

Name : .....

Form : .....



**BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH  
DAN SEKOLAH KECEMERLANGAN  
KEMENTERIAN PELAJARAN MALAYSIA**

**PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2012**

**3472 / 1**

**PERCUBAAN SIJIL PELAJARAN MALAYSIA**

**ADDITIONAL MATHEMATICS**

**Kertas 1**

**Ogos 2012**

**2 jam**

**Dua 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.*

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

Kertas soalan ini mengandungi **26** halaman 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.

### 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

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

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

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

4 Area under a curve

$$= \int_a^b y \, dx \quad \text{or}$$

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

5 Volume generated

$$= \int_a^b \pi y^2 \, dx \quad \text{or}$$

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

### GEOMETRY

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

2 Midpoint

$$(x, y) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad |r| = \sqrt{x^2 + y^2}$$

$$4 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

5 A point dividing a segment of a line

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

6 Area of triangle

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

[Lihat halaman sebelah]

## STATISTIC

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

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

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

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

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

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

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

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

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

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

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

$$12 \quad \text{Mean } \mu = np$$

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

$$14 \quad z = \frac{x - \mu}{\sigma}$$

## TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

$$2 \quad \text{Area of sector, } L = \frac{1}{2} r^2 \theta$$

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

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

$$5 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

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

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$8 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

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

$$10 \quad \cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$11 \quad \tan (A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

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

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

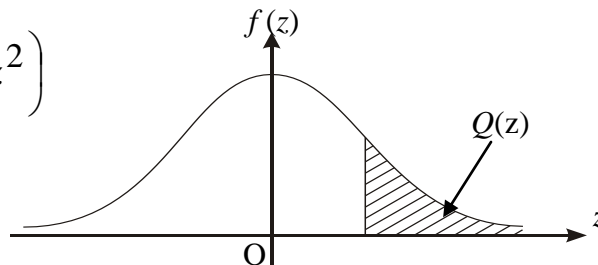
$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

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

$z$	0	1	2	3	4	5	6	7	8	9	Minus / Tolak								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

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

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



Example / Contoh:

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

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

1. Given that set  $P = \{16, 25, 81, 100\}$  and set  $Q = \{-4, -3, 4, 5, 9, 10\}$ . The relation from set  $P$  to set  $Q$  is “the square root of”.

*Diberi set  $P = \{16, 25, 81, 100\}$  dan set  $Q = \{-4, -3, 4, 5, 9, 10\}$ . Hubungan antara set  $P$  kepada set  $Q$  adalah “punca kuasa dua bagi”.*

State,  
*Nyatakan,*

- (a) the object of 5  
*objek bagi 5*
- (b) the image of 16  
*imej bagi 16*

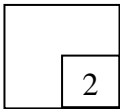
[ 2 marks ]

[2 markah]

Answer/Jawapan :

- (a)
- (b)

1



2. Given that the function  $k : x \rightarrow \frac{3x}{x-2}, x \neq m$ .

*Diberi fungsi  $k : x \rightarrow \frac{3x}{x-2}, x \neq m$ .*

Find

*Cari*

- (a) the value of  $m$   
*nilai bagi  $m$*
- (b)  $k^{-1}(2)$ .

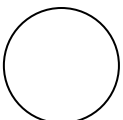
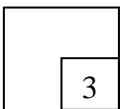
[ 3 marks ]

[3 markah]

Answer/Jawapan :

- (a)
- (b)

2



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3. Given that the function  $g : x \rightarrow \frac{5}{x}, x \neq 0$  and  $gf : x \rightarrow \frac{5}{x-3}, x \neq 3$ .

*Diberi fungsi  $g : x \rightarrow \frac{5}{x}, x \neq 0$  dan  $gf : x \rightarrow \frac{5}{x-3}, x \neq 3$ .*

Find

*Cari*

- (a) the function  $f(x)$

*fungsi bagi  $f(x)$*

- (b)  $f(2)$

[ 3 marks ]

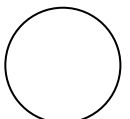
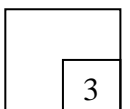
[3 markah]

Answer/Jawapan :

(a)

(b)

3



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**SULIT**

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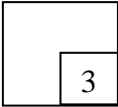
4. Find the range of values of  $m$  if the quadratic equation  $3 - 2x - mx^2 = -2x^2 + 4x$  has no roots.

*Cari julat bagi nilai  $m$  jika persamaan kuadratik  $3 - 2x - mx^2 = -2x^2 + 4x$  tidak mempunyai punca.*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

**4**

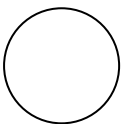
5. Find the range of values of  $p$  for  $2p^2 - p \leq p^2 - 2(2p + 1)$ .

*Cari julat nilai  $p$  bagi  $2p^2 - p \leq p^2 - 2(2p + 1)$ .*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

**5**



6. Diagram 6 shows the graph of a quadratic function for  $f(x) = (x + m)^2 - 4$ .

Rajah 6 menunjukkan graf fungsi kuadratik bagi  $f(x) = (x + m)^2 - 4$ .

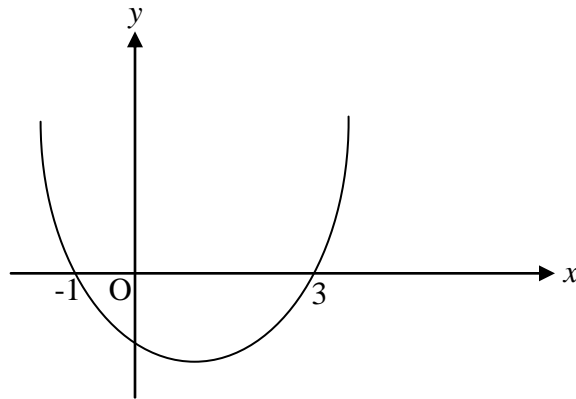


Diagram 6  
Rajah 6

Find

Cari

- (a) the equation of the axis of symmetry,  
*persamaan paksi simetri,*
- (b) the value of  $m$ ,  
*nilai  $m$ ,*
- (c) the coordinates of the minimum point.  
*koordinat bagi titik minimum.*

[ 3 marks ]

[3 markah]

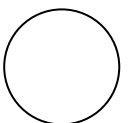
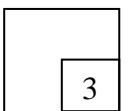
Answer/Jawapan :

(a)

(b)

(c)

6



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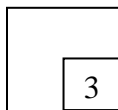
7. Solve the equation  $\sqrt{9^{2x-3}} = 243(27^{2x})$ .

*Selesaikan persamaan  $\sqrt{9^{2x-3}} = 243(27^{2x})$ .*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

**7**

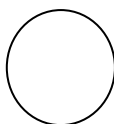
8. Given that  $\log_5 m - \log_{125} n = 4$ , express  $m$  in terms of  $n$ .

*Diberi  $\log_5 m - \log_{125} n = 4$ , ungkapkan  $m$  dalam sebutan  $n$ .*

[ 4 marks ]

[4 markah]

Answer/Jawapan :

**8**

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9. It is given that  $-7, h, k, 20, \dots$  are the first four terms of an arithmetic progression.

*Diberi bahawa  $-7, h, k, 20, \dots$  adalah empat sebutan pertama bagi suatu jangjang aritmetik.*

Find the value of  $h$  and of  $k$ .

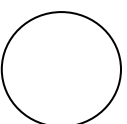
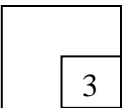
*Cari nilai bagi  $h$  dan bagi  $k$ .*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

9



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**SULIT**

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- 10 In a geometric progression, the first term is  $\frac{1}{2}$  and the fourth term is  $-\frac{4}{27}$ .

*Dalam satu jangjang geometri, sebutan pertama ialah  $\frac{1}{2}$  dan sebutan keempat ialah  $-\frac{4}{27}$ .*

Calculate,

*Hitung,*

- (a) the common ratio,  
*nisbah sepunya,*
- (b) the sum to infinity of the geometric progression.  
*hasil tambah hingga sebutan ketakterhinggaan bagi jangjang geometri itu.*

[ 3 marks ]

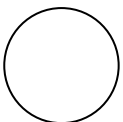
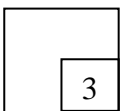
[3 markah]

Answer/Jawapan :

(a)

(b)

10



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- 11 The first three terms of an arithmetic progression are  
*Tiga sebutan pertama suatu jangjang aritmetik ialah*

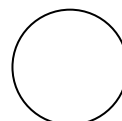
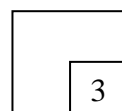
$$3h + 1, 4h + 2, 5h + 3, \dots$$

Find the sum of the first tenth terms in terms of  $h$ .

*Cari hasitambah sepuluh sebutan pertama dalam sebutan  $h$ .*

[ 3 marks ]  
[3 markah]

Answer/Jawapan :

**11**

[Lihat halaman sebelah  
**SULIT**

**SULIT****3472/1**

For  
examiner's  
use only

- 12 The variables  $x$  and  $y$  are related by the equation  $y = pq + px$ , where  $p$  and  $q$  are constants. Diagram 12 shows the straight line obtained by plotting  $\frac{y}{x}$  against  $\frac{1}{x}$ .

*Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = pq + px$ , dengan keadaan  $p$  dan  $q$  adalah pemalar. Rajah 12 menunjukkan graf garislurus diperolehi dengan memplotkan  $\frac{y}{x}$  melawan  $\frac{1}{x}$ .*

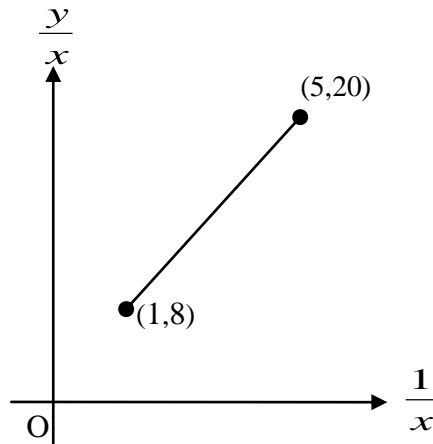


Diagram 12

Rajah 12

- (a) Express  $p$  in terms of  $q$ .  
*Ungkapkan  $p$  dalam sebutan  $q$ .*
- (b) Find the  $y$ -intercept.  
*Cari pintasan- $y$ .*

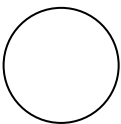
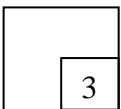
[ 3 marks ]  
[3 markah]

Answer/Jawapan :

(a)

(b)

12



13. Given that the straight line  $\frac{x}{3} + \frac{y}{2} = 1$  intersect the  $x$ -axis at point  $S$  and intersect the  $y$ -axis at point  $T$ .

*Diberi bahawa persamaan garis lurus  $\frac{x}{3} + \frac{y}{2} = 1$  menyilang paksi-  $x$  di titik  $S$  dan menyilang di paksi-  $y$  di titik  $T$ .*

Find the equation of the perpendicular bisector of  $ST$ .

*Cari persamaan pembahagi dua sama seranjang bagi  $ST$ .*

[4 marks ]

[4 markah]

Answer/Jawapan :

For  
examiner's  
use only

13

4

14. A point  $S$  moves along the arc of a circle with centre  $P(-2,2)$ . The arc of circle passes through point  $Q(6,-4)$ .

*Titik  $S$  bergerak pada lengkok suatu bulatan berpusat  $P(-2,2)$ . Lengkok bulatan itu melalui titik  $Q(6,-4)$ .*

Find the equation of the locus of point  $S$ .

*Cari persamaan lokus bagi titik  $S$ .*

[ 3 marks ]

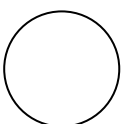
[3 markah]

Answer/Jawapan :

14

3

[Lihat halaman sebelah  
SULIT



SULIT

15. Diagram 15 shows the vector  $\overrightarrow{OR}$ .  
*Rajah 15 menunjukkan vektor  $\overrightarrow{OR}$ .*

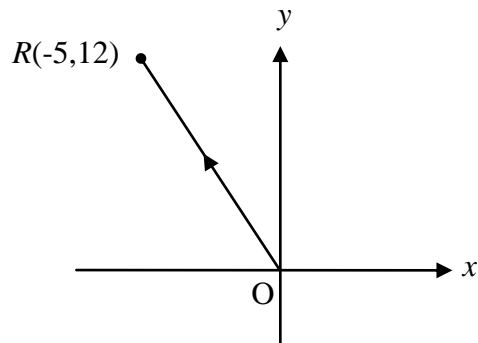


Diagram 15

*Rajah 15*

- (a) Express  $\overrightarrow{OR}$  in the form  $x\mathbf{i} + y\mathbf{j}$ .  
*Ungkapkan  $\overrightarrow{OR}$  dalam sebutan  $x\mathbf{i} + y\mathbf{j}$ .*
- (b) Find the unit vector in the direction of  $\overrightarrow{OR}$ .  
*Cari vektor unit dalam arah  $\overrightarrow{OR}$ .*

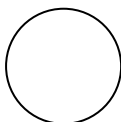
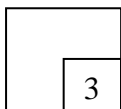
[ 3 marks ]  
[3 markah]

Answer/Jawapan :

(a)

(b)

15





**SULIT****3472/1**

16. Given that  $\overrightarrow{OP} = \underline{i} + \underline{j}$  and  $\overrightarrow{OQ} = 3\underline{i} - 2\underline{j}$ .

Diberi  $\overrightarrow{OP} = \underline{i} + \underline{j}$  dan  $\overrightarrow{OQ} = 3\underline{i} - 2\underline{j}$ .

Find the value of  $k$  if  $4k\overrightarrow{OP} + \overrightarrow{OQ}$  is parallel to the y-axis.

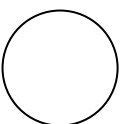
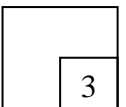
Cari nilai  $k$  jika  $4k\overrightarrow{OP} + \overrightarrow{OQ}$  selari dengan paksi-y.

[ 3 marks ]

[3 markah]

Answer/Jawapan :

For  
examiner's  
use only

**16**

[Lihat halaman sebelah  
**SULIT**

17. Diagram 17 shows a right angle triangle  $POR$  and a sector  $ROS$  in a circle with centre  $R$ .

*Rajah 17 menunjukkan segitiga bersudut tegak  $POR$  dan sektor  $ROS$  dalam bulatan yang berpusat  $R$ .*

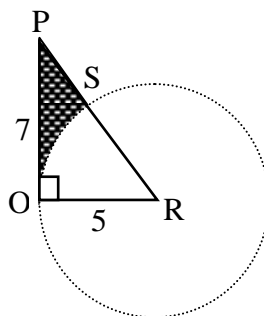


Diagram 17  
*Rajah 17*

Find,  
*Cari,*

[Use/Guna  $\pi = 3.142$ ]

- (a)  $\angle ORS$ , in radian,  
 $\angle ORS$ , dalam radian,
- (b) perimeter of shaded region.  
*perimeter kawasan berlorek.*

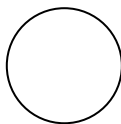
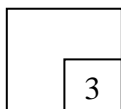
[ 3 marks ]  
[3 markah]

Answer/Jawapan :

(a)

(b)

17



**SULIT****3472/1**

18. Solve the trigonometry equation  $4\sin x \cos x = 1$  for  $0^\circ \leq x \leq 360^\circ$ .

*Selesaikan persamaan trigonometri  $4\sin x \cos x = 1$  untuk  $0^\circ \leq x \leq 360^\circ$ .*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

For  
examiner's  
use only

**18**

19. Given  $y = 16x(5 - x)$ .

*Diberi  $y = 16x(5 - x)$ .*

Find

*Cari*

(a)  $\frac{dy}{dx}$

- (b) the value of  $x$  when  $y$  is maximum.

*nilai  $x$  apabila  $y$  adalah maksimum.*

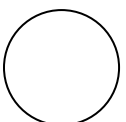
[ 3 marks ]

[3 markah]

Answer/Jawapan :

(a)

(b)

**19**

[Lihat halaman sebelah  
**SULIT**

For  
examiner's  
use only

20. Given that the point  $M\left(-1, \frac{3}{2}\right)$  lies on a curve with gradient function  $x - 3$ .

*Diberi bahawa titik  $M\left(-1, \frac{3}{2}\right)$  berada pada suatu lengkung dengan fungsi kecerunan  $x - 3$ .*

Find the equation of the tangent at point  $M$ .

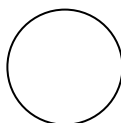
*Cari persamaan tangen pada titik  $M$ .*

[ 3 marks ]

[3 markah]

Answer/Jawapan :

20



**SULIT****3472/1**For  
examiner's  
use only

21. Given that  $\int_1^3 f(x)dx = 5$ .

*Diberi bahawa  $\int_1^3 f(x)dx = 5$ .*

Find,  
*Cari,*

(a) the value of  $\int_3^1 2f(x)dx$ ,

*nilai bagi  $\int_3^1 2f(x)dx$ ,*

(b) the value of  $h$  if  $\int_1^3 [h - \frac{f(x)}{2}]dx = \frac{7}{2}$ .

*nilai  $h$  jika  $\int_1^3 [h - \frac{f(x)}{2}]dx = \frac{7}{2}$ .*

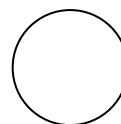
[ 4 marks ]

[4 markah]

Answer/Jawapan :

(a)

(b)

**21**

[Lihat halaman sebelah  
**SULIT**

For  
examiner's  
use only

22. Table 22 shows a cumulative frequency for 20 teams and the score obtained from a game.

*Jadual 22 menunjukkan kekerapan longgokan bagi 20 pasukan dan mata yang diperolehi daripada suatu permainan.*

Score Mata	0	1	2	3	4
Cumulative frequency Kekerapan longgokan	2	5	7	15	20

Table 22  
*Jadual 22*

Find  
*Cari,*

- (a) the value of median,  
*nilai bagi median,*
- (b) variance, for the score.  
*varians, bagi mata yang diperolehi.*

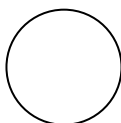
[ 4 marks ]  
[4 markah]

Answer/Jawapan :

(a)

(b)

22



23. A team consists of 5 students are to be chosen from 4 girls and 6 boys.  
*Satu pasukan terdiri daripada 5 orang pelajar hendak dipilih daripada 4 orang pelajar perempuan dan 6 orang pelajar lelaki.*

For  
examiner's  
use only

Find the number of ways the team can be formed if  
*Cari bilangan cara pasukan itu boleh dibentuk jika*

- (a) there is no restriction,  
*tiada syarat dikenakan,*
- (b) a minimum of 3 girls must be chosen.  
*minimum 3 orang pelajar perempuan mesti dipilih.*

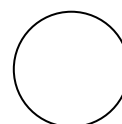
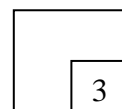
[ 3 marks ]  
 [3 markah]

Answer/Jawapan :

(a)

(b)

23



[Lihat halaman sebelah  
 SULIT

For  
examiner's  
use only

24. In a selection to represent the school for the mathematics competition, the probability that Ramon, Ailing and Suzana is chosen are  $\frac{2}{5}$ ,  $\frac{3}{4}$  and  $\frac{2}{3}$  respectively.

*Dalam satu pemilihan untuk mewakili sekolah bagi suatu pertandingan matematik, kebarangkalian bahawa Ramon, Ailing dan Suzana terpilih adalah  $\frac{2}{5}$ ,  $\frac{3}{4}$  dan  $\frac{2}{3}$  masing-masing.*

Find the probability that

*Cari kebarangkalian bahawa*

- (a) only Suzana is chosen,  
*hanya Suzana yang terpilih,*
- (b) at least one of them is chosen.  
*sekurang-kurangnya seorang daripada mereka terpilih.*

[ 4 marks ]

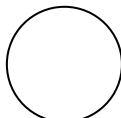
[4 markah]

Answer/Jawapan :

(a)

(b)

24





25. Diagram 25 shows a normal distribution graph.

*Rajah 25 menunjukkan graf taburan normal.*

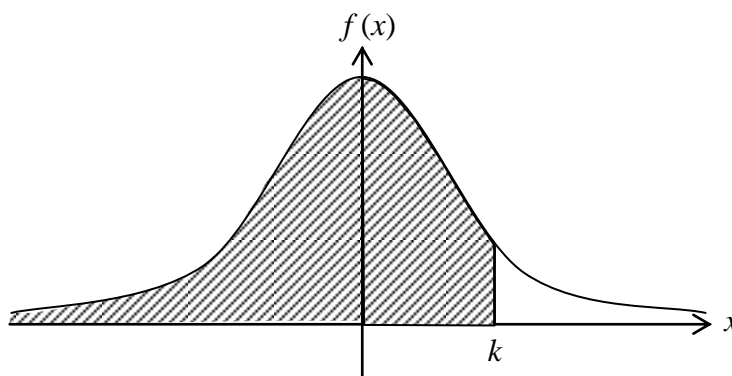


Diagram 25

*Rajah 25*

Given that the area of the shaded region is 0.8259.

*Diberi bahawa luas kawasan berlorek adalah 0.8259.*

- (a) Find the value of  $P(x > k)$ .

*Nilai bagi  $P(x > k)$ .*

- (b)  $X$  is a continuous random variable which is normally distributed with a mean of 45 and a standard deviation of 5 .

*$X$  adalah pembolehubah rawak selanjar yang tertabur secara normal dengan min 45 dan sisihan piawai 5.*

Find the value of  $k$ .

*Cari nilai  $k$ .*

[ 4 marks ]

[4 markah]

Answer/Jawapan :

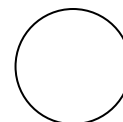
(a)

(b)

END OF QUESTION PAPER  
KERTAS SOALAN TAMAT

For  
examiner's  
use only

25



**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 non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*
11. Hand in this question paper to the invigilator at the end of the examination.  
*Serahkan kertas soalan ini kepada pengawas peperiksaan di akhir peperiksaan.*

**3472/2**  
**Matematik**  
**Tambahan**  
**Kertas 2**  
2 ½ jam  
Ogos 2012



**BAHAGIAN PENGURUSAN**  
**SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN**  
**KEMENTERIAN PELAJARAN MALAYSIA**

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**PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2012**  
**PERCUBAAN SIJIL PELAJARAN MALAYSIA**

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**ADDITIONAL MATHEMATICS**

**Kertas 2**

**Dua jam tiga puluh minit**

---

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *This question paper consists of three sections : **Section A**, **Section B** and **Section C**.*
  2. *Answer **all** questions in **Section A** , **four** questions from **Section B** and **two** questions from **Section C**.*
  3. *Give only **one** answer / solution to each question.*
  4. *Show your working. It may help you to get marks.*
  5. *The diagram in the questions provided are not drawn to scale unless stated.*
  6. *The marks allocated for each question and sub-part of a question are shown in brackets.*
  7. *A list of formulae and normal distribution table is provided on pages 2 to 4.*
  8. *A booklet of four-figure mathematical tables is provided.*
  9. *You may use a non-programmable scientific calculator.*
- 

Kertas soalan ini mengandungi **19** halaman bercetak

**[Lihat Halaman Sebelah**  
**SULIT**

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

## 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

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

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

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

$$4 \quad \text{Area under a curve}$$

$$= \int_a^b y \, dx \quad \text{or}$$

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

$$5 \quad \text{Volume generated}$$

$$= \int_a^b \pi y^2 \, dx \quad \text{or}$$

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

## GEOMETRY

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

$$2 \quad \text{Midpoint}$$

$$(x, y) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad |r| = \sqrt{x^2 + y^2}$$

$$4 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

$$5 \quad \text{A point dividing a segment of a line}$$

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

$$6. \quad \text{Area of triangle} =$$

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

## STATISTIC

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

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

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

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

$$5 \quad M = L + \left[ \frac{\frac{1}{2}N - F}{f_m} \right] C$$

$$6 \quad I = \frac{P_1}{P_0} \times 100$$

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

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

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

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

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

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

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

$$14 \quad z = \frac{x - \mu}{\sigma}$$

## TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

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

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

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

$$5 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

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

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$8 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

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

$$10 \quad \cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$11 \quad \tan (A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

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

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

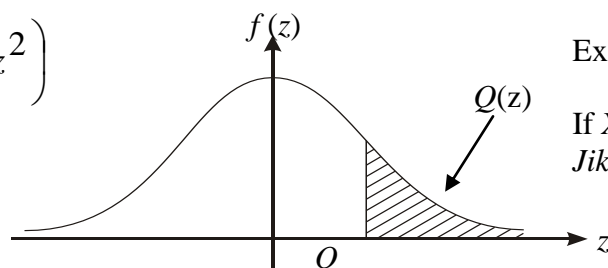
$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

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

$z$	0	1	2	3	4	5	6	7	8	9	Minus / Tolak								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

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

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



Example / Contoh:

If  $X \sim N(0, 1)$ , then  $P(X > k) = Q(k)$

Jika  $X \sim N(0, 1)$ , maka  $P(X > k) = Q(k)$

**Section A**  
**Bahagian A**

[40 marks]

[40 markah]

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

- 1 Solve the following simultaneous equations:

*Selesaikan persamaan serentak berikut:*

$$2x + 3y - 8 = 0$$

$$y^2 + 3xy + 6 = 0$$

Give your answer correct to 3 decimal places.

[5 marks]

*Beri jawapan betul kepada 3 tempat perpuluhan.*

[5 markah]

- 2 Given that  $y = -x^2 + 2x - 3k$  has a maximum value of 4.

*Diberi  $y = -x^2 + 2x - 3k$  mempunyai nilai maksimum 4.*

- (a) By using the method of completing the square, find the value of  $k$ . [3 marks]

*Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai  $k$ .*

[3 markah]

- (b) Hence sketch the graph for  $y = -x^2 + 2x - 3k$ . [3 marks]

*Seterusnya lakarkan graf bagi  $y = -x^2 + 2x - 3k$ . [3 markah]*

3

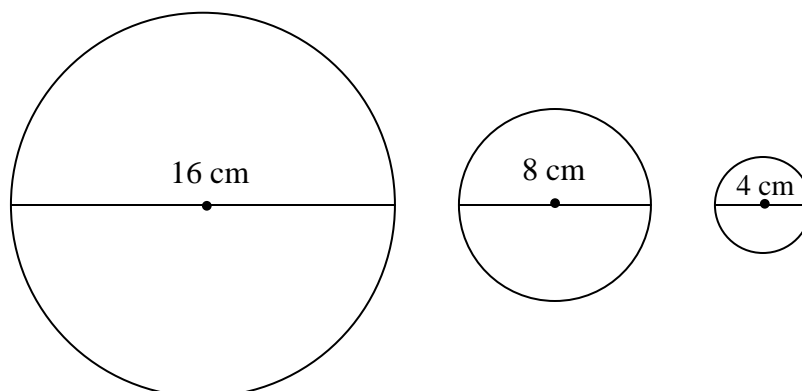


Diagram 3  
Rajah 3

Diagram 3 shows the first three of an infinite series of circles. The first circle has a diameter of 16 cm, the second circle has a diameter of 8 cm, the third circle has a diameter of 4 cm and so on.

*Rajah 3 menunjukkan tiga bulatan daripada satu siri bulatan yang ketakterhinggaan. Bulatan pertama mempunyai diameter 16 cm, bulatan kedua mempunyai diameter 8 cm, bulatan ketiga mempunyai diameter 4 cm dan seterusnya.*

Find,  
Cari,

- (a) the value of  $n$ , if the total length of the circumferences of the first  $n$  circles is more than  $30.5\pi$  cm, [4 marks]

*nilai  $n$ , jika hasil tambah panjang lilitan bulatan bagi  $n$  bulatan pertama adalah melebihi  $30.5\pi$  cm,*

[4 markah]

- (b) the total area, in  $\text{cm}^2$ , of this infinite series of circles. [3 marks]  
*jumlah luas, dalam  $\text{cm}^2$ , bagi siri bulatan yang ketakterhinggaan ini.* [3 markah]



- 4 Solutions to this question by scale drawing will **not** be accepted.  
*Penyelesaian secara lukisan berskala tidak diterima.*

Diagram 4 shows the straight line  $BC$  with equation  $3y + x + 6 = 0$  which is perpendicular to straight line  $AB$  at point  $B$ .

*Rajah 4 menunjukkan garis lurus  $BC$  dengan persamaan  $3y + x + 6 = 0$  yang berserenjang dengan garis lurus  $AB$  pada titik  $B$ .*

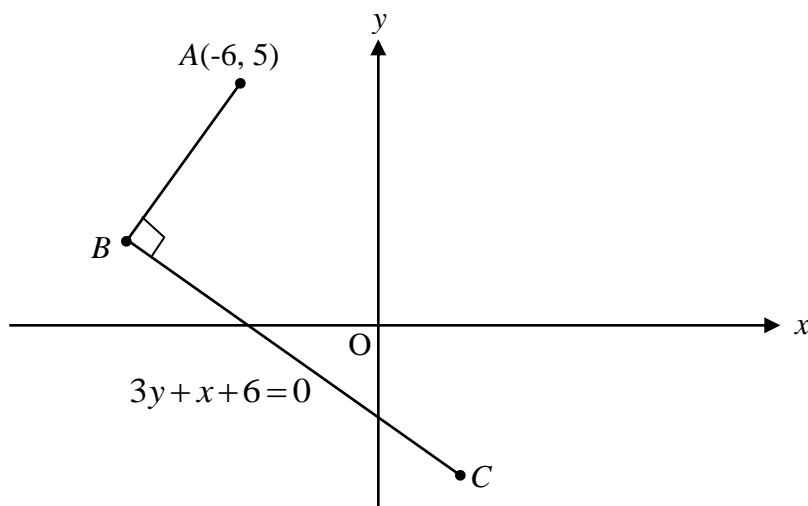


Diagram 4  
Rajah 4

- (a) Find  
*Cari*

- (i) the equation of the straight line  $AB$ ,  
*persamaan garis lurus  $AB$ ,*
- (ii) the coordinates of  $B$ .  
*koordinat titik  $B$ .*

[5 marks]  
[5 markah]

- (b) The straight line  $AB$  is extended to a point  $D$  such that  $AB : BD = 2 : 3$ .  
Find the coordinates of  $D$ .

[2 marks]

*Garis lurus  $AB$  dipanjangkan ke titik  $D$  dimana  $AB : BD = 2 : 3$ .  
Cari koordinat  $D$ .*

[2 markah]

- 5 (a) Sketch the graph of  $y = -3 \sin 2x$  for  $0 \leq x \leq 2\pi$ . [4 marks]

*Lakarkan graf bagi  $y = -3 \sin 2x$  untuk  $0 \leq x \leq 2\pi$ . [4 markah]*

- (b) By using the same axes, sketch a suitable straight line to find the number of solutions for the equation  $3 \sin 2x + \frac{5x}{\pi} = 2$  for  $0 \leq x \leq 2\pi$ .

State the number of solutions.

[3 marks]

*Dengan menggunakan paksi yang sama, lakarkan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan  $3 \sin 2x + \frac{5x}{\pi} = 2$  untuk  $0 \leq x \leq 2\pi$ . Nyatakan bilangan penyelesaian itu.*

[3 markah]

- 6 Table 6 shows the marks obtained by 36 candidates in an examination.  
*Jadual 6 menunjukkan markah yang diperolehi oleh 36 orang calon dalam suatu peperiksaan.*

Marks <i>Markah</i>	Number of candidates <i>Bilangan calon</i>
40 – 49	4
50 – 59	5
60 – 69	6
70 – 79	9
80 – 89	4
90 – 99	8

Table 6  
*Jadual 6*

- (a) Without drawing an ogive, find the third quartile of the marks, [3 marks]  
*Tanpa melukis ogif, cari kuartil ketiga bagi markah itu, [3 markah]*

- (b) Find,  
*Hitung,*

- (i) the mean of the marks,  
*min markah tersebut,*
- (ii) the standard deviation of the marks.  
*sisihan piawai bagi markah tersebut.*

[5 marks]

[5 markah]

[ Lihat halaman sebelah  
**SULIT**

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

[40 marks]

[40 markah]

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

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

- 7 Use graph paper to answer this questions.  
*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 by the equation  $x^2y = 2mx^2 - \frac{n}{m}x$ , where  $m$  and  $n$  are constants.

*Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah  $x$  dan  $y$ , yang diperolehi daripada satu eksperimen. Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan*

*$x^2y = 2mx^2 - \frac{n}{m}x$ , dengan keadaan  $m$  and  $n$  adalah pemalar.*

$x$	10	5	4	2.5	2	1.25
$y$	62	54	50	38	29	4

Table 7

*Jadual 7*

- (a) Plot  $y$  against  $\frac{1}{x}$ , using a scale of 2 cm to 0.1 units on the  $\frac{1}{x}$  - axis and 2 cm to 10 units on the  $y$ -axis. Hence, draw the line of best fit. [4 marks]

*Plot  $y$  melawan  $\frac{1}{x}$ , dengan menggunakan skala 2 cm kepada 0.1 unit pada paksi-  $\frac{1}{x}$  dan 2 cm kepada 10 unit pada paksi- $y$ . Seterusnya, lukis garis lurus penyuaian terbaik.*

[4 markah]

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

- (i)  $m$ ,
- (ii)  $n$ ,
- (iii)  $x$  when  $y = 40$ .  
 *$x$  apabila  $y = 40$ .*

[6 marks]

[6 markah]

[ Lihat halaman sebelah

**SULIT**

- 8 Diagram 8 shows part of the curve  $y = f(x)$  which passes through point  $(-1, 4)$ .  
*Rajah 8 menunjukkan sebahagian dari lengkung  $y = f(x)$  yang melalui titik  $(-1, 4)$ .*

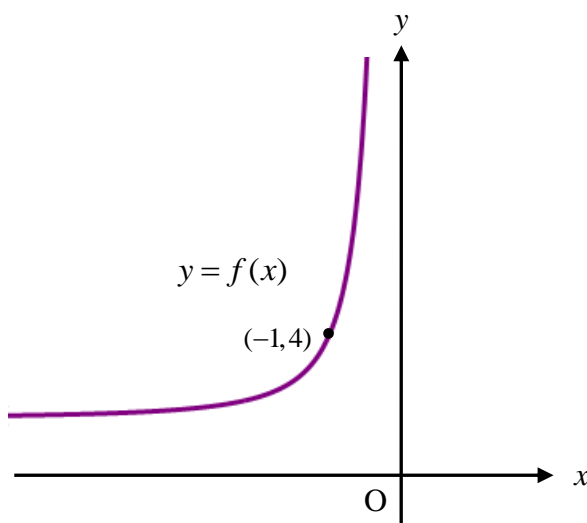


Diagram 8  
*Rajah 8*

The curve has a gradient function of  $-\frac{4}{x^3}$ .

*Lengkung itu mempunyai fungsi kecerunan  $-\frac{4}{x^3}$ .*

- (a) Find the equation of the curve, [3 marks]  
*Cari persamaan lengkung,* [3 markah]
- (b) A region is bounded by the curve, the  $x$ -axis, the line  $x = -5$  and the line  $x = -2$ .  
*Satu kawasan dibatasi oleh lengkung, paksi- $x$ , garis  $x = -5$  dan garis  $x = -2$ .*
- (i) Find the area of the region.  
*Cari luas kawasan yang dibatasi.*
- (ii) The region is revolved through  $360^\circ$  about the  $x$ -axis.  
 Find the volume generated, in terms of  $\pi$ .  
*Kawasan itu dikisarkan melalui  $360^\circ$  pada paksi- $x$ .  
 Cari isipadu yang dijana dalam sebutan  $\pi$ .*

[7 marks]  
 [7 markah]

- 9 Diagram 9 shows quadrilateral  $OABC$ . Point  $D$  lies on straight line  $AC$ .  
*Rajah 9 menunjukkan sisiempat  $OABC$ . Titik  $D$  berada di atas garis lurus  $AC$ .*

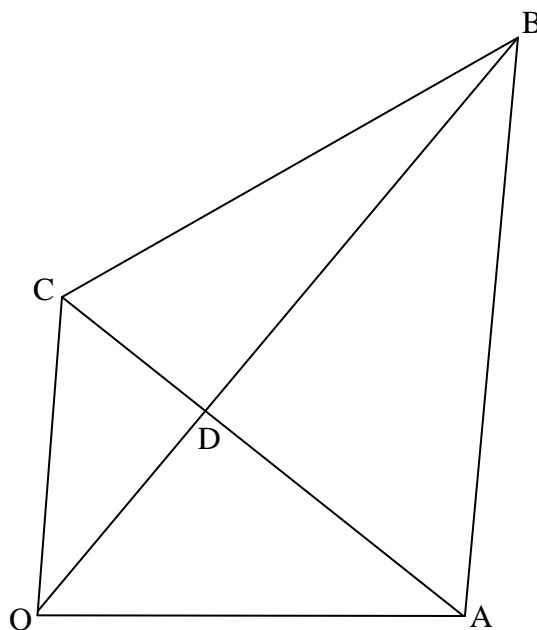


Diagram 9  
*Rajah 9*

- (a) It is given that  $\overrightarrow{OA} = 7\underline{x}$ ,  $\overrightarrow{OC} = 5\underline{y}$ ,  $AD : DC = 3 : 1$  and  $\overrightarrow{OC}$  is parallel to  $\overrightarrow{AB}$ .  
*Diberi bahawa  $\overrightarrow{OA} = 7\underline{x}$ ,  $\overrightarrow{OC} = 5\underline{y}$ ,  $AD : DC = 3 : 1$  dan  $\overrightarrow{OC}$  selari dengan  $\overrightarrow{AB}$ .*

Express in terms of  $\underline{x}$  and/or  $\underline{y}$ .

*Ungkapkan dalam sebutan  $\underline{x}$  dan/atau  $\underline{y}$*

- (i)  $\overrightarrow{AC}$ ,  
 (ii)  $\overrightarrow{OD}$ .

[3 marks]

[3 markah]

- (b) Using  $\overrightarrow{AB} = h\overrightarrow{OC}$  and  $\overrightarrow{DB} = k\overrightarrow{OD}$ , where  $h$  and  $k$  are constants, find the value of  $h$  and of  $k$ .

[5 marks]

*Dengan menggunakan  $\overrightarrow{AB} = h\overrightarrow{OC}$  and  $\overrightarrow{DB} = k\overrightarrow{OD}$ , di mana  $h$  dan  $k$  adalah pemalar, cari nilai  $h$  dan nilai  $k$ .*

[5 markah]

- (c) Given that  $|\underline{y}| = 4$  units and the area of  $OCD$  is  $50 \text{ cm}^2$ , find the perpendicular distance from point  $D$  to  $OC$ .

[2 marks]

*Diberi bahawa  $|\underline{y}| = 4$  unit dan luas  $OCD$  ialah  $50 \text{ cm}^2$ , cari jarak tegak dari titik  $D$  ke  $OC$ .*

[2 marks]

[ Lihat halaman sebelah

SULIT

- 10 (a) In a garden, 30% of the flower are white roses. If 10 flowers are chosen at random, find the probability (correct to four significant figures) that

*Dalam sebuah taman, 30% daripada bunga adalah bunga ros putih. Jika 10 kuntum bunga dipilih secara rawak, cari kebarangkalian (betul sehingga 4 angka beerti) bahawa*

- (i) 6 white roses are selected,  
*6 kuntum bunga ros putih dipilih,*
- (ii) at least 9 white roses are selected.  
*sekurang-kurangnya 9 kuntum bunga ros putih dipilih.*

[5 marks]

[5 markah]

- (b) The ages of the teachers in a school is normally distributed with a mean of 45 years old and a standard deviation of 3.5 years old.  
*Umur guru-guru di sebuah sekolah adalah mengikut taburan normal dengan min 45 tahun dan sisihan piawai 3.5 tahun.*

- (i) If a teacher in the school is chosen at random, find the probability that the teacher has age between 40 and 48 years old.  
*Jika seorang guru di sekolah itu dipilih secara rawak, cari kebarangkalian bahawa guru itu berumur antara 40 dan 48 tahun.*
- (ii) Given that 70% of age of the teachers are more than  $m$  years old. Find the value of  $m$ .  
*Diberi bahawa 70% guru-guru di sekolah itu berumur lebih daripada  $m$  tahun.  
Cari nilai bagi  $m$ .*

[5 marks]

[5 markah]

- 11 Diagram 11 shows a circle  $RST$  with centre  $O$  and radius 7 cm.  $PR$  is a tangent to the circle at point  $R$  and  $PRQ$  is a quadrant of a circle with centre  $R$ .  $R$  is the midpoint of  $OQ$  and  $RS$  is a chord.  $ORQ$  and  $POS$  are straight lines.

*Rajah 11 menunjukkan satu bulatan  $RST$  yang berpusat  $O$  dan berjari 7 cm.  $PR$  adalah garis tangen kepada bulatan pada titik  $R$  dan  $PRQ$  adalah sukuan bagi bulatan berpusat  $R$ .  $R$  adalah titik tengah bagi  $OQ$  dan  $RS$  adalah garis perentas.  $ORQ$  dan  $POS$  adalah garis lurus.*

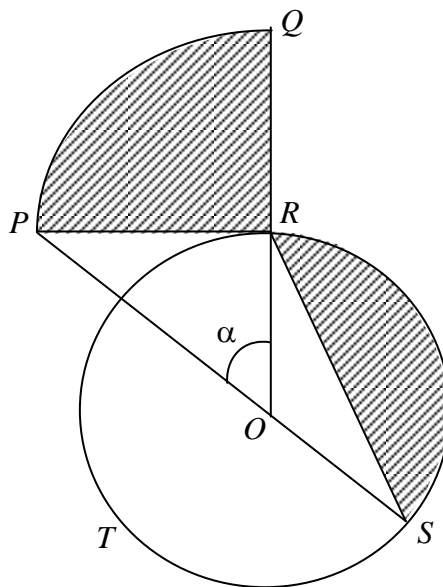


Diagram 11  
Rajah 11

Calculate,  
*Hitung,*

[Use / Guna  $\pi = 3.142$ ]

- |     |   |                         |
|-----|---|-------------------------|
| (a) | the angle $\alpha$ , in radians,<br><i>sudut <math>\alpha</math>, dalam radian,</i>                                       | [2 marks]<br>[2 markah] |
| (b) | the perimeter, in cm, of the shaded region,<br><i>perimeter, dalam cm, bagi kawasan berlorek,</i>                         | [4 marks]<br>[4 markah] |
| (c) | the area, in $\text{cm}^2$ , of the shaded region,<br><i>luas, dalam <math>\text{cm}^2</math>, bagi kawasan berlorek.</i> | [4 marks]<br>[4 markah] |

**Section C**  
**Bahagian C**

[20 marks]

[20 markah]

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

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

- 12 A particle moves along a straight line and passes a fixed point  $O$ , with a velocity of  $30 \text{ ms}^{-1}$ . Its acceleration,  $a \text{ ms}^{-2}$ , is given by  $a = 10 - 5t$ , where  $t$  is the time, in second, after passing through  $O$ .

*Satu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap  $O$  dengan halaju  $30 \text{ ms}^{-1}$ . Pecutannya,  $a \text{ ms}^{-2}$ , diberi oleh  $a = 10 - 5t$ , dengan keadaan  $t$  ialah masa, dalam saat, selepas melalui  $O$ .*

Find,

*Cari,*

- (a) the constant velocity, in  $\text{ms}^{-1}$ , of the particle, [4 marks]  
*halaju tetap, dalam  $\text{ms}^{-1}$ , zarah itu, [4 markah]*
- (b) the range of values of  $t$ , when the particle moves to the right, [3 marks]  
*julat nilai  $t$ , apabila zarah itu bergerak ke kanan, [3 markah]*
- (c) the total distance, in m, travelled by the particle in the first 8 seconds. [3 marks]  
*jumlah jarak, dalam m, yang dilalui oleh zarah itu dalam 8 saat pertama. [3 markah]*



- 13 Table 13 shows the price indices in the year 2011 based on the year 2010, of four different materials  $P$ ,  $Q$ ,  $R$  and  $S$  in the production of a type of a body lotion.

*Jadual 13 menunjukkan indeks harga pada tahun 2011 berdasarkan harga pada tahun 2010 bagi empat bahan berlainan  $P$ ,  $Q$ ,  $R$  dan  $S$  yang digunakan dalam pengeluaran suatu jenis losyen badan.*

Material <i>Bahan</i>	Price Index 2011 <i>Indeks Harga 2011</i> (2010 = 100)	Weightage <i>Pemberat</i>
$P$	110	$h$
$Q$	125	4
$R$	140	$h + 3$
$S$	88	5

Table 13 / *Jadual 13*

- (a) If the price of material  $Q$  is RM55 in the year 2011, calculate its price in the year 2010. [2 marks]

*Jika harga bahan  $Q$  ialah RM55 pada tahun 2011, hitung harganya pada tahun 2010.* [2 markah]

- (b) If the composite index for the year 2011 based on the year 2010 is 115, find the value of  $h$ . [2 marks]

*Jika indeks komposit pada tahun 2011 berdasarkan tahun 2010 ialah 115, cari nilai  $h$ .* [2 markah]

- (c) Find the price of the body lotion in the year 2011 if its price in the year 2010 was RM 20.00. [2 marks]

*Cari harga losyen badan pada tahun 2011 jika harganya pada tahun 2010 ialah RM20.00.* [2 markah]

- (d) Given that the price of material  $S$  increases by 25 % from the year 2011 to the year 2012, while the others remain unchanged. Calculate the composite index of the body lotion in the year 2012 based on the year 2010. [4 marks]

*Diberi bahawa harga bahan  $S$  meningkat 25 % dari tahun 2011 ke tahun 2012, manakala bahan-bahan lain tidak berubah. Hitung indeks komposit losyen badan pada tahun 2012 berdasarkan tahun 2010.* [4 markah]

- 14 Use the graph paper provided to answer this question.

*Gunakan kertas graf untuk menjawab soalan ini.*

A prestige college offers two courses, A and B. The enrolment of students is based on the following constraints :

*Sebuah kolej ternama menawarkan dua kursus, A dan B. Kemasukan pelajar adalah berdasarkan kekangan berikut :*

- I The capacity of the college is 170 students.

*Kapasiti kolej adalah 170 orang pelajar.*

- II The minimum total number of students enrolled is 80.

*Jumlah minimum pengambilan pelajar adalah 80 orang.*

- III The number of students enrolled for course B exceeds twice the number of students enrolled for course A by at least 20 students.

*Bilangan pelajar yang diambil untuk kursus B adalah melebihi dua kali bilangan pelajar yang diambil untuk kursus A sekurang-kurangnya 20 orang.*

Given that there are  $x$  students enrolled for course A and  $y$  students enrolled for course B,

*Diberi bahawa  $x$  pelajar mendaftar untuk kursus A dan  $y$  pelajar mendaftar untuk kursus B.*

- (a) Write three inequalities, other than  $x \geq 0$  and  $y \geq 0$ , that satisfy all the above constraints. [3 marks]

*Tulis tiga ketaksamaan, selain daripada  $x \geq 0$  dan  $y \geq 0$ , yang memenuhi semua kekangan di atas.* [3 markah]

- (b) Using a scale of 2 cm to 10 students on the x-axis and 2 cm to 20 students on the y-axis, construct and shade the region R which satisfies all the above constraints. [3 marks]

*Menggunakan skala 2 cm kepada 10 pelajar pada paksi-x dan 2 cm kepada 20 pelajar pada paksi-y, bina dan lorek rantau R yang memuaskan semua kekangan di atas.* [3 markah]

- (c) Using the graph constructed in 14(b), find,  
*Dengan menggunakan graf yang dibina di 14(b), cari*

- (i) the maximum amount of fees collected per month if the monthly fees for course A is RM 100 and for course B is RM 80. [3 marks]

*jumlah maksimum kutipan yuran sebulan jika kutipan yuran bulanan bagi seorang pelajar kursus A ialah RM100 dan bagi seorang pelajar B ialah RM80.* [3 markah]

- (ii) the range of the number of students enrolled for course B if the number of students enrolled for course A is 30. [1 mark]

*julat bilangan pelajar yang mendaftar untuk kursus B jika bilangan pelajar yang mendaftar untuk kursus A ialah 30.* [1 markah]

- 15 Diagram 15 shows a quadrilateral  $ABCD$  where the sides  $AB$  and  $DC$  are parallel.  
 $\angle BAC$  is an obtuse angle.

*Rajah 15 menunjukkan sebuah sisiempat  $ABCD$  dengan keadaan sisi  $AB$  dan sisi  $DC$  adalah selari.  $\angle BAC$  ialah sudut cakak.*

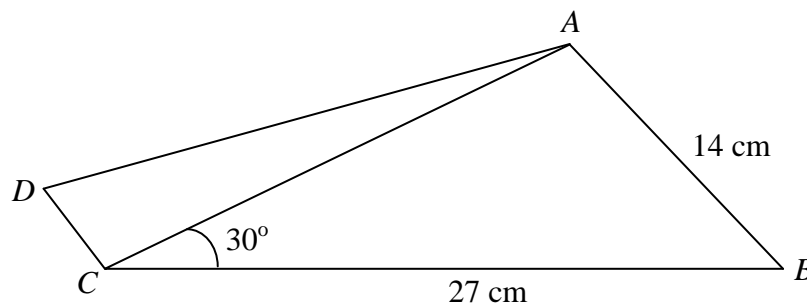


Diagram 15  
*Rajah 15*

Given that  $AB = 14$  cm,  $BC = 27$  cm,  $\angle ACB = 30^\circ$  and  $DC : AB = 3 : 7$ .

*Diberi bahawa  $AB = 14$  cm,  $BC = 27$  cm,  $\angle ACB = 30^\circ$  dan  $DC : AB = 3 : 7$ .*

Calculate

Hitung

- |  |                           |
|--|---------------------------|
| (a) $\angle BAC$ ,   | [3 marks]<br>[3 markah]   |
| (b) the length, in cm, of diagonal $BD$ ,<br><i>panjang, dalam cm, bagi perpenjuru <math>BD</math>,</i>                                      | [ 3 marks ]<br>[3 markah] |
| (c) the area, in $\text{cm}^2$ , of quadrilateral $ABCD$ .<br><i>luas, dalam <math>\text{cm}^2</math>, bagi sisiempat <math>ABCD</math>.</i> | [4 marks]<br>[ 4 markah]  |

END OF QUESTION PAPER  
 KERTAS SOALAN TAMAT

**INFORMATION FOR CANDIDATES**  
**MAKLUMAT UNTUK CALON**

- 1 This question paper consists of three sections : **Section A**, **Section B** and **Section C**.  
*Kertas soalan ini mengandungi tiga bahagian Bahagian A, Bahagian B dan Bahagian C*
- 2 Answer **all** questions in **Section A**, **four** questions from **Section B** and **two** questions from **Section C**.  
*Jawab semua soalan dalam **Bahagian A**, mana-mana **empat** soalan daripada **Bahagian B** dan mana-mana **dua** soalan daripada **Bahagian C***
- 3 Write your answer on the ‘buku jawapan’ provided. If the buku jawapan is insufficient, you may ask for ‘helaian tambahan’ from the invigilator.  
*Jawapan anda hendaklah ditulis di dalam buku jawapan yang disediakan. Sekiranya buku jawapan tidak mencukupi, sila dapatkan helaian tambahan daripada pengawas peperiksaan.*
- 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 The diagrams in the questions provided are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
- 6 The marks allocated for each question and sub-part of a question are shown in brackets.  
*Markah yang diperuntukan bagi setiap soalan dan cerian soalan are shown in brackets.*
- 7 A list of formulae is provided on pages 2 and 3.  
*Satu senarai rumus disediakan di halaman 3 hingga 5*
8. Graph paper and booklet of four – figure mathematical tables is provided.  
*Kertas graf dan sebuah buku sifir matematik empat angka disediakan.*
9. You may use a non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator scientific calculator yang tidak boleh diprogramkan.*
10. Tie the ‘helaian tambahan’ and the graph papers together with the ‘buku jawapan’ and hand in to the invigilator at the end of the examination.  
*Ikat helaian tambahan dan kertas graf bersama-sama dengan buku jawapan dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

NO.KAD PENGENALAN

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ANGKA GILIRAN

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Arahan Kepada Calon

- 1 Tulis nombor kad pengenalan dan angka giliran anda pada petak yang disediakan.
- 2 Tandakan ( / ) untuk soalan yang dijawab.
- 3 Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan buku jawapan.

Kod Pemeriksa				
Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh ( Untuk Kegunaan Pemeriksa)
A	1		5	
	2		6	
	3		7	
	4		7	
	5		7	
	6		8	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
JUMLAH				