

**SULIT**  
**3472/1**  
**Matematik**  
**Tambahan**  
**Kertas 1**  
**September**  
**2010**

3472/1



**MAKTAB RENDAH SAINS MARA**

**PEPERIKSAAN PERCUBAAN**  
**SIJIL PELAJARAN MALAYSIA 2010**

2 jam

**MATEMATIK TAMBAHAN**

Kertas 1  
Dua jam

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

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Kertas soalan ini mengandungi 20 halaman bercetak dan 1 halaman tidak bercetak.

**[Lihat halaman sebelah**

**3472/1**

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**SULIT**

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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

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

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

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

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

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

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

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

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

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

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

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

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

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

## CALCULUS / KALKULUS

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

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

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

4 Area under a curve

*Luas di bawah lengkung*

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

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

5 Volume generated

*Isi padu janaan*

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

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

## STATISTICS / STATISTIK

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## GEOMETRY / GEOMETRI

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

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

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

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

$$4 \quad \text{Area of triangle / Luas segitiga} \\ = \frac{1}{2} | (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) |$$

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

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

## TRIGONOMETRY / TRIGONOMETRI

- |   |  |    |  |
|---|--|----|--|
| 1 | Arc length, $s = r\theta$<br><i>Panjang lengkok, <math>s = j\theta</math></i>  | 8  | $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$<br><br>$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ |
| 2 | Area of sector, $A = \frac{1}{2}r^2\theta$<br><br><i>Luas sektor, <math>L = \frac{1}{2}j^2\theta</math></i>  | 9  | $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$<br><br>$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ |
| 3 | $\sin^2 A + \cos^2 A = 1$<br><br>$\sin^2 A + \cos^2 A = 1$   | 10 | $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$  |
| 4 | $\sec^2 A = 1 + \tan^2 A$<br><br>$\sec^2 A = 1 + \tan^2 A$   | 11 | $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$  |
| 5 | $\operatorname{cosec}^2 A = 1 + \cot^2 A$<br><br>$\operatorname{kosek}^2 A = 1 + \cot^2 A$   | 12 | $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$   |
| 6 | $\sin 2A = 2 \sin A \cos A$<br><br>$\sin 2A = 2 \sin A \cos A$   | 13 | $a^2 = b^2 + c^2 - 2bc \cos A$<br><br>$a^2 = b^2 + c^2 - 2bc \cos A$                                       |
| 7 | $\cos 2A = \cos^2 A - \sin^2 A$<br>$= 2 \cos^2 A - 1$<br>$= 1 - 2 \sin^2 A$<br><br>$\cos 2A = \cos^2 A - \sin^2 A$<br>$= 2 \cos^2 A - 1$<br>$= 1 - 2 \sin^2 A$ | 14 | Area of triangle / <i>Luas segitiga</i><br>$= \frac{1}{2}ab \sin C$  |

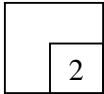
For  
Examiner's  
Use

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

- 1 Function  $f$  is defined as  $f: x \rightarrow 3x^2 + x - 1$  with domain  $x = \{-2, 0, 3\}$ . Find the range of  $f$  corresponding to the given domain. [2 marks]

*Fungsi  $f$  ditakrifkan sebagai  $f: x \rightarrow 3x^2 + x - 1$  dengan domain  $x = \{-2, 0, 3\}$ . Cari julat bagi  $f$  sepadan dengan domain yang diberi.* [2 markah]

1



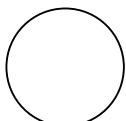
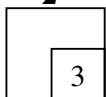
Answer / Jawapan: .....

- 2 Given that  $g(x) = |2x - 5|$ , find  
Diberi bahawa  $g(x) = |2x - 5|$ , cari

(a)  $g(-1)$ ,

(b) the values of  $x$  such that  $g(x) = x$ . [3 marks]  
*nilai-nilai  $x$  dengan keadaan  $g(x) = x$ .* [3 markah]

2



Answer / Jawapan: (a)  $g(-1) =$ .....

(b)  $x =$  .....

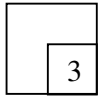
- 3 Given that  $f(x) = x + h$ ,  $g(x) = x^2 + 1$  and  $gf(x) = x^2 + 4x + k$ , find the value of  $h$  and of  $k$ . [3 marks]

*Diberi bahawa  $f(x) = x + h$ ,  $g(x) = x^2 + 1$  dan  $gf(x) = x^2 + 4x + k$ , cari nilai  $h$  dan nilai  $k$ .* [3 markah]

Answer / Jawapan:  $h = \dots\dots\dots$

$k = \dots\dots\dots$

3

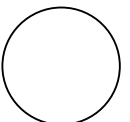
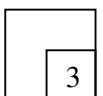


- 4 One of the roots of the equation  $x^2 + px + 18 = 0$  is half the other root. Find the possible values of  $p$ . [3 marks]

*Satu daripada punca-punca persamaan  $x^2 + px + 18 = 0$  adalah separuh daripada punca yang satu lagi. Cari nilai-nilai yang mungkin bagi  $p$ .* [3 markah]

Answer / Jawapan :  $p = \dots\dots\dots$

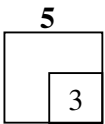
4



For  
Examiner's  
Use

- 5 Given that the line  $y = 2 - px$ , where  $p$  is a constant, does not intersect the curve  $xy = 2$ , find the range of values of  $p$ . [3 marks]

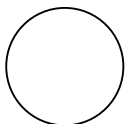
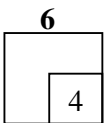
*Diberi bahawa garis lurus  $y = 2 - px$ , dengan keadaan  $p$  ialah pemalar, tidak bersilang dengan lengkung  $xy = 2$ , cari julat nilai-nilai  $p$ . [3 markah]*



Answer / Jawapan : .....

- 6 Find the range of values of  $x$  that satisfy both the inequalities  $2x^2 - 4x - 3 \geq x$  and  $-2 < x - 1 < 4$ . [4 marks]

*Cari julat nilai-nilai  $x$  yang memenuhi kedua-dua ketaksamaan  $2x^2 - 4x - 3 \geq x$  dan  $-2 < x - 1 < 4$ . [4 markah]*



Answer / Jawapan : .....



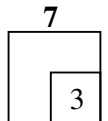
- 7 Given that  $3^x = y$  and  $2^x = z$ , express  $6^x(9^{x-1})$  in terms of  $y$  and  $z$ . [3 marks]

*Diberi bahawa  $3^x = y$  dan  $2^x = z$ , ungkap  $6^x(9^{x-1})$  dalam sebutan  $y$  dan  $z$ .*

[3 markah]

For  
Examiner's  
Use

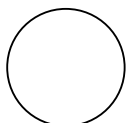
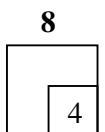
Answer / Jawapan : .....



- 8 Solve the equation  $\log_3(5 + x^2) = \log_{\sqrt{3}}(2 - x)$ . [4 marks]

*Selesaikan persamaan  $\log_3(5 + x^2) = \log_{\sqrt{3}}(2 - x)$ .* [4 markah]

Answer / Jawapan: .....



For  
Examiner's  
Use

- 9** The first term and the  $n^{\text{th}}$  term of an arithmetic progression are  $-4$  and  $26$  respectively. Given that the sum of the first  $n$  terms is  $99$ , find the value of  $n$ . [3 marks]

*Sebutan pertama dan sebutan ke- $n$  suatu jangjang aritmetik masing-masing ialah  $-4$  dan  $26$ . Diberi bahawa hasil tambah  $n$  sebutan pertama ialah  $99$ , cari nilai  $n$ .* [3 markah]

9



Answer / Jawapan :  $n =$  .....

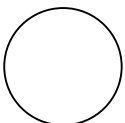
- 10** Given that  $p = 0.04166666\dots$  is a recurring decimal number, express  $p$  as a fraction in its simplest form. [3 marks]

*Diberi bahawa  $p = 0.04166666\dots$  ialah nombor perpuluhan jadi semula, ungkap  $p$  sebagai pecahan termudah.* [3 markah]

10



Answer / Jawapan :  $p =$  .....



11 Diagram 11 shows the graph of  $\frac{y}{x}$  against  $x^2$ .

Rajah 11 menunjukkan graf  $\frac{y}{x}$  melawan  $x^2$ .

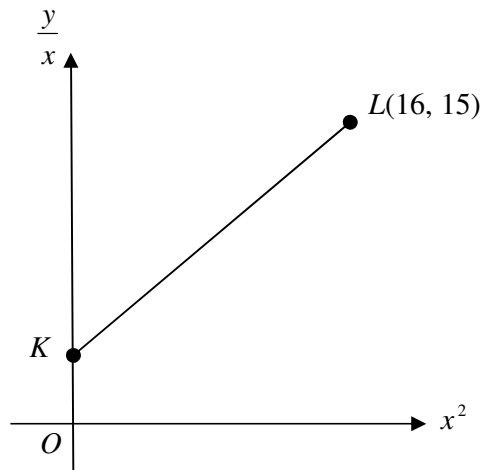


Diagram 11  
Rajah 11

It is given that the gradient of  $KL = \frac{3}{4}$  and point  $K$  lies on the  $\frac{y}{x}$ -axis.

Diberi bahawa kecerunan  $KL = \frac{3}{4}$  dan titik  $K$  terletak pada paksi- $\frac{y}{x}$ .

(a) Find the coordinates of  $K$ .  
Cari koordinat  $K$ .

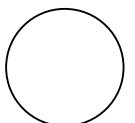
(b) Express  $y$  in terms of  $x$ .  
Ungkap  $y$  dalam sebutan  $x$ .

[3 marks]  
[3 markah]

Answer / Jawapan : (a) .....

(b) .....

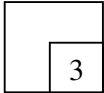
11
3



- 12** Given that  $P(3, 4)$ ,  $Q(0, w)$ ,  $R(v, 2)$  and  $S(4, 1)$  are the vertices of a parallelogram  $PQRS$ , calculate the value of  $v$  and of  $w$ . [3 marks]

*Diberi bahawa  $P(3, 4)$ ,  $Q(0, w)$ ,  $R(v, 2)$  dan  $S(4, 1)$  ialah bucu-bucu sebuah segiempat selari  $PQRS$ , hitung nilai  $v$  dan nilai  $w$ . [3 markah]*

12



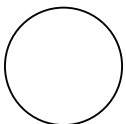
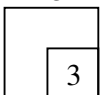
Answer / Jawapan :  $v = \dots\dots\dots$

$w = \dots\dots\dots$

- 13** The vectors  $\begin{pmatrix} a \\ b \end{pmatrix}$  and  $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$  are parallel. Given that  $\begin{pmatrix} a \\ b \end{pmatrix}$  has a magnitude of  $\sqrt{45}$  and  $a > 0$ , find the value of  $a$  and of  $b$ . [3 marks]

*Vektor-vektor  $\begin{pmatrix} a \\ b \end{pmatrix}$  dan  $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$  adalah selari. Diberi bahawa  $\begin{pmatrix} a \\ b \end{pmatrix}$  mempunyai magnitud  $\sqrt{45}$  dan  $a > 0$ , cari nilai  $a$  dan nilai  $b$ . [3 markah]*

13



Answer / Jawapan :  $a = \dots\dots\dots$

$b = \dots\dots\dots$

- 14 Diagram 14 shows a quadrilateral  $PQRS$  such that  $\overrightarrow{PS} = (m - 1)\underline{x}$ ,  $\overrightarrow{SR} = n\underline{y}$  and  $\overrightarrow{QR} = n\underline{x}$ , where  $m$  and  $n$  are constants.

Rajah 14 menunjukkan sisiempat  $PQRS$  dengan keadaan  $\overrightarrow{PS} = (m - 1)\underline{x}$ ,  $\overrightarrow{SR} = n\underline{y}$  dan  $\overrightarrow{QR} = n\underline{x}$ , dengan keadaan  $m$  dan  $n$  ialah pemalar.

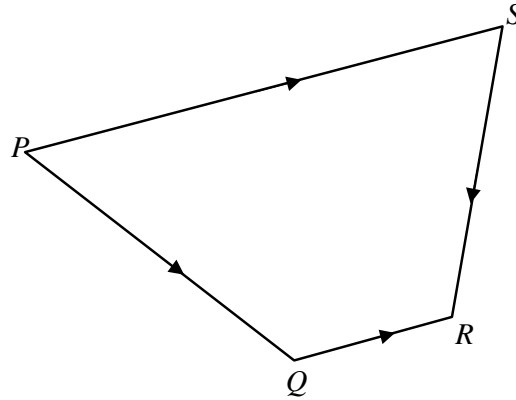


Diagram 14  
Rajah 14

If  $\overrightarrow{PQ} = 3\underline{x} + \left(\frac{m+1}{5}\right)\underline{y}$ , find the value of  $m$  and of  $n$ .

[3 marks]

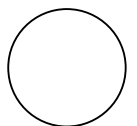
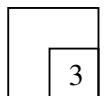
Jika  $\overrightarrow{PQ} = 3\underline{x} + \left(\frac{m+1}{5}\right)\underline{y}$ , cari nilai  $m$  dan nilai  $n$ .

[3 markah]

Answer / Jawapan:  $m = \dots\dots\dots$

$n = \dots\dots\dots$

14



**15** It is given that  $\sin (90^\circ - \beta) = k$ , where  $\beta$  is an acute angle. Find, in terms of  $k$ ,  
*Diberi bahawa  $\sin (90^\circ - \beta) = k$ , dengan keadaan  $\beta$  ialah sudut tirus. Cari, dalam sebutan  $k$ ,*

(a)  $\cos \beta$ ,  
*kos  $\beta$ ,*

(b)  $\operatorname{cosec} \beta$ .  
*kosek  $\beta$ .*

[3 marks]

[3 markah]

15



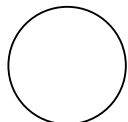
Answer / Jawapan : (a) .....

(b) .....

**16** Solve the equation  $\cos x \sin x = \frac{1}{4}$  for  $0^\circ \leq x \leq 360^\circ$ . [3 marks]

*Selesaikan persamaan  $\cos x \sin x = \frac{1}{4}$  untuk  $0^\circ \leq x \leq 360^\circ$ . [3 markah]*

16



Answer / Jawapan : .....

- 17 Diagram 17 shows sectors of circles,  $OPQ$ , centred at  $O$  and  $PAB$ , centred at  $P$ .  
Rajah 17 menunjukkan sektor-sektor bulatan,  $OPQ$ , berpusat di  $O$  dan  $PAB$ , berpusat di  $P$ .

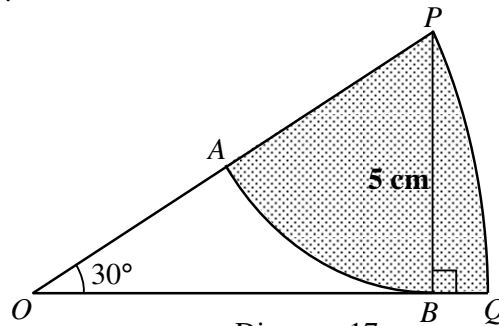


Diagram 17  
Rajah 17

It is given that  $A$  lies on  $OP$ ,  $B$  lies on  $OQ$  and triangle  $OPB$  is right angled at  $B$ .  
Diberi bahawa  $A$  terletak pada  $OP$ ,  $B$  terletak pada  $OQ$  dan segitiga  $OPB$  bersudut tegak di  $B$ .

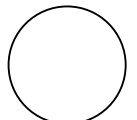
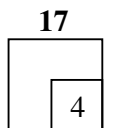
Calculate the perimeter, in cm, of the shaded region.  
Hitung perimeter, dalam cm, kawasan berlorek.

[4 marks]

[4 markah]

Answer / Jawapan : (a).....

(b).....



- 18 It is given that  $f'(x) = \frac{4x^2}{1-3x}$  and  $f''(x) = \frac{kx+hx^2}{(1-3x)^2}$ , where  $h$  and  $k$  are constants. Find the value of  $h$  and of  $k$ . [2 marks]

Diberi bahawa  $f'(x) = \frac{4x^2}{1-3x}$  dan  $f''(x) = \frac{kx+hx^2}{(1-3x)^2}$ , dengan keadaan  $h$  dan  $k$  ialah pemalar. Cari nilai  $h$  dan nilai  $k$ . [2 markah]

18



Answer / Jawapan :  $h = \dots\dots\dots$

$k = \dots\dots\dots$

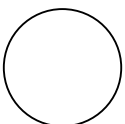
- 19 The curve  $y = (a-x)^3$ , where  $a$  is a constant, has a gradient of  $-\frac{1}{12}$  when  $x = 1$ . Find the possible values of  $a$ . [3 marks]

Lengkung  $y = (a-x)^3$ , dengan keadaan  $a$  ialah pemalar, mempunyai kecerunan  $-\frac{1}{12}$  apabila  $x = 1$ . Cari nilai-nilai yang mungkin bagi  $a$ . [3 markah]

19



Answer / Jawapan :  $a = \dots\dots\dots$





20 Given that  $\int_1^2 f(x)dx = 7$ , find the value of  $k$  if  $\int_1^2 [2f(x) - kx]dx = 6\frac{1}{2}$ . [3 marks]

Diberi bahawa  $\int_1^2 f(x)dx = 7$ , cari nilai  $k$  jika  $\int_1^2 [2f(x) - kx]dx = 6\frac{1}{2}$ . [3 markah]

20

3

Answer / Jawapan :  $k = \dots\dots\dots$

21 A curve has a gradient function,  $\frac{dy}{dx} = 2x + q$ , where  $q$  is a constant. The gradient of the normal to the curve at point  $(1, 5)$  is  $\frac{2}{3}$ . Find

Satu lengkung mempunyai fungsi kecerunan,  $\frac{dy}{dx} = 2x + q$ , dengan keadaan  $q$  ialah pemalar. Kecerunan normal kepada lengkung itu pada titik  $(1, 5)$  ialah  $\frac{2}{3}$ . Cari

- (a) the value of  $q$ ,  
nilai  $q$ ,
- (b) the equation of the curve.  
persamaan lengkung tersebut.

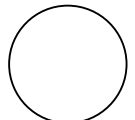
[4 marks]  
[4 markah]

21

4

Answer / Jawapan : (a)  $q = \dots\dots\dots$

(b).....



**22** A set of data: 65, 40, 65, 50,  $p$ , 82, 73 and 50 has a mean of 60. Find

*Satu set data: 65, 40, 65, 50,  $p$ , 82, 73 dan 50 mempunyai min 60. Cari*

- (a) the value of  $p$ ,  
*nilai  $p$ ,*
- (b) the standard deviation of the set of data.  
*sisihan piawai set data tersebut.*

[4 marks]  
[4 markah]

22



Answer / Jawapan : (a)  $p = \dots\dots\dots$

(b)  $\dots\dots\dots$

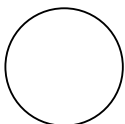
**23** A team of 4 members is to be chosen from 6 boys and 9 girls to participate in a mathematics quiz. Find the number of ways of selecting the team if

*Satu pasukan terdiri daripada 4 orang akan dipilih dari 6 lelaki dan 9 perempuan untuk menyertai satu kuiz matematik. Cari bilangan cara memilih pasukan tersebut jika*

- (a) all the participants are of the same sex,  
*semua peserta adalah sama jantina,*
- (b) the number of boys and girls must be equal.  
*bilangan lelaki dan perempuan mesti sama.*

[4 marks]  
[4 markah]

23



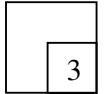
Answer / Jawapan : (a)  $\dots\dots\dots$

(b)  $\dots\dots\dots$

- 24 In a bag, there are 4 green cards and  $y$  red cards. Two cards are picked at random from the bag, one after the other, without replacement. Find the value of  $y$  if the probability of getting two red cards is  $\frac{1}{3}$ . [3 marks]

*Dalam satu beg, terdapat 4 kad hijau dan  $y$  kad merah. Dua kad dipilih secara rawak dari beg tersebut, satu per satu, tanpa dikembalikan. Cari nilai  $y$  jika kebarangkalian mendapat dua kad merah ialah  $\frac{1}{3}$ .* [3 markah]

24



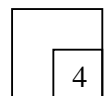
Answer / Jawapan:  $y = \dots\dots\dots$

- 25 Farah made 5 attempts in an archery practice. The probability that Farah strikes the target in an attempt is 0.7. It is given that  $X$  is a discrete random variable that represents the number of times Farah strikes the target.

*Farah membuat 5 cubaan dalam suatu latihan memanah. Kebarangkalian Farah menepati sasaran bagi satu cubaan ialah 0.7. Diberi bahawa  $X$  ialah satu pembolehubah rawak diskrit yang mewakili bilangan kali Farah menepati sasaran.*

- (a) List all the elements of  $X$ .  
*Senaraikan semua unsur bagi  $X$ .*
- (b) Calculate the probability that Farah strikes the target at least 2 times.  
*Hitung kebarangkalian Farah menepati sasaran sekurang-kurangnya 2 kali.*
- [4 marks]  
[4 markah]

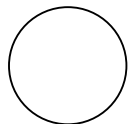
25



Answer / Jawapan : (a).....

(b).....

**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 this question paper.  
*Jawapan anda hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*
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.  
*Jika anda hendak menukar jawapan, batalkan dengan kemas 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 pada akhir peperiksaan.*