

SULIT

NO. KAD PENGENALAN

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ANGKA GILIRAN

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**LEMBAGA PEPERIKSAAN
KEMENTERIAN PELAJARAN MALAYSIA**

SIJIL PELAJARAN MALAYSIA 2011**3472/1****ADDITIONAL MATHEMATICS****Kertas 1****Nov./Dis.****2 jam****Dua jam****JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tulis nombor kad pengenalan dan angka giliran anda pada petak 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.*

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

Kertas soalan ini mengandungi 26 halaman bercetak dan 2 halaman tidak bercetak.

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HALAMAN KOSONG

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

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{mn}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 1$$

$$13 \quad S_\infty = \frac{a}{1 - r}, \quad |r| < 1$$

CALCULUS
KALKULUS

$$1 \quad y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2 \quad y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$3 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4 Area under a curve
Luas di bawah lengkung

$$= \int_a^b y \, dx \text{ or (atau)}$$

$$= \int_a^b x \, dy$$

5 Volume of revolution
Isi padu kisanan

$$= \int_a^b \pi y^2 \, dx \text{ or (atau)}$$

$$= \int_a^b \pi x^2 \, dy$$

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STATISTICS
STATISTIK

$$1 \quad \bar{x} = \frac{\sum x}{N}$$

$$7 \quad \bar{I} = \frac{\sum W_i I_i}{\sum W_i}$$

$$2 \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$8 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

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

$$9 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$10 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

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

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

$$12 \quad \text{Mean / Min} , \mu = np$$

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

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

$$14 \quad Z = \frac{X - \mu}{\sigma}$$

$$6 \quad I = \frac{Q_1}{Q_0} \times 100$$

GEOMETRY
GEOMETRI

$$1 \quad \text{Distance / Jarak} \\ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$5 \quad |\underline{r}| = \sqrt{x^2 + y^2}$$

$$2 \quad \text{Midpoint / Titik tengah} \\ (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$6 \quad \hat{r} = \frac{x\mathbf{i} + y\mathbf{j}}{\sqrt{x^2 + y^2}}$$

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

$$(x, y) = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n} \right)$$

4 Area of triangle / *Luas segi tiga*

$$= \frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

TRIGONOMETRY
TRIGONOMETRI

1 Arc length, $s = r\theta$
Panjang lengkok, $s = j\theta$

2 Area of sector, $A = \frac{1}{2}r^2\theta$
Luas sektor, $L = \frac{1}{2}j^2\theta$

3 $\sin^2 A + \cos^2 A = 1$
 $\sin^2 A + \text{kos}^2 A = 1$

4 $\sec^2 A = 1 + \tan^2 A$
 $\text{sek}^2 A = 1 + \tan^2 A$

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

6 $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \text{kos} A$

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

$\text{kos} 2A = \text{kos}^2 A - \sin^2 A$
 $= 2 \text{kos}^2 A - 1$
 $= 1 - 2 \sin^2 A$

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

$\sin(A \pm B) = \sin A \text{kos} B \pm \text{kos} A \sin B$

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

$\text{kos}(A \pm B) = \text{kos} A \text{kos} B \mp \sin A \sin B$

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

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

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

13 $a^2 = b^2 + c^2 - 2bc \cos A$
 $a^2 = b^2 + c^2 - 2bc \text{kos} A$

14 Area of triangle / *Luas segi tiga*
 $= \frac{1}{2} ab \sin C$

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

- 1 It is given that the relation between set $X = \{0, 1, 4, 9, 16\}$ and set $Y = \{0, 1, 2, 3, 4, 5, 6\}$ is 'square of'.

Diberi bahawa hubungan antara set $X = \{0, 1, 4, 9, 16\}$ dan set $Y = \{0, 1, 2, 3, 4, 5, 6\}$ ialah 'kuasa dua bagi'.

- (a) Find the image of 9.

Cari imej bagi 9.

- (b) Express the relation in the form of ordered pairs.

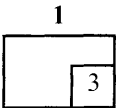
Ungkapkan hubungan itu dalam bentuk pasangan tertib.

[3 marks]
[3 markah]

Answer / Jawapan:

- (a)

- (b)



- 2 It is given that the functions $g(x) = 4x - 7$ and $h(x) = 2x$.

Find the value of $gh(2)$.

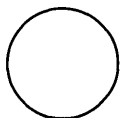
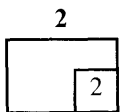
[2 marks]

Diberi bahawa fungsi $g(x) = 4x - 7$ dan $h(x) = 2x$.

Cari nilai $gh(2)$.

[2 markah]

Answer / Jawapan:



- 3 The inverse function h^{-1} is defined by $h^{-1} : x \rightarrow \frac{2}{3-x}, x \neq 3$.

Fungsi songsang h^{-1} ditakrifkan $h^{-1} : x \rightarrow \frac{2}{3-x}, x \neq 3$.

Find

Cari

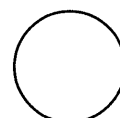
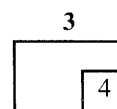
- (a) $h(x)$,
- (b) the value of x such that $h(x) = -5$.
nilai x dengan keadaan $h(x) = -5$.

[4 marks]
[4 markah]

Answer / Jawapan:

(a)

(b)



- 4 The quadratic equation $mx^2 + (1 + 2m)x + m - 1 = 0$ has two equal roots.

Find the value of m .

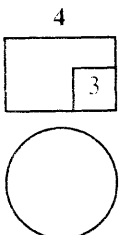
[3 marks]

Persamaan kuadratik $mx^2 + (1 + 2m)x + m - 1 = 0$ mempunyai dua punca sama.

Cari nilai m .

[3 markah]

Answer / Jawapan:



5 Diagram 5 shows the graph of the quadratic function $f(x) = (x + 3)^2 + 2k - 6$, where k is a constant.

Rajah 5 menunjukkan graf fungsi kuadratik $f(x) = (x + 3)^2 + 2k - 6$, dengan keadaan k ialah pemalar.

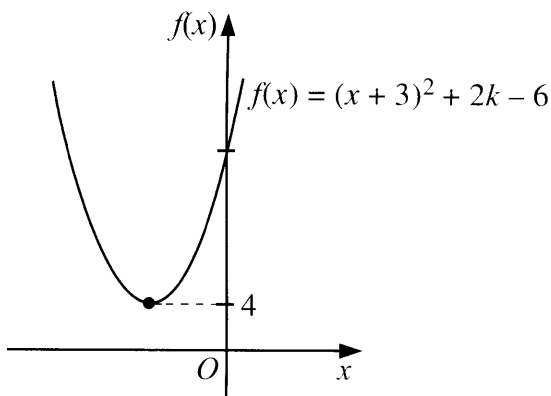


Diagram 5
Rajah 5

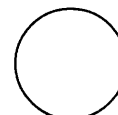
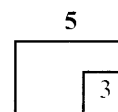
- (a) State the equation of the axis of symmetry of the curve.
Nyatakan persamaan paksi simetri bagi lengkung itu.
- (b) Given that the minimum value of the function is 4, find the value of k .
Diberi nilai minimum bagi fungsi itu ialah 4, cari nilai k .

[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)



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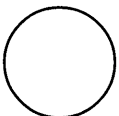
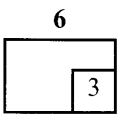
6 Find the range of values of x for $3x^2 - 5x - 16 \leq x(2x + 1)$.

[3 marks]

Cari julat nilai x bagi $3x^2 - 5x - 16 \leq x(2x + 1)$.

[3 markah]

Answer / Jawapan:



7 Solve the equation:

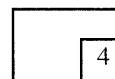
Selesaikan persamaan:

$$2^{3x} = 8 + 2^{3x-1}$$

[4 marks]
[4 markah]

Answer / Jawapan:

7



8 Given that $\log_2 x = h$ and $\log_2 y = k$, express $\log_2 \frac{x^3}{y}$ in terms of h and k .

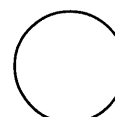
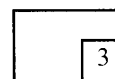
[3 marks]

Diberi $\log_2 x = h$ dan $\log_2 y = k$, ungkapkan $\log_2 \frac{x^3}{y}$ dalam sebutan h dan k .

[3 markah]

Answer / Jawapan:

8



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9 It is given that $x, 5, 8, \dots, 41, \dots$ is an arithmetic progression.
Diberi $x, 5, 8, \dots, 41, \dots$, ialah satu jangjang aritmetik.

(a) State the value of x .

Nyatakan nilai x .

(b) Write the three consecutive terms after 41.

Tulis tiga sebutan berturutan selepas 41.

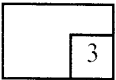
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

9



10 The second term of an arithmetic progression is -3 and the sixth term is 13.

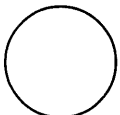
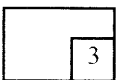
Find the first term and the common difference of the progression. [3 marks]

Sebutan kedua suatu jangjang aritmetik ialah -3 dan sebutan keenam ialah 13.

Cari sebutan pertama dan beza sepunya bagi jangjang itu. [3 markah]

Answer / Jawapan:

10



- 11 It is given that $x^2, x^4, x^6, x^8, \dots$ is a geometric progression such that $0 < x < 1$. The sum to infinity of this progression is $\frac{1}{3}$.

Diberi bahawa $x^2, x^4, x^6, x^8, \dots$ ialah satu jangjang geometri dengan keadaan $0 < x < 1$. Hasil tambah hingga ketakterhinggaan jangjang ini ialah $\frac{1}{3}$.

Find

Cari

- (a) the common ratio of this progression in terms of x ,
nisbah sepunya jangjang ini dalam sebutan x ,
- (b) the value of x .
nilai x .

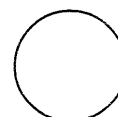
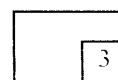
[3 marks]
[3 markah]

Answer / *Jawapan:*

(a)

(b)

11



- 12 The variables x and y are related by the equation $3y = (p - 1)x + \frac{12}{x}$, where p is a constant. Diagram 12 shows the straight line QR obtained by plotting xy against x^2 .

Pembolehubah x dan y dihubungkan oleh persamaan $3y = (p - 1)x + \frac{12}{x}$, dengan keadaan p ialah pemalar. Rajah 12 menunjukkan garis lurus QR yang diperolehi dengan memplot xy melawan x^2 .

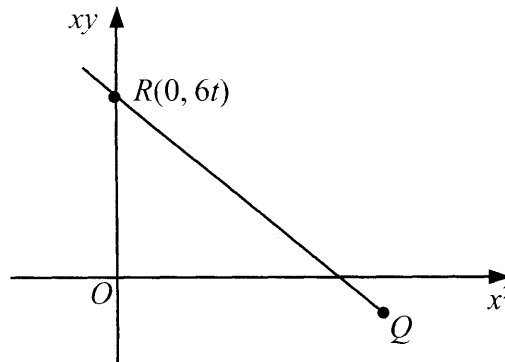


Diagram 12
Rajah 12

- (a) Express the equation $3y = (p - 1)x + \frac{12}{x}$ in its linear form, which is used to obtain the straight line graph shown in Diagram 12.

Ungkapkan persamaan $3y = (p - 1)x + \frac{12}{x}$ dalam bentuk linear, yang digunakan untuk memperoleh graf garis lurus seperti ditunjukkan dalam Rajah 12.

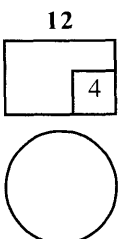
- (b) Given that the gradient of QR is -2 , find the value of p and of t .
Diberi kecerunan QR ialah -2 , cari nilai p dan nilai t .

[4 marks]
[4 markah]

Answer / Jawapan:

(a)

(b)



- 13 A straight line $\frac{x}{2} + \frac{y}{6} = 1$ cuts the x -axis at P and y -axis at Q .

Garis lurus $\frac{x}{2} + \frac{y}{6} = 1$ memotong paksi- x di P dan paksi- y di Q .

Find

Cari

- (a) the gradient of the straight line,
kecerunan garis lurus itu,
- (b) the equation of the perpendicular bisector of the straight line.
persamaan pembahagi dua sama garis lurus itu.

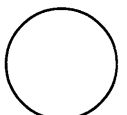
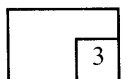
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

13



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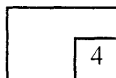
14 Solve the equation $\sin 2\theta = \cos \theta$ for $0^\circ \leq \theta \leq 360^\circ$.

Selesaikan persamaan $\sin 2\theta = \cos \theta$ untuk $0^\circ \leq \theta \leq 360^\circ$.

[4 marks]
[4 markah]

Answer / Jawapan:

14



15 It is given that $\tan A = \frac{3}{4}$ and $\tan B = \frac{7}{24}$, where A is an acute angle and B is a reflex angle.

Diberi bahawa $\tan A = \frac{3}{4}$ dan $\tan B = \frac{7}{24}$, dengan keadaan A ialah sudut tirus dan B ialah sudut refleks.

Find

Cari

(a) $\cot A$,

kot A ,

(b) $\sin(A + B)$.

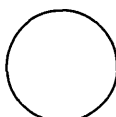
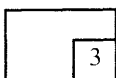
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

15



16 Diagram 16 shows a parallelogram $ODEF$ drawn on a Cartesian plane.

Rajah 16 menunjukkan sebuah segi empat selari $ODEF$ dilukis pada suatu satah Cartesian.

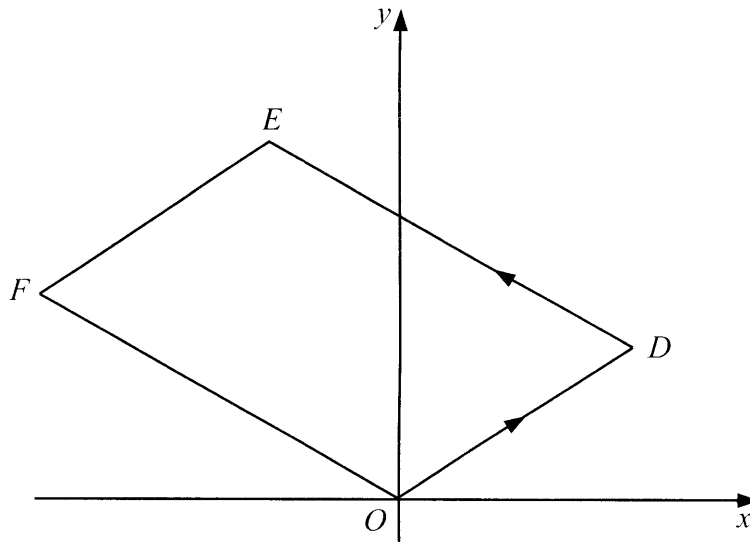


Diagram 16
Rajah 16

It is given that $\overrightarrow{OD} = 3\mathbf{i} + 2\mathbf{j}$ and $\overrightarrow{DE} = -5\mathbf{i} + 3\mathbf{j}$.

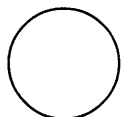
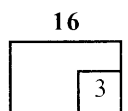
Find \overrightarrow{DF} .

Diberi bahawa $\overrightarrow{OD} = 3\mathbf{i} + 2\mathbf{j}$ dan $\overrightarrow{DE} = -5\mathbf{i} + 3\mathbf{j}$.

Cari \overrightarrow{DF} .

[3 marks]
[3 markah]

Answer / Jawapan:



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17 It is given that vector $\underline{r} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$ and vector $\underline{s} = \begin{pmatrix} h \\ 7 \end{pmatrix}$, where h is a constant.

Diberi bahawa vektor $\underline{r} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$ dan vektor $\underline{s} = \begin{pmatrix} h \\ 7 \end{pmatrix}$, dengan keadaan h ialah pemalar.

(a) Express the vector $\underline{r} + \underline{s}$, in terms of h .

Ungkapkan vektor $\underline{r} + \underline{s}$, dalam sebutan h .

(b) Given that $|\underline{r} + \underline{s}| = 13$ units, find the positive value of h .

Diberi $|\underline{r} + \underline{s}| = 13$ unit, cari nilai positif h .

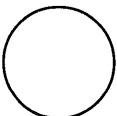
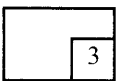
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

17



18 Diagram 18 shows a sector POQ of a circle with centre O .

Rajah 18 menunjukkan sektor POQ bagi sebuah bulatan berpusat O .

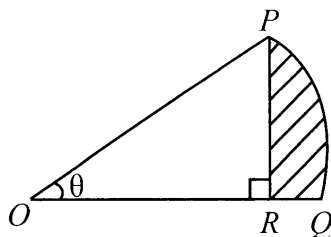


Diagram 18
Rajah 18

It is given that $OR = 8$ cm and $OP = 10$ cm,

Diberi bahawa $OR = 8$ cm dan $OP = 10$ cm,

(Use / Guna $\pi = 3.142$)

Find

Cari

- (a) the value of θ , in radian,
nilai θ , dalam radian,
- (b) the perimeter, in cm, of the shaded region.
perimeter, dalam cm, kawasan berlorek.

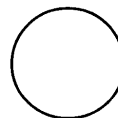
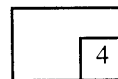
[4 marks]
[4 markah]

Answer / Jawapan:

(a)

(b)

18



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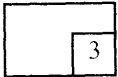
19 Given $y = \frac{5x}{x^2 + 1}$ and $\frac{dy}{dx} = g(x)$, find the value of $\int_0^3 2g(x)dx$.

Diberi $y = \frac{5x}{x^2 + 1}$ dan $\frac{dy}{dx} = g(x)$, cari nilai $\int_0^3 2g(x)dx$.

[3 marks]
[3 markah]

Answer / Jawapan:

19



20 It is given that $y = 10 - \frac{12}{x}$.

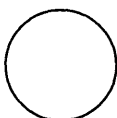
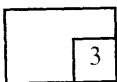
Find the small change in x , in terms of p , when the value of y changes from 4 to $4 + p$.
[3 marks]

Diberi bahawa $y = 10 - \frac{12}{x}$.

Cari perubahan kecil dalam x , dalam sebutan p , apabila nilai y berubah daripada 4 kepada $4 + p$.
[3 markah]

Answer / Jawapan:

20



21 Find $\int_4^a (x+1)dx$, in terms of a .

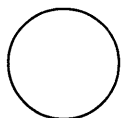
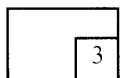
[3 marks]

Cari $\int_4^a (x+1)dx$, dalam sebutan a .

[3 markah]

Answer / Jawapan:

21



- 22 A group of 6 students has a total mass of 240 kg. The sum of the squares of their mass is 9 654 kg.

Sekumpulan 6 orang murid mempunyai jumlah jisim 240 kg. Hasil tambah kuasa dua jisim-jisim mereka ialah 9 654 kg.

Find

Cari

- (a) the mean mass of the 6 students,
min jisim 6 orang murid itu,

- (b) the standard deviation.
sisihan piawai.

[3 marks]

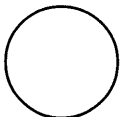
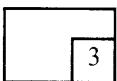
[3 markah]

Answer / *Jawapan:*

(a)

(b)

22



23 Diagram 23 shows seven letter cards.

Rajah 23 menunjukkan tujuh keping kad huruf.



Diagram 23

Rajah 23

A five-letter code is to be formed using five of these cards.

Suatu kod lima huruf hendak dibentuk dengan menggunakan lima daripada kad-kad itu.

Find

Cari

- (a) the number of different five-letter codes that can be formed,
bilangan kod lima huruf yang berlainan yang dapat dibentuk,
- (b) the number of different five-letter codes which begin with a vowel and end with a consonant.
bilangan kod lima huruf yang berlainan yang bermula dengan huruf vokal dan berakhir dengan huruf konsonan.

[4 marks]

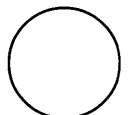
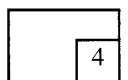
[4 markah]

Answer / Jawapan:

(a)

(b)

23



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24 A sample space of an experiment is given by $S = \{1, 2, 3, \dots, 20\}$. Events M and N are defined as follows:

*Satu ruang sampel bagi suatu eksperimen diberi oleh $S = \{1, 2, 3, \dots, 20\}$.
Peristiwa-peristiwa M dan N ditakrifkan seperti berikut:*

$$M : \{3, 6, 9, 12, 15, 18\}$$

$$N : \{1, 3, 5, 15\}$$

Find

Cari

(a) $P(M)$,

(b) $P(M \text{ and } N)$.

$P(M \text{ dan } N)$.

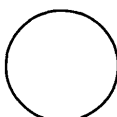
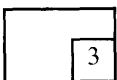
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

24



- 25 Diagram 25 shows the graph of a binomial distribution of X .
Rajah 25 menunjukkan graf suatu taburan binomial bagi X .

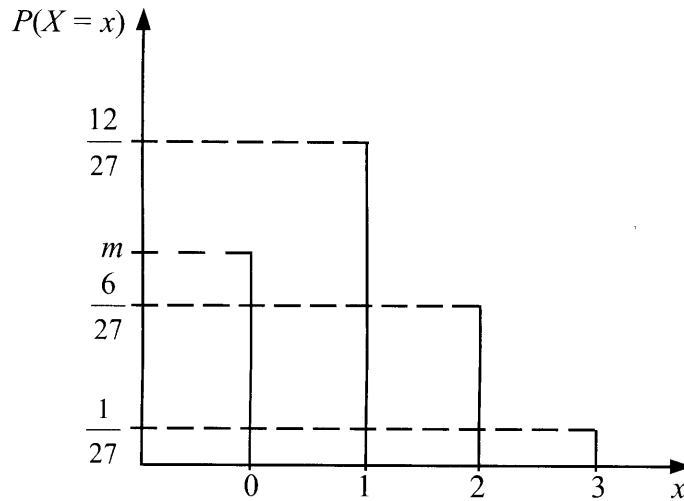


Diagram 25
Rajah 25

Find
Cari

- (a) $P(X \geq 1)$,
(b) the value of m .
nilai m .

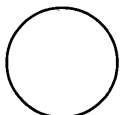
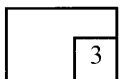
[3 marks]
[3 markah]

Answer / Jawapan:

(a)

(b)

25



END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions.
Kertas soalan ini mengandungi 25 soalan.
2. Answer **all** questions.
Jawab semua soalan.
3. Write your answers in the spaces provided in the question paper.
Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.
4. Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.
5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
6. The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. The marks allocated for each question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.
8. A list of formulae is provided on pages 3 to 5.
Satu senarai rumus disediakan di halaman 3 hingga 5.
9. A booklet of four-figure mathematical tables is provided.
Sebuah buku sifir matematik empat angka disediakan.
10. You may use a scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik.
11. Hand in this question paper to the invigilator at the end of the examination.
Serahkan kertas soalan ini kepada pegawai peperiksaan di akhir peperiksaan.