2018 berasaskan tahun 2016 ialah 146.

[5 marks]
[5 markah]



QUESTION 68

(c) The composite index for the cost of making the shoes in the year 2018 based on the year 2017 is 126.25. Calculate
Indeks gubahan bagi kos membuat kasut itu dalam tahun 2018 *berasaskan tahun* 2017 *ialah* 126.25. *Hitung*

(i) the price of a pair of shoes in the year 2017 if its corresponding price in the year 2018 is RM65.65.
harga bagi sepasang kasut dalam tahun 2017 *jika harga sepadan dalam tahun* 2018 *ialah* RM65.65.

(ii) the value of k if the quantities of the materials P, Q, R and S used are in the ratio of $8 : 4 : k : 3$.
nilai bagi k jika kuantiti bagi bahan P, Q, R dan S yang digunakan adalah dalam nisbah $8 : 4 : k : 3$.

[5 marks/5 *markah*]

Table 15 shows the prices of four materials, P, Q, R and S, used in the production of a type of shoes.
Jadual 15 *menunjukkan harga bagi empat jenis bahan, P, Q, R dan S, yang digunakan untuk membuat sejenis kasut.*

Material *Bahan*	Price per unit (RM) *Harga seunit* (RM)	
	Year / *Tahun* 2017	Year / *Tahun* 2018
P	7.00	w
Q	5.50	7.15
R	x	y
S	6.00	6.60

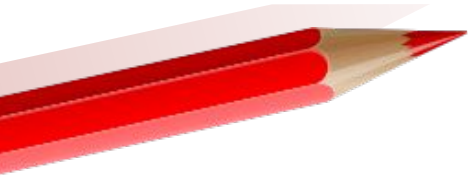
Diagram 15 / *Rajah* 15

(a) The index number of material P in year 2018 based on the year 2017 is 125. Calculate the value of w.
Nombor indeks bagi bahan P dalam tahun 2018 *berasaskan tahun* 2017 *ialah* 125. *Hitung nilai bagi w.*

[2 marks/2 *markah*]

(b) The index number of material R in the year 2018 based on the year 2017 is 135. The price per unit of material R in the year 2018 is RM1.40 more than its corresponding price in the year 2017. Calculate the values of x and y.
Nombor indeks bagi bahan R dalam tahun 2018 *berasaskan tahun* 2017 *ialah* 135. *Harga seunit bagi bahan R dalam tahun* 2018 *ialah* RM1.40 *lebih daripada harga sepadannya dalam tahun* 2017. *Hitung nilai x dan y.*

[3 marks/3 *markah*]



QUESTION 69

Diagram 6 shows the ingredients used to produce a type of biscuit and Table 2 shows price indices for the year 2018 based on the year 2016.
Rajah 6 menunjukkan bahan-bahan yang digunakan untuk menghasilkan sejenis biskut dan Jadual 2 menunjukkan indeks harga pada tahun 2018 berasaskan tahun 2016.

Recipe of "**Tawar Madu**" biscuit
Resepi biskut "Tawar Madu"

Ingredient *A* *Bahan A*	200 g
Ingredient *B* *Bahan B*	100 g
Ingredient *C* *Bahan C*	300 g
Ingredient *D* *Bahan D*	400 g

Diagram 6
Rajah 6

Ingredient *Bahan*	Price index for the year 2018 based on the year 2016 *Indeks harga pada tahun 2018 berasaskan tahun 2016*
A	*t*
B	125
C	140
D	120

Table 2
Jadual 2

(a) The price of ingredient *A* is increased by 30% from the year 2016 to the year 2018.
Harga bagi bahan A menokok sebanyak 30% dari tahun 2016 hingga tahun 2018.

(i) State the value of *t*.
Nyatakan nilai t.

(ii) If the price of ingredient *A* in the year 2016 was RM3.00, find its price in the year 2018.
Jika harga bahan A pada tahun 2016 ialah RM3.00, cari harganya pada tahun 2018.

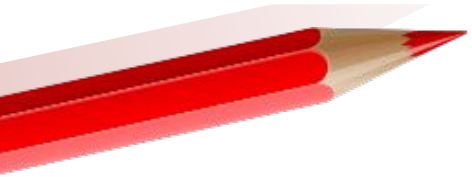
[3 markah]
[3 marks]

(b) It is given that the composite index for the cost of making the biscuit is expected to increase by 20% from the year 2018 to the year 2020.
Diberi bahawa indeks gubahan bagi kos membuat biskut dijangka meningkat sebanyak 20% dari tahun 2018 berasaskan tahun 2020.

(i) Calculate the composite index for the cost of making the biscuit in the year 2020 based on the year 2016.
Hitung indeks gubahan bagi kos membuat biskut pada tahun 2020 berasaskan tahun 2016.

(ii) Given Yusra has RM500 and the cost of making a packet of biscuit in the year 2016 was RM 15.40.
Calculate the maximum number of packets of biscuit that can be produced by Yusra in the year 2020.
Diberi Yusra mempunyai RM500 dan kos pembuatan untuk setiap bungkus biskut pada tahun 2016 ialah RM 15.40.
Hitungkan bilangan bungkus biskut yang boleh dihasilkan oleh Yusra pada tahun 2020.

[7 markah]
[7 marks]



QUESTION 70

7. Table 2 shows the price indices for the year 2018 and 2020 based on the year 2016 of three materials *P*, *Q* and *R* used in making a type of chair.
Jadual 2 menunjukkan indeks harga bagi tahun 2018 dan 2020 berasaskan tahun 2016 untuk tiga jenis bahan P, Q dan R yang digunakan untuk membuat sebuah kerusi.

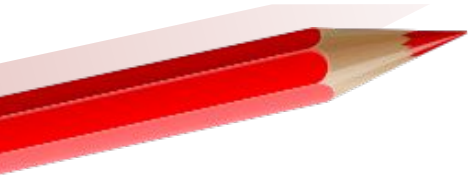
Material *Bahan*	Price index in the year 2018 based on the year 2016 *Indeks harga pada tahun 2018 berasaskan tahun 2016*	Price index in the year 2020 based on the year 2016 *Indeks harga pada tahun 2020 berasaskan tahun 2016*
P	108	120
Q	125	135
R	117	*x*

Table 2
Jadual 2

a) The price of material *R* in the year 2016 is RM 22.00 and its price in the year 2020 is RM 28.60
Harga bahan R pada tahun 2016 ialah RM 22.00 *dan harganya pada tahun 2020 ialah* RM 28.60.
Find/ *Cari*
the value of *x*,
nilai x,
) the price of material *R* in the year 2018.
harga bagi bahan R pada tahun 2018.
[3 marks]
[3 markah]

b) The composite index for the production cost of the chair in the year 2018 based on the year 2016 is 119.2. The ratio of materials *P*, *Q* and *R* used are 2 : *h* : 3.
Indeks gubahan untuk kos pengeluaran kerusi itu pada tahun 2018 berasaskan tahun 2016 ialah 119.2. Nisbah bahan-bahan P,Q dan R yang digunakan ialah 2 : h : 3.
Find/*Cari*
(i) the value of *h*,
nilai h,
(ii) the corresponding price of the chair in the year 2016 if the price of chair in the year 2018 is RM 59.60.
Harga sepadan bagi kerusi itu pada tahun 2016 jika harga kerusi itu pada tahun 2018 ialah RM 59.60.
[5 marks]
[5 markah]

c) Find the price index of material *Q* in the year 2020 based on the year 2018.
Cari indeks harga bagi bahan Q pada tahun 2020 berasaskan tahun 2018.
[2 marks]



QUESTION 71

Table 13 shows the prices of five items recoded by a student at the beginning of a school term , the price indices of the items for the year 2017 based on the year 2015 and the percentage of expenditure of the five items.

Jadual 13 menunjukkan harga bagi lima item yang diperlukan oleh seorang pelajar pada permulaan penggal persekolahan, indeks harga item-item tersebut bagi tahun 2017 berasaskan tahun 2015 dan peratus perbelanjaan bagi kelima-lima item tersebut.

Item	Price per item (RM) *Harga setiap item (RM)*		Price index in 2017 based on 2015 *Indeks harga pada 2017 berasaskan 2015*	Percentage of expenditure (%) *Peratus perbelanjaan (%)*
	2015	2017		
Bag /*Beg*	x	70	175	8
Shoes /*Kasut*	30	45	150	12
Uniform /*Uniform*	60	75	125	10
Books /*Buku*	20	y	100	24
Stationery / *Alat tulis*	15	18	z	46

Table 13
Jadual 13

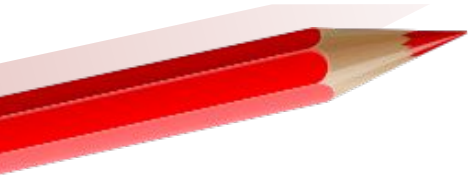
(a) Find the values of x, of y and of z. [3 marks]
Cari nilai x, nilai y dan nilai z. [3 markah]

(b) Calculate the composite index of the items for the year 2017 based on the year 2015. [2 marks]
Hitung indeks gubahan bagi item-item itu untuk tahun 2017 berasaskan tahun 2015. [2 markah]

(c) The total expenditure of the items in the year 2017 was RM 880.00.
Calculate the corresponding total expenditure for the year 2015. [2 marks]
Jumlah perbelanjaan untuk item-item pada tahun 2017 adalah RM 880.00.
Hitung jumlah perbelanjaan yang sepadan pada tahun 2015. [2 markah]

(d) The price of the bag is expected to decrease by 5%, while the price of each of other items is expected to increase by 10% from the year 2017 to the year 2018.
Find the expected composite index for the year 2018 based on the year 2015. [3 marks]

Harga beg dijangka berkurang sebanyak 5%, sementara harga setiap item yang lain dijangka meningkat sebanyak 10% dari tahun 2017 ke tahun 2018.
Cari indeks gubahan yang dijangkakan pada tahun 2018 berasaskan tahun 2015. [3 markah]



QUESTION 72

7. Table 15 shows the price indices for the year 2014 based on the year 2013 and the percentages of usage of four ingredients in the making a type of cake.
Jadual 15 menunjukkan indeks harga tahun 2014 berasaskan tahun 2013 dan peratus penggunaan empat jenis bahan yang digunakan dalam pembuatan sejenis kek.

Ingredient *Bahan*	Price Index *Indeks Harga*	Percentange (%) *Peratus (%)*
J	84	5
K	154	40
M	189	10
N	*p*	45

Table 15
Jadual 15

(a) Find
Cari

(i) the price of *M* in the year 2013 if its price in the year 2014 is RM2.00.
harga M pada tahun 2013 jika harganya pada tahun 2014 ialah RM2.00

(ii) the price index of *J* in the year 2014 based on the year 2015 if its price index in the year 2013 based on the year 2015 is 184.
indeks harga bagi J pada tahun 2014 berasaskan tahun 2015 jika indeks harganya pada tahun 2013 berasaskan tahun 2015 ialah 184.

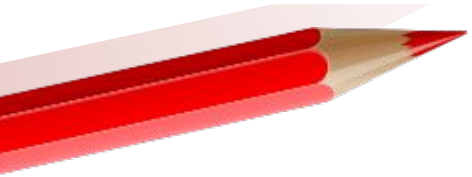
[5 *marks*]
[5 *markah*]

(b) The composite index for the cost of the cake in the year 2014 based on the year 2013 is 154. Calculate
indeks gubahan untuk kos kek itu pada tahun 2014 berasaskan tahun 2013 ialah 154. *Kirakan*

(i) the value of *p*,
nilai p,

(ii) the corresponding price of the cake in the year 2013 if the price of a cake in the year 2014 is RM27.10.
harga sepadan bagi kek itu pada tahun 2013 jika harga kek itu pada tahun 2014 ialah RM27.10

[5 *marks*]
[5 *markah*]



QUESTION 73

(c) The composite index for the cost of making the food is expected to increase by 15% from the year 2017 to the year 2019,

Indeks gubahan bagi kos membuat makanan itu dijangka meningkat sebanyak 15% *dari tahun* 2017 *ke tahun* 2019,

Calculate

Hitung

(i) the composite index for the year 2019 based on the year 2015,
indeks gubahan bagi tahun 2019 *berasaskan tahun* 2015,

(ii) the price of 1 kg of the food in the year 2019 if its price in the year 2017 is RM85.00.
harga 1 kg *makanan itu pada tahun* 2019 *jika harganya pada tahun* 2017 *ialah* RM85.00.

[4 *marks*]
[4 *markah*]

Table 14 shows the price indices and weightages of four items *A*, *B*, *C* and *D* used in a production of a type of food.

Jadual 14 *menunjukkan indeks harga dan pemberat bagi empat bahan A, B, C dan D yang digunakan dalam pengeluaran sejenis makanan.*

Item *Bahan*	Price index in the year 2017 based on the year 2015 *Indeks harga dalam tahun* 2017 *berasaskan tahun* 2015	Weightage *Pemberat*
A	100	4
B	120	3
C	x	2
D	106	1

Table 14
Jadual 14

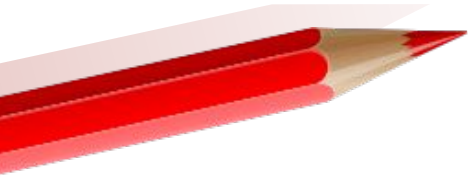
The composite index for the cost of making the food for the year 2017 based on the year 2015 is 105.6.

Indeks gubahan bagi kos pembuatan makanan itu pada tahun 2017 *berasaskan tahun* 2015 *ialah* 105.6.

(a) Find the value of x and hence, give your comment on the change in price of item *C*.
[4 *marks*]
Cari nilai x dan seterusnya, beri komen anda terhadap perubahan harga bahan C.
[4 *markah*]

(b) Calculate the price of item *B* in the year 2017 if its price in the year 2015 was RM7.80.
[2 *marks*]

Hitung harga bahan B pada tahun 2017 *jika harganya pada tahun* 2015 *ialah* RM7.80.
[2 *markah*]



QUESTION 74

Table 3 shows the prices and the prices indices of four ingredients *P*, *Q*, *R* and *S*, use in the production of a type of curry powder.

Jadual 3 menunjukkan harga dan indeks harga bagi empat jenis bahan P, Q, R dan S, yang digunakan dalam penghasilan sejenis serbuk kari.

Ingredient *Bahan*	Price (RM) per kg for the year *Harga (RM) per kg pada tahun*		Price index for the year 2015 based on the year 2013 *Indeks harga pada tahun 2015 berasaskan tahun 2013*	Percentage *Peratus* %
	2013	2015		
P	4	*x*	137	37
Q	2·80	3·32	115	33
R	3·75	3·60	*y*	*m*
S	*z*	7·20	150	14

Table 3
Jadual 3

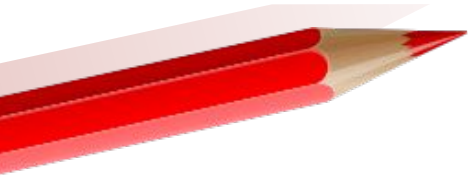
(*a*) Find the values of *x*, *y* and *z*. [3 *marks*]
Cari nilai x, y dan z. [3 *markah*]

(*b*) Calculate the composite index for the cost of making the curry powder for the year 2015 based on the year 2013. [3 *marks*]

Hitung indeks gubahan bagi kos membuat serbuk kari pada tahun 2015 *berasaskan tahun* 2013. [3 *markah*]

(*c*) It is given that the composite index for the cost of making a packet of curry powder increases by 60% from the year 2013 to the year 2017. Calculate the cost of making a packet of curry powder in the year 2017 if the corresponding cost in the year 2015 is 50 cent. [4 *marks*]

Diberi indek gubahan untuk membuat sepeket serbuk kari meningkat dari tahun 2013 *kepada tahun* 2017 *sebanyak* 60% . *Hitung kos membuat sepeket serbuk kari pada tahun* 2017 *jika kos sepadan pada tahun* 2015 *ialah* 50 *sen.* [4 *markah*]



QUESTION 75

Table 12 shows the price of four ingredients, *E*, *F*, *G* and *H*, used in the making of a dessert.

Jadual 12 menunjukkan harga bagi empat bahan, E, F, G dan H, digunakan untuk membuat sejenis pencuci mulut.

Ingredient *Bahan*	Price per kilogram (RM) *Harga per kilogram (RM)*	
	2015	2017
E	4.50	*w*
F	2.50	3.50
G	*x*	*y*
H	4.00	4.80

Table 12/ *Jadual 12*

(a) The price index of ingredient *E* in the year 2017 based on the year 2015 is 120. Calculate the value of *w*. [2 *marks*]

Indeks harga bagi bahan E pada tahun 2017 berasaskan tahun 2015 ialah 120. Hitung nilai w. [2 *markah*]

(b) The price index of ingredient *G* in the year 2017 based on the year 2015 is 130. The price per kilogram of ingredient *G* in the year 2017 is RM3.00 more than its corresponding price in the year 2015. Calculate the value of *x* and of *y*.

Indeks harga bagi bahan G pada tahun 2017 berasaskan tahun 2015 ialah 130. Harga per kilogram bagi bahan G pada tahun 2017 ialah RM3.00 lebih daripada harga yang sepadan pada tahun 2015. Hitung nilai x dan nilai y.

[3 *marks*]

[3 *markah*]

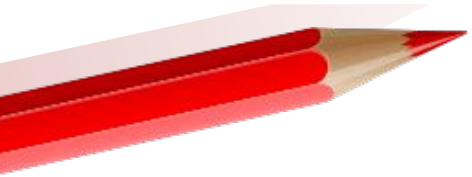
(c) Calculate the composite index for the cost of making the dessert in the year 2017 based on the year 2015 if the quantity of ingredients, *E*, *F*, *G* and *H* used are in the ratio of 7 : 3 : 4 : 2. [2 *marks*]

Hitung indeks gubahan bagi kos pembuatan pencuci mulut itu pada tahun 2017 berasaskan tahun 2015 jika kuantiti bahan E, F, G dan H yang digunakan mengikut nisbah 7 : 3 : 4 : 2. [2 *markah*]

(d) The composite index for the cost of making the dessert increased by 20% from the year 2017 to the year 2018. Calculate the price of a bowl of the dessert in the year 2018 if its corresponding price in the year 2015 is RM20. [3 *marks*]

Indeks gubahan bagi kos pembuatan pencuci mulut meningkat sebanyak 20% daripada tahun 2017 kepada tahun 2018. Hitung harga bagi semangkuk pencuci mulut itu pada tahun 2018 jika harga sepadan pada tahun 2015 ialah RM20.

[3 *markah*]



QUESTION 76

Table 14 shows the prices, price indices and weightages of five ingredients used in making a type of biscuit.

Jadual 14 menunjukkan harga, indeks harga dan pemberat bagi lima bahan yang digunakan untuk membuat sejenis biskut.

Ingredient *Bahan*	Price per kilogram (RM) *Harga sekilogram (RM)*		Price index for the year 2015 based on the year 2014 *Indeks harga pada tahun 2015 berdasarkan tahun 2014*	Weightage *Pemberat*
	2014	2015		
J	2·80	*x*	75	2
K	4·00	5·60	140	5
L	*y*	2·40	120	4
M	3·00	3·30	*z*	*p*
N	5·00	5·80	116	2

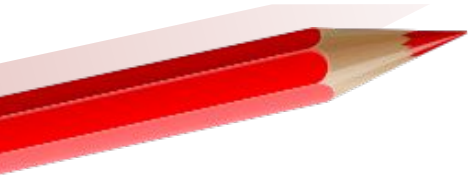
Table 14
Jadual 14

(a) Find the value of *x*, *y* and *z*. [3 marks]
Cari nilai-nilai x, y dan z. [3 markah]

(b) The composite index for the cost of making the biscuits in the year 2015 based on the year 2014 is 118·25. Calculate the value of *p*. [3 marks]
Indeks gubahan bagi kos membuat biskut tersebut pada tahun 2015 berasaskan tahun 2014 ialah 118·25. Hitung nilai p. [3 markah]

(c) A pack of the biscuit is sold at a price of RM40 in the year 2014. Calculate the corresponding price of the biscuit in the year 2015. [2 marks]
Satu pek biskut tersebut dijual dengan harga RM40 pada tahun 2014. Hitung harga yang sepadan bagi biskut itu pada tahun 2015. [2 markah]

(d) The price of *M* is expected to increase by 54% from the year 2014 to the year 2016. Calculate the expected price index for *M* in the year 2016 based on the year 2015. [2 marks]
Harga bagi M dijangka meningkat sebanyak 54% dari tahun 2014 ke tahun 2016. Hitung indeks harga yang dijangkakan bagi M pada tahun 2016 berasaskan tahun 2015. [2 markah]



SIR VEN

SOLUTION OF TRIANGLE/ PENYELESAIAN SEGI TIGA

SOALAN 14

QUESTION 77

Diagram 5 shows a trapezium $PQRS$.
Rajah 5 menunjukkan sebuah trapezium PQRS.

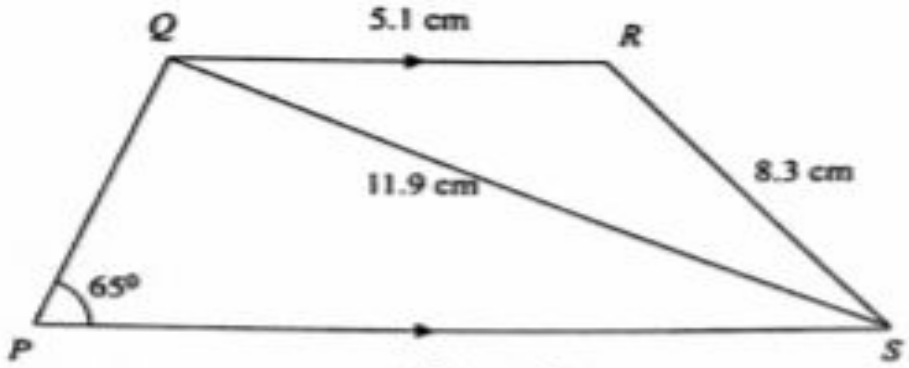


Diagram 5
Rajah 5

(a) Calculate
Hitung

(i) $\angle SQR$,

(ii) the length, in cm, of PS,
panjang, dalam cm, bagi PS,

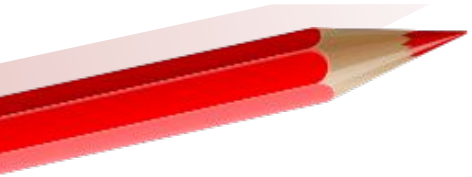
(iii) the area, in cm^2, of trapezium $PQRS$.
luas, dalam cm^2, bagi trapezium PQRS.

[8 marks]
[8 markah]

(b) Sketch a triangle $Q'R'S'$ which has a different shape from triangle QRS such that $Q'R' = QR$, $S'R' = SR$ and $\angle Q'S'R' = \angle QSR$.
Hence, state $\angle S'Q'R'$.

Lakar sebuah segi tiga $Q'R'S'$ yang mempunyai bentuk berbeza daripada segi tiga QRS dengan keadaan $Q'R' = QR$, $S'R' = SR$ dan $\angle Q'S'R' = \angle QSR$.
Seterusnya, nyatakan $\angle S'Q'R'$.

[2 marks]
[2 markah]



QUESTION 78

Solution by scale drawing is not be accepted.
Penyelesaian secara lukisan berskala tidak diterima.

Diagram 14 shows a triangle ABC.
Rajah 14 menunjukkan segi tiga ABC.

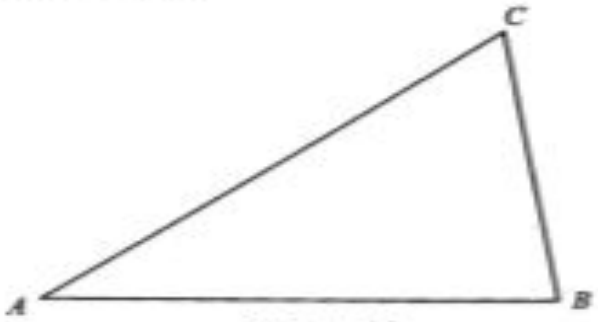


Diagram 14
Rajah 14

It is given that $AB = 5$ cm, $BC = 4.7$ cm and $AC = 6.5$ cm. Point D lies on line AC such that $AD = BD$.

Diberi bahawa $AB = 5$ cm, $BC = 4.7$ cm dan $AC = 6.5$ cm. Titik D terletak atas garis AC dengan keadaan $AD = BD$.

(a) Find
Cari

(i) $\angle BAC$,

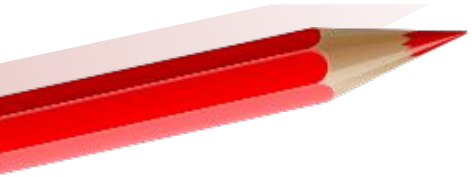
(ii) the length, in cm, of BD.
panjang, dalam cm, *bagi* BD.

[4 marks]
[4 markah]

(b) Sketch the triangle $A'B'C'$ which has a different shape from triangle ABC such that $B'C' = BC$ and $\angle B'A'C' = \angle BAC$.
Then find the $\angle B'C'A'$.
[4 marks]

Lakar sebuah segi tiga $A'B'C'$ yang mempunyai bentuk berbeza daripada segi tiga ABC dengan keadaan $B'C' = BC$ dan $\angle B'A'C' = \angle BAC$.
Kemudian, cari $\angle B'C'A'$.
[4 markah]

(c) Calculate the area, in cm^2, of $\Delta A'B'C'$.
[2 marks]
Hitung luas, dalam cm^2, *bagi* $\Delta A'B'C'$.
[2 markah]



QUESTION 79

Diagram 12 shows a triangle ABC. It is given that $AB : AC = 3 : 1$ and $BC = 30$ cm.

Diagram 12 menunjukkan sebuah segitiga ABC. Diberi bahawa AB : AC = 3 : 1 dan BC = 30 cm.

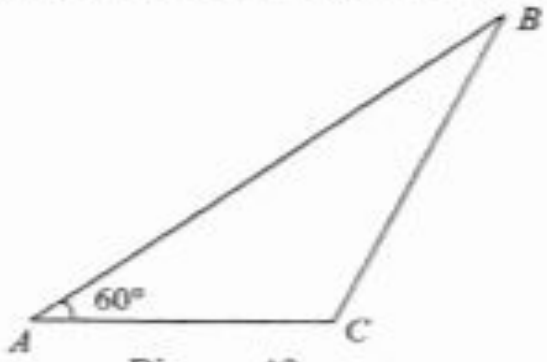


Diagram 12
Rajah 12

(a) Find

Cari

(i) the length AB,

panjang AB,

(ii) $\angle ACB$,

(iii) the area, in cm^2, of triangle ABC. [7 marks]

luas, dalam cm^2, segitiga ABC. [7 markah]

(b) The side AC is extended to point C' such that $BC = BC'$.

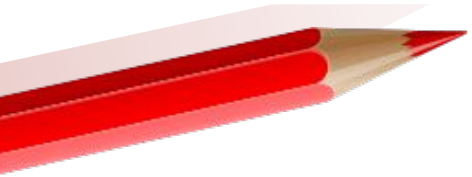
Sisi AC diperpanjangkan ke titik C' dengan keadaan BC = BC'.

(i) Sketch $\Delta ABC'$.

Lakarkan $\Delta ABC'$.

(ii) Find the shortest distance from B to AC'. [3 marks]

Cari jarak terpendek dari B kepada AC'. [3 markah]



QUESTION 80

SIR VEN

7 Diagram 8 shows a quadrilateral $PQRS$ and $\angle PQR$ is acute angle.
Rajah 8 menunjukkan sebuah segiempat PQRS dan $\angle PQR$ adalah sudut tirus.

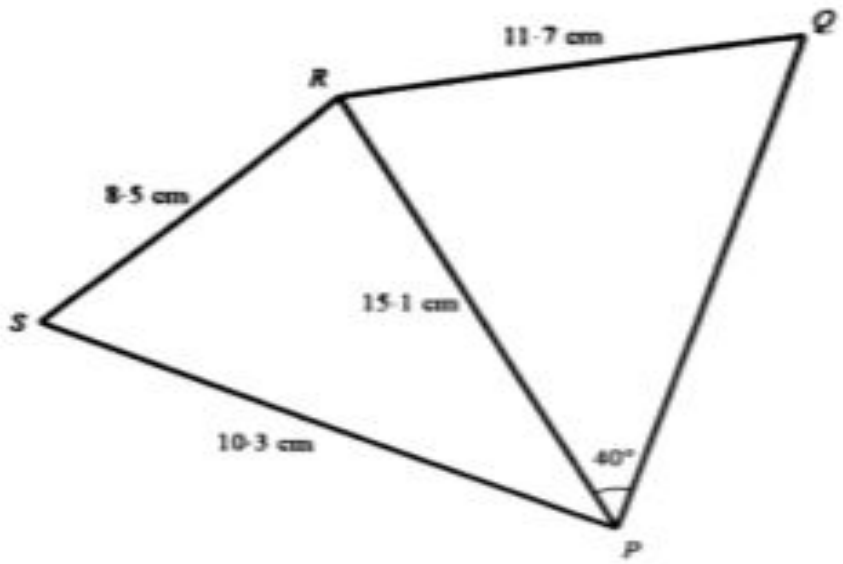


Diagram 8
Rajah 8

(a) Find
Cari

(i) $\angle PQR$. [2 marks]
[2 markah]

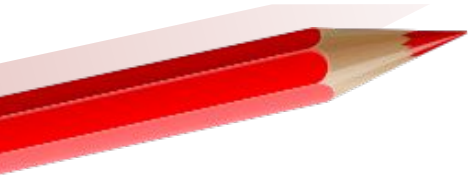
(ii) $\angle PSR$. [2 marks]
[2 markah]

(iii) the area, in cm^2, of quadrilateral $PQRS$. [4 marks]
luas, dalam cm^2, bagi segiempat PQRS. [4 markah]

(b) (i) Sketch a $\Delta P'Q'R'$ which has a different shape from ΔPQR such that $P'R' = PR, Q'R' = QR$ and $\angle Q'P'R' = \angle QPR$. [1 mark]

Lakar sebuah $\Delta P'Q'R'$ yang mempunyai bentuk berbeza dari ΔPQR dengan keadaan $P'R' = PR, Q'R' = QR$ dan $\angle Q'P'R' = \angle QPR$.
[1 markah]

(ii) Hence, state the size of $\angle P'Q'R'$. [1 mark]
Seterusnya, nyatakan saiz $\angle P'Q'R'$. [1 markah]



QUESTION 81

Diagram 13 shows a quadrilateral $PQRS$. Given $\angle SQR = 13°$ and $\angle SRQ$ is obtuse.

Rajah 13 menunjukkan sisi empat PQRS. Diberi $\angle SQR = 13°$ *dan* $\angle SRQ$ *ialah sudut cakah.*

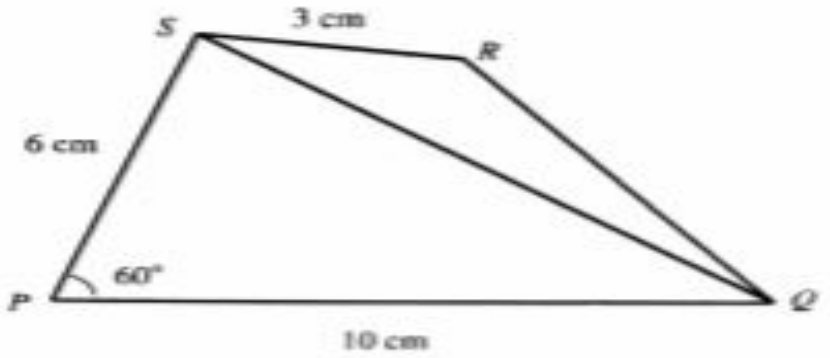


Diagram 13/ *Rajah 13*

(a) Find

Cari

(i) the length, in cm, of SQ

panjang SQ, dalam cm

(ii) $\angle SRQ$

[5 marks]

[5 markah]

(b) (i) Sketch triangle $P'Q'S'$ which has a different shape from the triangle PQS such that $\angle P'Q'S' = \angle PQS$, $P'S' = PS$ and $S'Q' = SQ$.

Lakar segi tiga $P'Q'S'$ *yang mempunyai bentuk yang berbeza daripada segi tiga PQS dengan keadaan* $\angle P'Q'S' = \angle PQS$, $P'S' = PS$ *dan* $S'Q' = SQ$.

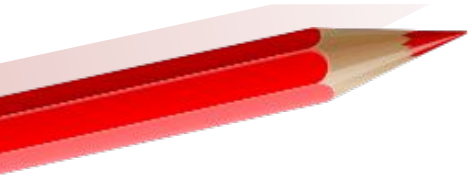
(ii) Hence, calculate the area, in cm^2, of the triangle $P'Q'S'$.

Seterusnya, hitung luas, dalam cm^2, *segi tiga* $P'Q'S'$.

[5 marks]

[5 markah]

SIR VEN



QUESTION 82

Solution by scale drawing will not be accepted.
Penyelesaian secara lukisan berskala tidak akan diterima.

Diagram 12 shows a triangle EFH and G lies on FH.
Rajah 12 menunjukkan sebuah segi tiga EFH dan G berada pada FH.

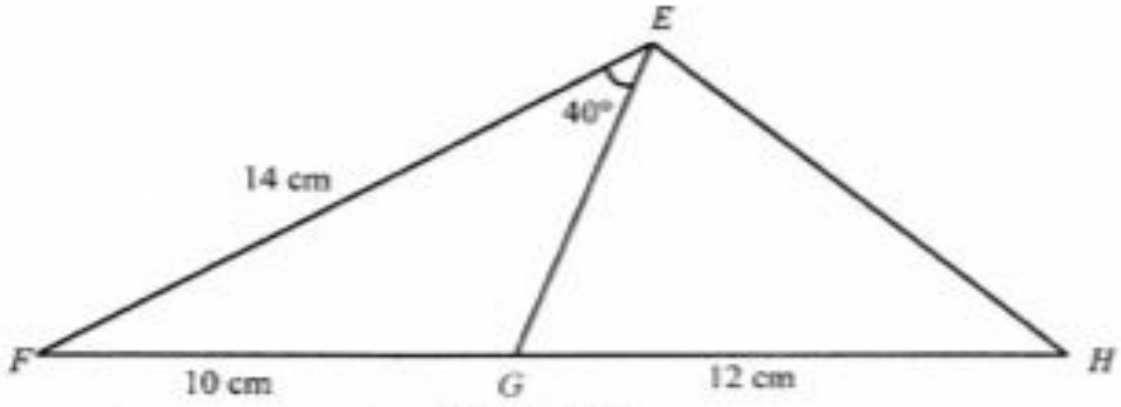


Diagram 12
Rajah 12

(*a*) Find
Cari

(i) $\angle FGE$,

(ii) the length, in cm, of EH,
panjang, dalam cm, *bagi EH,*

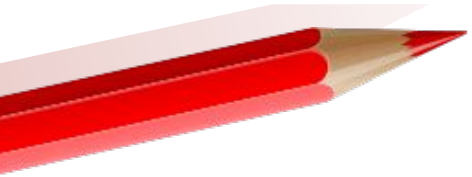
(iii) the area, in cm^2, of the triangle EGH.
luas, dalam cm^2, *bagi segi tiga EGH.*

[9 marks]
[9 markah]

(*b*) Sketch and label a new triangle EFG of different shape from triangle EFG in Diagram 12 such that the length of EF, FG and $\angle FEG$ remain unchanged.

[1 mark]

Lakar dan label sebuah segi tiga EFG yang berlainan bentuk daripada segi tiga EFG dalam Rajah 12 dengan keadaan panjang EF, FG dan $\angle FEG$ *tidak berubah.*



QUESTION 83

Diagram 13 shows a quadrilateral $ABCD$.
Rajah 13 menunjukkan sebuah siti empat $ABCD$.

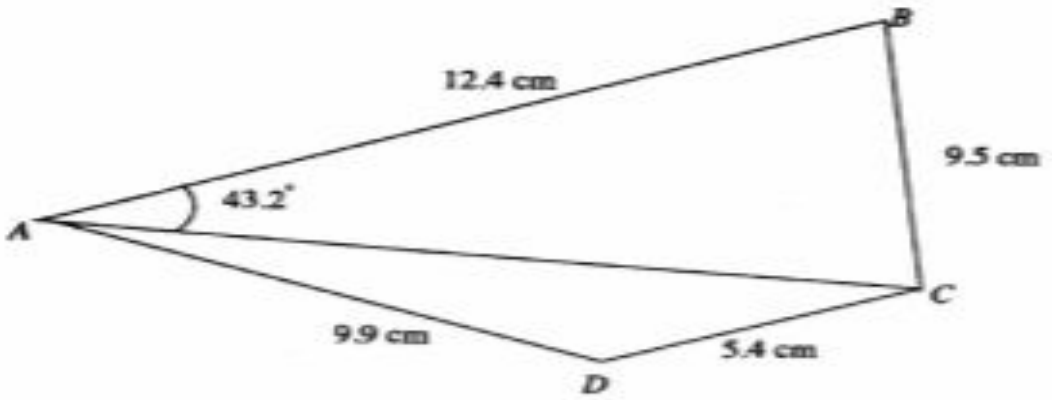


Diagram 13
Rajah 13

Calculate
Hitung

(a) $\angle ACB$, [2 marks] [2 markah]

(b) the length, in cm, of AC,
panjang, dalam cm, bagi AC, [3 marks] [3 markah]

(c) area, in cm^2, of triangle ACD,
luas, dalam cm^2, segi tiga ACD, [3 marks] [3 markah]

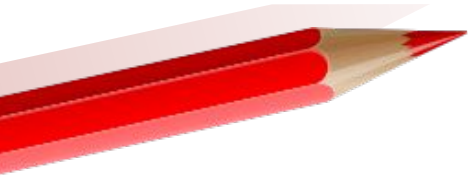
(d) A triangle $A'B'C'$ has the same measurements as those given for triangle ABC, that is, $A'B' = 12.4$ cm, $B'C' = 9.5$ cm and $\angle B'A'C' = 43.2°$, but which is different in shape to triangle ABC.

Sebuah segi tiga $A'B'C'$ yang mempunyai ukuran yang sama dengan segi tiga ABC, iaitu $A'B' = 12.4$ cm, $B'C' = 9.5$ cm and $\angle B'A'C' = 43.2°$, tetapi mempunyai bentuk yang berbeza daripada segitiga ABC.

(i) Sketch the triangle $A'B'C'$,
Lakarkan segi tiga $A'B'C'$,

(ii) State the size of $\angle A'C'B'$,
Tentukan saiz bagi $\angle A'C'B'$.

[2 marks] [2 markah]



(a)	$2m-1=3$ $m=2$	or equivalent
(b)	$g(2x-1)=4x+3$ $g(y)=4\left(\frac{y+1}{2}\right)+3$ $g(x)=2x+5$	or equivalent

5 (a)ii)	7	P1 7
ii)	-4	P1 -4
b)	$\frac{x+1}{2}$ $\frac{(4x-20)+1}{2}$ $\frac{4x-19}{2}$	K1 Find f K1 substitute $4x-20$ into f N1 $\frac{4x+19}{2}$
c)	$f'\left(\frac{4x-19}{2}\right)=4x-20$ $x=\frac{21}{4}$	K1 find $f'g(x)$ N1 $x=\frac{21}{4}$

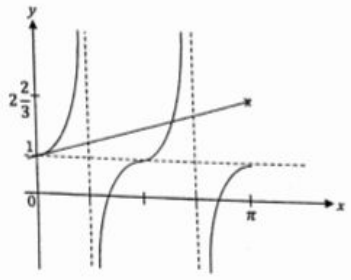
(a)	$288\pi=\frac{4}{3}\pi r^3$ $r=6$ cm	K1 (find r)
	guna $\frac{dV}{dt}=\frac{dV}{dr}\times\frac{dr}{dt}$	K1
	$x=-36\pi$ cm^{3}s^{-1}	N1
(b)	guna $\frac{dA}{dt}=\frac{dA}{dr}\times\frac{dr}{dt}$	K1
	$=12\pi$ cm^{2}s^{-1}	N1
(c)	Jejari selepas penyusutan = 5.4 cm Peratus penyusutan dalam isi padu	P1
	$\frac{78.048}{288}\times100\%$	K1
	27.1 %	N1

(a)

$\frac{\sin 2x}{\cos 2x}$

$\tan 2x$

(b)



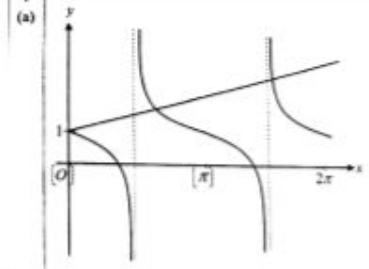
$y = \frac{5x}{3\pi} + 1$

Straight line

Number of solutions = 2

1

(a)



P1	Shape of tangent graph	
P1	Shape of negative tangent graph	
P1	Shift upward +1	3

Note:
1. Do not accept sine and cosine graph.
2. Ignore graph outside the range.

(b) $y = \frac{x}{\pi} + 1$

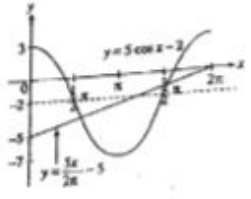
N1	$y = \frac{x}{\pi} + 1$	
K1	Sketch straight line $y = \frac{x}{\pi} + 1$ with *gradient property or *y-intercept property correct.	
N1	3	3 6

Number of solutions = 3

(a) $\frac{\tan 2x \cos 2x}{\sin x} = \frac{\left(\frac{\sin 2x}{\cos 2x}\right)\cos 2x}{\sin x}$ dan $\frac{2\sin x \cos x}{\sin x}$ K1

$= 2\cos x$ N1

(b) (i)



Shape of cosine graph P1
Amplitude = 5 P1
1 cycle for $0 \le x \le 2\pi$ and shifted down 2 units P1

(ii) $y = \frac{5x}{2\pi} - 5$ N1

Lakar garis lurus samada kecerunan atau pintasan-y betul K1

Bilangan penyelesaian = 2 N1

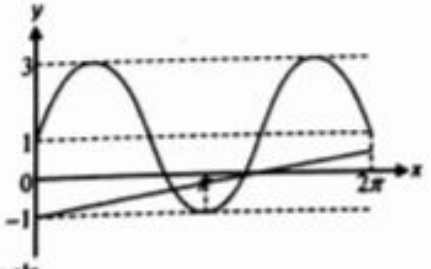
2(a)

$\frac{2\sin x \cos x}{1-(1-2\sin^2 x)}$

$= \frac{\cos x}{\sin x}$

$= \cot x$

(b)



Shape and cycle

Amplitude

Shipted

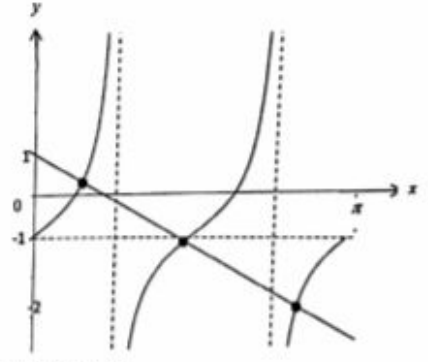
$y = \frac{3x}{4\pi} - 1$

2(a)

$\frac{2\tan x}{2-(\tan^2 x + 1)}$

$\tan 2x$

(b)



Shape of tangent graph

1 cycle for $0 \le x \le \pi$

Shifted

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

Draw a straight line $y = 1 - \frac{3x}{\pi}$

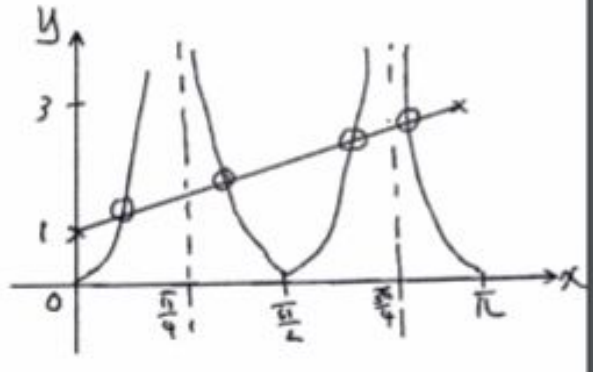
No of solutions = 3

4a) $\frac{2\sin x}{2\cos x - \frac{1}{\cos x}} = \frac{2\sin x \cos x}{2\cos^2 x - 1}$

$= \frac{\sin 2x}{\cos 2x}$

$= \tan 2x$

b)



SIR VEN

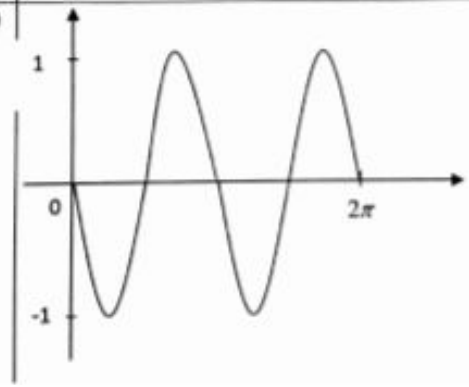
TRIGONOMETRY

2(a) Menggunakan rumus identiti asas $\sin^2 x + kos^2 x = 1$

$$\text{LHS} = \frac{kos^2 x + \sin^2 x}{\sin x kos x}$$

$$= \frac{2}{\sin 2x} = \text{RHS}\ .\ \text{Terbukti}$$

(b)(i)



$y = \sin x$ (bentuk)

$y = -\sin 2x$ (2 kala

Amplitud

a) $6\sin x \cos x = 3\sin 2x$ OR $\cos^2 x - \sin^2 x = \cos 2x$

$$\frac{3\sin 2x}{\cos 2x} = 3\tan 2x$$

(b) (i)

Shape of $\tan x$ graph

Amplitud and cycle

(b) (ii) $y = \frac{2x}{\pi} - 1$

Plot straight line $y = \frac{2x}{\pi} - 1$

No of solution 2

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$x = 13.24, 4.757$

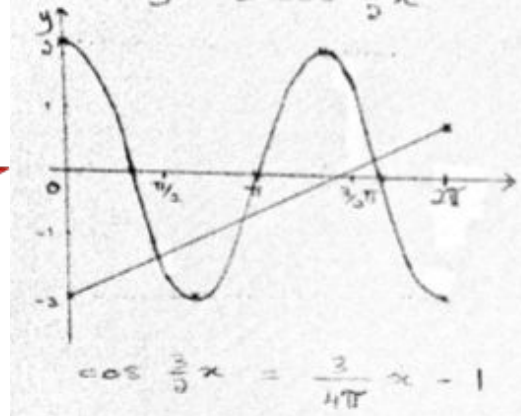
$y = 3.121, -1.121$

(a)

(b) $y = 2 - \frac{2x}{\pi}$

Bilangan penyelesaian = 3

2. (a) $y = 2\cos\frac{3}{2}x$

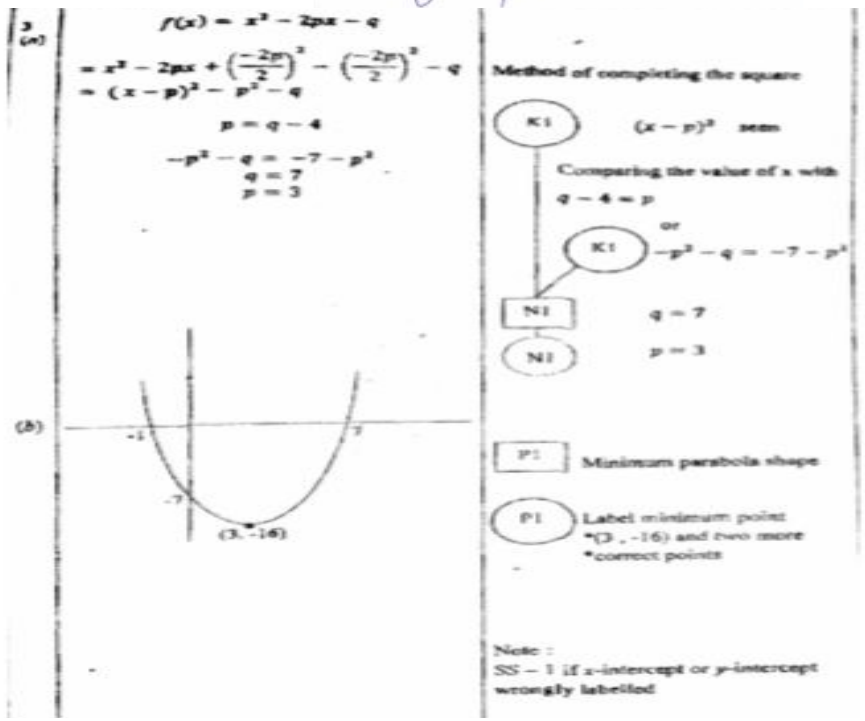


$\cos\frac{3}{2}x = \frac{3}{4\pi}x - 1$

$y = \frac{3}{2\pi}x - 2$

NOS : 3

CTS



SIR VEN

CTS

ECTOR

3 (a) A(0,3)

(b) $-\left(x-\frac{m}{2}\right)^2+\left[\frac{m^2}{4}+3\right]$

Compare

$m=2$
$n=4$

OR

$\frac{dy}{dx}=-2x+m=0$
$-2(1)+m=0$
$m=2$

$f(x)=-(1)^2+2(1)+3=n$
$n=4$

OR

$1=-\frac{m}{2(-1)}$ $\left(\text{Use } x=-\frac{b}{2a}\right)$
$m=2$

$f(x)=-(1)^2+2(1)+3=n$
$n=4$

(c) $a(x+p)^2+q$

$a=1$ or $p=-1$ or $q=-4$

$f(x)=(x-1)^2-4$

OR

ax^2+bx+c

$a=1$ or $b=-2$ or $c=-3$

$f(x)=x^2-2x-3$

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5(a)(i) $\overrightarrow{RB}=\overrightarrow{RC}+\overrightarrow{CB}$

$3\underline{a}-6\underline{b}$

(ii) $10\underline{a}-4\underline{b}$

(b) $\overrightarrow{RQ}=3m\underline{a}-6m\underline{b}$

$\overrightarrow{QP}=-5n\underline{a}-4n\underline{b}$

$-5n\underline{a}-4n\underline{b}=(6m-4)\underline{b}-(3m+2)\underline{a}$

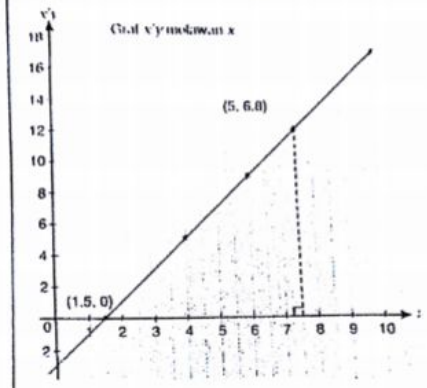
$3m+2=5n$ @ $6m-4=-4n$

$m=\frac{2}{7}$, $n=\frac{4}{7}$ (both)

7 (a)

x	2.0	4.0	6.0	8.0	10.0
x^2y	1.0	5.0	9.0	13.0	17.0

(b)



(c) $x^2y=hx+k$

(i) $y=0.32$

(ii) $h=m=2$
$1.90\le h\le 2.03$

9 (a) $\overrightarrow{AQ}=\overrightarrow{AO}+\overrightarrow{OQ}$ or $\overrightarrow{OP}=\overrightarrow{OA}+\overrightarrow{AP}$

(i) $\overrightarrow{AQ}=-\underline{a}+\frac{3}{4}\underline{b}$

(ii) $\overrightarrow{OP}=\frac{3}{4}\underline{a}+\frac{1}{4}\underline{b}$

(b) $\overrightarrow{OS}=m\overrightarrow{OP}$
$=m\left(\frac{3}{4}\underline{a}+\frac{1}{4}\underline{b}\right)$

$\overrightarrow{OS}=\underline{a}+n\left(-\underline{a}+\frac{3}{4}\underline{b}\right)$

$\frac{3}{4}m=1-n$ or $\frac{1}{4}m=\frac{3}{4}n$

$3m+4n=4$ and $m=3n$ shown

Solve simultaneous linear equations

$m=\frac{12}{13}$

$n=\frac{4}{13}$

10

(a) $\overrightarrow{OE}=\overrightarrow{OC}+\overrightarrow{CE}$ or $\overrightarrow{AD}=\overrightarrow{AO}+\overrightarrow{OD}$ — K1 Use triangle law to find $\overrightarrow{OE}$ or $\overrightarrow{AD}$

(i) $\overrightarrow{OE}=3\underline{y}+\underline{u}$ — N1 $3\underline{y}+\underline{u}$

(ii) $\overrightarrow{AD}=2\underline{y}-4\underline{u}$ — N1 $2\underline{y}-4\underline{u}$

(b)

(i) $\overrightarrow{OF}=h(3\underline{y}+\underline{u})$ — N1 $h(3\underline{y}+\underline{u})$

(ii) $\overrightarrow{OF}=4\underline{u}+(-4k\underline{u}+2k\underline{y})$ — K1 Use $\overrightarrow{OF}=\overrightarrow{OA}+k*\overrightarrow{AD}$

$\overrightarrow{OF}=(4-4k)\underline{u}+2k\underline{y}$ — N1 $(4-4k)\underline{u}+2k\underline{y}$

(c) $3h=2k$ or $h=4-4k$ — K1 Equate the coefficients of $\underline{u}$ and of $\underline{y}$

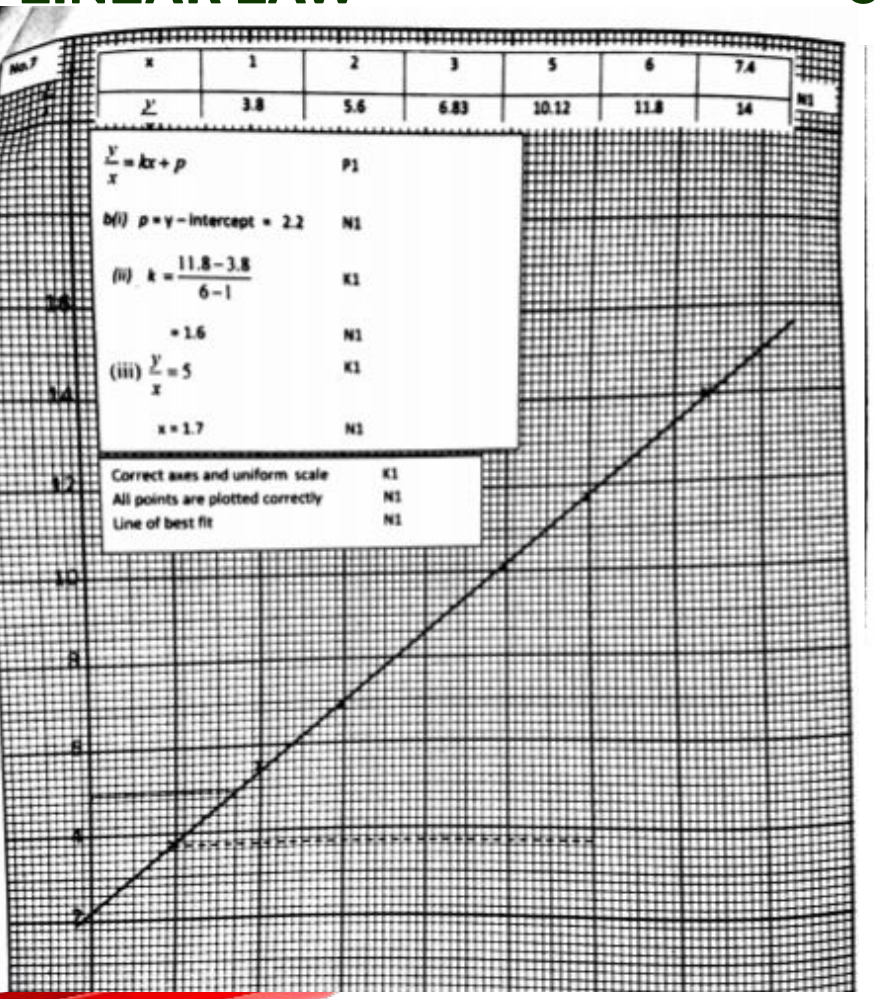
$3(4-4k)=2k$ — K1 Solve simultaneous equation for h or k

$k=\frac{6}{7}$ — N1 $k=\frac{6}{7}$

$h=\frac{4}{7}$ — N1 $h=\frac{4}{7}$

LINEAR LAW

SIR VEN



x	1	2	3	5	6	7.4
$\frac{y}{x}$	3.8	5.6	6.83	10.12	11.8	14

N1

$\frac{y}{x} = kx + p$ P1

b(i) p = y – intercept = 2.2 N1

(ii) $k = \frac{11.8-3.8}{6-1}$ K1

$= 1.6$ N1

(iii) $\frac{y}{x} = 5$ K1

$x = 1.7$ N1

Correct axes and uniform scale K1
All points are plotted correctly N1
Line of best fit N1

(a)

(i)

$-8x - 24 = -\frac{4}{7}x + \frac{40}{7}$

$C(-4, 8)$

(ii)

$B(-3,0)$

$A = \frac{1}{2}|-4(4) + 3(0) + (-3) - [8(3) + 4(-3) + 0(-4)]|$

$= 26\ unit^2$

(b)

$\frac{3(3)+2x}{3+2} = -3$ or $\frac{3(4)+2y}{3+2} = 0$

$D(-12, -6)$

(a) (i) $\frac{p-5}{6-3} = -\frac{1}{3}$ K1

$p = 4$ N1

(ii) $y - 5 = -\frac{1}{3}(x-3)$ K1 atau menggunakan $y = mx + c$

$y = -\frac{1}{3}x + 6$ N1 atau setara

(iii) $\frac{1}{2}|(-42+30) - (-84+12)|$ K1

$= 30$ N1

(b) (i) $\sqrt{(x-3)^2 + (y-5)^2} = 2\sqrt{(x-6)^2 + (y-4)^2}$

K1 menggunakan $WK = \frac{1}{2}WJ$ atau $WJ = 2WK$

$3x^2 + 3y^2 - 42x - 22y + 174 = 0$ N1

(ii) $3y^2 - 22y + 174 = 0$ dan $(-22)^2 - 4(3)(174) = -1604$ K1

$b^2 - 4ac < 0$, tiada punca..... maka tidak memintas paksi-y N1

10 (a) i) $m = 2$

$y - 9 = 2(x+4)$

$y = 2x + 17$

(ii) $2x + 17 = \frac{-x-6}{2}$

$B(-8, 1)$

(iii) $\frac{3(-8)+2x}{5} = 0$ or $\frac{3(1)+2y}{5} = -3$

$D(12, -9)$

(iv) area BOD $= \frac{1}{2}\begin{vmatrix} -8 & 0 & 12 & -8 \\ 1 & 0 & -9 & 1 \end{vmatrix}$

$= \frac{1}{2}|12 - 72|$

$= 30\ unit^2$

(b) $PA = PB$

$\sqrt{(x+4)^2 + (y-9)^2} = \sqrt{(x+8)^2 + (y-1)^2}$

$x + 2y = 4$

INTEGRATION

7a) $y = -\frac{5}{2}x$

$y = 9 - x^2$

$x^2 - \frac{5}{2}x - 9 = 0$

$2x^2 - 5x - 18 = 0$

$(2x - 9)(x + 2) = 0$

$x = -2$

$y = 5$

$A(-2, 5)$

b) Area $= \int_{-2}^{0} 9 - x^2\,dx - \frac{1}{2}(2)(5)$

$= \left[9x - \frac{x^3}{3}\right]_{-2}^{0} - 5$

$= \frac{46}{3}$ unit^2

c) $V = \frac{1}{3}\pi(2^2)(5) + \pi\int_5^9 9 - y\,dy$

$= \frac{20}{3}\pi + \left[9y - \frac{y^2}{2}\right]_5^9$

$= \frac{44}{3}\pi$ unit^3

11a) $\frac{dy}{dx} = -2x$

$m = -2(2) = -4$

$y - 12 = -4(x - 2)$

$h = 5$

b) $\frac{1}{2}(3)(12) - \int_2^4 (16 - x^2)\,dx$

$18 - \left[16x - \frac{x^3}{3}\right]_2^4$

$18 - \left[16(4) - \frac{(4)^3}{3} - \left[16(2) - \frac{2^3}{3}\right]\right]$

$4\frac{2}{3}$

(c) $\pi\int_{12}^{16}(16 - y)\,dy$

$\pi\left[16y - \frac{y^2}{2}\right]_{12}^{16}$

8π

8(a) $y = \int 2x\,dx$

$y = \frac{2x^2}{2} + c$

$c = -16$ or $-12 = 4^2 + C$

$y = x^2 - 16$

(b)(i) $\frac{1}{2}(20)\left(\frac{20}{4}\right)$ *atau* $\left|\int_0^4 (x^2 - 16)\,dx\right|$

$\frac{1}{2}(20)\left(\frac{20}{4}\right) - \left|\left[\frac{x^3}{3} - 16x\right]_0^4\right|$

$50 - \frac{128}{3}$

$\frac{22}{3}$ or 7.3333 or $7\frac{1}{3}$

(ii) $\pi\int_{-16}^{0}(y + 16)\,dy$

$\pi\left[\frac{y^2}{2} + 16y\right]_{-16}^{0}$

$\pi\left[\left[\frac{0^2}{2} + 16(0)\right] - \left[\frac{(-16)^2}{2} + 16(-16)\right]\right]$

128π

$m = 1$

b) $y = \frac{4x^2}{2} + c$

$y = 2x^2$

(c) $\int_0^1 2x^2\,dx = \left[\frac{2x^3}{3}\right]_0^1$

$\frac{2(1)^3}{3} - 0$

$\frac{2}{3}$

(d) $\pi\int_0^1 4x^4\,dx = \left[\frac{4x^5}{5}\right]_0^1$

$\frac{1}{3}\pi(2)^2(1)$ OR $\pi\left[\frac{4(1)^5}{5} - 0\right]$

$\frac{1}{3}\pi(2)^2(1) - \pi\left[\frac{4(1)^5}{5} - 0\right]$

$\frac{8}{15}\pi$

8 (a) $\frac{dy}{dx} = -2x$

$y = \int -2x\,dx$

$y = -x^2 + c$

$M(4,0)$

$0 = -4^2 + c$

$c = 16$

$y = -x^2 + 16$

(b) Find area of A_1:

$\frac{1}{2} \times 20 \times 20 = 200$ OR $\int_0^{20}(12 - x)\,dx = \left[12x - \frac{x^2}{2}\right]_0^{20} = 200$

Use $\int_0^4 y\,dx$ to find area of A_2:

$\int_0^4 (-x^2 + 16)\,dx = \left[-\frac{x^3}{3} + 16x\right]_0^4$

$= \frac{128}{3}$

$*A_1 - *A_2$

$200 - \frac{128}{3} = \frac{472}{3} = 157\frac{1}{3}$

(c) $\pi\int_0^{16}(-y + 16)\,dy$

$\pi\left[-\frac{y^2}{2} + 16y\right]_0^{16}$

128π

6. $\frac{dy}{dx} = 2x + 2$

(a) $y = x^2 + 2x + c$

$3 = (-2)^2 + 2(-2) + c$

$c = 3$

$y = x^2 + 2x - 3$

(b) $A = \frac{1}{2}(2)(3 - 6) - \int_{-3}^{0} x^2 + 2x + 3\,dx$

$= 9 - \left[\frac{x^3}{3} + x^2 + 3x\right]_{-3}^{0}$

$= 9 - \left[0 - \left(-\frac{14}{3}\right)\right]$

$= \frac{13}{3}$ unit^2

SIR VEN

PROBABILITY DISTRIBUTION

(a) (i) ${}^8C_6(0.4)^6(0.6)^2$

0.04129

(ii) $\sqrt{30(0.4)(0.6)}$

2.683

(b) (i) $z = \frac{400-300}{50}$

$1 - P(z > 2)$

0.9772

(ii) $z = -0.38$

$\frac{h-300}{50} = -0.38$

$h = 281$

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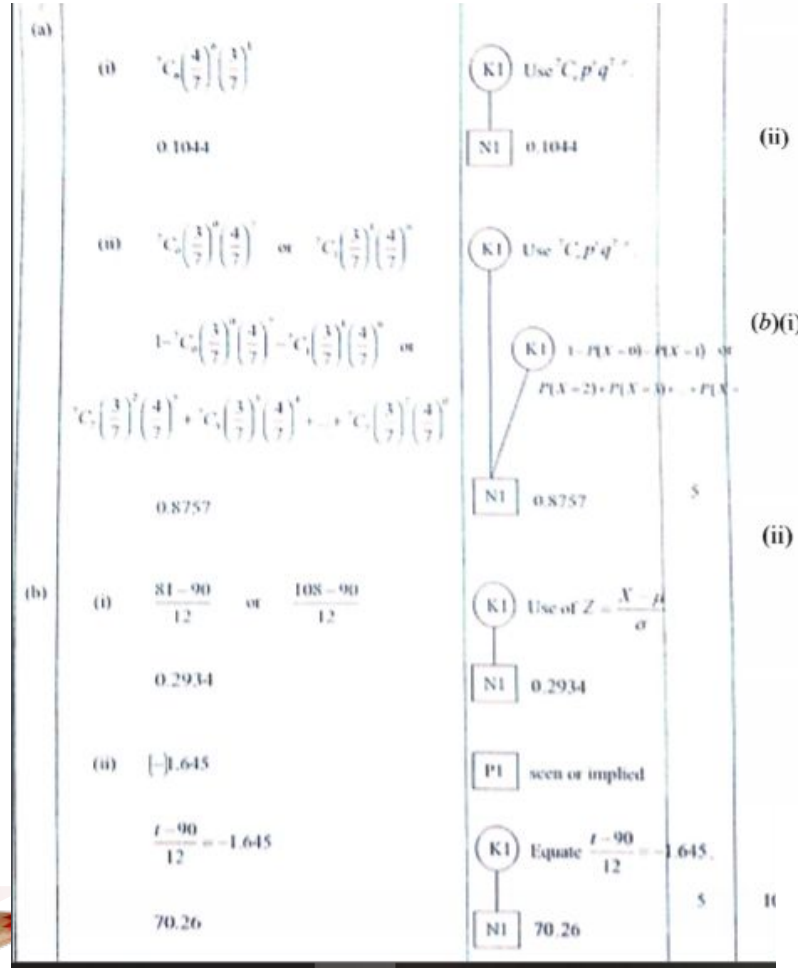


8

(a)(i) Use ${}^nC_r(p)^r(q)^{n-r}, p+q=1$ **P1**

Substitute $X=3$ into ${}^8C_3(0.4)^3(0.6)^5$ **K1**

0.2787 **N1**

(ii) Write $P(X=6)+P(X=7)+P(X=8)$ **K1**

${}^8C_6(0.4)^6(0.6)^2 + {}^8C_7(0.4)^7(0.6)^1 + {}^8C_8(0.4)^8(0.6)$

0.04981 **N1**

(b)(i) $P\left(z > \frac{80-70}{16}\right)$ or $P(z > 0.625)$ **K1**

0.266 **N1**

(ii) ± 0.583 **P1**

$\frac{m-70}{16} = -0.583$ **K1**

$m = 60.67$ **N1**

(a) (i) $P(X=8) = {}^{12}C_8(0.6)^8(0.4)^4$ K1

$= 0.2128$ N1

(ii) $P(X<3) = P(X=0) + P(X=1) + P(X=2)$ P1

$= {}^{12}C_0(0.6)^0(0.4)^{12} + {}^{12}C_1(0.6)^1(0.4)^{11} + {}^{12}C_2(0.6)^2(0.4)^{10}$ K1

$= 0.00281$ N1

(b) (i) $P\left(z \le \frac{4.5-4.2}{0.8}\right)$ K1

$= 0.6462$ N1

(ii) $P\left(z > \frac{m-4.2}{0.8}\right) = 0.6$

Baca sifir $Q(z)$, - 0.253 dilihat P1

$\frac{m-4.2}{0.8} = -0.253$ K1

$m = 3.9976\,kg$ N1

PROBABILITY DISTRUBU

11 (a) i) $P(x=7) = {}^{10}C_7 (0.55)^7 (0.45)^3$
$= 0.1665$

(ii) ${}^{10}C_0 (0.45)^0 (0.55)^{10}$ or ${}^{10}C_1 (0.45)^1 (0.55)^9$

$1 - P(X=0) - P(X=1)$ equivalent

$= 0.9767$

(b) i) $\frac{3.6 - 3.56}{0.25}$

0.4364

(ii) Seen -0.524 or 0.524

$\frac{k - 3.56}{0.25} = -0.524$

$k = 3.429$

9 (a) (i) ${}^{10}C_6(0.7)^6(0.3)^{10}$ or ${}^{10}C_7(0.7)^7(0.3)^9$ or ${}^{10}C_8(0.7)^8(0.3)^8$

${}^{10}C_6(0.7)^6(0.3)^{10} + {}^{10}C_7(0.7)^7(0.3)^9 + {}^{10}C_8(0.7)^8(0.3)^8$

0.00159

K1 Use ${}^{10}C_6(0.7)^6(0.3)^{10}$

K1 Use $P(x=0) + P(x=1) + P(x=2)$

N1 0.00159

(ii) $n(0.7) = 280$

$n = 400$

K1 Use $np = 280$

N1 400

(b) (i) $z = 1.406$

$*1.406 = \frac{?}{}$

$m = 62.97$

(ii) $z = \frac{50 - *62}{5}$

0.00474

12 (a) (i) $30^2 = x^2 + (3x)^2 - 2(x)(3x)\cos 60°$

$x = 11.34$

$3x = 34.017$

K1 Use cosine rule

N1 11.34

N1 34.017

(ii) $\frac{34.017}{\sin C} = \frac{30}{\sin 60°}$

$C = 100.89°$

K1 Use sine rule

N1 100.89°

(iii) $\frac{1}{2} * (34.02)(30)\sin * 19.11$ or $\frac{1}{2} * (34.02) * (11.35)\sin 60$ or $\frac{1}{2} * (11.35)(30)\sin * 100.87$ or

K1 Use $\frac{1}{2}ab\sin C$ to find area of ΔABC

N1 167.2

(b) (i) Sketch $\Delta ABC'$

P1

(ii) $\sin 60 = \frac{h}{*34.02}$

K1 Use $\sin 60 = \frac{h}{*AB}$

N1 $h = 29.46$

SOLUTION OF TRIAN

(a)(i) $8.3^2 = 5.1^2 + 11.9^2 - 2(5.1)(11.9)kos\angle SQR$

$\angle SQR = 35.57°$

(ii) $\angle PQS = 79.43°$

$\frac{PS}{\sin 79.43°} = \frac{11.9}{\sin 65°}$

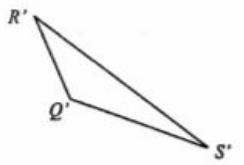
$PS = 12.91cm$

(iii) $\frac{1}{2}(5.1)(11.9)\sin 35.57°$ or $\frac{1}{2}(11.9)(12.91)\sin 35.57°$

$\frac{1}{2}(5.1)(11.9)\sin 35.57° + \frac{1}{2}(11.9)(12.91)\sin 35.57°$

$62.33\ cm^2$

(b)(i)



(ii) $\angle SQ'R = 144.43°$

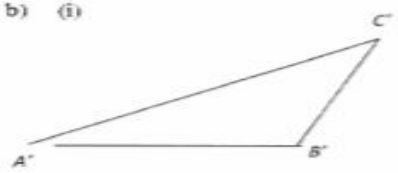
(a) (i) $4.7^2 = 6.5^2 + 5^2 - 2(6.5)(5)\cos A$

45.99

(ii) $\frac{BD}{\sin 45.99} = \frac{5}{\sin 88.02}$

3.598

b) (i)



$\frac{\sin B}{6.5} = \frac{\sin 45.99}{4.7}$

$\angle ABC = 84.08$

$\angle A'C'B' = 38.09$

(c) $\frac{1}{2}(6.5)(4.7)(\sin 38.09)$

9.423

SIR VEN

SOLUTION OF TRIANGLE

12 (a) (i) $30^2 = x^2 + (3x)^2 - 2(x)(3x)\cos 60°$ — K1 Use cosine rule

$x = 11.34$ — N1 11.34

$3x = 34.017$ — N1 34.017

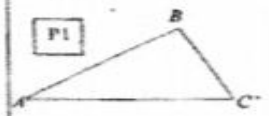
(ii) $\frac{34.017}{\sin C} = \frac{30}{\sin 60°}$ — K1 Use sine rule

$C = 100.89°$ — N1 100.89°

(iii) $\frac{1}{2}$*(34.02)(30)sin*19.13 or $\frac{1}{2}$*(34.02)*(11.35)sin 60 or $\frac{1}{2}$*(11.35)(30)sin*100.87 or — K1 Use $\frac{1}{2}ab\sin C$ to find area of ΔABC

167.2 — N1

(b) (i) Sketch ΔABC — P1



(ii) $\sin 60 = \frac{h}{*34.02}$ — K1 Use $\sin 60 = \frac{h}{*AB}$

$h = 29.46$ — N1

(a) (i) $\frac{\sin \angle PQR}{15.1} = \frac{\sin 40}{11.7}$

$\angle PQR = 56.06°$

(ii) $15.1^2 = 10.3^2 + 8.5^2 - 2(10.3)(8.5)\cos \angle PSR$

$\angle PSR = 106.48°$

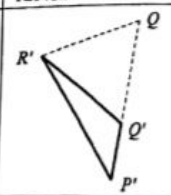
(iii) $\frac{1}{2}(10.3)(8.5)\sin 106.48°$

$\frac{1}{2}(11.7)(15.1)\sin 83.94°$

$\frac{1}{2}(10.3)(8.5)\sin 106.48° + \frac{1}{2}(11.7)(15.1)\sin 83.94°$

129.82

(b) (i)



$\angle P'Q'R'$ obtuse angle

(ii) 123.94°

13 (a) $\frac{\sin \angle ACB}{12.4} = \frac{\sin 43.2°}{9.5}$

$\angle ACB = 63.32°$

(b) See 73.48°

$AC^2 = 9.5^2 + 12.4^2 - 2(9.5)(12.4)\cos 73.48°$

$AC = 13.30\ cm$

(c) $13.3^2 = 9.9^2 + 5.4^2 - 2(9.9)(5.4)\cos \angle ADC$

$\angle ADC = 117.71°$

$\frac{1}{2} \times 9.9 \times 5.4 \times \sin 117.71°$

$= 23.66\ cm^2$

(d) i)

ii) 116.68°

Scanned with CamScanner

9(i) $SQ^2 = 6^2 + 10^2 - 2(6)(10)\cos 60°$

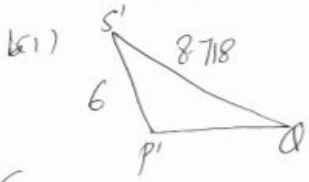
$= 8.718$

(ii) $\frac{8.718}{\sin Q} = \frac{3}{\sin 13}$

$Q = 40.82$

$\angle SRQ = 139.18°$

(iii)



(ii) $\angle SP'Q' = 120°$

$\frac{6}{\sin Q'} = \frac{8.718}{\sin 120}$

$\angle P'QS' = 36.59$ $\angle P'S'Q' = 23.41$

Area $= \frac{1}{2}(6)(8.718)\sin 23.41$

$= 10.39$

12. (a)(i) $\frac{\sin x FGE}{14} = \frac{\sin 40°}{10}$

$x FGE = 180° - 64.15°$

$= 115.85°$

(ii) $x EFG = 24.15°$

$EH = \sqrt{22^2 + 14^2 - 2(22)(14)\cos 24.15°}$

$= 10.86\ cm$

(iii) $A_{EFH} = \frac{1}{2}(14)(22)\sin 24.15°$

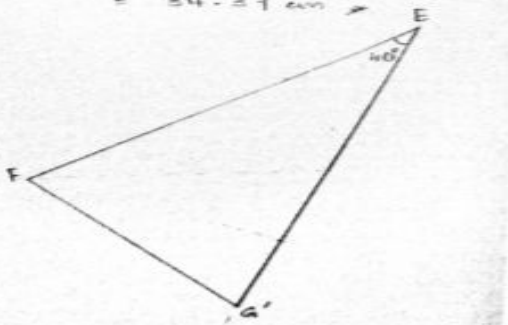
$= 63.01\ cm^2$

$A_{EFG} = \frac{1}{2}(14)(10)\sin 24.15°$

$= 28.64\ cm^2$

$A = 63.01 - 28.64$

$= 34.37\ cm^2$



SIR VEN

INDEX NUMBER

(a)

$$\frac{RM13.50}{P_{16}} \times 100 = 116$$

$P_{16} = RM11.64$

(b)

$$\frac{180(5) + 116(4) + p(2) + 125(1)}{5 + 4 + 2 + 1} = 146$$

$p = 131.5$

(c)

see $I_R = 198$ or $I_S = 110.2$

$$\bar{I} = \frac{198(5) + 110.2(4) + 131.5(2) + 125(1)}{5 + 4 + 2 + 1}$$

$= 151.57$

(d)

$$\frac{P_{19}}{RM18} \times 100 = 151.57$$

$P_{19} = RM27.28$

15(*a*) $125 = \frac{w}{7.00} \times 100$ OR $135 = \frac{x+1.40}{x} \times 100$ K1

$w = 8.75$ N1

(*b*) $y = x + 1.40$ or implied P1

$x = 4.00$ N1

$y = 5.40$ N1

(*c*)(*i*) $126.25 = \frac{65.65}{\text{Tahun 2017}} \times 100$ K1

Tahun 2017 = RM52.00 N1

(*ii*) $I_Q = 130$ or $I_S = 110$ P1

$126.25 = \frac{125(8)+130(4)+135(k)+110(3)}{8+4+k+3}$ K1

$k = 5$ N1

(12a) (i) 130

(ii) $P_{18} = \frac{130}{100} \times 3$

$= RM3.90$

b) i) $\bar{I}_{18/16} = \frac{130(200)+125(400)+140(300)+120(100)}{1000}$

$= 128.5$

$\bar{I}_{20/18} = 120$

$\bar{I}_{20/16} = \frac{128.5 \times 120}{100}$

$= 154.2$

ii) $\frac{P_{20}}{P_{16}} \times 100 = 154.2$

$P_{20} = \frac{154.2}{100} \times 15.4$

$= 23.75$

$\frac{RM500}{RM 23.75} = 21$ packets

(i) $\frac{28.6}{22} \times 100$ or $\frac{p}{22} \times 100 = 117$

$x = 130$

(ii) RM25.74

b)(i) $$\frac{108(2) + 125(h) + 117(3)}{2 + h + 3} = 119.2$$

$h = 5$

(ii) $\frac{59.6}{y} \times 100 = 119.2$

$RM50.00$

c) $\frac{100}{125} \times 135$

108

---

13 (*a*) $\frac{70}{x} \times 100 = 175$ or $\frac{y}{20} \times 100 = 100$ or $\frac{18}{15} \times 100 = z$

$x = 40,\ y = 20,\ z = 120$

(*b*) $\bar{I} = \frac{175(8)+150(12)+125(10)+100(24)+*120(46)}{100}$

123.7

(*c*) $P_{06} = \frac{880 \times 100}{*123.7}$

RM 711.40

(*d*) Seen $I_{18/15} = 166.25$ or 165 or 137.5 or 110 or 132

$$\bar{I} = \frac{166.25(8) + 165(12) + 137.5(10) + 110(24) + 132(46)}{100}$$

133.97

---

15 (a)(i) $\frac{2}{P_{2013}} \times 100 = 189$ (guna formula **dan** samakan dengan 189)

$P_{2013} = RM1.06$

(ii) $\frac{Q_{2013}}{Q_{2015}} \times 100 = 184$ or $\frac{Q_{2014}}{Q_{2013}} \times 100 = 84$

$= \frac{84}{100} \times \frac{184}{100} \times 100$

$= 154.56$

(b)(i) $\frac{(84 \times 5) + (154 \times 40) + (189 \times 10) + 45p}{5+40+10+45}$

$\frac{(84 \times 5) + (154 \times 40) + (189 \times 10) + 45p}{5+40+10+45} = 154$ (samakan dengan 154)

$p = 154$

(ii) $\frac{27.10}{P_{2013}} \times 100 = 154$

$P_{2013} = RM17.60$

---

14 (a) $\bar{I}_{2017, 2015} = 105.6$

$\frac{4(100)+3(120)+2x+1(106)}{10} = 105.6$

$2x = 190$

$x = 95$

% of price change = 5%

(b) $\frac{P_{17}}{7.80} \times 100 = 120$

$P_{17} =$ RM 9.36

(c)(i) $\frac{115 \times 105.6}{100}$

$= 121.44$

(ii) $\frac{P_{19}}{85} \times 100 = 121.44$

$P_{19} =$ RM 103.22

K1 Use formula $\frac{\sum w_i I_i}{\sum w_i}$

K1 Solve Equation

N1 95

N1 % of price change = 5%

K1 Use formula $I = \frac{Q_1}{Q_0} \times 100$

N1 RM9.36

K1 Use $\frac{115}{100} \times \frac{105.6}{100} \times 100$

N1 121.44

K1 $\frac{P_{19}}{85} \times 100 = 121.44$

N1 RM103.22

SIR VEN

INDEX NUMBER

(a) Use $I_{15/13} = \frac{P_{15}}{P_{13}} \times 100$

$x = 5{\cdot}48$, $y = 96$, $z = 4.80$

(Correct all N2, 1 mistake N1)

(b) $m = 16$

$$\frac{137\times37+115\times33+96\times16+150\times14}{100}$$

125

(c) $\frac{0.50}{P_{13}} \times 100 = 125$ OR $I_{17/15} = \frac{160}{125} \times 100$

$P_{13} = 0.40$ OR $I_{17/15} = 128$

$\frac{P_{17}}{0.40} \times 100 = 160$ OR $\frac{P_{17}}{0.50} \times 100 = 128$

RM 0.64

(a) $\frac{w}{4.50} \times 100 = 120$ K1

$w = 5.40$ N1

(b) $y = x + 3$ .....(I) P1

$\frac{y}{x} \times 100 = 130$ .....(II)

$\frac{x+3}{x} \times 100 = 130$ K1 (try to solve equation)

$x = 10$, $y = 13$ N1(both)

(c) $\frac{7(120) + 3(140) + 4(130) + 2(120)}{16}$ K1

$= 126.25$ N1

(d) $\frac{126.25 \times 120}{100} = 151.5$ K1

$\frac{P_{15}}{20} \times 100 = 151.5$ K1

$= 30.30$

4. (a) $\frac{x}{3.40} \times 100 = 75$

$x = 2.10$

$\frac{2.40}{y} \times 100 = 120$

$y = 2.00$

$z = \frac{3.30}{3.00} \times 100 = 110$

(b) $\frac{75(2) + 140(5) + 120(4) + 110p + 116(2)}{13 + p} = 118.25$

$1562 + 110p = 1537.25 + 118.25p$

$8.25p = 24.75$

$p = 3$

(c) $\frac{P_{15}}{240} \times 100 = 118.25$

$P_{15} = 283.80$

(d) $M_{16/15} = 154$

$M_{16/15} = \frac{154}{100} \times \frac{100}{110} \times 100$

$= 140$

TISTICS

(a) (i) $\bar{x} = \frac{\Sigma x}{N}$

$50 = \frac{\Sigma x}{20}$

$\Sigma x = 1\,000$ kg

(ii) $\sigma = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$

$4 = \sqrt{\frac{\Sigma x^2}{20} - 50^2}$

$16 = \frac{\Sigma x^2}{20} - 2\,500$

$\Sigma x^2 = 50\,320$ kg^2

(b) For mean unchanged, the mass of the new student = Mean of mass = 50 kg

$\sigma = \sqrt{\frac{50\,320 + 50^2}{21} - 50^2}$

$= 3.90$ kg

(a) $54.5 = 49.5 + \left(\frac{\frac{1}{2}(50 + r) - 29}{5}\right)(10)$

$54.5 = 49.5 + \left(\frac{50 + r - 58}{10}\right)(10)$

$54.5 = 49.5 + (r - 8)$

$r - 8 = 5$

$\therefore r = 13$

2 (a) (i) $\bar{x} = \frac{\Sigma x}{N}$

$42 = \frac{\Sigma x}{5}$

$\Sigma x = 210$ kg

(ii) $\sigma = \sqrt{\frac{\Sigma x^2}{N} - (\bar{x})^2}$

$1.2 = \sqrt{\frac{\Sigma x^2}{5} - (42)^2}$

$1.44 = \frac{\Sigma x^2}{5} - 1\,764$

$\Sigma x^2 = 8\,827.2$

(b) (i) New mean: $\frac{42}{2} + 25 = 46$ kg

(ii) New variance: $\frac{1.2^2}{2^2} = 0.36$ kg

(b) $\bar{x} = \frac{13(24.5) + 7(34.5) + 9(44.5) + 5(54.5) + 16(64.5) + 13(74.5)}{13 + 7 + 9 + 5 + 16 + 13}$

$= \frac{3\,233.5}{63} = 51.3254$

$\sigma^2 = \frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2$

$= \frac{13(24.5)^2 + 7(34.5)^2 + 9(44.5)^2 + 5(54.5)^2 + 16(64.5)^2 + 13(74.5)^2}{63} - 51.3254^2$

$= \frac{187\,525.75}{63} - 51.3254^2$

$= 342.30$

$\sigma = 18.50$

(a) (i) Mean $= \frac{12 + 13 + 21 + 10 + 23}{5} = \frac{79}{5}$

$= 15.8$ cm

(ii) $\sigma^2 = \frac{1\,383}{5} - (15.8)^2 = 26.96$

$\sigma = 5.19$

(b) (i) $\frac{2k - 5 + 2 + k + 6}{3} = 8$

$3k + 3 = 24$

$k = 7$

(ii) New mean $= 8(3) = 24$

(a) $(62 \times 18) + (88 \times 23) + (16 \times 28) + (13 \times 33) + (11 \times 38) + (10 \times 43)$

$\frac{(62 \times 18) + (88 \times 23) + (16 \times 28) + (13 \times 33) + (11 \times 38) + (10 \times 43)}{200}$

24. 33

$(62 \times 18^2) + (88 \times 23^2) + (16 \times 28^2) + (13 \times 33) + (11 \times 38^2) + (10 \times 43^2)$

$\sqrt{\frac{(62 \times 18^2) + (88 \times 23^2) + (16 \times 28^2) + (13 \times 33^2) + (11 \times 38^2) + (10 \times 43^2)}{200} - (24.33)^2}$

6.828

(b) Mean will reduce 5 and standard deviation unchanged

SIR VEN

STASTISTICS

4

(a) $L_1 = 99.5$ *or* $L_3 = 119.5$ *or* $f_{Q1} = 17$ *or* $f_{Q3} = 21$
or $F_{Q1} = 21$ *or* $F_{Q3} = 57$ *or* $C = 10$

$$Q_1 = 99.5 + \left(\frac{25-21}{17}\right)10 \quad or \quad Q_3 = 119.5 + \left(\frac{75-57}{21}\right)10$$

$$Q_3 - Q_1 = 119.5 + \left(\frac{75-57}{21}\right)10 - 99.5 + \left(\frac{25-21}{17}\right)10$$

Julat Antara Kuartil = 26.22

(b) Ya

Kerana jika setiap data diganda dua secara seragam julat antara kuartil adalah 2 kali julat antara kuartil yang asal.

1(a) 69.5

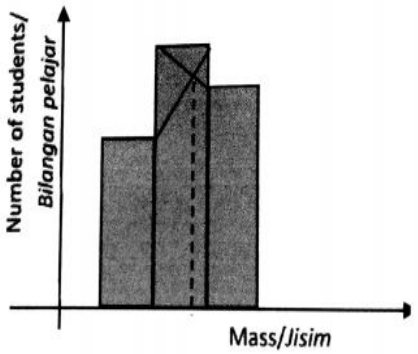
$$74.5 = 69.5 + \left[\frac{\frac{3}{4}(46+h) - (24+h)}{16}\right]10$$

$h = 10$

(b) Melukis sekurang-kurangnya 3 carta bar yang betul.

Kaedah mencari mod yang betul.

Mod = 67.5



(c) 71.5

3 (a) $L_0 = 35.5$ or $F = 16$ or $f_m = 10$

$$35.5 + \left(\frac{25-16}{10}\right)5$$

40

(b) Mid point : 28, 33, 38, 43, 48, 53, 58

$$\frac{11(28)+5(33)+10(38)+x(43)+6(48)+4(53)+1(58)}{11+5+10+x+6+4+1} = 39$$

$x = 8$

Bil pekerja yang berpindah : 2 orang

SIMULTANEOUS EQUATION

$2x - y - 3 = 0$

$y = 2x - 3$ ..... ①

$2x^2 - 10x + y + 9 = 0$ ..... ②

Substitute ① into ②:

$2x^2 - 10x + (2x - 3) + 9 = 0$

$2x^2 - 8x + 6 = 0$

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

Therefore, $x = 3$ or $x = 1$

Substitute the values of x into ①:

When $x = 3$, $y = 2(3) - 3 = 3$

When $x = 1$, $y = 2(1) - 3 = -1$

Therefore, $x = 3$, $y = 3$ and $x = 1$, $y = -1$

$3p - m = -6$

$m = 3p + 6$ ..... ①

$m^2 + 2p^2 = 11$ ..... ②

Substitute ① into ②.

$(3p+6)^2 + 2p^2 = 11$

$9p^2 + 36p + 36 + 2p^2 - 11 = 0$

$11p^2 + 36p + 25 = 0$

$(11p + 25)(p + 1) = 0$

$11p + 25 = 0$ or $p + 1 = 0$

$11p = -25$ $p = -1$

$p = -\frac{25}{11}$

Substitute the values of p into ①.

When $p = -\frac{25}{11}$, $m = 3\left(-\frac{25}{11}\right) + 6 = -\frac{9}{11}$

When $p = -1$, $m = 3(-1) + 6 = 3$

The solutions are $m = -\frac{9}{11}$, $p = -\frac{25}{11}$ and $m = 3$, $p = -1$.

$3x - y = 14$

$y = 3x - 14$ ..... ①

$x^2 - y^2 = 1$ ..... ②

Substitute ① into ②.

$x^2 - (3x - 14)^2 = 1$

$x^2 - (9x^2 - 84x + 196) = 1$

$-8x^2 + 84x - 197 = 0$

$$x = \frac{-84 \pm \sqrt{84^2 - 4(-8)(-197)}}{2(-8)}$$

$$= \frac{-84 \pm \sqrt{752}}{-16}$$

$= 3.536$ or 6.964

Substitute the values of x into ①.

When $x = 3.536$, $y = 3(3.536) - 14 = -3.392$

When $x = 6.964$, $y = 3(6.964) - 14 = 6.892$

The solutions are $x = 3.536$, $y = -3.392$ and $x = 6.964$, $y = 6.892$.

$y - 2x = 1$ ..... ①

$x^2 + y^2 - 2y = 4$ ..... ②

From ①, $y = 2x + 1$.

Substitute $y = 2x + 1$ into ②.

$x^2 + (2x + 1)^2 - 2(2x + 1) = 4$

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

$5x^2 - 5 = 0$

$5(x + 1)(x - 1) = 0$

$x + 1 = 0$ or $x - 1 = 0$

$x = -1$ $x = 1$

When $x = -1$, $y = 2(-1) + 1$

$y = -1$

When $x = 1$, $y = 2(1) + 1$

$y = 3$

$m + 2n = 1$ ..... ①

$m^2 - 3m + 2n^2 = 2$ ..... ②

From ①, $m = 1 - 2n$.

Substitute $m = 1 - 2n$ into ②.

$(1 - 2n)^2 - 3(1 - 2n) + 2n^2 = 2$

$1 - 4n + 4n^2 - 3 + 6n + 2n^2 - 2 = 0$

$6n^2 + 2n - 4 = 0$

$3n^2 + n - 2 = 0$

$(3n - 2)(n + 1) = 0$

$3n - 2 = 0$ or $n + 1 = 0$

$n = \frac{2}{3}$ $n = -1$

When $n = \frac{2}{3}$, $m = 1 - 2\left(\frac{2}{3}\right)$

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

When $n = -1$, $m = 1 - 2(-1)$

$m = 3$

$m - 2n - 1 = 0$

$m = 1 + 2n$ .....①

$mn + n + 3m^2 = 0$ .....②

Substitute ① into ②:

$(1 + 2n)n + n + 3(1 + 2n)^2 = 0$

$n + 2n^2 + n + 3(1 + 4n + 4n^2) = 0$

$2n + 2n^2 + 3 + 12n + 12n^2 = 0$

$14n^2 + 14n + 3 = 0$

$n = \frac{-14 + \sqrt{14^2 - 4(14)(3)}}{2(14)}$

$= \frac{-14 \pm \sqrt{28}}{28}$

$n = \frac{-14 + \sqrt{28}}{28}$, $n = \frac{-14 - \sqrt{28}}{28}$

$= -0.311$ $= -0.689$

When $n = -0.311$, $m = 1 + 2(-0.311)$

$= 0.378$

When $n = -0.689$, $m = 1 + 2(-0.689)$

$= -0.378$

$\therefore m = 0.378, n = -0.311$; $m = -0.378, n = -0.689$

$x + 5y = 2$

$x = 2 - 5y$ ..... ①

$x^2 + 4xy + 3y^2 = 8$ ..... ②

Substitute ① into ②.

$(2 - 5y)^2 + 4(2 - 5y)y + 3y^2 = 8$

$4 - 20y + 25y^2 + 8y - 20y^2 + 3y^2 = 8$

$8y^2 - 12y - 4 = 0$

$2y^2 - 3y - 1 = 0$

$y = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-1)}}{2(2)}$

$= 1.78$ or -0.281

Substitute the values of y into ①.

When $y = 1.78$, $x = 2 - 5(1.78)$

$= -6.90$

When $y = -0.281$, $x = 2 - 5(-0.281)$

$= 3.41$

The solutions are $x = -6.90$, $y = 1.78$ and $x = 3.41$, $y = -0.281$.

$4x + y + 1 = 0$

$y = -4x - 1$.....①

$6x^2 - y^2 = xy$

$6x^2 - y^2 - xy = 0$.....②

Substitute ① into ②:

$6x^2 - (-4x - 1)^2 - x(-4x - 1) = 0$

$6x^2 - (16x^2 + 8x + 1) + 4x^2 + x = 0$

$-6x^2 - 7x - 1 = 0$

$(6x + 1)(x + 1) = 0$

$6x + 1 = 0$, $x + 1 = 0$

$x = -\frac{1}{6}$ $x = -1$

When $x = -\frac{1}{6}$, $y = -4\left(-\frac{1}{6}\right) - 1 = -\frac{1}{3}$

When $x = -1$, $y = -4(-1) - 1 = 3$

$\therefore x = -\frac{1}{6}, y = -\frac{1}{3}$; $x = -1, y = 3$

SOALAN 2

(a) $\frac{dy}{dx} = 2x - \frac{2}{x^2}$

At turning point $(k, 8)$, $\frac{dy}{dx} = 0$.

$2k - \frac{2}{k^2} = 0$

$2k^3 = 2$

$k^3 = 1$

$k = 1$

(b) $\frac{d^2y}{dx^2} = 2 + \frac{4}{x^3}$

When $x = 1$, $\frac{d^2y}{dx^2} = 6 (> 0)$

Thus, (1, 8) is a minimum point.

(c) $y = \int (2x - 2x^{-2})\, dx$

$= x^2 + \frac{2}{x} + c$

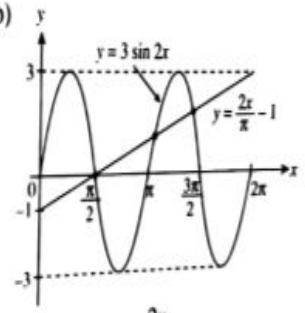
At turning point (1, 8), $x = 1$ and $y = 8$.

$8 = 1 + 2 + c$

$c = 5$

Equation of the curve: $y = x^2 + \frac{2}{x} + 5$

(a), (b)



$3 \sin 2x + 1 = \frac{2x}{\pi}$

$3 \sin 2x = \frac{2x}{\pi} - 1$

$y = \frac{2x}{\pi} - 1$

The suitable straight line to be sketched is $y = \frac{2x}{\pi} - 1$.

Number of solutions = 3

. (a) $y = \frac{7}{x^2}$

$\frac{dy}{dx} = -14x^{-3} = -\frac{14}{x^3}$

$x = 2, \frac{dy}{dx} = -\frac{14}{2^3}$

$= -\frac{7}{4}$

(b) $\delta x = 1.97 - 2 = -0.03$

$\frac{\delta y}{-0.03} = -\frac{7}{4}$

$\delta y = 0.0525$

$\frac{7}{(1.97)^2} = \frac{7}{2^2} + 0.0525$

$= 1.8025$

(a) $y = 4x^3 - 3x + 5$

$\frac{dy}{dx} = 12x^2 - 3$

$\frac{d^2y}{dx^2} = 24x$

Hence, $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4$

$= 24x - (12x^2 - 3) + 4$

$= 24x - 12x^2 + 3 + 4$

$= \mathbf{24x - 12x^2 + 7}$

(b) $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4 = -29$

$24x - 12x^2 + 7 = -29$

$12x^2 - 24x - 36 = 0$

$x^2 - 2x - 3 = 0$

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

$x + 1 = 0$ or $x - 3 = 0$

$x = -1$ $x = 3$

(a) Let $y = f^{-1}(x)$, then

$f(y) = x$

$2y + 1 = x$

$y = \frac{x - 1}{2}$

$\therefore f^{-1}(x) = \frac{x - 1}{2}$

(b) $f(x) = 2x + 1$ and $g(x) = 5x + p$

$fg(x) = 2(5x + p) + 1$

$= 10x + 2p + 1$ ...①

Compare ① with $fg(x) = kx - 7$,

$k = 10$ and $2p + 1 = -7$

$2p = -8$

$p = -4$

(c) $hg(x) = 10x$

$h(5x - 4) = 10x$

Let $y = 5x - 4$, then

$x = \frac{y + 4}{5}$

Thus,

$h(y) = 10\left(\frac{y + 4}{5}\right)$

$= 2y + 8$

$\therefore h(x) = 2x + 8$

(a) $x^2 + 3(4x + h) = 0$

$x^2 + 12x + 3h = 0$

So / *Maka*, $k + 3k = -12$

$4k = -12$

$k = -3$

Also / *Juga*, $(k)(3k) = 3h$

$3(-3)^2 = 3h$

$h = 9$

(b) The roots of the equation are $k - 2$ and $k + 5$, or -5 and 2.

Punca-punca persamaan ialah $k - 2$ *and* $k + 5$, *atau* -5 *dan* 2.

The quadratic equation is:

Persamaan kuadratik itu ialah:

$x^2 - (-5 + 2)x + (-5)(2) = 0$

$x^2 - (-3)x + (-10) = 0$

$x^2 + 3x - 10 = 0$

SOALAN 4

(b) (i) For the straight line:

$x + 11y - 5 = 0$

$11y = -x + 5$

$y = -\frac{x}{11} + \frac{5}{11}$

Gradient of the straight line $= -\frac{1}{11}$

The gradient of the tangent to the curve at $(1, -5)$ is 11.

Hence, $k(1^3) - 1 = 11$

$k = 12$

(ii) $\frac{dy}{dx} = 12x^3 - 1$

$y = \int (12x^3 - 1)\, dx$

$= 3x^4 - x + c$

The curve passes the point $(1, -5)$.

Hence, $-5 = 3(1^4) - 1 + c$

$c = -7$

The equation of the curve is $y = 3x^4 - x - 7$.

(a) The total number of parcels is 40.

So, $5 + x + y + 8 + 6 = 40$

$x + y = 21$

$y = 21 - x$ .... ①

Given the median mass is 35.5 g.

So, the median class is 31 – 40, where

$L = 30.5$ $f_m = y$

$F = x + 5$ $C = 40.5 - 30.5 = 10$

Median $= L + \left(\frac{\frac{1}{2}N - F}{f_m}\right)C$

$35.5 = 30.5 + \left(\frac{\frac{1}{2}(40) - (x + 5)}{y}\right)(10)$

$5 = \left(\frac{20 - x - 5}{y}\right)(10)$

$5y = 10(15 - x)$

$y = 30 - 2x$ ..... ②

Substitute ① into ②.

$21 - x = 30 - 2x$

$x = 9$

Substitute $x = 9$ into ①.

$y = 21 - 9 = 12$

Hence, $x = 9$ and $y = 12$.

(b) The modal class is 31 – 40.

(a) $\frac{dy}{dx} = 3x^2 + 2x - 5$

$y = \int (3x^2 + 2x - 5)\, dx = x^3 + x^2 - 5x + c$

At point (2, 1), $x = 2$ and $y = 1$.

$1 = 2^3 + 2^2 - 5(2) + c$

$1 = 2 + c$

$c = -1$

The equation of the curve is $y = x^3 + x^2 - 5x - 1$.

(b) At the turning points, $\frac{dy}{dx} = 0$.

$3x^2 + 2x - 5 = 0$

$(x - 1)(3x + 5) = 0$

$x = 1$ or $x = -\frac{5}{3}$

$\frac{d^2y}{dx^2} = 6x + 2$

When $x = 1$, $\frac{d^2y}{dx^2} = 6(1) + 2 = 8 > 0 \Rightarrow$ Minimum

$y = 1^3 + 1^2 - 5(1) - 1 = -4$

Hence, the minimum point is $(1, -4)$.

When $x = -\frac{5}{3}$, $\frac{d^2y}{dx^2} = 6\left(-\frac{5}{3}\right) + 2 = -8 < 0$

$\Rightarrow$ Maximum

$y = \left(-\frac{5}{3}\right)^3 + \left(-\frac{5}{3}\right)^2 - 5\left(-\frac{5}{3}\right) - 1 = 5\frac{13}{27}$

Hence, the maximum point is $\left(-1\frac{2}{3}, 5\frac{13}{27}\right)$.

(b) (i) For the straight line:

$x + 11y - 5 = 0$

$11y = -x + 5$

$y = -\frac{x}{11} + \frac{5}{11}$

Gradient of the straight line $= -\frac{1}{11}$

The gradient of the tangent to the curve a

$(1, -5)$ is 11.

Hence, $k(1^3) - 1 = 11$

$k = 12$

(ii) $\frac{dy}{dx} = 12x^3 - 1$

$y = \int (12x^3 - 1)\, dx$

$= 3x^4 - x + c$

The curve passes the point $(1, -5)$.

Hence, $-5 = 3(1^4) - 1 + c$

$c = -7$

The equation of the curve is $y = 3x^4 - x - 7$.

(a) It is given that $\frac{dy}{dx} = px^3 - 32x$.

At point $(1, 5)$, $x = 1$.

$\frac{dy}{dx} = p(1)^3 - 32(1)$

$= p - 32$

The tangent to the curve at the point $(1, 5)$ is perpendicular to the straight line $4y = x + 8$ or $y = \frac{1}{4}x + 2$.

Then, the gradient of the tangent to the curve $= -\frac{1}{\left(\frac{1}{4}\right)}$

$= -4$

Hence, $p - 32 = -4$

$p = 28$

(b) $\frac{dy}{dx} = 28x^3 - 32x$

$y = \int (28x^3 - 32x)\, dx$

$y = 7x^4 - 16x^2 + c$

When $x = 1$, $y = 5$.

$5 = 7(1)^4 - 16(1)^2 + c$

$c = 14$

The equation of the curve is $y = 7x^4 - 16x^2 + 14$.

(a) $m_n = \frac{1}{7}$ and $m_t = -7$

$3(1)^2 - p(1) = -7$

$p = 10$

(b) $3x^2 - 10x = 0$

$\frac{d^2y}{dx^2} = 6x - 10$

$\frac{d^2y}{dx^2} = 6(0) - 10 = -10$ or $\frac{d^2y}{dx^2} = 6\left(\frac{10}{3}\right) - 10 = 10$

Maximum, $x = 0$

(a) $1 + \frac{1}{2x^2} = 3$		K1
$x = \pm\frac{1}{2}, x = \frac{1}{2}(> 0)$		
$x = \frac{1}{2}, y = \frac{5}{2}$ or $P\left(\frac{1}{2}, \frac{5}{2}\right)$		N1
$y - \frac{5}{2} = -\frac{1}{3}\left(x - \frac{1}{2}\right)$ OR $\frac{5}{2} = -\frac{1}{3}\left(\frac{1}{2}\right) + c$		K1
$y = -\frac{1}{3}x + \frac{8}{3}$		N1
(b) $y = x - \frac{1}{2x} + c$		K1 kamiran
$\frac{5}{2} = \frac{1}{2} - \frac{1}{2(\frac{1}{2})} + c$		K1
$y = x - \frac{1}{2x} + 3$		N1

SIR VEN