



BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2019
PERCUBAAN SIJIL PELAJARAN MALAYSIA

ADDITIONAL MATHEMATICS

Kertas 1

2 Jam

**JANGAN BUKA KERTAS SOALAN
INI SEHINGGA DIBERITAHU**

1. *Tulis nama dan tingkatan anda pada ruangan yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
1	2	
2	2	
3	2	
4	3	
5	4	
6	2	
7	4	
8	2	
9	4	
10	4	
11	3	
12	4	
13	4	
14	2	
15	4	
16	4	
17	4	
18	3	
19	4	
20	3	
21	3	
22	2	
23	4	
24	4	
25	3	
JUMLAH	80	

Kertas soalan ini mengandungi 29 halaman bercetak.

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

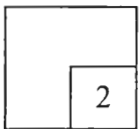
- 1 Given an arithmetic progression with first term 36 and common difference -4 . Find the number of terms in the progression if the sum of all terms is 0.
Diberi suatu jangjang aritmetik dengan sebutan pertama 36 dan beza sepunya -4 . Cari bilangan sebutan jangjang itu jika hasil tambah bagi semua sebutannya ialah 0.

[2 marks]

[2 markah]

Answer / Jawapan :

1



- 2 Diagram 1 shows the shaded region that satisfies a quadratic inequality.
Rajah 1 menunjukkan kawasan berlorek yang memuaskan suatu ketaksamaan kuadratik.

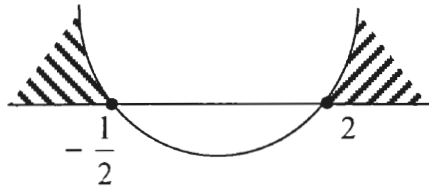


Diagram 1
Rajah 1

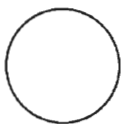
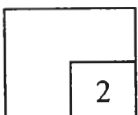
Form the quadratic inequality.
Bentukkan ketaksamaan kuadratik tersebut.

[2 marks]

[2 markah]

Answer / Jawapan :

2



- 3 A set of data consists of 12, -1, 8, 2, -10, 0, -7, 3, 20 and $p - 1$.
Satu set data terdiri daripada 12, -1, 8, 2, -10, 0, -7, 3, 20 dan $p - 1$.

- (a) Express mean in terms of p ,
Ungkapkan min dalam sebutan p ,
- (b) If $p = -4$, find the value of range.
Jika $p = -4$, cari nilai julat.

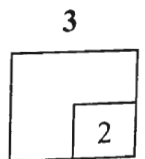
[2 marks]
[2 markah]

Answer / Jawapan :

(a)

(b)

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4

It is given that n and $6-n$ are the roots of the quadratic equation $x^2 + px + 9 = 0$, where p and n are constants.

Find the value of p and of n .

Diberi bahawa n dan $6-n$ ialah punca – punca bagi persamaan kuadratik $x^2 + px + 9 = 0$, dengan keadaan p dan n ialah pemalar.

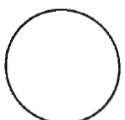
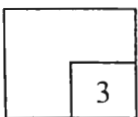
Cari nilai p dan nilai n .

[3 marks]

[3 markah]

Answer / Jawapan :

4



- 5 Diagram 2 shows part of a curve $y = \frac{4}{(3x-2)^2}$ which passes through point $P(1,4)$.

Rajah 2 menunjukkan sebahagian daripada lengkung $y = \frac{4}{(3x-2)^2}$ yang melalui titik $P(1,4)$.

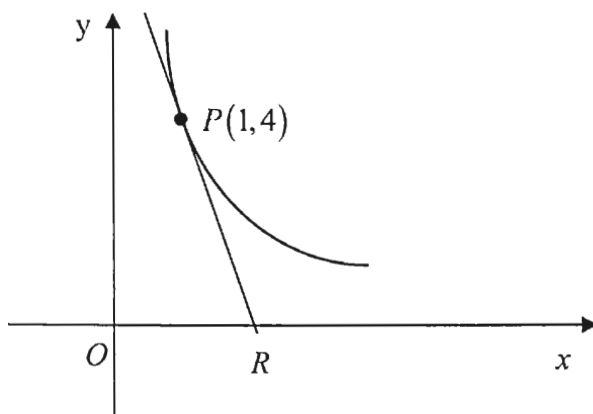


Diagram 2
Rajah 2

Straight line PR is a tangent to the curve at point P .
Garis lurus PR ialah tangen kepada lengkung pada titik P .

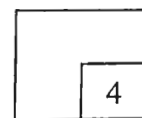
Find the equation of the straight line PR .
Cari persamaan garis lurus PR .

[4 marks]
[4 markah]

Answer / Jawapan :

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6

Diagram 3 shows, curve $y = g(x)$ intersects straight line $y = f(x)$ at point P and Q .
Rajah 3 menunjukkan, lengkung $y = g(x)$ menyalang garis lurus $y = f(x)$ di titik P dan Q .

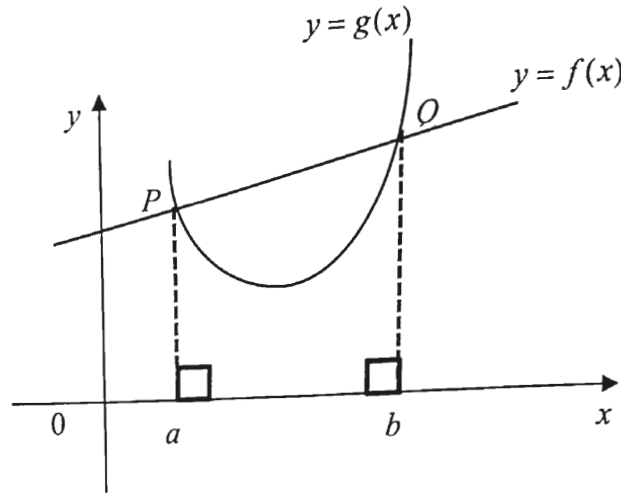


Diagram 3
Rajah 3

Area M is a region bounded by the straight line $y = f(x)$ and the curve $y = g(x)$.
Kawasan M ialah rantau yang dibatasi oleh garis lurus $y = f(x)$ dan lengkung $y = g(x)$.

- (a) Shade, in Diagram 3, area M .
Lorek, dalam Rajah 3, kawasan M .
- (b) Using definite integral, write an expression to represent area M .
Menggunakan kamiran tentu, tulis ungkapan mewakili kawasan M .

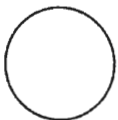
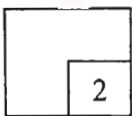
[2 marks]

[2 markah]

Answer / Jawapan :

(b)

6



7 Given that $\int_1^4 \frac{px^5 + 8x^2}{x^4} dx = 2p - 5$, where p is a constant, find the value of p .

Diberi $\int_1^4 \frac{px^5 + 8x^2}{x^4} dx = 2p - 5$, dengan keadaan p ialah pemalar, cari nilai p .

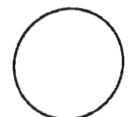
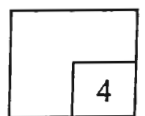
[4 marks]

[4 markah]

Answer / Jawapan :

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7



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8

Diagram 4 shows part of the graph $y = f(x)$.
Rajah 4 menunjukkan sebahagian daripada lakaran graf bagi fungsi $y = f(x)$.

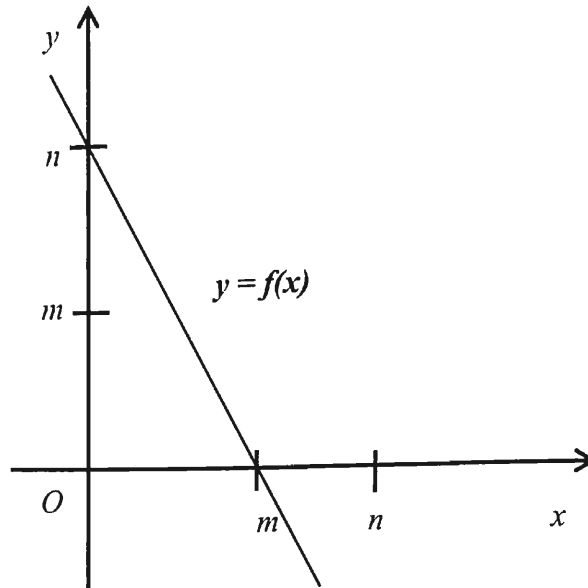


Diagram 4
Rajah 4

- (a) Find $f^{-1}(0)$
Cari $f^{-1}(0)$
- (b) Sketch the graph $y = f^{-1}(x)$ on the axis given below.
Lakarkan graf $y = f^{-1}(x)$ di atas paksi yang diberikan di bawah.

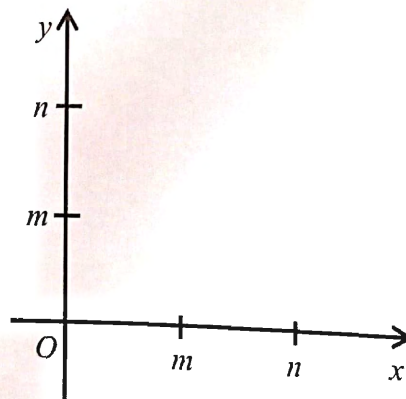
[2 marks]

[2 markah]

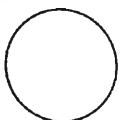
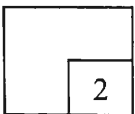
Answer / Jawapan :

(a)

(b)



8



- 9 A sales representative for a health product supplier is paid a monthly salary plus a bonus of 4.5 % if sales exceeding RM 12 000 . Given $f(x) = x - 12\ 000$ represents the amount of sales for bonus purposes and $g(x) = 0.045x$ represents the bonus that he/she gets .

Seorang juru jual bagi produk kesihatan dibayar gaji beserta bonus 4.5 % jika jumlah jualan melebihi RM 12 000. Diberi $f(x) = x - 12\ 000$ mewakili jumlah jualan untuk tujuan bonus dan $g(x) = 0.045x$ mewakili bonus yang diperolehi oleh beliau.

- (a) Determine the amount of bonus if sales for the month is RM 25 000.
Tentukan jumlah bonus yang didapati jika jualan ialah RM 25 000.
- (b) The amount of bonus that he/she gets can be represented by a composite function. Find the composite function.
Jumlah bonus yang diperolehi boleh diwakili dengan fungsi gubahan. Cari fungsi gubahan tersebut.

[4 marks]

[4 markah]

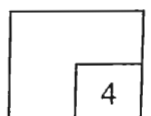
Answer / Jawapan :

(a)

(b)

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9



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- 10 Table 1 shows the distribution of marks for a group of students in an Additional Mathematics test.

Jadual 1 menunjukkan taburan markah bagi sekumpulan murid dalam ujian Matematik Tambahan.

Marks <i>Markah</i>	Number of students <i>Bilangan murid</i>
20 – 29	2
30 – 39	10
40 – 49	17
50 – 59	10
60 – 69	16
70 – 79	5

Table 1
Jadual 1

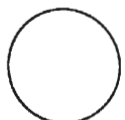
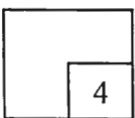
- (a) State the mode mark.
Nyatakan markah mod.
- (b) Mr Edra, the subject teacher, intends to give reward to the best 25% students. Determine the minimum mark should be obtained by the students in order for them to receive the reward.
Encik Edra, guru mata pelajaran, berhasrat untuk memberi ganjaran kepada 25% murid-murid terbaik.
Tentukan markah minimum yang perlu diperoleh oleh murid-murid bagi melayakkan mereka menerima ganjaran tersebut.

[4 marks]

[4 markah]

Answer / *Jawapan* :

10



- 11 The variables x and y are related by the equation $y = \frac{hx}{p} + \frac{k}{x}$, where p , h and k are constants. A straight line is obtained by plotting xy against x^2 , as shown in Diagram 5.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y = \frac{hx}{p} + \frac{k}{x}$, dengan keadaan p , h dan k ialah pemalar. Suatu garis lurus diperolehi dengan memplotkan xy melawan x^2 , seperti ditunjukkan pada Rajah 5.

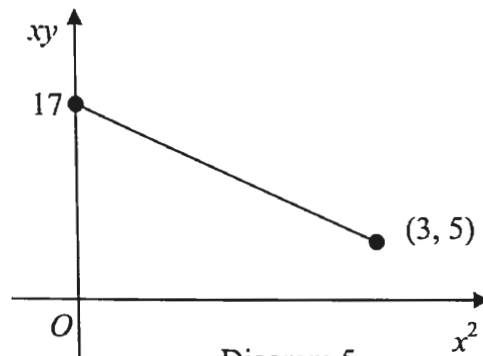


Diagram 5
Rajah 5

- (a) Find the value of k .
Cari nilai k .
- (b) Express h in terms of p .
Ungkapkan h dalam sebutan p .

[3 marks]

[3 markah]

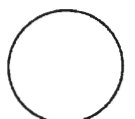
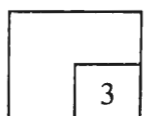
Answer / Jawapan :

(a)

(b)

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11



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- 12 Diagram 6 shows six numbers.
Rajah 6 menunjukkan enam nombor.

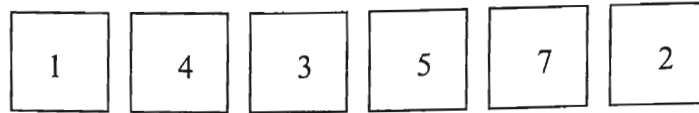


Diagram 6
Rajah 6

Luqman wants to built password in a computer game. The password must contain 4 digits without repetition.

Luqman ingin membina kata laluan dalam permainan computer. Kata laluan itu mesti mengandungi 4 digit tanpa pengulangan.

How many
Berapa banyak

- (a) different passwords can be formed?
kata laluan yang berlainan boleh dibentuk ?
- (b) different passwords that are odd and greater than 4000 can be formed?
kata laluan berbeza bernombor ganjil dan lebih besar dari 4000 yang boleh dibentuk ?

[4 marks]

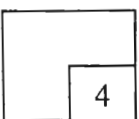
[4 markah]

Answer/*Jawapan* :

(a)

(b)

12



- 13 Table 2 shows the number of different colours of pens in a bag.
Jadual 2 menunjukkan bilangan pen berlainan warna di dalam sebuah beg.

Colour <i>Warna</i>	Numbers of pens <i>Bilangan pen</i>
Red <i>Merah</i>	5
Blue <i>Biru</i>	6
Black <i>Hitam</i>	4

Table 2
Jadual 2

Two pens are taken at random from the box. Find probability
Dua batang pen diambil secara rawak dari kotak itu. Cari kebarangkalian bahawa

- (a) both pens are of same colour,
kedua-dua batang pen adalah sama warna,
- (b) both pens are of different colour.
kedua-dua batang pen adalah berlainan warna.

[4 marks]
 [4 markah]

Answer / *Jawapan* :

(a)

(b)

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13



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14

Diagram 7 shows a standard normal distribution graph.
Rajah 7 menunjukkan satu graf taburan normal piawai.

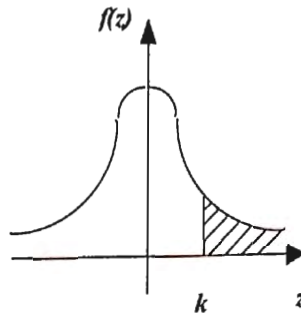


Diagram 7
Rajah 7

The probability represented by the area of the shaded region is h .
Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah h .

Find, in terms of h ,
Cari, dalam sebutan h ,

- (a) $P(0 \leq z \leq k)$,
(b) $P(|z| \geq k)$.

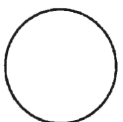
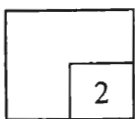
[2 marks]
[2 markah]

Answer / *Jawapan* :

(a)

(b)

14



- 15 The discrete random variable X has a binomial probability distribution with $n = 4$, where n is the number of trials. Diagram 8 shows the probability distribution of X and it is given that $P(X \geq 2) = 0.78$.

Pemboleh ubah rawak diskret X mempunyai satu taburan kebarangkalian binomial dengan $n = 4$, dengan keadaan n ialah bilangan percubaan. Rajah 8 menunjukkan taburan kebarangkalian bagi X dan diberi bahawa $P(X \geq 2) = 0.78$.

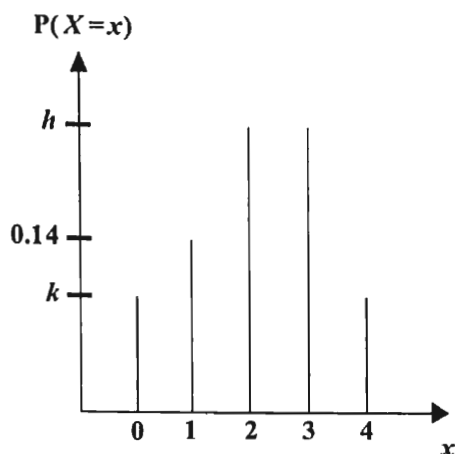


Diagram 8
Rajah 8

Find
Cari

- (a) the value of k ,
nilai k ,
- (b) the value of h ,
nilai h .

[4 marks]
[4 markah]

Answer / Jawapan :

- (a)
- (b)

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16

Diagram 9 shows a semicircle PQR with centre O .
Rajah 9 menunjukkan sebuah semi bulatan PQR berpusat O .

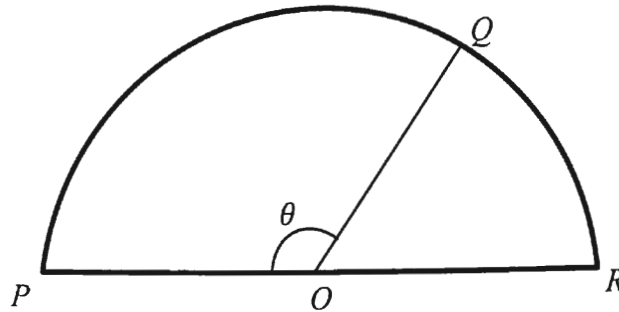


Diagram 9

Rajah 9

It is given that the length of arc QR is equal to the radius of the semicircle, r .
Diberi bahawa panjang lengkok QR adalah sama dengan jejari semi bulatan, r .

[Use /Guna $\pi = 3.142$]

Find
Cari

- the value of θ in radian,
nilai θ dalam radian,
- the area, in cm^2 , of sector QOP if the radius of the semicircle is 8 cm.
luas, dalam cm^2 , sector QOP jika jejari semi bulatan ialah 8 cm.

[4 marks]

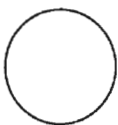
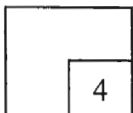
[4 markah]

Answer / Jawapan :

(a)

(b)

16



- 17 Given $\sin \theta = \sqrt{1 - k^2}$, where k is a constant and θ is an obtuse angle. Find in terms of k .

Diberi $\sin \theta = \sqrt{1 - k^2}$, dengan keadaan k ialah pemalar dan θ ialah sudut cakah. Cari dalam sebutan k

- (a) cosec θ ,
kosek θ ,
- (b) $\cos (90^\circ - \theta)$
 $\text{kos } (90^\circ - \theta)$
- (c) $\sin \frac{1}{2}\theta$

[4 marks]
[4 markah]

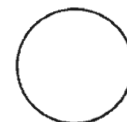
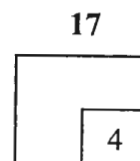
Answer / Jawapan :

(a)

(b)

(c)

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18 Given $p = 5^x$ and $q = 5^y$, express $\frac{25^{x+y}}{125^{x-y}}$ in terms of p and q .

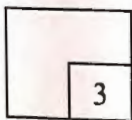
Diberi $p = 5^x$ dan $q = 5^y$, ungkapkan $\frac{25^{x+y}}{125^{x-y}}$ dalam sebutan p dan q .

[3 marks]

[3 markah]

Answer / Jawapan :

18



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- 19 Given that $4\log_{10}(x\sqrt{y}) = \frac{3}{2} + \log_{10} x - \log_{10} y$, such that x and y are both positive, express, in its simplest form, y in terms of x .

Diberi bahawa $4\log_{10}(x\sqrt{y}) = \frac{3}{2} + \log_{10} x - \log_{10} y$, dengan keadaan x dan y kedua-duanya positif, ungkapkan, dalam bentuk teringkas, y dalam sebutan x .

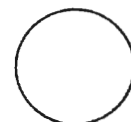
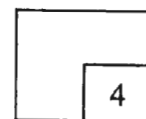
[4 marks]

[4 markah]

Answer / Jawapan :

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20

Diagram 10 shows a straight line PQ .
Rajah 10 menunjukkan satu garis lurus PQ .

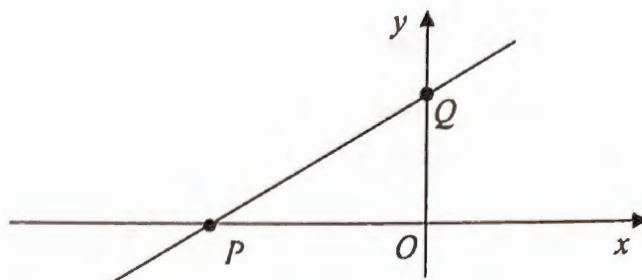


Diagram 10
Rajah 10

Given the equation PQ is $\frac{2hx}{3} + \frac{y}{k} = 1$.

Diberi persamaan PQ ialah $\frac{2hx}{3} + \frac{y}{k} = 1$.

Express in terms of h and/or k :

Ungkapkan dalam sebutan h and/or k :

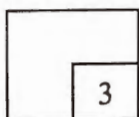
- coordinates of Q ,
koordinat Q ,
- coordinates of P ,
koordinat P ,
- gradient of PQ .
kecerunan PQ .

[3 marks]
[3 markah]

Answer / *Jawapan :*

-
-
-

20



- 21 Diagram 11 shows a straight line AB .
Rajah 11 menunjukkan satu garis lurus AB .

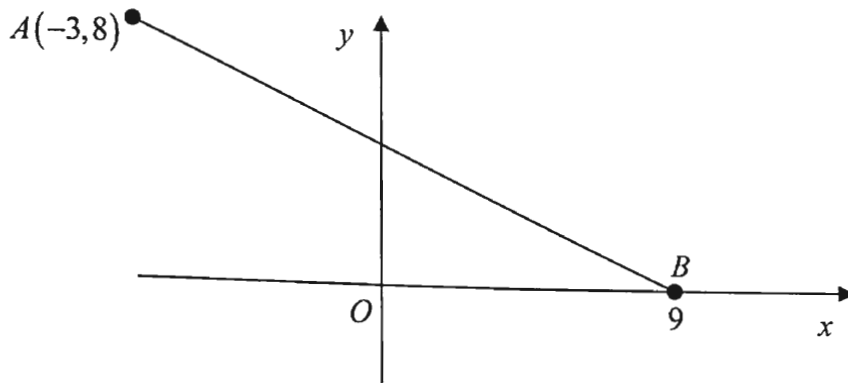


Diagram 11
Rajah 11

Find the equation of perpendicular bisector AB .
Cari persamaan pembahagi dua sama seranjang AB .

[3 marks]
[3 markah]

Answer / *Jawapan* :

*For
Examiner's
Use*

21

3

[Lihat halaman sebelah
SULIT

For
Examiner's
Use

- 22 Given that $\underline{u} = \begin{pmatrix} a \\ b \end{pmatrix}$, where $a > 0$ and $b > 0$, find a unit vector parallel to \underline{u} , in terms of a and b .

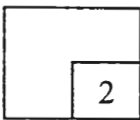
Diberi bahawa $\underline{u} = \begin{pmatrix} a \\ b \end{pmatrix}$, di mana $a > 0$ dan $b > 0$, cari satu unit vektor yang selari dengan \underline{u} , dalam sebutan a dan b .

[2 marks]

[2 markah]

Answer / Jawapan :

22



- 23 The position vectors of three points A , B and C relative to an origin O are $3\underline{i} + \underline{j}$, $5\underline{i} - 2\underline{j}$ and $\lambda\underline{i} - 6\underline{j}$ respectively. Given that A , B and C are collinear.

Vektor – vektor kedudukan bagi tiga titik A , B dan C relative kepada O adalah $3\underline{i} + \underline{j}$, $5\underline{i} - 2\underline{j}$ dan $\lambda\underline{i} - 6\underline{j}$ masing-masing. Diberi bahawa A , B dan C adalah segaris.

Find
Cari

- (a) the value of λ ,
nilai bagi λ ,

- (b) $\frac{AB}{BC}$.

[4 marks]

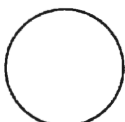
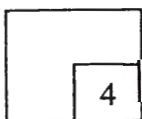
[4 markah]

Answer / Jawapan :

(a)

(b)

23



- 24 Diagram 12 shows water rocket is launched from point A . The height, h in meter, of the water rocket at t seconds after its launch is $h(t) = -(t-p)^2 + q$, with point A as the origin and AB is the horizontal line. The rocket takes 9 seconds to reach B .

Rajah 12 menunjukkan sebuah roket air dilancarkan dari titik A . Ketinggian, h dalam meter, roket air itu pada masa t saat selepas dilancarkan ialah $h(t) = -(t-p)^2 + q$, dengan titik A sebagai asalan dan AB ialah garis mengufuk. Roket mengambil masa 9 saat untuk sampai di B .

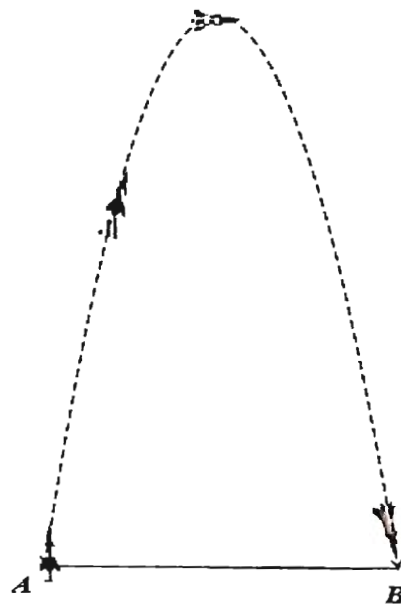


Diagram 12
Rajah 12

Find the maximum height of the water rocket can archived.

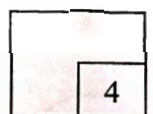
Cari ketinggian maksimum yang boleh dicapai oleh roket air tersebut.

[4 marks]

[4 markah]

Answer / Jawapan :

24



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SULIT

For
Examiner's
Use

- 25 An athlete runs the first kilometre in 4 minutes . His speed reduces in such a way that each kilometre takes 5 % longer than the preceding mile. Assuming that the length of the marathon is 26 km , find the total time, in hours and minutes, for him to complete the marathon.

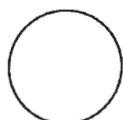
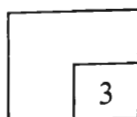
Seorang atlit mengambil masa 4 minit untuk berlari bagi kilometer yang pertama. Kelajuan lariannya berkurang dengan keadaan masa lariannya bertambah sebanyak 5 % dari kilometer sebelumnya. Cari masa yang diperlukan, dalam jam dan minit, untuk menamatkan larian jika jarak marathon tersebut ialah 26 km .

[3 marks]

[3 markah]

Answer / Jawapan :

25



END OF QUESTION PAPER
KERTAS SOALAN TAMAT