SULIT

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2012

MATEMATIK

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi **32** halaman bercetak

MATHEMATICAL FORMULAE
RUMUS MATEMATIK

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

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

PERKAITAN
RELATIONS

1. $a^m \times a^n = a^{m+n}$

2. $a^m \div a^n = a^{m-n}$

3. $(a^m)^n = a^{mn}$

4. $A^{-1} = \dfrac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

5. Distance / *Jarak* =
$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

6. Midpoint / *Titik tengah*
$(x, y) = \left(\dfrac{x_1+x_2}{2}, \dfrac{y_1+y_2}{2}\right)$

7. Average speed $= \dfrac{\text{distance travelled}}{\text{time taken}}$
Purata laju $= \dfrac{\textit{jarak yang dilalui}}{\textit{masa yang diambil}}$

8. Mean $= \dfrac{\text{sum of data}}{\text{number of data}}$
Min $= \dfrac{\textit{hasil tambah nilai data}}{\textit{bilangan data}}$

9. Mean $= \dfrac{\text{sum of (class mark} \times \text{frequency)}}{\text{sum of frequencies}}$
Min $= \dfrac{\textit{hasil tambah (nilai titik tengah kelas} \times \textit{kekerapan)}}{\textit{hasil tambah kekerapan}}$

10. Pythagoras Theorem
Teorem Pithagoras
$c^2 = a^2 + b^2$

11. $P(A) = \dfrac{n(A)}{n(S)}$

12. $P(A') = 1 - P(A)$

13. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

14. $m = -\dfrac{y\text{-intercept}}{x\text{-intercept}}$
$m = -\dfrac{\text{pintasan} - y}{\text{pintasan} - x}$

BENTUK DAN RUANG
SHAPES AND SPACE

1. Area of trapezium $= \frac{1}{2} \times$ sum of parallel sides $\times$ height

   Luas trapezium $= \frac{1}{2} \times$ *hasil tambah dua sisi selari* $\times$ *tinggi*

2. Circumference of circle $= \pi d = 2\pi r$ / *Lilitan bulatan* $= \pi d = 2\pi j$

3. Area of circle $= \pi r^2$ / *Luas bulatan* $= \pi j^2$

4. Curved surface area of cylinder $= 2\pi rh$ / *Luas permukaan melengkung silinder* $= 2\pi jt$

5. Surface area of sphere $= 4\pi r^2$ / *Luas permukaan sfera* $= 4\pi j^2$

6. Volume of right prism = cross sectional area $\times$ length
   Isipadu prisma tegak = luas keratan rentas $\times$ *panjang*

7. Volume of cylinder $= \pi r^2 h$ / *Isipadu silinder* $= \pi j^2 t$

8. Volume of cone $= \frac{1}{3}\pi r^2 h$ / *Isipadu kon* $= \frac{1}{3}\pi j^2 t$

9. Volume of sphere $= \frac{4}{3}\pi r^3$ / *Isipadu sfera* $= \frac{4}{3}\pi j^3$

10. Volume of right pyramid $= \frac{1}{3} \times$ base area $\times$ height

    Isipadu piramid tegak $= \frac{1}{3} \times$ *luas tapak* $\times$ *tinggi*

11. Sum of interior angles of a polygon $= (n-2) \times 180^\circ$
    Hasil tambah sudut pedalaman poligon $= (n-2) \times 180^\circ$

12. $\dfrac{\text{arc length}}{\text{circumference of circle}} = \dfrac{\text{angle subtended at centre}}{360^\circ}$

    $\dfrac{\textit{panjang lengkuk}}{\textit{lilitan bulatan}} = \dfrac{\textit{sudut pusat}}{360^\circ}$

13. $\dfrac{\text{area of sector}}{\text{area of circle}} = \dfrac{\text{angle subtended at centre}}{360^\circ}$ / $\dfrac{\textit{luas sektor}}{\textit{luas bulatan}} = \dfrac{\textit{sudut pusat}}{360^\circ}$

14. Scale factor, $k = \dfrac{PA'}{PA}$ / *Faktor skala*, $k = \dfrac{PA'}{PA}$

15. Area of image $= k^2 \times$ area of object / *Luas imej* $= k^2 \times$ *luas objek*

1. Jadual 1 menunjukkan nombor dan nombor yang dibundarkan.
Table 1 shows the numbers and the rounded off numbers.

	Nombor *Number*	**Nombor yang dibundarkan** *Rounded off number*
I	0·322	0·32
II	471·2	470
III	5·602	5·60

Jadual 1
Table 1

Nombor-nombor yang manakah dibundarkan betul kepada dua angka bererti ?
Which numbers are rounded off correctly to two significant figures ?

A I, II

B I, III

C II, III

D I, II, III

2. Nombor yang manakah diungkapkan dalam bentuk piawai ?
Which number is expressed in standard form ?

	Nombor *Number*	**Bentuk piawai** *Standard form*
A	8400000	$8{\cdot}4 \times 10^{5}$
B	7300000	73×10^{5}
C	0·00051	51×10^{-5}
D	0·000062	$6{\cdot}2 \times 10^{-5}$

3. $9{\cdot}5 \times 10^{-6} - 0{\cdot}00000027 =$

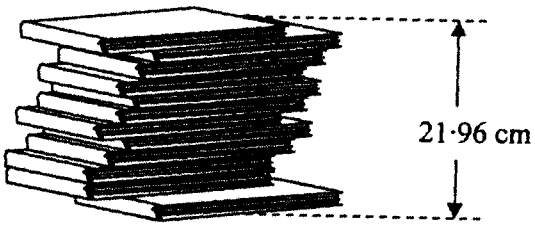
A $6{\cdot}80 \times 10^{-6}$

B $9{\cdot}23 \times 10^{-6}$

C $6{\cdot}80 \times 10^{-7}$

D $9{\cdot}23 \times 10^{-7}$

4. Rajah 4 menunjukkan ketebalan bagi 12 buah buku Matematik yang sama.
Diagram 4 shows the thickness of 12 identical Mathematics books.



Rajah 4
Diagram 4

Cari ketebalan , dalam m, 5 buah buku itu.
Find the thickness, in m, *of 5 books.*

A $1{\cdot}83 \times 10^{-1}$

B $9{\cdot}15 \times 10^{-1}$

C $1{\cdot}83 \times 10^{-2}$

D $9{\cdot}15 \times 10^{-2}$

5. Ungkapkan $8^3 + 2 \times 8^2 + 5$ sebagai satu nombor dalam asas lapan.
Express $8^3 + 2 \times 8^2 + 5$ *as a number in base eight.*

A 1025_8

B 1052_8

C 1205_8

D 1250_8

6. $110100_2 - 1101_2 =$

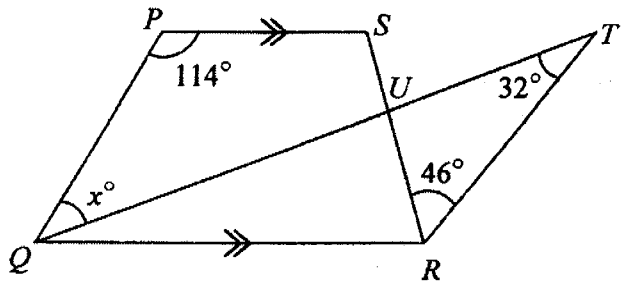
A 110001_2

B 101011_2

C 101101_2

D 100111_2

7. Dalam Rajah 7, *PQRS* ialah trapezium. *QUT* dan *SUR* ialah garis lurus.
In Diagram 7, PQRS is a trapezium. QUT and SUR are straight lines.



Rajah 7
Diagram 7

Diberi $QU = QR$, cari nilai x.
Given $QU = QR$, find the value of x.

A 24°

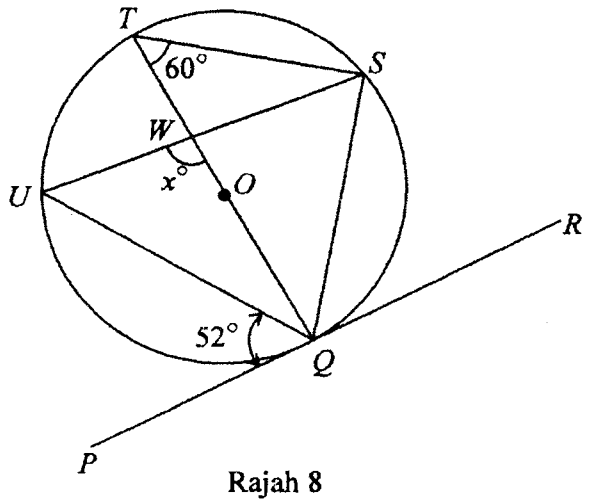
B 42°

C 66°

D 78°

8. Dalam Rajah 8, *PQR* ialah tangen kepada bulatan *QSTU* berpusat *O*, di *Q*. *TOQ* ialah diameter bagi bulatan itu dan *UWS* ialah garis lurus.

In Diagram 8, PQR is the tangent to the circle QSTU with centre O, at Q. TOQ is a diameter to the circle and UWS is a straight line.



Rajah 8
Diagram 8

Cari nilai *x*.

Find the value of x.

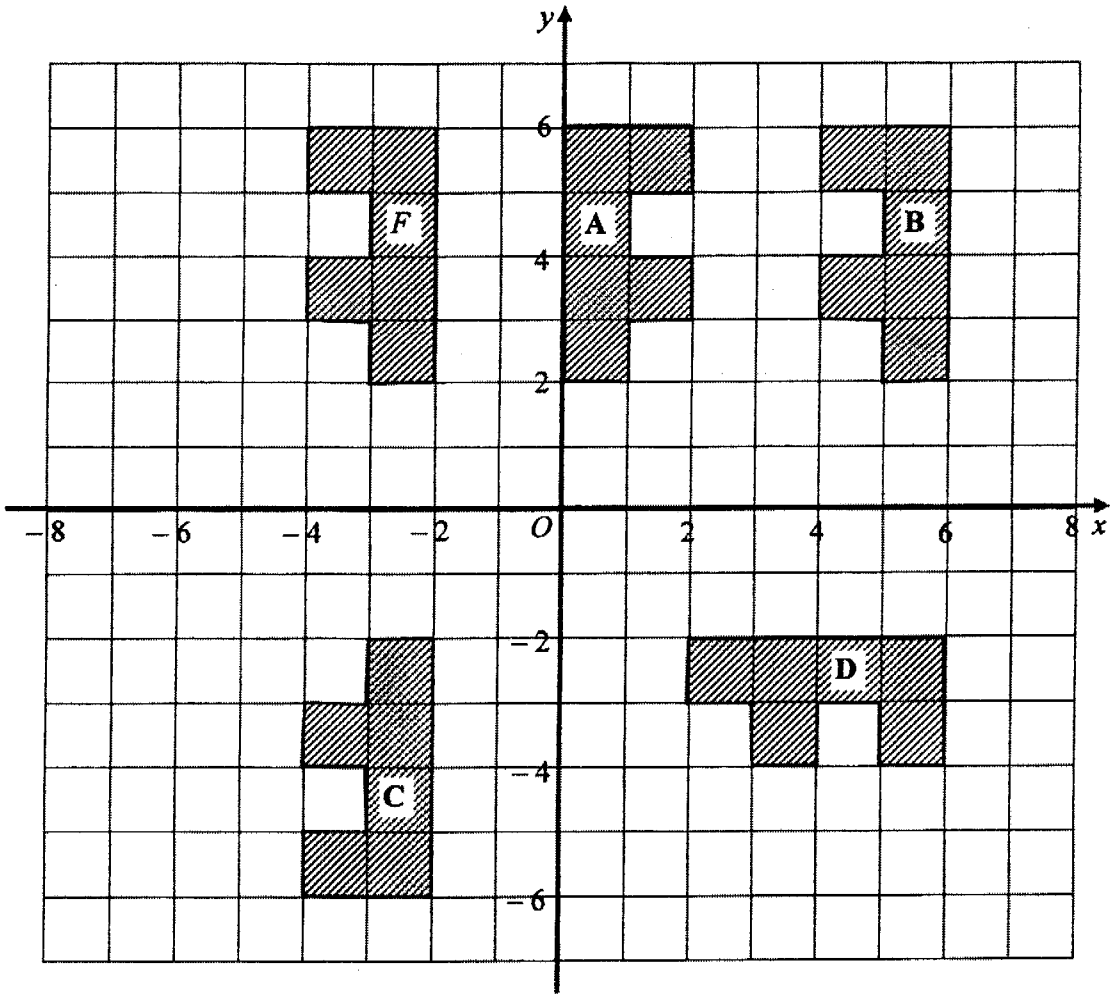
A 78°

B 82°

C 92°

D 98°

9. Rajah 9 menunjukkan lima poligon, *F*, **A**, **B**, **C** dan **D**, dilukis pada satah Cartesan.
Diagram 9 shows five polygons, F, **A**, **B**, **C** *and* **D**, *drawn on a Cartesian plane.*



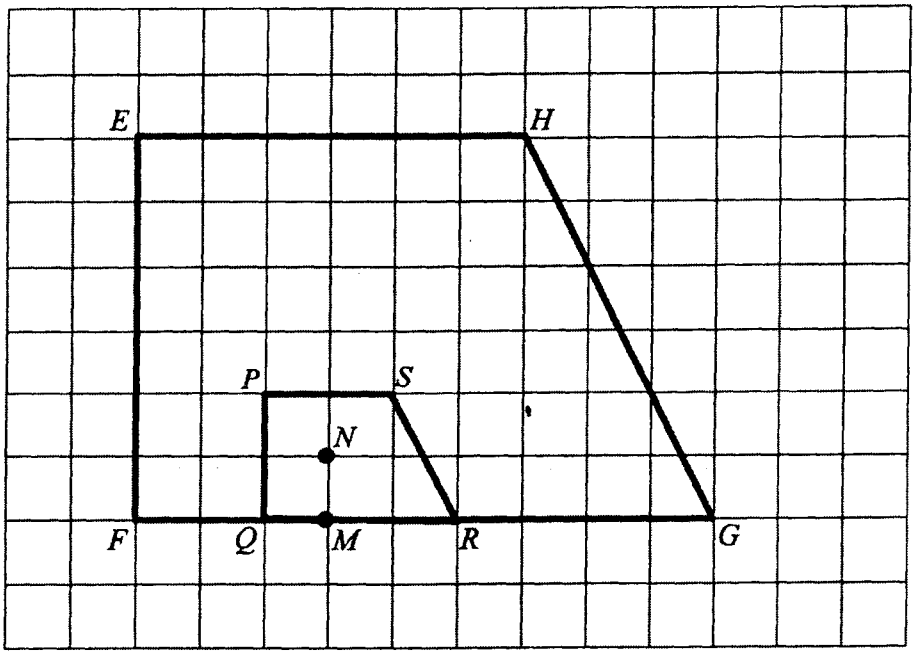
Rajah 9
Diagram 9

Di antara poligon-poligon **A**, **B**, **C** dan **D**, yang manakah imej bagi poligon *F* di bawah pantulan pada garis $y = x$?

Which of the polygons **A**, **B**, **C** *and* **D**, *is the image of polygon F under a reflection in the line* $y = x$?

10. Rajah 10 menunjukkan dua trapezium, *PQRS* dan *EFGH*, dilukis pada grid segi empat sama.

Diagram 10 *shows two trapeziums, PQRS and EFGH, drawn on square grids.*



Rajah 10
Diagram 10

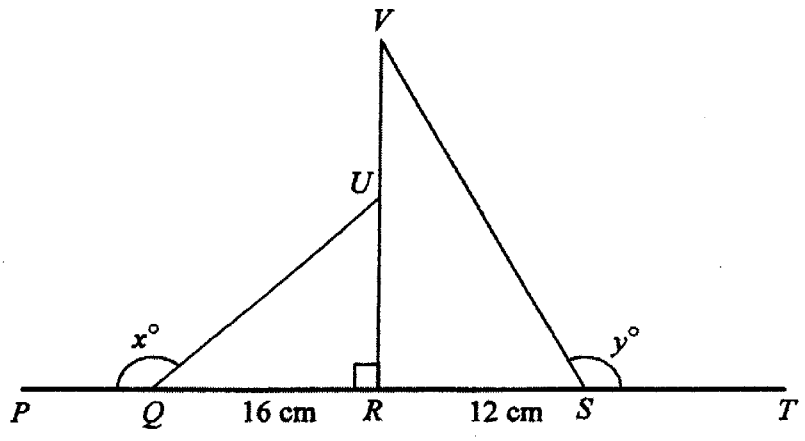
Diberi bahawa *EFGH* ialah imej bagi *PQRS* di bawah satu pembesaran.
Cari pusat dan faktor skala pembesaran itu.

It is given that EFGH is the image of PQRS under an enlargement.
Find the centre and the scale factor of the enlargement.

	Pusat pembesaran *Centre of enlargement*	**Faktor skala** *Scale factor*
A	*M*	2
B	*M*	3
C	*N*	2
D	*N*	3

11. Dalam Rajah 11, *QRU* dan *RSV* ialah segi tiga bersudut tegak. *PQRST* ialah garis lurus.

In Diagram 11, *QRU and RSV* are right-angled triangle. *PQRST is a straight line.*



Rajah 11
Diagram 11

Diberi $\cos x° = -\frac{4}{5}$ dan $\tan y° = -\frac{5}{3}$, hitung panjang, dalam cm, *UV*.

Given $\cos x° = -\frac{4}{5}$ *and* $\tan y° = -\frac{5}{3}$, *calculate the length, in* cm, *of UV.*

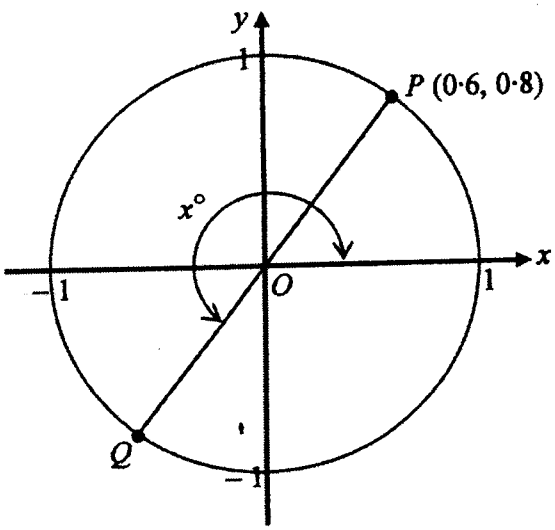
A 2

B 4

C 6

D 8

12. Dalam Rajah 12, POQ ialah diameter bulatan unit.
In Diagram 12, POQ is a diameter of a unit circle.



Rajah 12
Diagram 12

Cari nilai $\sin x°$.
Find the value of $\sin x°$.

A $-\frac{4}{3}$

B $-\frac{4}{5}$

C $-\frac{3}{5}$

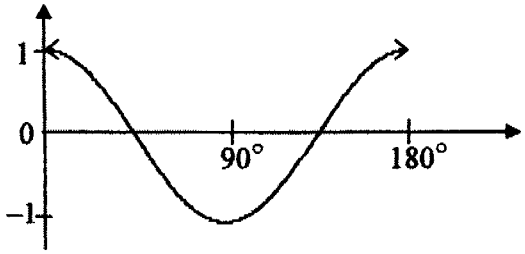
D $-\frac{3}{4}$

SULIT

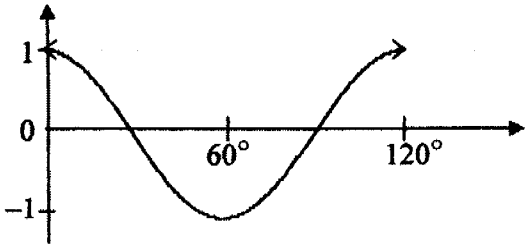
13 Graf manakah yang mewakili sebahagian daripada $y = \text{kos } x$?

Which graph represents part of $y = \cos x$?

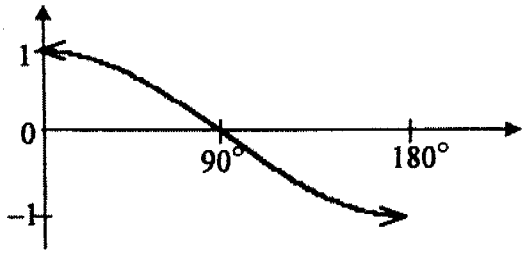
A



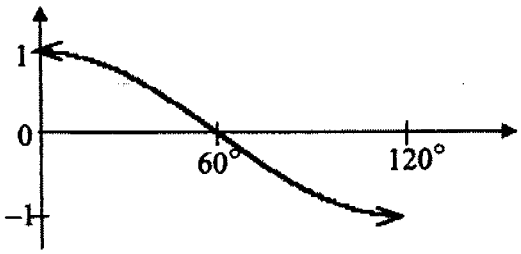
B



C

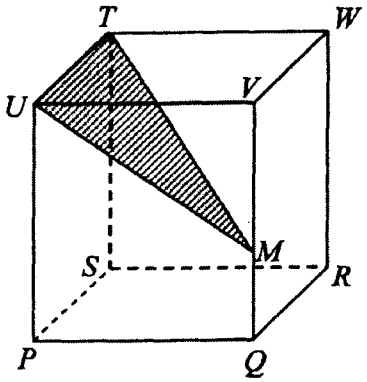


D



14. Rajah 14 menunjukkan sebuah kuboid dengan tapak mengufuk *PQRS*. *M* ialah titik yang berada di atas garis *QV*.

Diagram 14 *shows a cuboid with a horizontal base PQRS. M is a point on the line QV.*



Rajah 14
Diagram 14

Namakan sudut di antara satah *UMT* dengan satah *PSTU*.

Name the angle between the plane UMT and the plane PSTU.

A $\angle MTU$

B $\angle MTS$

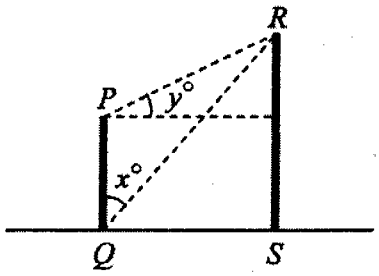
C $\angle MUS$

D $\angle MUP$

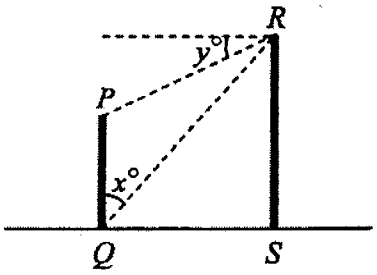
15. *PQ* dan *RS* ialah dua batang tiang tegak yang terletak pada tanah mengufuk. Sudut dongakan *P* dari *S* ialah $x°$ dan sudut tunduk *P* dari *R* ialah $y°$.
Rajah manakah yang mewakili situasi tersebut ?

PQ and RS are two vertical poles on the horizontal ground. The angle of elevation of P from S is $x°$ and the angle of depression of P from R is $y°$.
Which diagram represents the situation ?

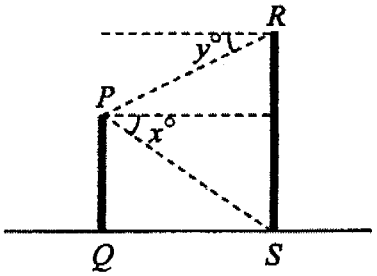
A



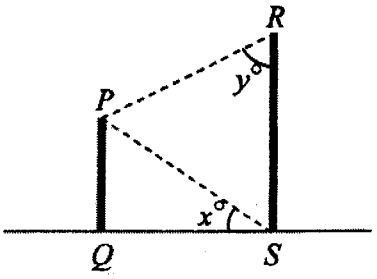
B



C

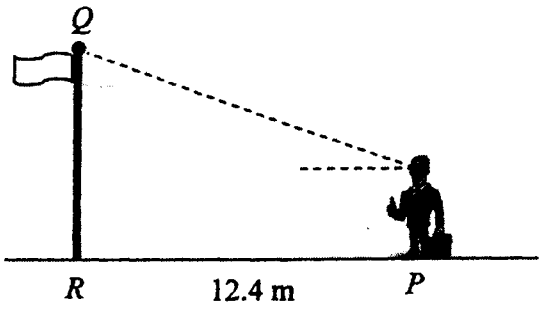


D



16. Rajah 16 menunjukkan sebatang tiang bendera tegak RQ dan seorang lelaki berada di P. Sudut dongakan Q dari matanya ialah $30°$.

Diagram 16 *shows a vertical flagpole RQ and a man at P. The angle of elevation of Q from his eye is* $30°$.



Rajah 16
Diagram 16

Diberi bahawa aras matanya adalah 1·5 m dari tanah mengufuk.
Hitung tinggi, dalam m, tiang bendera itu.

It is given that his eye level is 1·5 m *above the horizontal ground. Calculate the height, in* m, *of the flagpole.*

A 7·159

B 8·659

C 10·74

D 21·47

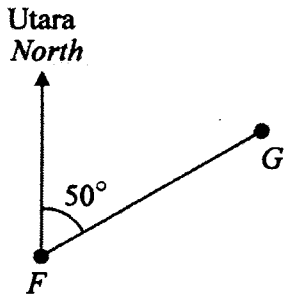
17. Diberi bahawa titik F dan titik G terletak pada suatu satah mengufuk. Bearing F dari G ialah $310°$.

Rajah manakah yang menunjukkan kedudukan yang betul bagi F dan G ?

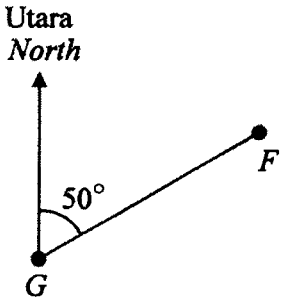
It is given that point F and point G lie on a horizontal plane. The bearing of F from G is $310°$.

Which diagram shows the correct locations of F and G ?

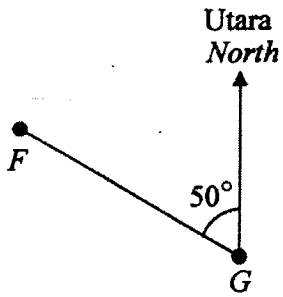
A



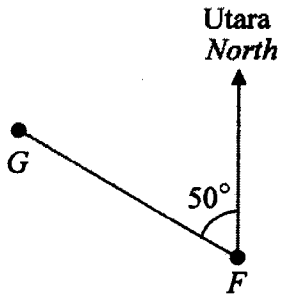
B



C



D



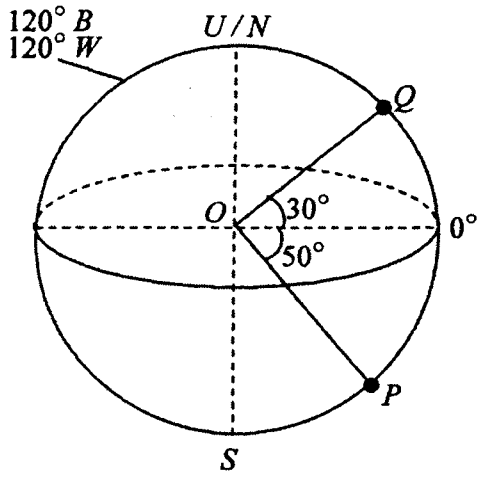
18. U ialah Kutub Utara, S ialah Kutub Selatan dan O ialah pusat bumi. $P(50°S, 60°T)$ dan $Q(30°U, 60°T)$ ialah dua titik pada permukaan bumi.

Rajah manakah menunjukkan kedudukan yang betul bagi P dan Q ?

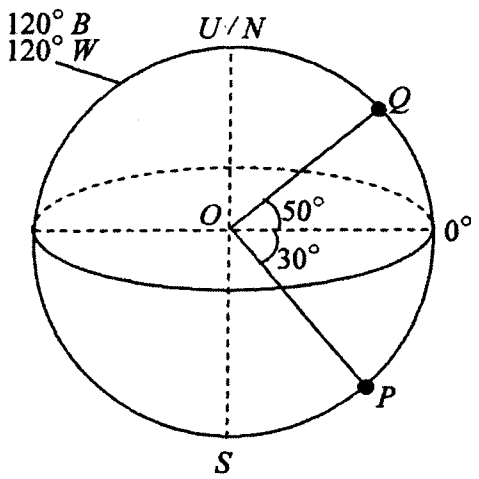
N is the North Pole, S is the South Pole and O is the centre of the earth. $P(50°S, 60°E)$ and $Q(30°N, 60°E)$ are two points on the surface of the earth.

Which diagram shows the correct locations of P and Q ?

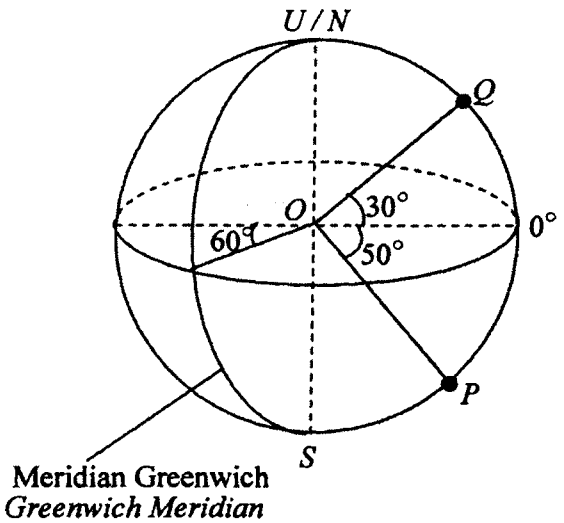
A



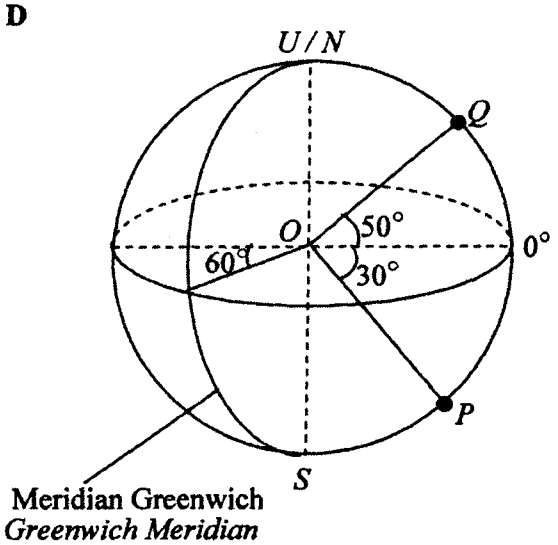
B



C



D



19. $(3+2p)^2 - 4p(p-q) =$

A $9 + 12p + 4pq$

B $9 - 12p + 4pq$

C $9 + 12p - 4pq$

D $9 - 12p - 4pq$

20. Ungkapkan $\frac{1-y}{y^2} - \frac{1-y}{2y}$ sebagai satu pecahan tunggal dalam bentuk termudah.

Express $\frac{1-y}{y^2} - \frac{1-y}{2y}$ *as a single fraction in its simplest form.*

A $\frac{y^2 - y + 2}{2y^2}$

B $\frac{y^2 - 3y + 2}{2y^2}$

C $\frac{-y^2 - y + 2}{2y^2}$

D $\frac{-y^2 - 3y + 2}{2y^2}$

33 Jadual 33 menunjukkan nilai-nilai pintasan-x dan pintasan-y.

Antara **A**, **B**, **C** dan **D**, yang manakah merupakan pintasan-x dan pintasan-y bagi persamaan garis lurus $2x - 3y = 6$?

Diagram 33 shows the values of x-intercepts and y-intercepts.

Which pair of intercepts, **A**, **B**, **C** *and* **D**, *is the x-intercept and y-intercept of straight line* $2x - 3y = 6$?

	***x*-intercept**	***y*-intercept**
A	-2	3
B	-3	2
C	2	-3
D	3	-2

34 Dalam sebuah mangkuk terdapat 30 biji manik berwarna hijau dan beberapa biji manik berwarna kuning sahaja. Sebiji manik dipilih secara rawak daripada mangkuk itu. Kebarangkalian sebiji manik berwarna hijau dipilih ialah $\frac{3}{5}$.

Hitung bilangan manik berwarna kuning di dalam mangkuk itu.

A bowl contains 30 green beads and several yellow beads. A bead is chosen at random from the bowl. The probability that a green bead chosen is $\frac{3}{5}$.

Calculate the number of yellow beads in the bowl.

A 15

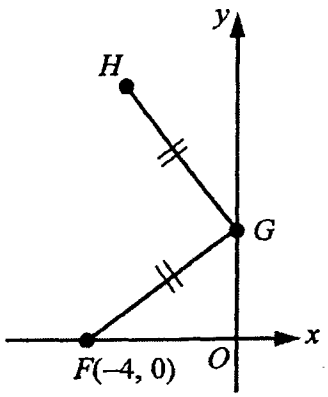
B 20

C 25

D 30

32 Rajah 32 menunjukkan dua garis lurus FG dan GH.

Diagram 32 showing two straight lines, FG and GH.



Rajah 32
Diagram 32

Diberi bahawa $FG = GH$, kecerunan FG ialah $\frac{3}{4}$ dan kecerunan GH ialah $-\frac{4}{3}$. Cari koordinat bagi titik H.

It is given that $FG = GH$, the gradient of FG is $\frac{3}{4}$ and the gradient of GH is $-\frac{4}{3}$. Find the coordinates of H.

A (–3, 7)

B (–3, 5)

C (–4, 7)

D (–4, 5)

30 Diberi bahawa set semesta, $\xi = P \cup Q \cup R$, set $P = \{ b, l, u, e \}$, set $Q = \{ p, i, n, k \}$ dan set $R = \{ b, l, a, c, k \}$.

Senaraikan semua unsur set $(P \cup Q) \cap R$.

It is given that $\xi = P \cup Q \cup R$, set $P = \{ b, l, u, e \}$, set $Q = \{ p, i, n, k \}$ *and set* $R = \{ b, l, a, c, k \}$.

Listing all the elements of set $(P \cup Q) \cap R$.

A $\{ b, l, k \}$

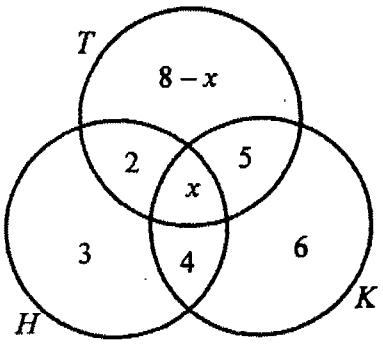
B $\{ b, l, u, e, p, i, n, k \}$

C $\{ u, e, p, i, n \}$

D $\{ \ \}$

31 Rajah 31 ialah gambar rajah Venn menunjukkan bilangan pemain dalam set H, set K dan set T. Diberi bahawa set semesta, $\xi = H \cup K \cup T$, set $H = \{$ pemain hoki $\}$, set $K = \{$ pemain bola keranjang $\}$ dan set $T = \{$ pemain sepak takraw $\}$.

Diagram 31 *is the Venn diagram showing the number of players in* set H, set K *and* set T. *Given that the universal set,* $\xi = H \cup K \cup T$, *set* $H = \{$ *hockey players* $\}$, *set* $K = \{$ *basketball players* $\}$ *and set* $T = \{$ *sepak takraw players* $\}$.



Rajah 31
Diagram 31

Diberi bahawa $n(H') = n(T \cap K)$, cari jumlah semua pemain hoki.

Given that $n(H') = n(T \cap K)$, *find the total number of hockey players.*

A 28

B 22

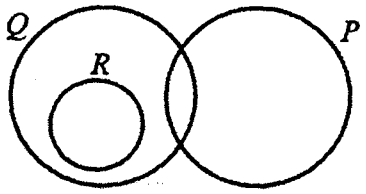
C 16

D 15

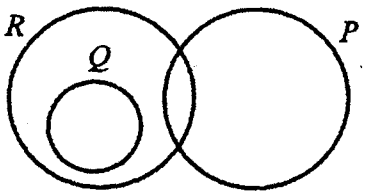
29 Diberi bahawa set semesta, $\xi = P \cup Q \cup R$, $P \cap Q \neq \varnothing$ dan $R \subset Q$. Gambar rajah Venn manakah yang mewakili hubungan ini ?

It is given that the universal set, $\xi = P \cup Q \cup R$, $P \cap Q \neq \varnothing$ *and* $R \subset Q$. *Which of the following Venn diagram represents these relationships ?*

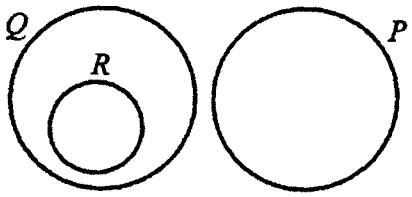
A



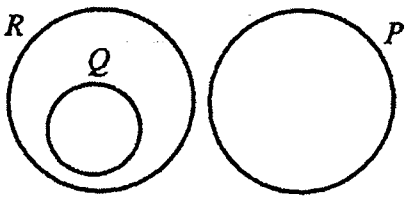
B



C



D



27 Jadual 27 menunjukkan gred yang diperoleh oleh sekumpulan murid.

Table 27 shows the grade obtained by a group of pupils.

Gred *Grade*	A	B	C	D	E
Bilangan murid *Numbers of pupils*	25	35	45	30	15

Jadual 27
Table 27

Diberi A ialah gred yang terbaik, cari bilangan murid yang memperoleh gred yang lebih baik daripada gred mod.

Given A is the best grade, find the number of pupils who achieve better grades than the modal grade.

A 45

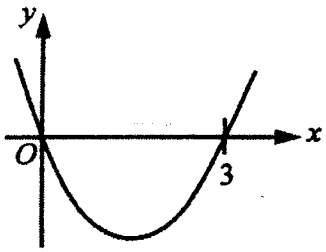
B 60

C 90

D 105

28 Rajah 28 menunjukkan suatu graf pada satah Cartesan.

Diagram 28 shows a graph on a Cartesian plane.



Rajah 28
Diagram 28

Antara yang berikut, yang manakah adalah persamaan bagi graf itu ?

Which of the following is the equation of the graph ?

A $y = 3x^2 - x$

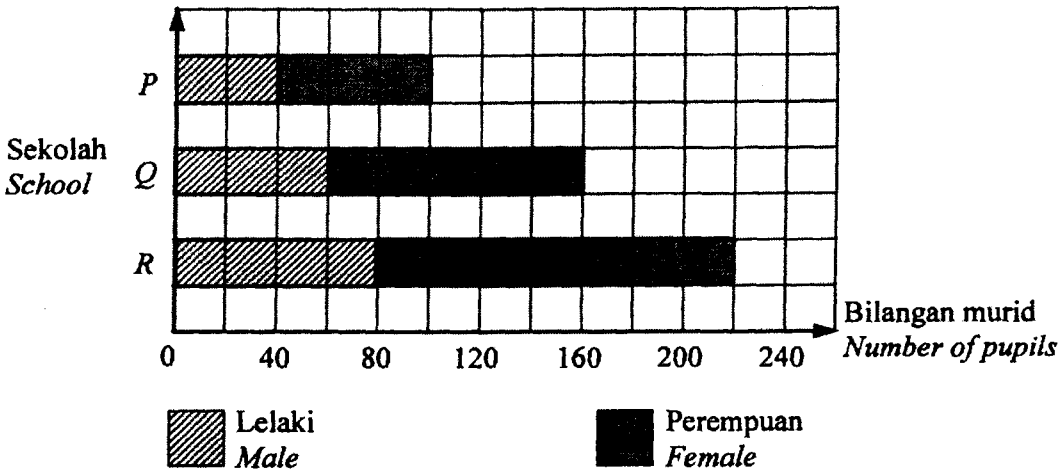
B $y = 3x^2 + x$

C $y = x^2 - 3x$

D $y = x^2 + 3x$

26 Rajah 26 ialah sebuah carta palang yang menunjukkan bilangan murid dari tiga buah sekolah, *P*, *Q* dan *R* yang mengambil bahagian dalam suatu pertandingan catur.

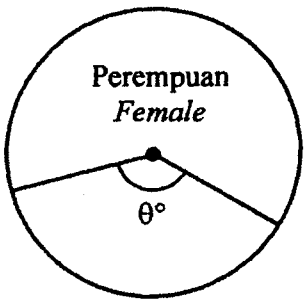
Diagram 26 is a bar chart showing the number of pupils from three schools, P, Q and R who took part in a chess competition.



Rajah 26
Diagram 26

Data pada carta palang diwakili oleh suatu carta pai seperti pada Rajah 26·1, hitung nilai θ.

The data in the bar chart is represented by a pie chart as shown in Diagram 26·1, calculate the value of θ.



Rajah 26·1
Diagram 26·1

A 95°

B 115°

C 135°

D 155°

24 Ringkaskan:
Simplify:

$$\frac{3f \times (16g^6)^{\frac{1}{2}}}{(f^9\, g^{-3})^{\frac{1}{3}}}$$

A $\frac{24g^4}{f^8}$

B $\frac{24g^2}{f^2}$

C $\frac{12g^2}{f^8}$

D $\frac{12g^4}{f^2}$

25 Diberi bahawa $x \leq m \leq y$ ialah penyelesaian bagi kedua-dua ketaksamaan linear serentak $m - 3 \leq 11$ dan $2m + 5 \geq 9$, cari nilai x dan y.

Given that $x \leq m \leq y$ is the solution for both of the simultaneous inequalities $m - 3 \leq 11$ and $2m + 5 \geq 9$, find the values of x and y.

A $x = 2,\ y = 14$

B $x = 4,\ y = 14$

C $x = 14,\ y = 4$

D $x = 14,\ y = 2$

21 Diberi $\frac{p}{3} = \frac{t-2}{q}$, ungkapkan t dalam sebutan p dan q.

Given $\frac{p}{3} = \frac{t-2}{q}$, *express t in terms of p and q.*

A $t = \frac{pq+6}{3}$

B $t = \frac{pq+2}{3}$

C $t = \frac{pq}{3} + 2q$

D $t = pq + 2$

22 Diberi bahawa $\frac{1}{u-2} = \frac{3}{u+4}$, hitung nilai u.

Given that $\frac{1}{u-2} = \frac{3}{u+4}$, *calculate the value of u.*

A 1

B 2

C 4

D 5

23 $Q^{\frac{3}{5}} =$

A $\sqrt[5]{Q^3}$

B $\sqrt[3]{Q^5}$

C $(\sqrt{Q^3})^5$

D $(\sqrt{Q^5})^3$

35 Jadual 35 menunjukkan satu set nombor. Satu nombor dipilih secara rawak daripada jadual itu.

Table 35 shows a set of numbers. A number is chosen at random from the table.

13	14	15	16
17	18	20	23
31	32	41	50

Jadual 35
Table 35

Hitung kebarangkalian bahawa nombor yang dipilih itu mempunyai hasil tambah digit-digitnya ialah 5.

Calculate the probability that the number chosen has the sum of its digits is 5.

A $\frac{1}{4}$

B $\frac{1}{6}$

C $\frac{5}{12}$

D $\frac{7}{12}$

38 Diberi bahawa $P \propto R$ dan $R = 2T + 10$.
Jika $P = 4$ apabila $T = 3$, maka $P =$

It is given that $P \propto R$ *and* $R = 2T + 10$.
If $P = 4$ *when* $T = 3$, *then* $P =$

A $\dfrac{T+5}{2}$

B $\dfrac{3(T+5)}{2}$

C $\dfrac{2T+10}{3}$

D $2(T+5)$

39 $2\begin{pmatrix}-1\\1\end{pmatrix} - \frac{1}{4}\begin{pmatrix}-12\\16\end{pmatrix} =$

A $\begin{pmatrix}-5\\2\end{pmatrix}$

B $\begin{pmatrix}-5\\-2\end{pmatrix}$

C $\begin{pmatrix}1\\2\end{pmatrix}$

D $\begin{pmatrix}1\\-2\end{pmatrix}$

40 Diberi bahawa $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & 0 \\ 0 & 2 \end{pmatrix}\begin{pmatrix} 1 \\ -4 \end{pmatrix}$.

Cari nilai x dan nilai y.

It is given that $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & 0 \\ 0 & 2 \end{pmatrix}\begin{pmatrix} 1 \\ -4 \end{pmatrix}$.

Find the values of x and y.

A $x = 2,\ y = -12$

B $x = 3,\ y = -8$

C $x = -12,\ y = 2$

D $x = -8,\ y = 3$

KERTAS SOALAN TAMAT
END OF QUESTION PAPER

MAJLIS PENGETUA SEKOLAH MENENGAH
NEGERI KEDAH DARUL AMAN

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM TAHUN 2012
MATEMATIK 1449
Kertas 1

Jawapan / Answer:

1	A	11	D	21	A	31	C
2	D	12	B	22	D	32	A
3	B	13	C	23	A	33	D
4	C	14	D	24	D	34	B
5	C	15	C	25	A	35	C
6	D	16	B	26	C	36	D
7	B	17	C	27	B	37	B
8	B	18	A	28	C	38	A
9	D	19	A	29	C	39	D
10	A	20	B	30	A	40	B

Analisis Jawapan / Answer Analysis:

Qs	1 – 10		11 – 20		21 – 30		31 – 40		JUMLAH
A	2	+	2	+	4	+	2	=	10
B	3	+	3	+	1	+	3	=	10
C	2	+	3	+	3	+	2	=	10
D	3	+	2	+	2	+	3	=	10
							JUMLAH KESELURUHAN :		40

NOTA: **MARKAH CALON** $= \dfrac{(K1 + K2)}{140} \times 100$

NAMA :.....

ANGKA GILIRAN :..... TINGKATAN : 5.....

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM
TAHUN 2012

MATEMATIK, 1449/2
Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	3	
	2	4	
	3	4	
	4	3	
	5	5	
	6	6	
	7	4	
	8	6	
	9	6	
	10	5	
	11	6	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
		Jumlah	

Kertas soalan ini mengandungi 36 halaman bercetak

RUMUS MATEMATIK
MATHEMATICAL FORMULAE

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

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

PERKAITAN
RELATIONS

1 $a^m \times a^n = a^{m+n}$

2 $a^m \div a^n = a^{m-n}$

3 $(a^m)^n = a^{mn}$

4 $A^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

5 Jarak / *Distance* $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

6 Titik Tengah / *midpoint*, $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

7 Purata laju $= \frac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$

Average speed $= \frac{\textit{distance travelled}}{\textit{time taken}}$

8 Min $= \frac{\text{hasil tambah nilai data}}{\text{bilangan data}}$

Mean $= \frac{\textit{sum of data}}{\textit{number of data}}$

9 Min $= \frac{\text{hasil tambah (nilai titik tengah kelas} \times \text{kekerapan)}}{\text{hasil tambah kekerapan}}$

Mean $= \frac{\textit{sum of (class mark} \times \textit{frequency)}}{\textit{sum of frequencies}}$

10 Teorem Pithagoras
Pythagoras Theorem
$c^2 = a^2 + b^2$

11 $P(A) = \frac{n(A)}{n(S)}$

12 $P(A') = 1 - P(A)$

13 $m = \frac{y_2 - y_1}{x_2 - x_1}$

14 $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$

$m = -\frac{\textit{y-intercept}}{\textit{x-intercept}}$

BENTUK DAN RUANG
SHAPES AND SPACE

1 Luas trapezium
$= \frac{1}{2} \times$ hasil tambah dua sisi selari $\times$ tinggi
Area of trapezium
$= \frac{1}{2} \times$ *sum of parallel sides* $\times$ *height*

2 Lilitan bulatan $= \pi d = 2\pi j$
Circumference of circle $= \pi d = 2\pi r$

3 Luas bulatan $= \pi j^2$
Area of circle $= \pi r^2$

4 Luas permukaan melengkung silinder $= 2\pi jt$
Curved surface area of cylinder $= 2\pi rh$

5 Luas permukaan sfera $= 4\pi j^2$
Surface area of sphere $= 4\pi r^2$

6 Isipadu prisma tegak = Luas keratan rentas $\times$ panjang
Volume of right prism = cross sectional area × length

7 Isipadu silinder $= \pi j^2 t$
Volume of cylinder $= \pi r^2 h$

8 Isipadu kon $= \frac{1}{3}\pi j^2 t$
Volume of cone $= \frac{1}{3}\pi r^2 h$

9 Isipadu sfera $= \frac{4}{3}\pi j^3$
Volume of sphere $= \frac{4}{3}\pi r^3$

10 Isipadu piramid tegak $= \frac{1}{3} \times$ luas tapak $\times$ tinggi
Volume of right pyramid $= \frac{1}{3} \times$ *base area* $\times$ *height*

11 Hasil tambah sudut pedalaman poligon $= (n-2) \times 180^\circ$
Sum of interior angles of a polygon $= (n-2) \times 180^\circ$

12 $\frac{\text{panjang lengkok}}{\text{lilitan bulatan}} = \frac{\text{sudut pusat}}{360^\circ}$
$\frac{\textit{arc length}}{\textit{circumference of circle}} = \frac{\textit{angle subtended at centre}}{360^\circ}$

13 $\frac{\text{luas sektor}}{\text{luas bulatan}} = \frac{\text{sudut pusat}}{360^\circ}$
$\frac{\textit{area of sector}}{\textit{area of circle}} = \frac{\textit{angle subtended at centre}}{360^\circ}$

14 Faktor skala, $k = \frac{PA'}{PA}$
Scale factor, $k = \frac{PA'}{PA}$

15 Luas imej $= k^2 \times$ luas objek
Area of image $= k^2 \times$ *area of object*

Untuk Kegunaan Pemeriksa

For Examiner's Use

Bahagian A
Section A

[52 markah / *marks*]

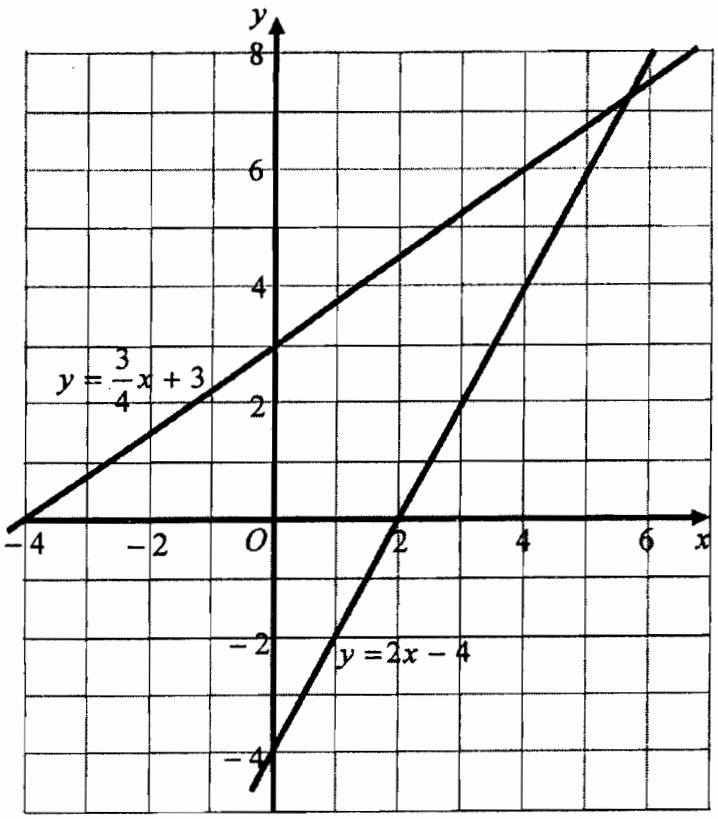
Jawab **semua** soalan dalam bahagian ini.
Answer **all** *questions in this section.*

1 Pada graf di ruang jawapan, lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $y \geq 2x - 4$, $y \leq \frac{3}{4}x + 3$ dan $x > 1$.

On the graph in the answer space, shade the region which satisfy the three inequalities $y \geq 2x - 4$, $y \leq \frac{3}{4}x + 3$ *and* $x > 1$.

[3 markah/*marks*]

Jawapan/*Answer*:



Untuk Kegunaan Pemeriksa

For Examiner's Use

2 Hitung nilai x dan nilai y yang memuaskan persamaan linear serentak berikut:

Calculate the value of x and of y that satisfy the following simultaneous linear equations:

$$2x - 3y = 16$$

$$x + \frac{1}{2}y = 4$$

[4 markah/*marks*]

Jawapan/*Answer*:

3 Selesaikan persamaan kuadratik berikut:

Solve the following quadratic equation:

$$\frac{7x^2 - 6}{x} = 3x + 5$$

[4 markah/*marks*]

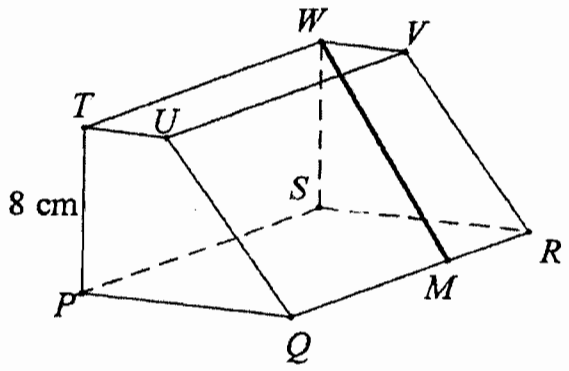
Jawapan/*Answer*:

Untuk Kegunaan Pemeriksa

For Examiner's Use

4 Rajah 4 menunjukkan sebuah prisma tegak. Tapak *PQRS* adalah segi empat tepat yang mengufuk. Trapezium *PQUT* ialah keratan rentas seragam prisma itu. *M* terletak di atas garis lurus *QR*.

Diagram 4 shows a right prism. The base PQRS is a horizontal rectangle. The trapezium PQUT is the uniform cross section of the prism. M lies on straight line QR.



Rajah 4
Diagram 4

Diberi $WM = 17$ cm.

Given $WM = 17$ cm.

(*a*) Namakan sudut di antara garis lurus *WM* dan satah *PQRS*.

Name the angle between the line WM and the plane PQRS.

(*b*) Hitung sudut di antara garis lurus *WM* dan satah *PQRS*.

Calculate the angle between the line WM and the plane PQRS.

[3 markah/*marks*]

Jawapan/*Answer*:

(*a*)

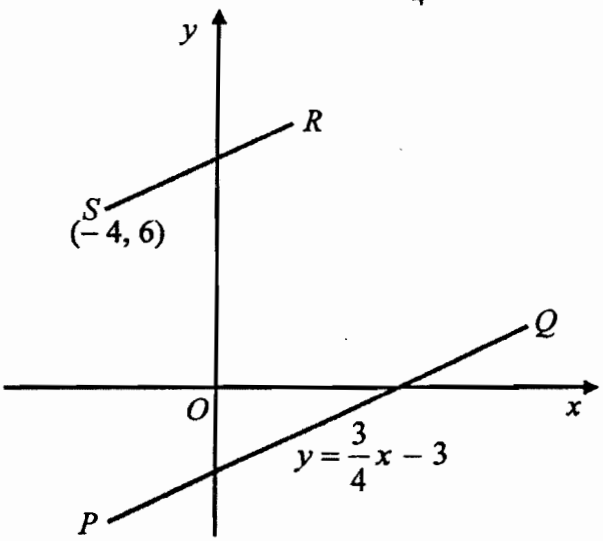
(*b*)

Untuk Kegunaan Pemeriksa

For Examiner's Use

5 Rajah 5 menunjukkan garis lurus PQ dan garis lurus SR yang dilukis pada suatu satah Cartesan dan O ialah asalan. Garis lurus PQ adalah selari dengan garis lurus SR. Persamaan garis lurus PQ ialah $y = \frac{3}{4}x - 3$.

Diagram 5 shows straight line PQ and straight line SR drawn on a Cartesian plane and O is the origin. Straight line PQ is parallel to straight line SR. The equation of the straight line PQ is $y = \frac{3}{4}x - 3$.



Rajah 5
Diagram 5

Cari

Find

(*a*) persamaan bagi garis lurus SR,

the equation of the straight line SR,

(*b*) pintasan-x bagi garis lurus PQ.

the x-intercept of the straight line PQ.

[5 markah/*marks*]

Jawapan /*Answer*:

(*a*)

(*b*)

Untuk Kegunaan Pemeriksa

For Examiner's Use

6 (*a*) Untuk setiap pernyataan berikut, tentukan sama ada pernyataan ini benar atau palsu.

For each of the following statements, determine whether the statement is true or false.

(i) $2^{-4} = \frac{1}{8}$ atau $4^2 = 16$

$2^{-4} = \frac{1}{8}$ *or* $4^2 = 16$

(ii) 3 ialah nombor ganjil dan 9 ialah nombor perdana.

3 *is an odd number and* 9 *is a prime number.*

(*b*) Tulis satu pernyataan berdasarkan dua implikasi berikut:

Write a statement based on two following implications:

Implikasi 1 : Jika $x > 3$, maka $4x > 12$.

Implikasi 2 : Jika $4x > 12$, maka $x > 3$.

Implication 1 : *If* $x > 3$, *then* $4x > 12$

Implication 2 : *If* $4x > 12$, *then* $x > 3$

(*c*) Tulis Premis 2 untuk melengkapkan hujah berikut.

Write down Premise 2 *to complete the following argument.*

Premis 1 : Semua nombor genap boleh dibahagi dengan 2.

Premise 1 : *All even numbers is divisible by* 2

Premis 2 / *Premise* 2 : .....

Kesimpulan : 96 boleh dibahagi dengan 2.

Conclusion : 96 *is divisible by* 2.

(*d*) Buat satu kesimpulan umum secara aruhan bagi urutan nombor 3, 8, 15, 24, ... yang mengikut pola berikut:

Make a general conclusion by induction for the sequence of numbers 3, 8,15, 24 ... *which follows the following pattern*:

$$3 = (1 + 1)^2 - 1$$
$$8 = (2 + 1)^2 - 1$$
$$15 = (3 + 1)^2 - 1$$
$$24 = (4 + 1)^2 - 1$$
$$\cdots \quad \cdots \quad \cdots$$
$$\cdots \quad \cdots \quad \cdots$$
$$\cdots \quad \cdots \quad \cdots$$
$$\ldots = \ldots\ldots\ldots\ldots$$

[6 markah/*marks*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

Jawapan / *Answer*:

(*a*) (i)

(ii)

(*b*) .....

(*c*) Premis 2 / *Premise* 2:

.....

(*d*) .....

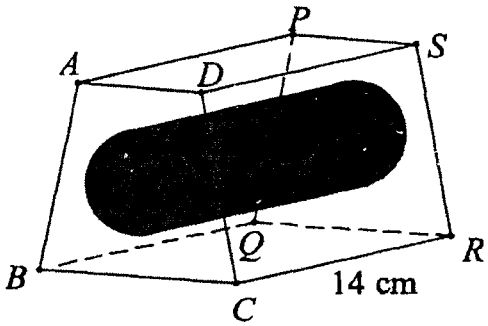
.....

Untuk Kegunaan Pemeriksa

For Examiner's Use

7 Rajah 7 menunjukkan sebuah pepejal berbentuk pisma tegak. Trapezium *ABCD* ialah keratan rentas seragam prisma itu. Sebuah silinder berjejari 3 cm dan tinggi 14 cm dikeluarkan dari pepejal itu.

Diagram 7 shows a solid right prism. Trapezium ABCD is the uniform cross section of the prism. A cylinder with radius 3 cm *and height* 14 cm *is taken out of the solid.*



Rajah 7
Diagram 7

Luas keratan rentas seragam *ABCD* ialah 108 cm^2.
Hitungkan isipadu, dalam cm^3, pepejal yang tinggal.

The area of the cross section ABCD is 108 cm^2.
Calculate the volume, in cm^3, *of the remaining solid.*

[Guna /*Use* $\pi = \frac{22}{7}$]

[4 markah/*marks*]

Jawapan / *Answer*:

For Examiner's Use

Untuk Kegunaan Pemeriksa

8 Diberi bahawa matriks $P = \begin{pmatrix} 2 & -3 \\ 4 & 1 \end{pmatrix}$ dan matriks $Q = k\begin{pmatrix} 1 & 3 \\ h & 2 \end{pmatrix}$ dengan keadaan $PQ = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

Given that matrix $P = \begin{pmatrix} 2 & -3 \\ 4 & 1 \end{pmatrix}$ *and matrix* $Q = k\begin{pmatrix} 1 & 3 \\ h & 2 \end{pmatrix}$ *such that* $PQ = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

(*a*) Carikan nilai k dan nilai h.

Find the value of k *and of* h.

(*b*) Tulis persamaan linear serentak berikut dalam persamaan matriks:

Write the following simultaneous linear equations as matrix equation:

$$2x - 3y = 13$$
$$4x + y = 5$$

Seterusnya, menggunakan kaedah matriks, hitung nilai x dan nilai y.

Hence, by using matrix method, calculate the value of x *and of* y.

[6 markah/*marks*]

Jawapan / *Answer*:

(*a*)

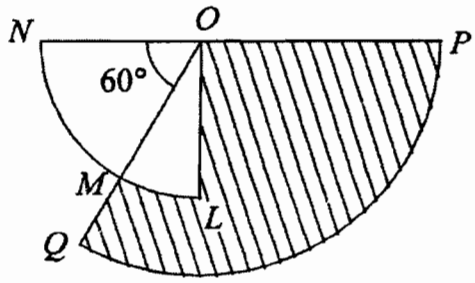
(*b*)

Untuk Kegunaan Pemeriksa

For Examiner's Use

9 Rajah 9 menunjukkan sukuan bulatan *OLMN* dan sektor bulatan *OPQ*, yang kedua-duanya berpusat *O*.

Diagram 9 shows quadrant OLMN and sector OPQ, both with centre O.



Rajah 9
Diagram 9

Diberi bahawa $OP = 21$ cm dan $ON = 14$ cm.

It is given that $OP = 21$ cm *and* $ON = 14$ cm.

[Guna/*Use* $\pi = \frac{22}{7}$]

Hitung

Calculate

(*a*) perimeter, dalam cm, seluruh rajah itu.

The perimeter, in cm, *of the whole diagram.*

(*b*) luas, dalam cm^2, kawasan belorek,

the area, in cm^2, *of the shaded region,*

[6 markah/*marks*]

Jawapan / *Answer*:

(*a*)

(*b*)

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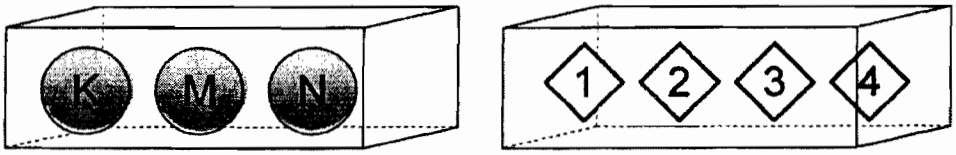
Untuk Kegunaan Pemeriksa

Untuk Kegunaan Pemeriksa

For Examiner's Use

10 Rajah 10 menunjukkan tiga biji bola ping pong berlabel huruf di dalam kotak A, dan empat kad berlabel nombor di dalam kotak B.

Diagram 10 *shows three table tennis balls labelled with numbers in box* A *and four cards labelled with letters in box* B.



Kotak A
Box A

Kotak B
Box B

Rajah 10
Diagram 10

Sebiji bola ping pong dipilih secara rawak dari kotak A dan kemudian satu kad dipilih secara rawak dari kotak B.

A table tennis ball is picked at random from box A *and then a card is picked at random from box* B.

(*a*) Jadual di ruang jawapan (*a*) menunjukkan kesudahan peristiwa yang mungkin, yang tidak lengkap.

Lengkapkan kesudahan peristiwa yang mungkin itu .

Table in the answer space (*a*) *shows the incomplete possible outcomes of the event.*

Complete the possible outcomes of the event.

[2 markah /*marks*]

(*b*) Menggunakan senarai lengkap kesudahan di ruang jawapan, cari kebarangkalian

Using the complete possible outcomes in the answer space, find the probability that

(i) satu bola dilabel dengan **K** dan satu kad dilabel dengan nombor genap dipilih,

a ball labelled with **K** *and a card labelled with even number are picked,*

(ii) satu bola dilabel dengan **M** atau satu kad dilabel dengan nombor ganjil dipilih.

a card labelled with **M** *or a card labelled with odd number are picked.*

[3 markah /*marks*]

Jawapan / *Answer*:

For Examiner's Use

Untuk Kegunaan Pemeriksa

(*a*)

	1	2	3	4
K	(K,1)	(K,2)		(K,4)
M	(M,1)		(M,3)	(M,4)
N	(N,1)	(N,2)	(M,3)	

(*b*) (i)

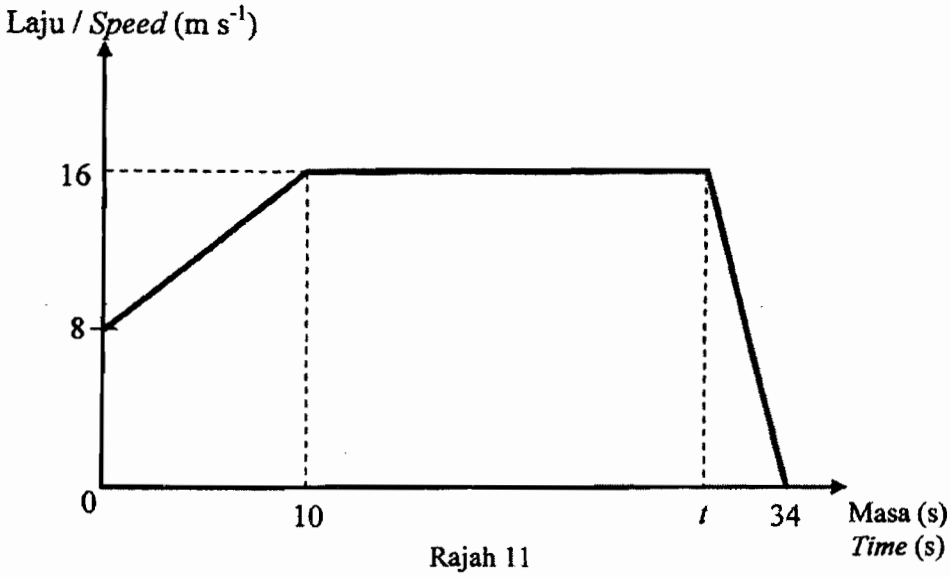
(ii)

Untuk Kegunaan Pemeriksa

For Examiner's Use

11 Rajah 11 menunjukkan graf laju-masa bagi pergerakan suatu zarah dalam tempoh 34 saat.

Diagram 11 *shows a speed-time graph for the movement of a particle for a period of* 34 *seconds.*



Rajah 11
Diagram 11

Jumlah jarak yang dilalui oleh zarah itu ialah 480 m.

The total distance travelled by the particle is 480 m.

(*a*) Nyatakan laju seragam, dalam ms^{-1}, zarah itu.

State the uniform speed, in ms^{-1}, *of particle.*

(*b*) Hitung kadar perubahan laju, dalam ms^{-2}, zarah itu dalam 10 s pertama.

Calculate the rate of change of speed, in ms^{-2}, *of particle for the first* 10 *s.*

(*c*) Hitung nilai *t*.

Calculate the value of t.

[6 markah/*marks*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

Jawapan / *Answer*:

(*a*)

(*b*)

(*c*)

Untuk Kegunaan Pemeriksa

For Examiner's Use

Bahagian B
Section B

[48 markah / *marks*]

Jawab mana-mana **empat** soalan daripada bahagian ini.
Answer any **four** *questions from this section.*

12 (*a*) Lengkapkan Jadual 12 di ruang jawapan pada halaman 20, bagi persamaan $y = 3x^2 + 4x - 5$ dengan menulis nilai y apabila $x = -1$ dan nilai y apabila $x = 2$.

Complete Table 12 *in the answer space on page* 20, *for the equation* $y = 3x^2 + 4x - 5$ *by writing down the value of* y *when* $x = -1$ *and the value of* y *when* $x = 2$.

[2 markah/*marks*]

(*b*) Untuk ceraian soalan ini, gunakan kertas graf yang disediakan pada halaman 21. Anda boleh menggunakan pembaris fleksibel.

Dengan menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2 cm kepada 5 unit pada paksi-y, lukiskan graf $y = 3x^2 + 4x - 5$ untuk $-3 \le x \le 3$ dan $-7 \le y \le 34$.

For this part of question, use the graph paper provided on page 21.
You may use a flexible curve rule.

By using a scale of 2 cm *to* 1 unit *on the x-axis and* 2 cm *to* 5 units *on the y-axis, draw the graph of* $y = 3x^2 + 4x - 5$ *for* $-3 \le x \le 4$ *and* $-7 \le y \le 34$.

[4 markah/*marks*]

(*c*) Dari graf di ruang jawapan **12**(*b*), cari

From the graph in the answer space **12**(*b*), *find*

(i) nilai y apabila $x = -1 \cdot 5$,

the value of y *when* $x = -1 \cdot 5$,

(ii) nilai x apabila $y = 20$.

the value of x *when* $y = 20$.

[2 markah/*marks*]

(*d*) Lukis satu garis lurus yang sesuai pada graf di ruang jawapan **12**(*b*) untuk mencari satu nilai x yang memuaskan persamaan $3x^2 + 2x - 11 = 0$ bagi $-3 \le x \le 3$ dan $-7 \le y \le 34$.

Nyatakan nilai-nilai x ini.

Draw a suitable straight line on your graph in the answer space 12(*b*) *to find the value of* x *which satisfy the equation* $3x^2 + 2x - 11 = 0$ *for* $-3 \le x \le 3$ *and* $-7 \le y \le 34$.

State these values of x.

[4 markah/*marks*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

Jawapan / *Answer*:

(*a*) $y = 3x^2 + 4x - 5$

x	-3	-2	-1	$-0{\cdot}5$	0	1	2	3
y	10	-1		$-6{\cdot}3$	-5	2		34

Jadual 12
Table 12

(*b*) Rujuk graf di halaman 23.

Refer graph on page 23.

(*c*) (i) $y =$ .....

(ii) $x =$ .....

(*d*)

$x =$ .....

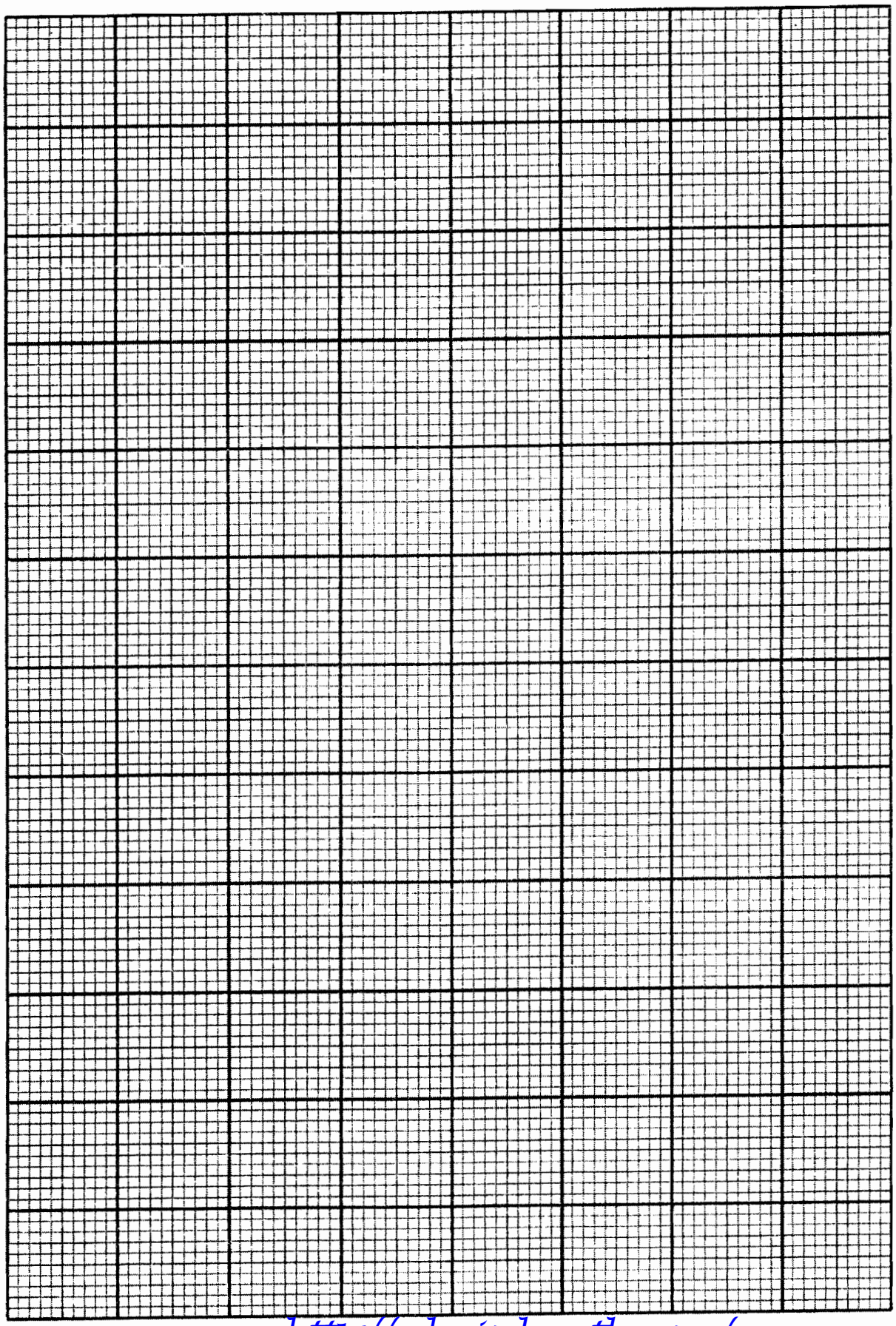
$x =$ .....

Graf untuk Soalan12

Graph for Question 12

Untuk Kegunaan Pemeriksa

For Examiner's Use



Untuk Kegunaan Pemeriksa

For Examiner's Use

13 (*a*) Penjelmaan **T** ialah translasi $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Penjelmaan **R** ialah pantulan pada garis lurus $x = 7$.

Transformation **T** *is a translation* $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Transformation **R** *is a reflection at the line* $x = 7$.

Nyatakan koordinat imej bagi titik (2, 1) di bawah penjelmaan berikut:

State the coordinates of the image of point (2, 1) *under the following transformation*:

(i) $\mathbf{T}^2$,

(ii) **TR**.

[4 markah/ *marks*]

Jawapan / *Answer*:

(*a*) (i)

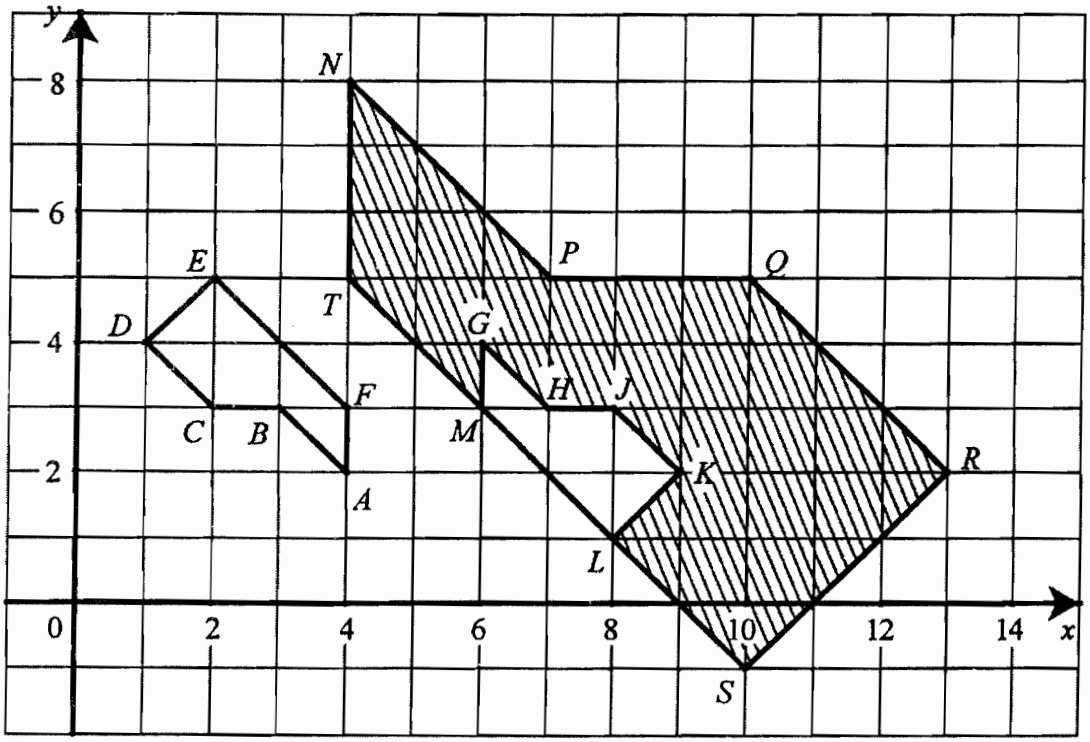
(ii)

Untuk Kegunaan Pemeriksa

For Examiner's Use

(*b*) Rajah 13 menunjukkan tiga heksagon, *ABCDEF*, *GHJKLM* dan *NPQRST* di atas satah Cartesian.

Diagram 13 *shows three hexagon, ABCDEF, GHJKLM and NPQRST on a Cartesian plane.*



Rajah 13
Diagram 13

GHJKLM ialah imej *ABCDEF* di bawah penjelmaan **V**.
NPQRST ialah imej *GHJKLM* di bawah penjelmaan **W**.

GHIJKL is the image of ABCDEF under transformation **V**.
NPQRST is the image of GHJKLM under transformation **W**.

(i) Huraikan selengkapnya penjelmaan:

Describe in full the transformation:

(*a*) **V**,

(*b*) **W**.

(ii) Diberi bahawa heksagon *NPQRST* mewakili suatu kawasan yang mempunyai luas 63 cm^2, hitungkan luas, dalam cm^2, kawasan yang diwakili oleh rantau berlorek.

Given that hexagon NPQRST represent a region of area 63 cm^2, *calculate the area, in* cm^2, *of the region represented by the shaded region.*

[8 markah/ *marks*]

Jawapan / *Answer*:

Untuk Kegunaan Pemeriksa

For Examiner's Use

(*b*) (i) (*a*) **V** : .....

.....

(*b*) **W** : .....

.....

(ii)

Untuk Kegunaan Pemeriksa

For Examiner's Use

14 Data dalam Rajah 14 menunjukkan bilangan pelajar yang hadir ke pusat tuisyen sehari dalam tempoh 40 hari.

The data in Diagram 14 *shows the number of students attended at tuition centre a day over* 40 *days.*

67	78	85	71	86	79	89	82	75	97
77	94	87	89	81	85	95	90	85	86
81	86	73	79	91	96	86	77	88	83
77	83	93	90	87	74	82	84	94	76

Rajah 14
Diagram 14

(*a*) (i) Berdasarkan data itu, lengkapkan Jadual 14 pada ruang jawapan.

Based on the data, complete Table 14 *in the answer space.*

[4 markah / *marks*]

(ii) Berdasarkan Jadual 14, hitung min anggaran bilangan pelajar yang hadir dalam tempoh 40 hari.

Based on Table 14, *calculate the estimated mean of the number of students attended in* 40 *days.*

[3 markah / *marks*]

(*b*) Untuk ceraian soalan ini, gunakan kertas graf yang disediakan di halaman 29.

Menggunakan skala 2 cm kepada 5 markah pada paksi mengufuk dan 2 cm kepada 5 hari pada paksi mencancang, lukis satu ogif bagi data tersebut.

For this part of the question, use the graph paper provided on page 29.

Using the scale of 2 cm *to* 5 *marks on the horizontal axis and* 2 cm *to* 5 *days on the vertical axis, draw an ogive for the data.*

[4 markah / *marks*]

(*c*) Berdasarkan ogif yang dilukis, cari bilangan hari kehadiran pelajar melebihi 90 orang.

Based on the ogive drawn, find the number of days the attendance is more than 90 *students.*

[1 markah / *mark*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

Jawapan / *Answer*:

(*a*) (i)

Bilangan Pelajar *Number of Students*	Kekerapan *Frequency*	Sempadan Atas *Upper Boundry*	Kekerapan Longgokan *Cumulatif Frequency*
61 – 65	0		0
66 – 70			
71 – 75			
76 – 80			
81 – 85			
86 – 90			
91 – 95			
96 – 100			

Jadual 14
Table 14

(ii)

(*b*) Rujuk graf di halaman 29.

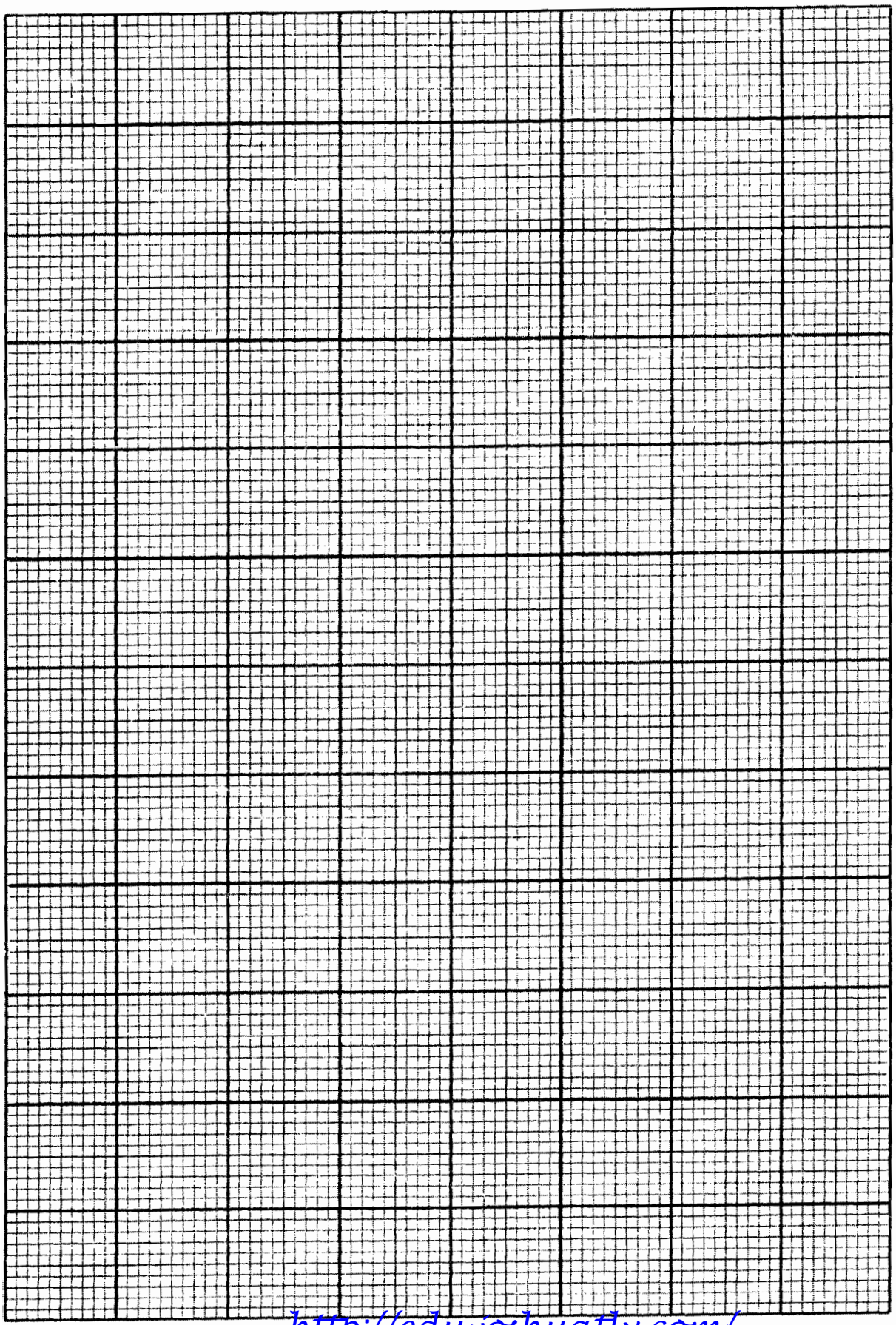
Refer graph on page 29.

(*c*)

Graf untuk Soalan 14
***Graph for Question* 14**

Untuk Kegunaan Pemeriksa

For Examiner's Use



Untuk Kegunaan Pemeriksa

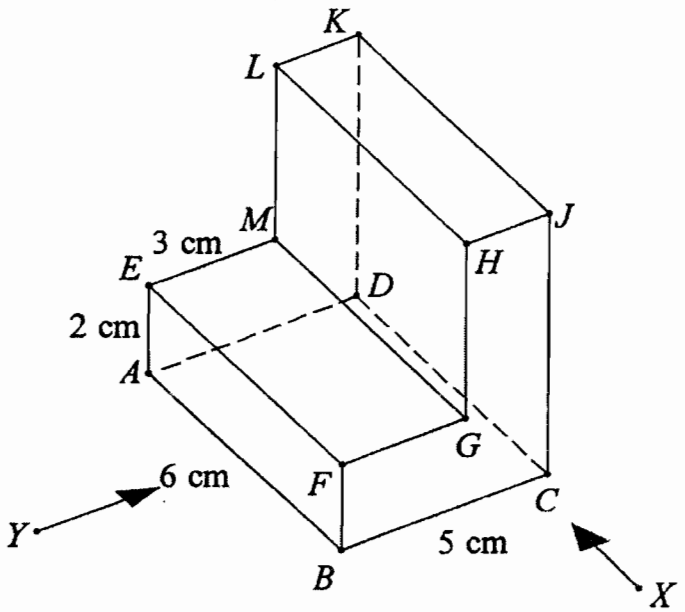
For Examiner's Use

15 You are **not** allowed to use graph paper to answer this question.

Anda **tidak** *dibenarkan menggunakan kertas graf untuk menjawab soalan ini.*

(*a*) Rajah 15.1 menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segi empat tepat *ABCD* terletak di atas satah mengufuk. Permukaan *BCJHGF* ialah keratan rentas seragam prisma itu. Segi empat tepat *EFGM* dan *LHJK* adalah satah mengufuk. Segi empat tepat *MGHL, ABFE* dan *DCJK* ialah satah tegak.

Diagram 15.1 *shows a solid right prism with rectangular base ABCD on a horizontal plane. The surface BCJHGF is the uniform cross section of the prism. Rectangles EFGM and LHJK are horizontal plane. Rectangles MGHL, ABFE and DCJK are vertical planes.*



Rajah 15.1
Diagram 15.1

Lukis dengan skala penuh, pelan pepejal itu.

Draw in full scale, the plan of the solid.

[3 markah/ *marks*]

Jawapan / *Answer*:

Untuk Kegunaan Pemeriksa

For Examiner's Use

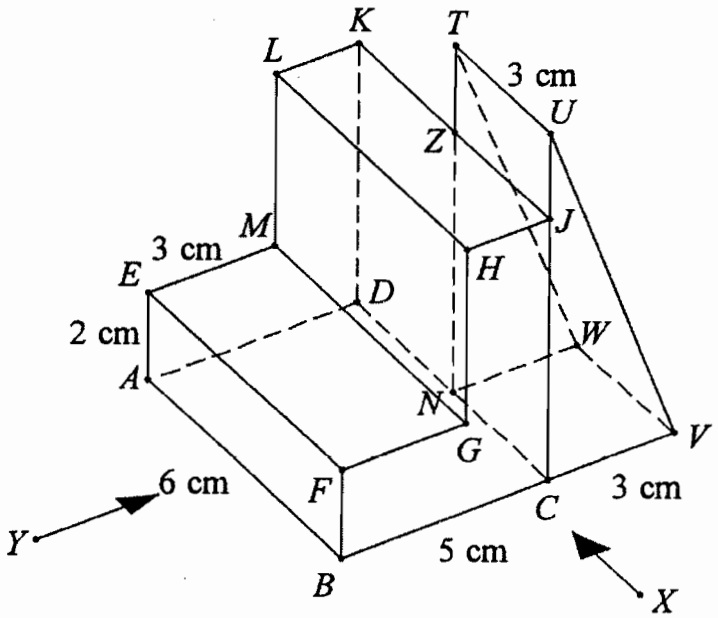
15 (*a*)

Untuk Kegunaan Pemeriksa

For Examiner's Use

(*b*) Sebuah pepejal lain berbentuk prisma tegak dengan tapak segi empat tepat *NCVW* dan keratan rentas seragamnya, segitiga bersudut tegak *UCV*, dicantumkan kepada prisma dalam Rajah 15.1 pada satah tegak *CJZN*. Gabungan pepejal adalah seperti yang ditunjukkan dalam Rajah 15.2. Tapak *ABCVWND* terletak di atas satah mengufuk. Segi empat tepat *WVUT* adalah satah condong dan tepi *CU* adalah tegak. Diberi bahawa *JU* = 2 cm.

Another solid in a form of a right prism with rectangular base NCVW and the uniform cross section of the prism, right angled triangle CVU is joined to the prism in Diagram 15.1 *at the vertical plane CJZN. The combined solid is as shown in Diagram* 15.2. *The base ABCVWND lies on a horizontal plane. Rectangle WVUT is an inclined plane and edge CU is vertical. It is given that JU* = 2 cm.



Rajah 15.2
Diagram 15.2

Lukis dengan skala penuh,

Draw to full scale

(i) dongakan gabungan pepejal itu pada satah mencancang yang selari dengan *BC* sebagaimana dilihat dari *X*.

the elevation of the combined solid on a vertical plane parallel to BC as viewed from X.

[4 markah/*marks*]

(ii) dongakan gabungan pepejal itu pada satah mencancang yang selari dengan *AB* sebagaimana dilihat dari *Y*.

the elevation of the combined solid on a vertical plane parallel to AB as viewed from Y.

[5 markah/*marks*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

Jawapan / *Answer*:

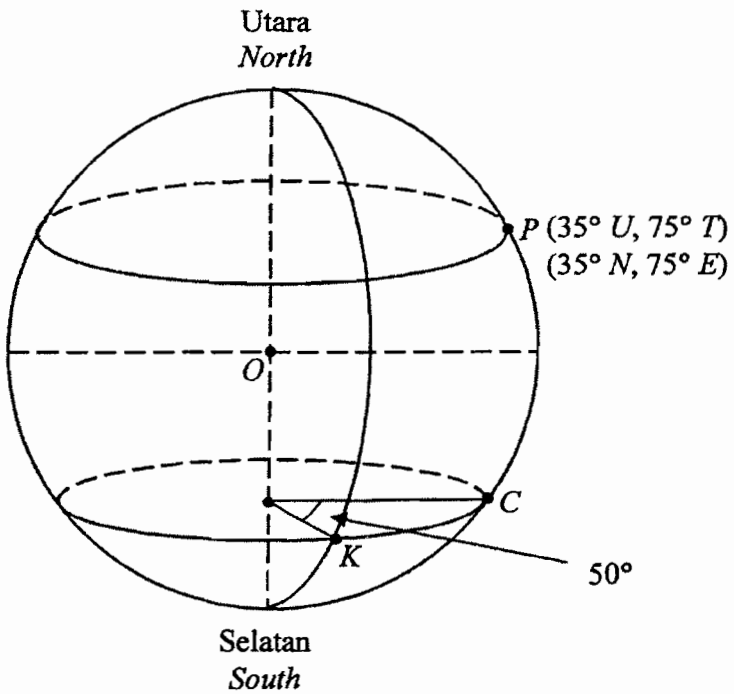
(*b*) (i), (ii)

Untuk Kegunaan Pemeriksa

For Examiner's Use

16 Rajah 16 menunjukkan tiga titik, C (45° S, 75° T), K (45° S, 25° T) dan P, di permukaan bumi. M ialah satu titik lagi di permukaan bumi dengan keadaan PM ialah diameter bumi.

Diagram 16 *shows three points* C (45° S, 75° E), K (45° S, 25° T) *and* P, *on the surface of the earth.* M *is another point on the surface of the earth such that* PM *is a diameter of the earth.*



Rajah 16
Diagram 16

(*a*) Nyatakan kedudukan bagi titik M.

State the location of point M.

[3 markah /*marks*]

(*b*) Hitung jarak, dalam batu nautika, dari K arah ke timur ke C diukur sepanjang selarian latitud sepunya 45° S.

Calculate the distance, in nautical mile, from K due east to C measured along the parallel of latitude of 45° *S.*

[3 markah/ *marks*]

(*c*) Hitung jarak terpendek, dalam batu nautika, dari C ke utara ke P, diukur sepanjang permukaan bumi.

Calculate the shortest distance, in nautical mile, from C to the North to P measured along the surface of the earth

[3 markah/ *marks*]

Untuk Kegunaan Pemeriksa

For Examiner's Use

(*d*) Sebuah kapal terbang berlepas dari *K* arah ke timur ke *C* mengikut selarian latitud sepunya dan kemudian terbang arah ke utara ke *P*. Purata laju bagi seluruh perjalanan itu ialah 600 knot.

Hitung jumlah masa, dalam jam, yang diambil bagi seluruh penerbangan itu.

An aeroplane took off from K and flew due east to C along the common parallel of latitude and then flew due north to P. The average speed for the whole flight was 600 *knots.*

Calculate the total time, in hours, taken for the whole flight.

[4 markah/ *marks*]

Jawapan / *Answer*:

(*a*)

(*b*)

(*c*)

(*d*)

MAKLUMAT UNTUK CALON
INFORMATION FOR CANDIDATES

1. Kertas soalan ini mengandungi dua bahagian: **Bahagian A** dan **Bahagian B**.

   This question paper consists of two sections: **Section A** *and* **Section B**.

2. Jawab **semua** soalan dalam **Bahagian A** dan mana-mana **empat** soalan daripada **Bahagian B**.

   Answer **all** *questions in* **Section A** *and any* **four** *questions from* **Section B**.

3. Tulis jawapan anda pada ruang yang disediakan dalam kertas soalan ini.

   Write your answer in the spaces provided in the question paper.

4. Tunjukkan kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

   Show your working. It may help you to get marks.

5. Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

   If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.

6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

   The diagrams in the questions provided are not drawn to scale unless stated.

7. Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

   The marks allocated for each question and sub-part of a question are shown in brackets.

8. Satu senarai rumus disediakan di halaman 2 hingga 3.

   A list of formulae is provided on pages 2 *to* 3.

9. Sebuah buku sifir matematik empat angka boleh digunakan.

   A booklet of four-figure mathematical tables can be used.

10. Anda dibenarkan menggunakan kalkulator saintifik.

    You may use a scientific calculator.

11. Serahkan kertas soalan ini kepada pengawas peperiksaan pada akhir peperiksaan.

    Hand this question paper to the invigilator at the end of the examination.

1449/2 (PP)
Matematik
Kertas 2
Peraturan
Pemarkahan
September
2012

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM TAHUN 2012

MATEMATIK

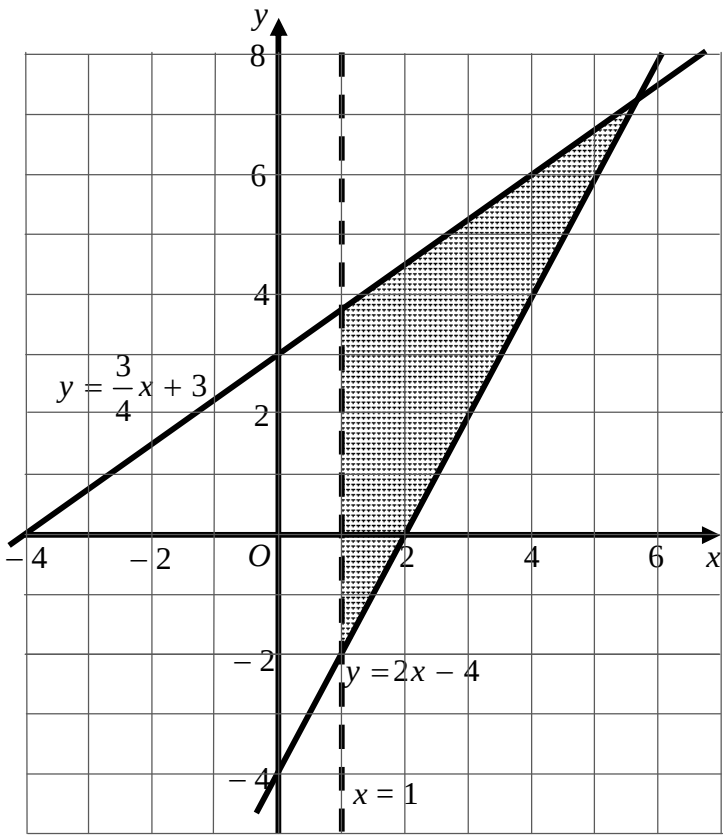
Kertas 2

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 19 halaman bercetak

Section A
[52 *marks*]

Question	Solution and Mark Scheme	Marks	
1			
	Straight dotted line $y = 2x$ correctly drawn.	K1	
	Region correctly shaded	P2	**3**
	Note: 1 Accept solid line $x = 1$ for K1 2 Award P1 to shaded region bounded by two correct lines, including part of **R**. (Check one vertex from any two correct lines		

Question	Solution and Mark Scheme	Marks	
2	$2x+y=8$ *or* $6x+3y=24$ *or* $\frac{6}{5}x+\frac{3}{2}y=-\frac{3}{5}$ *or* equivalent	K1	
	Note : Attempt to equate one of the coefficients the unknowns, award K1		
	OR		
	$x=\frac{3y+16}{2}$ *or* $y=\frac{2x-16}{3}$ *or* $x=4-\frac{1}{2}y$ *or* $y=8-2x$ *or* equivalent (K1)		
	Note : Attempt to make one of the unknowns as the subject award K1.		
	$-4y=8$ *or* $8x=40$ *or* equivalent	K1	
	OR		
	$\begin{pmatrix} x \\ y \end{pmatrix}=\frac{1}{(2)\left(\frac{1}{2}\right)-(1)(-3)}\begin{pmatrix} \frac{1}{2} & 3 \\ -1 & 2 \end{pmatrix}\begin{pmatrix} 16 \\ 4 \end{pmatrix}$ (K2)		
	Note : Attempt to write without equation, award (K1)		
	$x=5$ $y=-2$	N1 N1	4
	Note : $\begin{pmatrix} x \\ y \end{pmatrix}=\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ as final answer, award N1		

Question	Solution and Mark Scheme	Marks	
3	$4x^2 - 5x - 6 = 0$ *or* equivalent	K1	
	$(4x+3)(x-2) = 0$ *or* equivalent	K1	
	OR		
	$x = \dfrac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(-8)}}{2(3)}$ (K1)		
	$x = -\dfrac{3}{4}$ *or* $-0\cdot75$	N1	
	$x = 2$	N1	4
	Note : 1. Accept without '= 0'. 2. Accept three terms on the same side, in any order. 3. Accept $\left(x+\dfrac{3}{4}\right)(x-2)$ with $x = -\dfrac{3}{4}$, 2 for Kk2. 4. Accept correct answer from the correct term without factorisation for Kk2.		
4 (*a*)	$\angle WMS$ *or* $\angle SMW$	P1	1
(*b*)	$\sin\theta = \dfrac{8}{17}$	K1	
	$28\cdot07^\circ$ *or* $28^\circ\ 4'$	N1	2
			3
5 (*a*)	$m_{SR} = \dfrac{3}{4}$	P1	
	$\dfrac{y-6}{x-(-4)} = {}^*m_{SR}$ *or* $6 = {}^*m_{SR}(-4) + c$ *or* equivalent	K1	
	$y = \dfrac{3}{4}x + 9$	N1	3
(*b*)	$0 = \dfrac{3}{4}x - 3$ *or* equivalent	K1	
	x –intercept , 4	N1	2
			5
	Note: 1. Accept correct answer without working for K1N1. 2. Accept $x = 4$ for N1		

Question	Solution and Mark Scheme	Marks	
6 (*a*)(i)	True // Benar	P1	
(ii)	False // Palsu	P1	2
(*b*)	$x > 3$ If and only if $4x > 12$ // $x > 3$ *jika dan hanya jika* $4x > 12$ *or* $4x > 12$ If and only if $x > 3$ // $4x > 12$ *jika dan hanya jika* $x > 3$	P1	1
(*c*)	96 is an even number // 96 ialah nombor genap	P1	1
(*d*)	$(n + 1)^2 - 1$,	K1	
	$n = 1, 2, 3, \ldots$	N1	2
			6
7	108×14	K1	
	$\frac{22}{7} \times 3 \times 3 \times 14$	K1	
	$108 \times 14 - \frac{22}{7} \times 3 \times 3 \times 14$	K1	
	1116	N1	4
	NOTE 1. Accept π for K mark. 2. Accept correct value from incomplete substitution for K mark. 3. Correct answer from incomplete working, award Kk2.		

Question	Solution and Mark Scheme	Marks	
8 (*a*)	$k = \frac{1}{14}$ *or* $\frac{1}{2\times4-4\times(-3)}$	P1	
	$h = -4$	P1	2
(*b*)	$\begin{pmatrix} 2 & -3 \\ 4 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ 5 \end{pmatrix}$	P1	
	$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{(2)(1)-(4)(-3}\begin{pmatrix} 1 & 3 \\ -4 & 2 \end{pmatrix}\begin{pmatrix} 13 \\ 5 \end{pmatrix}$ *or*		
	$\begin{pmatrix} x \\ y \end{pmatrix} = {}^{*}\begin{pmatrix} Inverse \\ matrix \end{pmatrix}\begin{pmatrix} 13 \\ 5 \end{pmatrix}$	K1	
	$x = 2$	N1	
	$y = -3$	N1	4
			6
	Note:		
	1. $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ as final answer, award N1		
	2. Do not accept any solution solved no using matrix method.		
	3. Do not accept ${}^{*}\begin{pmatrix} inverse \\ matrix \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ 4 & 1 \end{pmatrix}$ *or* ${}^{*}\begin{pmatrix} inverse \\ matrix \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$		

Question		Solution and Mark Scheme	Marks	
9	(*a*)	$\frac{120}{360}\times 2\times\frac{22}{7}\times 21\times 21$ *or* $\frac{60}{360}\times 2\times\frac{22}{7}\times 14$	K1	
		$\frac{120}{360}\times 2\times\frac{22}{7}\times 21\times 21 + 21+14+ \frac{60}{360}\times 2\times\frac{22}{7}\times 14+7$	K1	
		$100\frac{2}{3}$ *or* $100\cdot 7$	N1	3
	(*b*)	$\frac{120}{360}\times\frac{22}{7}\times 21\times 21$ *or* $\frac{30}{360}\times\frac{22}{7}\times 14\times 14$	K1	
		$\frac{120}{360}\times\frac{22}{7}\times 21\times 21 - \frac{30}{360}\times\frac{22}{7}\times 14\times 14$	K1	
		$410\frac{2}{3}$ *or* $410\cdot 7$	K1	3
				6
		NOTE 1. Accept π for K mark. 2. Accept correct value from incomplete substitution for K mark. 3. Correct answer from incomplete working, award Kk2.		

Question	Solution and Mark Scheme	Marks	
10 (*a*)	(K,3), (M,2), (N,4)	P1	1
(*b*)	(i) { (K,2), (K,4) }	K1	
	$\frac{2}{12}$ *or* $\frac{1}{6}$ *or* $0 \cdot 17$	N1	2
	(ii) { (K,1), (K,3), (M,1), (M,2), (M,3), (M,4), (N,1), (N,3) }	K1	
	$\frac{8}{12}$ *or* $\frac{4}{6}$ *or* $\frac{2}{3}$ *or* $0 \cdot 67$	N1	2
			5
	NOTE: Accept answer without working from correct listing, tree diagram *or* grid *or* cannot listing for K1N1 provided P1 is achieved.		

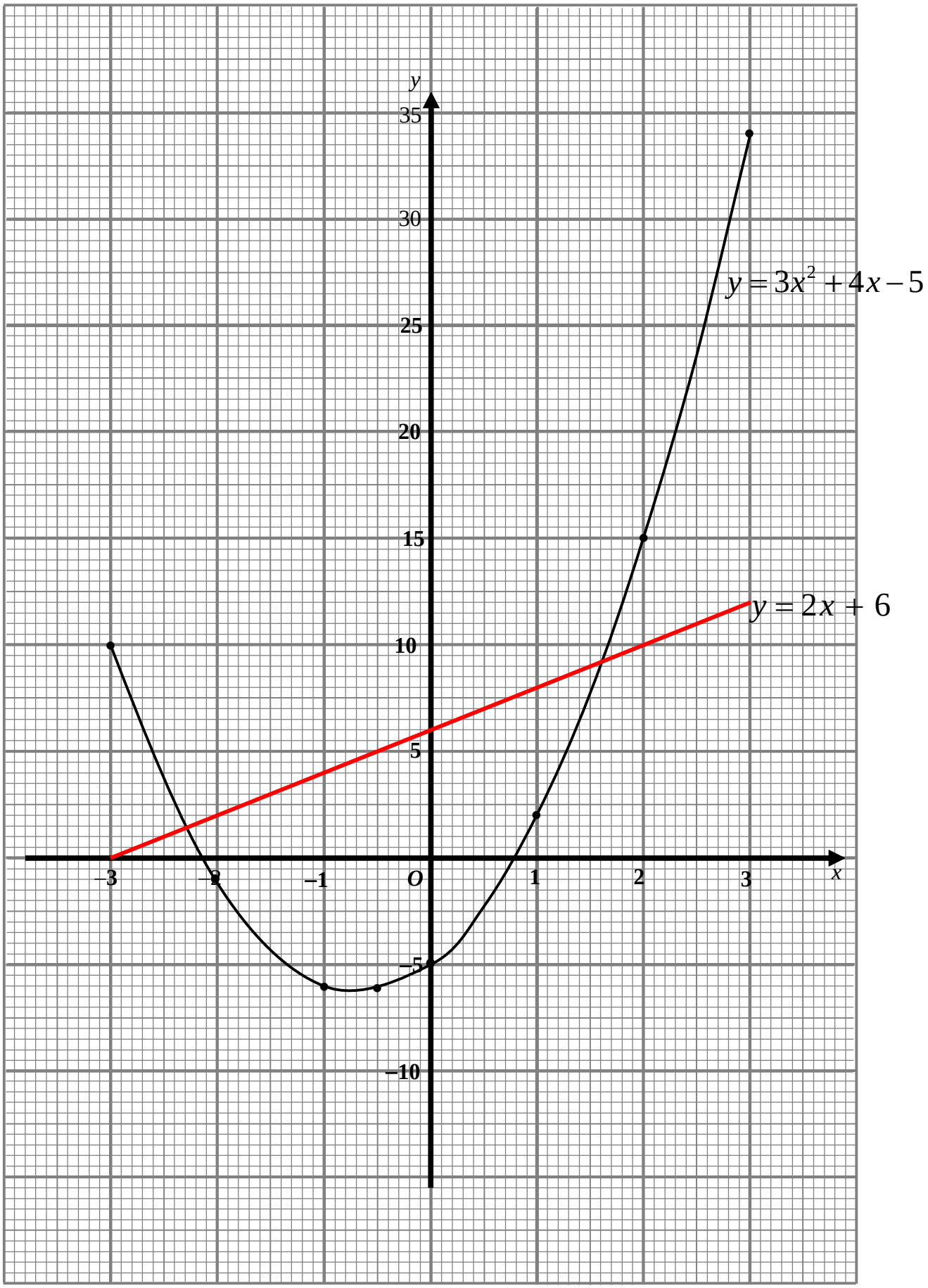
Question	Solution and Mark Scheme	Marks	
11 (*a*)	16	P1	1
(*b*)	$\frac{16-8}{10-0}$ *or equivalent*	K1	
	$\frac{4}{5}$ *or* $0\cdot8$	N1	2
	Note: Accept answer without working for K1N1		
(*c*)	$\frac{1}{2}(8+16)(10) + \frac{1}{2}(24+(t-10)(16) = 480$ *or* equivalent method	K2	
	Note: $\frac{1}{2}(8+16)(10)$ *or* $\frac{1}{2}(24+(t-10)(16)$ *or* equivalent, award K1		
	31	N1	3
			6

Section B
[48 *marks*]

Question	Solution and Mark Scheme	Marks	
12(*a*)	– 6	K1	
	15	K1	**2**
	Note : **K** only meant for table value.		
(*b*)	Graph		
	Axes drawn in correct direction, uniform scales in $-3 \le x \le 3$ and $-7 \le y \le 34$.	P1	
	All 6 points and *2 points correctly plotted *or* curve passes through these points for $-3 \le x \le 3$ and $-7 \le y \le 34$.	K2 (does not depend on **P**)	
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $-3 \le x \le 3$ and $-7 \le y \le 34$.	N1 (depends on **P** and **K**)	**4**
	Note : 1. 6 or 7 points correctly plotted, award K1. 2. Ignore curve out of range.		
(*c*)(i)	$-5 \le y \le -4$	P1	
(ii)	$2 \cdot 2 \le x \le 2 \cdot 4$	P1	**2**
	Note: 1. Allow P mark if value of x and y are shown on the graph. 2. Value of x and y obtained by calculation, award **P0**.		
(*d*)	Straight line $y = 2x + 6$ correctly drawn	K2	
	$-2 \cdot 4 \le x \le -2 \cdot 2$	N1	
	$1 \cdot 5 \le x \le 1 \cdot 7$	N1 (dep K2)	**3**
	Note : 1. Identify equation $3x^2 + 4x - 5 = 2x + 6$ *or* $y = 2x + 6$ award K1 2. Allow **N** marks if values of x shown on the graph. 3. Values x obtained by calculation, award **N0**.		**12**

Graf untuk Soalan12

***Graph for Question* 12**



Question	Solution and Mark Scheme	Marks	
13 (*a*)(i)	(6, 7) Note: (4, 4) award P1	P2	
(ii)	(14, 4) Note: (18, 1) award P1	P2	4
(*b*)(i) (*a*)	Rotation, 180°, centre (5, 3) Note: 1. Rotation 180° *or* Rotation centre (5, 3) award P2 Putaran 180° *atau* Putaran pusat (5, 3) beri P2 2. Rotation award P1 // Putaran beri P1	P3	
(*b*)	Enlargement, scale factor 3, at centre (7, 2) Note: 1. Enlargement, scale factor 3 *or* enlargement at centre(7, 2) award P2 // Pembesaran, faktor skala 3 atau pembesaran pada pusat (7, 2) beri P2 2. Enlargement award P1 // Pembesaran beri P1	P3	6
(ii)	$63 - \frac{63}{*3^2}$ 56	K1 N1	2
			12

Question	Solution and Mark Scheme	Marks	
14(*a*)(i)			

Kekerapan *Frequency*	Sempadan atas *Upper Boundry*	Kekerapan Longgokan *Cumulative frequency*	
0	65·5	0	I
1	70·5	1	II
4	75·5	5	III
7	80·5	12	IV
10	85·5	22	V
11	90·5	33	VI
5	95·5	38	VII
2	100·5	40	VIII

Upper Boundary	:	(I to VIII)	P1
Cumulative Frequency	:	(II to VIII)	P1
Frequency	:	(II to VIII)	P2

Note :

Allow one mistake in frequency for P1 — **4**

(ii)

$$\frac{(1\times 68)+(4\times 73)+(7\times 78)+(10\times 83)+(11\times 88)+(5\times 93)+(2\times 98)}{1+4+7+10+11+5+2}$$ K2

$$\frac{3365}{40}$$

$= 84\cdot 13$ N1 — **3**

(*b*)

Axes drawn in correct direction with uniform scale for $65\cdot 5 \le x \le 100\cdot 5$ and $0 \le y \le 40$

Horizontal axes labelled with values of upper boundary P1

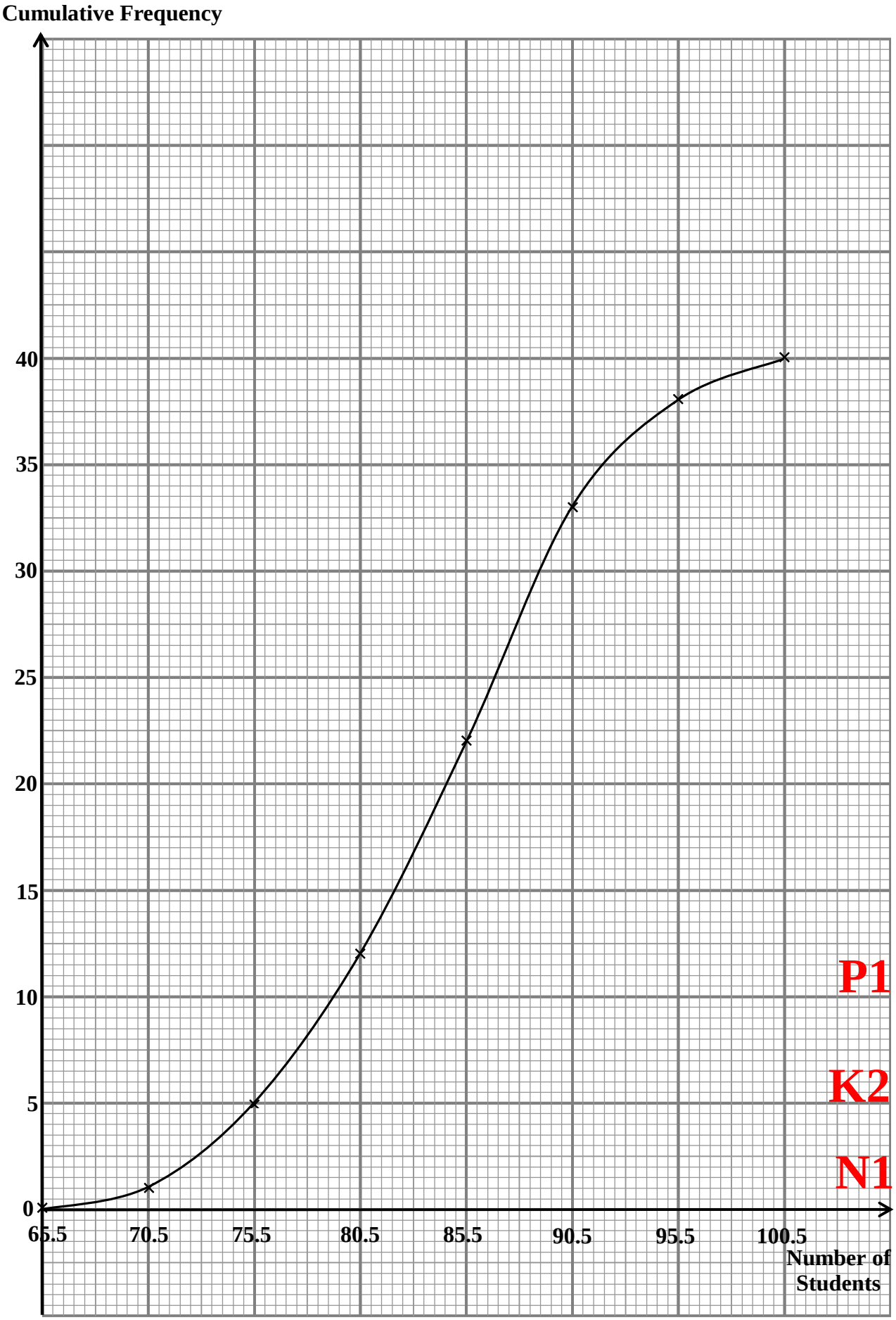
*8 points correctly plotted K2

Note :
*6 or *7 points correctly plotted, award K1

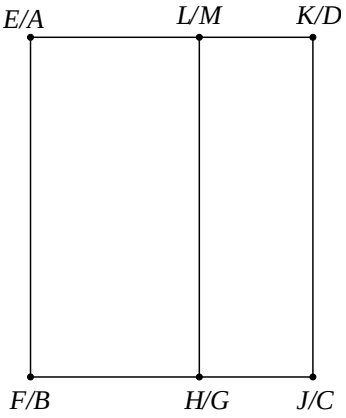
A smooth and continuous curve without any straight lines and passes through all 8 correct points using the given scales for $65\cdot 5 \le x \le 100\cdot 5$ and $0 \le y \le 40$. N1 — **4**

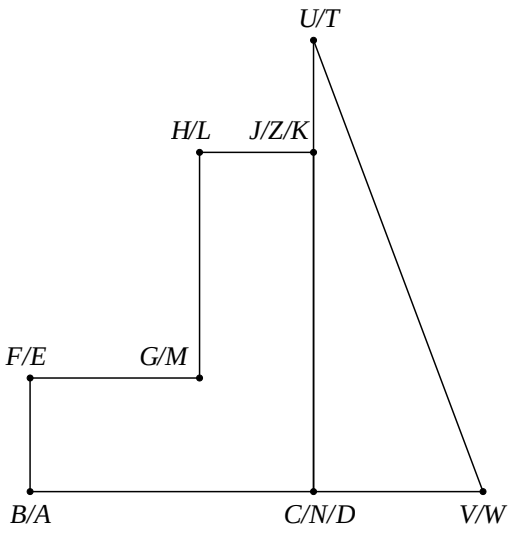
(*c*) 7 P1 — **1**

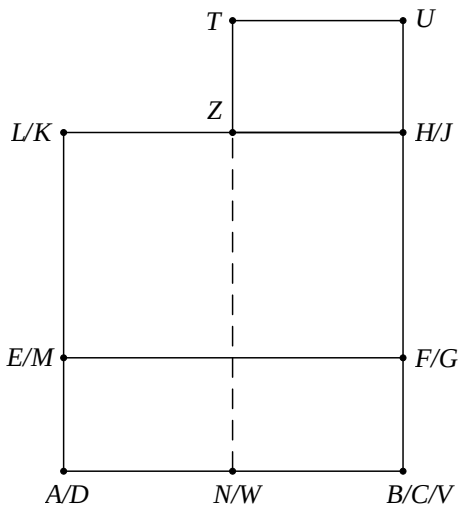
12



Question	Solution and Mark Scheme	Marks	
15	Note : (1) Accept drawing only (not sketch). (2) Accept diagrams with wrong labels and ignore wrong labels. (3) Accept correct rotation of diagrams. (4) Lateral inversions are not accepted. (5) If more than 3 diagrams are drawn, award mark to the correct ones only. (6) For extra lines (dotted or solid) except construction lines, no mark is awarded. (7) If other scales are used with accuracy of ± 0.2 cm one way, deduct 1 mark from the N mark obtained, for each part attempted. (8) Accept small gaps extensions at the corners. For each part attempted : (i) If $\leq 0 \cdot 4$ cm, deduct 1 mark from the N mark obtained. (ii) If $> 0 \cdot 4$ cm, no N mark is awarded. (9) If the construction lines cannot be differentiated from the actual lines: (i) Dotted line : If outside the diagram, award the N mark. If inside the diagram, award N0. (ii) Solid line : If outside the diagram, award N0. If inside the diagram, no mark is awarded. (10) For double lines or non-collinear or bold lines, deduct 1 mark from the N mark obtained, for each part attempted.		

Question	Solution and Mark Scheme	Marks	
15(*a*)			
	Correct shape with rectangles *ADCB* and *AMGB* All solid lines	K1	
	$AB > AD > AM > MD$	K1 dep K1	
	Measurement correct to $\pm\ 0\cdot2$ cm (one way) and all angles $\angle A$, $\angle B = 90° \pm 1°$	N1 dep K1K1	**3**

Question	Solution and Mark Scheme	Marks	
15(*b*)(i)			
	Correct shape with hexagon *AEMLKD* and right angled triangle *DTW* All solid lines	K1	
	$TW > DT = AW > KD > AD = LM > FM = DW > LK$	K1 dep K1	
	Measurement correct to $\pm 0 \cdot 2$ cm (one way) and all angles at the vertices of rectangles = 90° ± 1°	N2 dep K1K1	**4**

Question	Solution and Mark Scheme	Marks	
15(*b*)(ii)			
	Correct shape with square *AKJW* , rectangles *AMGV*, *MKJG* and *ZTUJ* All solid lines <u>Note</u> : Ignore straight line *WZ*	K1	
	Dashed line *WZ*	K1 dep K1	
	$UV > AB = AK > MK > AW = WB > AM = ZT$	K1 dep K1K1	
	Measurement correct to $\pm\ 0 \cdot 2$ cm (one way) and all angles at the vertices of rectangles = 90° ± 1°	N2 dep K1K1K1	**5**
			12

Question	Solution and Mark Scheme	Marks	
16(*a*)	$(35^\circ S, 105^\circ W)$ // $(35^\circ S, 105^\circ B)$ Note : 105° *or* $\theta^\circ W$ // $\theta^\circ B$, award P1	P1P2	**3**
(*b*)	$50 \times 60 \times \cos 45$ $2121 \cdot 32$ Note: 50 *or* cos 45 correctly used, award K1	K2 N1	**3**
(c)	$(35 + 45) \times 60$ 4800	K2 N1	**3**
(c)	$\dfrac{50 \times 60 \times \cos 45 + (35+45) \times 60}{600}$ Note : $*50 \times 60 \times \cos 45 + *(35 + 45) \times 60$, award K1 11.535	K2 N1	**3**
			12

END OF MARK SCHEME