

**SULIT**

**PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM**

**TAHUN 2011**

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**MATA PELAJARAN**

**MATEMATIK TAMBAHAN 1**

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

Name : .....

Form : .....

**PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2011  
ADDITIONAL MATHEMATICS**

Kertas 1

Ogos 2011

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	4	
4	3	
5	3	
6	3	
7	3	
8	3	
9	2	
10	3	
11	3	
12	3	
13	3	
14	4	
15	2	
16	3	
17	4	
18	4	
19	3	
20	4	
21	4	
22	3	
23	3	
24	4	
25	4	
<b>TOTAL</b>	<b>80</b>	

Kertas soalan ini mengandungi 20 halaman bercetak

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

**ALGEBRA**

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

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

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

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

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

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

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

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

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

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

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

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

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

**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

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

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

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

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

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

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**3472/1****STATISTICS**

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

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

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

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

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

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

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

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

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

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

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

12 Mean  $\mu = np$

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

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

**TRIGONOMETRY**

1 Arc length,  $s = r\theta$

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

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

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

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

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

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

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

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

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

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

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

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

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

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use only

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Answer all questions.  
Jawab semua soalan.

- 1 Diagram 1 shows the relation between set  $A$  and set  $B$ .  
Rajah 1 menunjukkan hubungan antara set  $A$  dan set  $B$ .

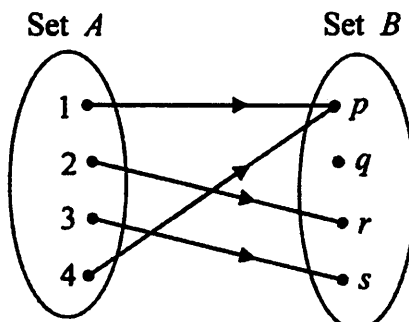


Diagram 1

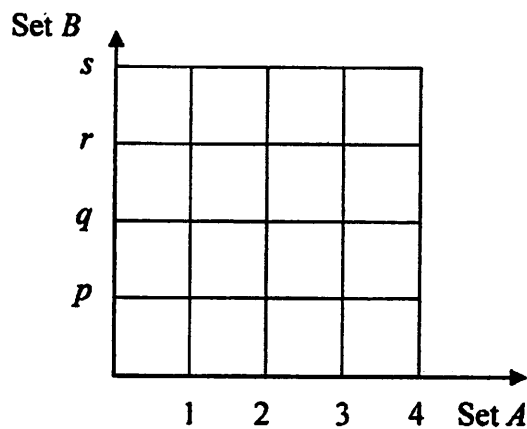
Rajah 1

- (a) Plot the relation in the graph form,  
*Plotkan hubungan itu dalam bentuk graf.*
- (b) State the type of the relation .  
*Nyatakan jenis hubungan itu .*

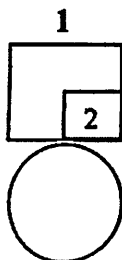
[2 marks]  
[2 markah]

Answer/Jawapan:

- (a)



- (b)



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- 2 Given the function  $h:x \rightarrow |3x-5|$ .  
Diberi fungsi  $h:x \rightarrow |3x-5|$ .

Find  
Cari

- (a) the image of  $-2$ ,  
imej bagi  $-2$ ,
- (b) the values of  $x$  such that  $h(x)=4$ .  
nilai-nilai  $x$  dengan keadaan  $h(x)=4$ .

[3 marks]  
[3 markah]

Answer/Jawapan:

(a)

(b)

2

3

- 3 Given the function  $h(x)=2+3x$  and  $k(x)=px-15$ , find  
Diberi fungsi  $h(x)=2+3x$  dan  $k(x)=px-15$ , cari

- (a)  $h^{-1}(7)$ ,
- (b) the value of  $p$  such that  $kh(4)=13$ .  
nilai bagi  $p$  dengan keadaan  $kh(4)=13$ .

[4 marks]  
[4 markah]

Answer/Jawapan:

(a)

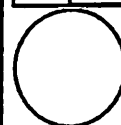
(b)

3

4

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- 4 Diagram 4 shows the graph of the function  $f(x) = 2(x - p)^2 - 5$ .

Rajah 4 menunjukkan graf bagi fungsi  $f(x) = 2(x - p)^2 - 5$ .

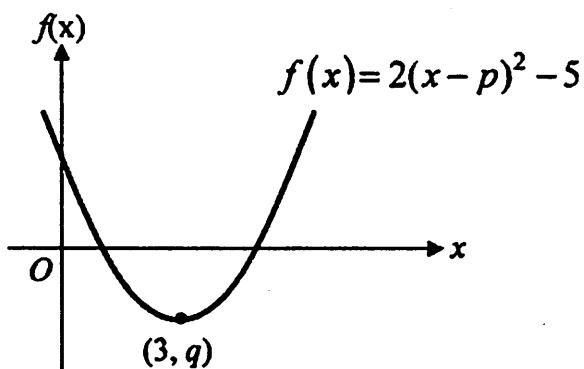


Diagram 4  
Rajah 4

The curve has the minimum point  $(3, q)$ .

Lengkung tersebut mempunyai titik minimum  $(3, q)$ .

State

Nyatakan

- the value of  $p$ ,  
nilai bagi  $p$ ,
- the value of  $q$ ,  
nilai bagi  $q$ ,
- the equation of the axis of symmetry.  
persamaan bagi paksi simetri.

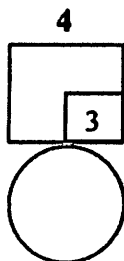
[3 marks]  
[3 markah]

Answer/Jawapan:

(a)

(b)

(c)



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use only

- 5 Given that  $\alpha$  and  $\beta$  are the roots of the quadratic equation  $2x^2 + 5x + k = 0$ , where  $k$  is a constant.

Diberi  $\alpha$  dan  $\beta$  adalah punca-punca bagi persamaan kuadratik  $2x^2 + 5x + k = 0$ , dengan keadaan  $k$  ialah pemalar.

Find

Cari

- (a) the value of  $\alpha + \beta$ ,  
nilai bagi  $\alpha + \beta$ ,
- (b) the value of  $k$  such that  $\alpha\beta = 3$ .  
nilai bagi  $k$  dengan keadaan  $\alpha\beta = 3$ .

[3 marks]  
[3 markah]

Answer/Jawapan:

(a)

(b)

5

3

- 6 Find the range of values of  $x$  for which  $4x^2 \geq 3 - 4x$ .

[3 marks]

Cari julat nilai-nilai  $x$  bagi  $4x^2 \geq 3 - 4x$ .

[3 markah]

Answer/Jawapan:

6

3



**SULIT**

8

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examiner's  
use only*

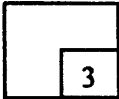
- 7 Solve the equation :  
*Selesaikan persamaan :*

$$2^x = 5(2^{x+1}) - 144$$

[3 marks]  
[3 markah]

*Answer/Jawapan:*

7



- 8 Solve the equation  $\log_5 x = 1 + \log_5(x - 4)$  .

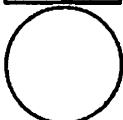
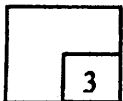
[3 marks]

*Selesaikan persamaan*  $\log_5 x = 1 + \log_5(x - 4)$  .

[3 markah]

*Answer/Jawapan:*

8



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**SULIT**

9

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- 9 The  $n^{\text{th}}$  term of an arithmetic progression is given by  $T_n = 11 - 3n$ . Find the common difference of the progression.

*Diberi sebutan ke- $n$  bagi suatu jangjang aritmetik ialah  $T_n = 11 - 3n$ . Cari beza sepunya bagi jangjang ini.*

[2 marks]  
[2 markah]

Answer/Jawapan:

9

2

- 10 Given that 12, 6, 3, ... is a geometric progression, find the sum of the first 7 terms after the 3<sup>rd</sup> term of the progression.

*Diberi 12, 6, 3, ... ialah suatu jangjang geometri, cari hasil tambah 7 sebutan pertama selepas sebutan ke-3.*

[3 marks]  
[3 markah]

Answer/Jawapan:

10

3



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10

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11 Given  $0.471 + 0.000471 + 0.000000471 + \dots = \frac{P}{333}$ . Find the value of  $p$ .

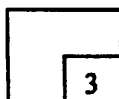
Diberi  $0.471 + 0.000471 + 0.000000471 + \dots = \frac{P}{333}$ . Cari nilai bagi  $p$ .

[3 marks]

[3 markah]

Answer/Jawapan:

11



12 Diagram 12 shows the straight line graph obtained by plotting  $\log_{10} y$  against  $\log_{10} x$ .  
Rajah 12 menunjukkan graf garis lurus yang diperolehi dengan memplot  $\log_{10} y$  melawan  $\log_{10} x$ .

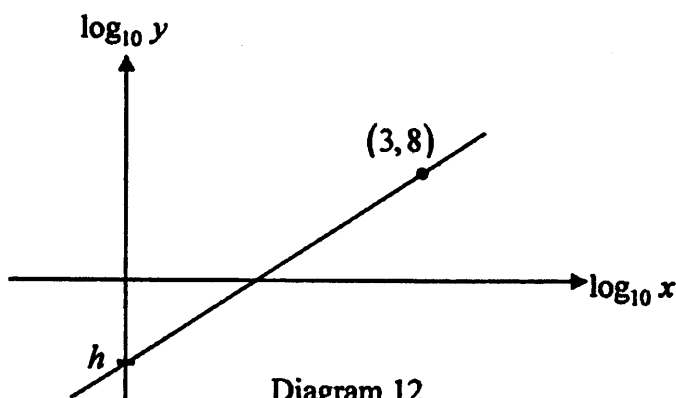


Diagram 12  
Rajah 12

The variables  $x$  and  $y$  are related by the equation  $y = \frac{x^k}{10}$  where  $k$  is a constant. Find the value of  $h$  and of  $k$ .

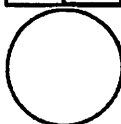
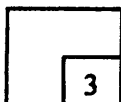
Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = \frac{x^k}{10}$ , dengan keadaan  $k$  ialah pemalar. Cari nilai  $h$  dan nilai  $k$ .

[3 marks]

[3 markah]

Answer/Jawapan:

12



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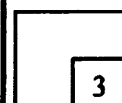
- 13 Find the equation of a straight line that passes through the point (5, 3) and perpendicular to the straight line  $2y - 4x = 7$ .

*Cari suatu persamaan garis lurus yang melalui titik (5, 3) dan berserenjang dengan garis lurus  $2y - 4x = 7$ .*

[3 marks]  
[3 markah]

*Answer/Jawapan:*

13



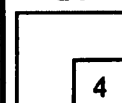
- 14 Given points  $A(k, 3k)$ ,  $B(-2, 1)$  and  $C(3, 2)$ . Find the values of  $k$  if the area of the triangle  $ABC$  is  $10.5 \text{ unit}^2$ .

*Diberi titik  $A(k, 3k)$ ,  $B(-2, 1)$  dan  $C(3, 2)$ . Cari nilai-nilai bagi  $k$  jika luas segi tiga  $ABC$  ialah  $10.5 \text{ unit}^2$ .*

[4 marks]  
[4 markah]

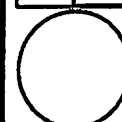
*Answer/Jawapan:*

14



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15 Diagram 15 shows two vectors,  $\overline{OA}$  and  $\overline{OB}$ .

Rajah 15 menunjukkan dua vektor,  $\overline{OA}$  dan  $\overline{OB}$ .

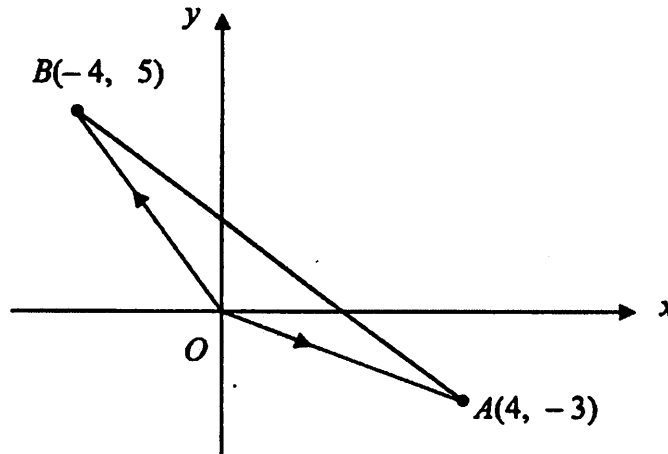


Diagram 15  
Rajah 15

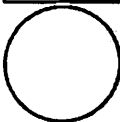
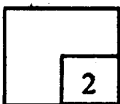
Express  $\overline{BA}$  in the form  $x\underline{i} + y\underline{j}$ .

Ungkapkan  $\overline{BA}$  dalam bentuk  $x\underline{i} + y\underline{j}$ .

[2 marks]  
[2 markah]

Answer/Jawapan:

15



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**SULIT**

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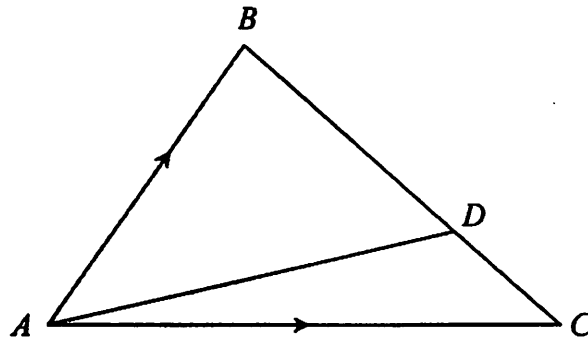


Diagram 16  
Rajah 16

Diagram 16 shows a triangle  $ABC$  and  $D$  is a point on  $BC$ . Given  $\overline{AB} = 3\mathbf{i} + 7\mathbf{j}$ ,  $\overline{AC} = 11\mathbf{i} + 3\mathbf{j}$  and  $BD = 3DC$ , find  $\overline{AD}$ .

Rajah 16 menunjukkan segi tiga  $ABC$  dan  $D$  ialah satu titik pada  $BC$ . Diberi  $\overline{AB} = 3\mathbf{i} + 7\mathbf{j}$ ,  $\overline{AC} = 11\mathbf{i} + 3\mathbf{j}$  dan  $BD = 3DC$ , cari  $\overline{AD}$ .

[3 marks]  
[3 markah]

Answer/Jawapan:

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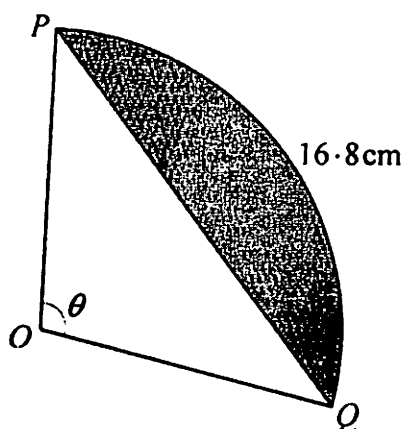


Diagram 17  
Rajah 17

Diagram 17 shows a sector  $OPQ$  of a circle with centre  $O$  and radius of  $7$  cm. Given the length of the arc  $PQ$  is  $16.8$  cm.

Rajah 17 menunjukkan sektor  $OPQ$  bagi sebuah bulatan berpusat  $O$  dan jejari  $7$  cm. Diberi panjang lengkok  $PQ$  ialah  $16.8$  cm.

Find  
Cari

- (a) the value of  $\theta$  in radians,  
nilai bagi  $\theta$  dalam radian,
- (b) the area, in  $\text{cm}^2$ , of the shaded region.  
luas, dalam  $\text{cm}^2$ , kawasan berlorek.

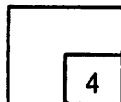
[4 marks]  
[4 markah]

Answer/Jawapan:

(a)

(b)

17



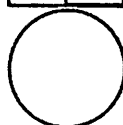
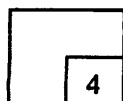
18 Solve the equation  $3\sin 2x = 2\cos x$  for  $0^\circ \leq x \leq 360^\circ$ .

Selesaikan persamaan  $3\sin 2x = 2\cos x$  bagi  $0^\circ \leq x \leq 360^\circ$ .

[4 marks]  
[4 markah]

Answer/Jawapan:

18



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19 Given  $\int_1^3 f(x)dx = 5$  and  $\int_3^1 g(x)dx = 2$ . Find the value of  $\int_1^3 [2f(x) - g(x)]dx$ .

Diberi  $\int_1^3 f(x)dx = 5$  dan  $\int_3^1 g(x)dx = 2$ . Cari nilai  $\int_1^3 [2f(x) - g(x)]dx$ .

[3 marks]

[3 markah]

Answer/Jawapan:

19

3

20 It is given that  $y = \frac{2x+1}{x-3}$ ,  $x \neq 3$ .

Diberi bahawa  $y = \frac{2x+1}{x-3}$ ,  $x \neq 3$ .

Find  
Cari

(a) the value of  $\frac{dy}{dx}$  when  $x = 4$ ,

nilai bagi  $\frac{dy}{dx}$  apabila  $x = 4$ ,

(b) the approximate change in  $y$  when  $x$  increases from 4 to 4.01.  
perubahan kecil bagi  $y$  apabila  $x$  bertambah dari 4 kepada 4.01.

[4 marks]

[4 markah]

Answer/Jawapan:

(a)

(b)

20

4

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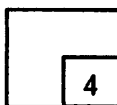
- 21 Point  $A$  lies on the curve  $y = 2x^4 - x$ , find the coordinates of point  $A$  where the gradient of the normal at point  $A$  is  $-\frac{1}{7}$ .

*Titik  $A$  terletak pada lengkung  $y = 2x^4 - x$ , cari koordinat bagi titik  $A$  dengan keadaan kecerunan normal pada titik  $A$  ialah  $-\frac{1}{7}$ .*

[4 marks]  
[4 markah]

Answer/Jawapan:

21



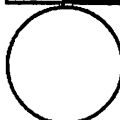
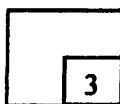
- 22 The standard deviation of a set of six numbers is  $\sqrt{15}$ . Given that the sum of square for the set of numbers is 144. Find the new mean when a number 10 is added to this set.

*Sisihan piawai bagi satu set yang terdiri daripada enam nombor ialah  $\sqrt{15}$ . Diberi bahawa hasil tambah kuasa dua bagi nombor-nombor tersebut ialah 144. Cari min baru apabila satu nombor 10 ditambah kepada set ini.*

[3 marks]  
[3 markah]

Answer/Jawapan:

22



3472/1

**SULIT**

**SULIT**

17

3472/1

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examiner's  
use only

- 23 Diagram 23 shows 3 letters and 4 digits.  
*Rajah 23 menunjukkan 3 huruf dan 4 angka.*

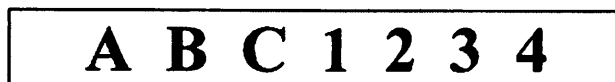


Diagram 23  
*Rajah 23*

A code is to be formed using those letters and digits. The code must consist of 2 letters followed by 3 digits. How many codes can be formed if no letter or digit is repeated in each code?

*Satu kod dibentuk menggunakan huruf-huruf dan angka-angka berkenaan. Kod ini mesti menggunakan 2 huruf dan diikuti dengan 3 angka. Berapa kod yang boleh dibentuk dengan tiada huruf dan angka yang berulang?*

[3 marks]  
[3 markah]

Answer/Jawapan:

23

3

- 24 In an athletic championship, the probability that an athlete is being chosen to take part in the 100 m event is  $\frac{3}{7}$  and in the 800 m event is  $\frac{2}{5}$ .

*Dalam satu kejohanan olahraga, kebarangkalian bahawa seorang peserta dipilih untuk mengambil bahagian dalam acara 100 m ialah  $\frac{3}{7}$  dan acara 800 m ialah  $\frac{2}{5}$ .*

Find the probability that the athlete will be chosen to take part in

*Cari kebarangkalian peserta itu dipilih untuk mengambil bahagian dalam*

- (a) both the events,  
*kedua-dua acara,*
- (b) at least one event.  
*sekurang-kurangnya satu acara.*

[4 marks]  
[4 markah]

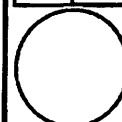
Answer/Jawapan:

(a)

(b)

24

4



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use only

**SULIT**

18

3472/1

- 25 The random variable  $X$  is normally distributed with a mean of 62 and a standard deviation of 3.

*Pembolehubah rawak  $X$  bertaburan normal dengan min 62 dan sisihan piawai 3.*

Find the value of

*Cari nilai bagi*

(a)  $P(X > 65)$ ,

(b)  $k$  if  $P(X > k) = 0.6915$ .

*k jika  $P(X > k) = 0.6915$ .*

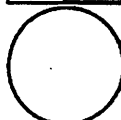
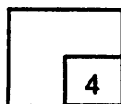
[4 marks]  
[4 markah]

Answer/Jawapan:

(a)

(b)

25



END OF QUESTION PAPER  
KERTAS SOALAN TAMAT

3472/1

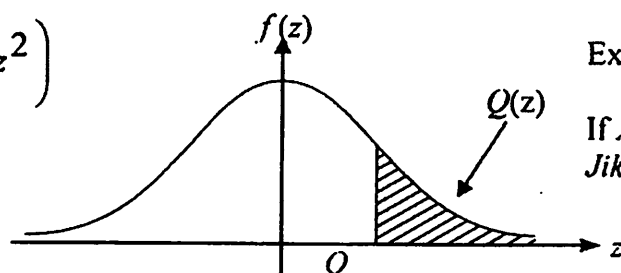
**SULIT**

**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										Minus / Tolak									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
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  $P(X > k) = Q(k)$

**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 2 and 3.  
*Satu senarai rumus disediakan di halaman 2 dan 3.*
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.*