NAMA : .....

TINGKATAN : .....

PENTAKSIRAN SUMATIF 3 SPM 2013 3472/1

MATEMATIK TAMBAHAN

Kertas 1

Ogos 2013

2 jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis* **Nama** *dan* **Tingkatan** *pada ruang 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 dalam bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 28 halaman bercetak.

TERENGGANU NEGERI ANJUNG ILMU

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Kerajaan Negeri Terengganu

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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. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2. $a^m \times a^n = a^{m+n}$
3. $a^m \div a^n = a^{m-n}$
4. $(a^m)^n = a^{mn}$
5. $\log_a mn = \log_a m + \log_a n$
6. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \dfrac{\log_c b}{\log_c a}$
9. $T_n = a + (n-1)d$
10. $S_n = \dfrac{n}{2}\{2a + (n-1)d\}$
11. $T_n = ar^{n-1}$
12. $S_n = \dfrac{a(r^n - 1)}{r-1} = \dfrac{a(1-r^n)}{1-r}, \quad r \neq 1$
13. $S_\infty = \dfrac{a}{1-r}, \quad |r| < 1$

CALCULUS / KALKULUS

1. $y = uv$

   $\dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

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

3. $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4. Area under a curve
   Luas di bawah lengkung

   $= \int_a^b y \, dx$ or / *atau*

   $= \int_a^b x \, dy$

5. Volume generated
   Isipadu janaan

   $= \int_a^b \pi y^2 \, dx$ or / *atau*

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

STATISTICS / STATISTIK

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

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. ${}^nP_r = \frac{n!}{(n-r)!}$

9. ${}^nC_r = \frac{n!}{(n-r)!\,r!}$

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

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

12. Mean / *Min* $= np$

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

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

GEOMETRI (GEOMETRY)

1. Distance / *Jarak*

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

2. 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. Area of triangle / *Luas segi tiga*

$\frac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

5. $|\mathbf{r}| = \sqrt{x^2 + y^2}$

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

TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$

   Panjang lengkok, $s = j\theta$

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

   Luas sektor, $L = \frac{1}{2} j^2\theta$

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

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

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

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

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

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

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

   $\sin 2A = 2 \sin A \, \text{kos} A$

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

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

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

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

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

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

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

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

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

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

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

14. Area of triangle / *Luas segi tiga*

    $= \frac{1}{2} ab \sin C$

UPPER TAIL PROBABILITIES $Q(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9	1 2 3	4 5 6	7 8 9
											SUBTRACT		
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4 8 12	16 20 24	28 32 36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4 8 12	16 20 24	28 32 36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4 8 12	15 19 23	27 31 35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4 7 11	15 19 22	26 30 34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4 7 11	14 18 22	25 29 32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3 7 10	14 17 20	24 27 31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3 7 10	13 16 19	23 26 29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3 6 9	12 15 18	21 24 27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3 5 8	11 14 16	19 22 25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3 5 8	10 13 15	18 20 23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2 5 7	9 12 14	16 19 21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2 4 6	8 10 12	14 16 18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2 4 6	7 9 11	13 15 17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2 3 5	6 8 10	11 13 14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1 3 4	6 7 8	10 11 13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1 2 4	5 6 7	8 10 11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1 2 3	4 5 6	7 8 9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1 2 3	4 4 5	6 7 8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1 1 2	3 4 4	5 6 6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1 1 2	2 3 4	4 5 5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0 1 1	2 2 3	3 4 4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0 1 1	2 2 2	3 3 4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0 1 1	1 2 2	2 3 3
2.3	.0107	.0104	.0102								0 1 1	1 1 2	2 2 2
				.$0^2$990	.$0^2$964	.$0^2$939	.$0^2$914				3 5 8	10 13 15	18 20 23
2.4	.$0^2$820	.$0^2$798	.$0^2$776	.$0^2$755	.$0^2$734			.$0^2$889	.$0^2$866	.$0^2$842	2 5 7	9 12 14	16 18 21
						.$0^2$714	.$0^2$695	.$0^2$676	.$0^2$657	.$0^2$639	2 4 6	8 11 13	15 17 19
2.5	.$0^2$621	.$0^2$604	.$0^2$587	.$0^2$570	.$0^2$554	.$0^2$539	.$0^2$523	.$0^2$508	.$0^2$494	.$0^2$480	2 3 5	6 8 9	11 12 14
2.6	.$0^2$466	.$0^2$453	.$0^2$440	.$0^2$427	.$0^2$415	.$0^2$402	.$0^2$391	.$0^2$379	.$0^2$368	.$0^2$357	1 2 3	5 6 7	8 9 10
2.7	.$0^2$347	.$0^2$336	.$0^2$326	.$0^2$317	.$0^2$307	.$0^2$298	.$0^2$289	.$0^2$280	.$0^2$272	.$0^2$264	1 2 3	4 5 6	7 8 9
2.8	.$0^2$256	.$0^2$248	.$0^2$240	.$0^2$233	.$0^2$226	.$0^2$219	.$0^2$212	.$0^2$205	.$0^2$199	.$0^2$193	1 1 2	3 4 4	5 6 6
2.9	.$0^2$187	.$0^3$181	.$0^2$175	.$0^2$169	.$0^2$164	.$0^2$159	.$0^2$154	.$0^2$149	.$0^2$144	.$0^2$139	0 1 1	2 2 3	3 4 4
3.0	.$0^2$135	.$0^2$131	.$0^2$126	.$0^2$122	.$0^2$118	.$0^2$114	.$0^2$111	.$0^2$107	.$0^3$104	.$0^2$100	0 1 1	2 2 2	3 3 4
3.1	.$0^3$968	.$0^3$935	.$0^3$904								3 6 9	13 16 19	22 25 28
				.$0^3$874	.$0^3$845	.$0^3$816	.$0^3$789				3 6 8	11 14 17	20 22 25
								.$0^3$762	.$0^3$736	.$0^3$711	2 5 7	10 12 15	17 20 22
3.2	.$0^3$687	.$0^3$664	.$0^3$641	.$0^3$619	.$0^3$598						2 4 7	9 11 13	15 18 20
						.$0^3$577	.$0^3$557	.$0^3$538	.$0^3$519	.$0^3$501	2 4 6	8 9 11	13 15 17
3.3	.$0^3$483	.$0^3$466	.$0^3$450	.$0^3$434	.$0^3$419						2 3 5	6 8 10	11 13 14
						.$0^3$404	.$0^3$390	.$0^3$376	.$0^3$362	.$0^3$349	1 3 4	5 7 8	9 10 12
3.4	.$0^3$337	.$0^3$325	.$0^3$313	.$0^3$302	.$0^3$291	.$0^3$280	.$0^3$270	.$0^3$260	.$0^3$251	.$0^3$242	1 2 3	4 5 6	7 8 9
3.5	.$0^3$233	.$0^3$224	.$0^3$216	.$0^3$208	.$0^3$200	.$0^3$193	.$0^3$185	.$0^3$178	.$0^3$172	.$0^3$165	1 1 2	3 4 4	5 6 7
3.6	.$0^3$159	.$0^3$153	.$0^3$147	.$0^3$142	.$0^3$136	.$0^3$131	.$0^3$126	.$0^3$121	.$0^3$117	.$0^3$112	0 1 1	2 2 3	3 4 5
3.7	.$0^3$108	.$0^3$104	.$0^3$100	.$0^4$96	.$0^4$92	.$0^4$88	.$0^4$85	.$0^4$82	.$0^4$78	.$0^4$75			
3.8	.$0^4$72	.$0^4$69	.$0^4$67	.$0^4$64	.$0^4$62	.$0^4$59	.$0^4$57	.$0^4$54	.$0^4$52	.$0^4$50			
3.9	.$0^4$48	.$0^4$46	.$0^4$44	.$0^4$42	.$0^4$41	.$0^4$39	.$0^4$37	.$0^4$36	.$0^4$34	.$0^4$33			

For negative z use the relation:

$$Q(z) = 1 - Q(-z) = P(-z)$$

Example: if $u \sim$ N (0,1), *find* (*a*) Prob ($u > 2$), (*b*) Prob ($0 < u < 2$), (*c*) Prob ($|u| > 2$), (*d*) Prob ($|u| < 2$). The desired probabilities are (*a*) $Q(2) = .0228$, (*b*) $Q(0) - Q(2) = .5000 - .0228 = .4772$, (*c*) $2Q(2) = .0456$, (*d*) $1 - 2Q(2) = .9544$.

If $v \sim N(\mu,\sigma^2)$, Prob ($v > x$) is given by $Q(z)$ with $z = (x - \mu)/\sigma$.

UPPER QUANTILES $z_{[P]}$ OF THE NORMAL DISTRIBUTION N(0,1)

P	Q	z	P	Q	z	P	Q	z	P	Q	z	Q	z
.50	.50	0.000	.85	.15	1.036	.975	.025	1.960	.990	.010	2.326	.$0^3$4	3.353
.55	.45	0.126	.86	.14	1.080	.976	.024	1.977	.991	.009	2.366	.$0^3$3	3.432
.60	.40	0.253	.87	.13	1.126	.977	.023	1.995	.992	.008	2.409	.$0^3$2	3.540
.65	.35	0.385	.88	.12	1.175	.978	.022	2.014	.993	.007	2.457	.$0^3$1	3.719
.70	.30	0.524	.89	.11	1.227	.979	.021	2.034	.994	.006	2.512	.$0^4$5	3.891
.75	.25	0.674	.90	.10	1.282	.980	.020	2.054	.995	.005	2.576	.$0^4$1	4.265
.76	.24	0.706	.91	.09	1.341	.981	.019	2.075	.996	.004	2.652	.$0^3$5	4.417
.77	.23	0.739	.92	.08	1.405	.982	.018	2.097	.997	.003	2.748	.$0^3$1	4.753
.78	.22	0.772	.93	.07	1.476	.983	.017	2.120	.998	.002	2.878	.$0^4$5	4.892
.79	.21	0.806	.94	.06	1.555	.984	.016	2.144	.999	.001	3.090	.$0^6$1	5.199
.80	.20	0.842	.950	.050	1.645	.985	.015	2.170	.9991	.$0^3$9	3.121	.$0^7$5	5.327
.81	.19	0.878	.955	.045	1.695	.986	.014	2.197	.9992	.$0^3$8	3.156	.$0^7$1	5.612
.82	.18	0.915	.960	.040	1.751	.987	.013	2.226	.9993	.$0^3$7	3.195	.$0^8$5	5.731
.83	.17	0.954	.965	.035	1.812	.988	.012	2.257	.9994	.$0^3$6	3.239	.$0^8$1	5.998
.84	.16	0.994	.970	.030	1.881	.989	.011	2.290	.9995	.$0^3$5	3.291	.$0^9$5	6.109

The tabulated function is $z_{[P]}$: if $u \sim N(0,1)$, Prob ($u < z_{[P]}$) $= P$, Prob ($u > z_{[P]}$) $= 1 - P = Q$, and (for $P > \frac{1}{2}$) Prob ($|u| > z_{[P]}$) $= 2Q$.

Lower quantiles ($P < \frac{1}{2}$) are given by:

$$z_{[P]} = -z_{[1-P]}$$

PROBABILITY DENSITY $\varphi(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9
0.	0.399	.397	.391	.381	.368	.352	.333	.312	.290	.266
1.	0.242	.218	.194	.171	.150	.130	.111	.094	.079	.066
2.	0.0540	.0440	.0355	.0283	.0224	.0175	.0136	.0104	.0079	.0060
3.	0.00443	.00327	.00238	.00172	.00123	.00087	.00061	.00042	.00029	.00020
4.	0.$0^3$134	.$0^4$89	.$0^4$59	.$0^4$39	.$0^4$25	.$0^4$16	.$0^4$10	.$0^5$64	.$0^5$40	.$0^5$24

For $z < 0$ use the relation:

$$\varphi(z) = \varphi(-z)$$

The tabulated functions are defined thus:

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

$$Q(z) = \int_z^\infty \varphi(u)\,du$$

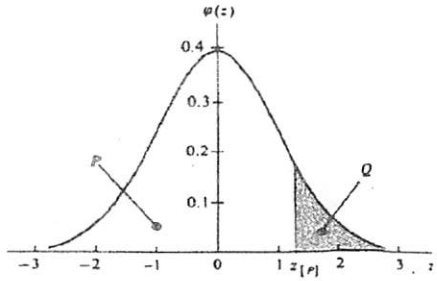
$$\int_{-\infty}^{z_{[P]}} \varphi(u)\,du = P$$

In the figure the probability density is represented by the ordinate of the graph, and the tail probabilities are represented by areas under the graph.

The probability density of the distribution N(μ, σ^2) is

$$f(x) = \frac{1}{\sigma}\varphi(z)$$

with $z = (x - \mu)/\sigma$.



Answer **all** questions.

*Jawab **semua** soalan.*

For Examiner's Use

1 Diagram 1 shows the relation between set X and set Y in the graph form.

Rajah 1 *menunjukkan hubungan antara set X dan set Y dalam bentuk graf.*

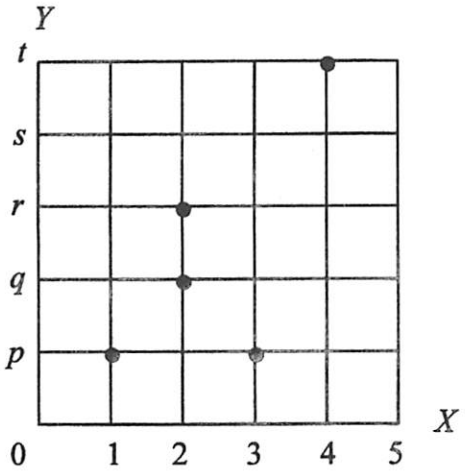


Diagram 1 / *Rajah* 1

State

Nyatakan

(a) the objects of p.

objek-objek bagi p.

(b) the range of the relation.

julat hubungan itu.

[2 *marks*]
[2 *markah*]

Answer/*Jawapan*:

(*a*)

(*b*)

1

2

For Examiner's Use

2 Given the functions $g : x \to 3x + 2$ and $h : x \to x^2 - 4$, find

Diberi fungsi $g : x \to 3x + 2$ *dan* $h : x \to x^2 - 4$, *cari*

(*a*) $g^{-1}(x)$

(*b*) $hg^{-1}(8)$

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

2

3

3 Form a quadratic equation which has roots $-\frac{1}{2}$ and $\frac{3}{2}$. Give your answer in general form. [2 *marks*]

Bentukkan persamaan kuadratik yang mempunyai punca-punca $-\frac{1}{2}$ *dan* $\frac{3}{2}$.

Berikan jawapan anda dalam bentuk am. [2 *markah*]

Answer / *Jawapan* :

3

2

4 A quadratic equation $x^2 + 2x - m - 5 = 0$ has no root. Find the range of values of m. [3 *marks*]

Persamaan kuadratik $x^2 + 2x - m - 5 = 0$ *tidak mempunyai punca. Cari julat nilai* m. [3 *markah*]

Answer/*Jawapan*:

For Examiner's Use

4

3

5 Find the range of values of x if $x^2 > 6x - 8$. [3 *marks*]

Cari julat nilai x *jika* $x^2 > 6x - 8$. [3 *markah*]

Answer/*Jawapan*:

5

3

For Examiner's Use

6 In Diagram 6, A is the maximum point of the graph with the equation $y = -(x + p)^2 + q$.

Dalam Rajah 6, A adalah titik maksimum bagi graf dengan persamaan $y = -(x + p)^2 + q$.

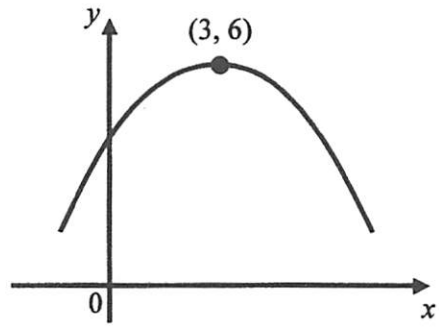


Diagram 6 / *Rajah 6*

(*a*) State the equation of the axis of symmetry of the curve.

Nyatakan persamaan paksi simetri bagi lengkung itu.

(*b*) Determine the value of p and q.

Tentukan nilai p dan nilai q.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(a)

(b)

6

3

7 Given the points $A(3, -1)$ and $B(-2, 5)$. A point $T(x, y)$ moves such that $TA = 2\,TB$. Find the equation of the locus of T. [3 *marks*]

Diberi titik-titik $A(3, -1)$ *dan* $B(-2, 5)$. *Satu titik* $T(x, y)$ *bergerak dengan keadaan* $TA = 2\,TB$. *Cari persamaan lokus bagi* T. [3 *markah*]

Answer/*Jawapan*:

For Examiner's Use

7

3

For Examiner's Use

8 Diagram 8 shows a semi circle *OABC* with centre *O* and radius *r*.

Rajah 8 *menunjukkan semi bulatan OABC dengan pusat O dan jejari r.*

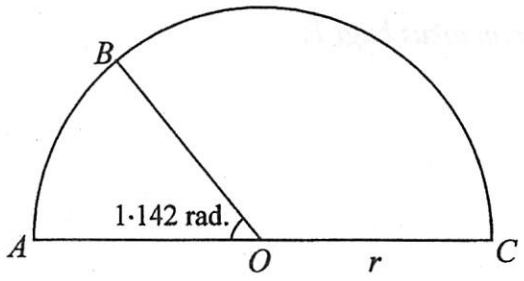


Diagram 8 / *Rajah* 8

Given the perimeter of sector *BOC* is 32 cm, find the value of *r*.

Diberi perimeter bagi sektor BOC ialah 32 cm, *cari nilai r*.

[3 *marks*]
[3 *markah*]

Answer/*Jawapan*:

8

3

9 The sum of the first n term of an arithmetic progression is given by $S_n = \frac{n}{2}[5n-13]$.

Hasil tambah n sebutan pertama bagi suatu janjang aritmetik diberi oleh

$S_n = \frac{n}{2}[5n-13]$.

Find / *Cari*

(a) the first term

sebutan pertama

(b) the sum from the fifth term to the tenth term.

hasil tambah dari sebutan kelima hingga sebutan kesepuluh.

[3 *marks*]
[3 *markah*]

For Examiner's Use

Answer/*Jawapan*:

(a)

(b)

9

3

For Examiner's Use

10 In a geometric progression, the first term is 128 and the fourth term is 2.
Dalam suatu janjang geometri, sebutan pertama ialah 128 *dan sebutan keempat ialah* 2.

Find / *Cari*

(*a*) the common ratio
nisbah sepunya

(*b*) the sum to infinity of the progression.
hasil tambah hingga ketakterhinggaan janjang itu.

[4 *marks*]
[4 *markah*]

Answer/*Jawapan*:

(a)

(b)

10

4

11 Solve the equation $4(4^{1+p}) = \frac{1}{8^{2p-1}}$. [4 *marks*]

Selesaikan persamaan $4(4^{1+p}) = \frac{1}{8^{2p-1}}$. [4 *markah*]

Answer/*Jawapan*:

For Examiner's Use

11

4

12 Solve the equation $\log_2 2k - \log_2(1-3k) = 2$. [3 *marks*]

Selesaikan persamaan $\log_2 2k - \log_2(1-3k) = 2$. [3 *markah*]

Answer/*Jawapan*:

12

3

For Examiner's Use

13 Given $m = 2^x$ and $n = 2^y$, express $\log_2\left(\frac{mn^3}{16}\right)$ in terms of x *and* y. [4 *marks*]

Diberi $m = 2^x$ *dan* $n = 2^y$, *ungkapkan* $\log_2\left(\frac{mn^3}{16}\right)$ *dalam sebutan* x *dan* y.

[4 *markah*]

Answer/*Jawapan*:

13

4

14 A set of data consists of 8, 5, 4, 7, 5, 9, 8, 1 and 8. Determine the interquartile range of the data. [3 *marks*]

Suatu set data terdiri daripada 8, 5, 4, 7, 5, 9, 8, 1 *dan* 8. *Tentukan julat antara kuartil bagi data itu.* [3 *markah*]

Answer/*Jawapan*:

14

3

15 The curve $y = 3x^2 - 4x + 5$ has a minimum point at $x = k$, where k is a constant.
Find the value of k. [3 *marks*]

Lengkung $y = 3x^2 - 4x + 5$ *mempunyai titik minimum pada* $x = k$ *dengan keadaan* k *ialah pemalar. Cari nilai* k. [3 *markah*]

Answer/*Jawapan*:

For Examiner's Use

15

3

16 Given that $y = \frac{x}{1-2x}$, find $\frac{dy}{dx}$. [3 *marks*]

Diberi $y = \frac{x}{1-2x}$, cari $\frac{dy}{dx}$. [3 *markah*]

Answer/*Jawapan*:

16

3

For Examiner's Use

17 Diagram 17 shows part of the graph $y = x^2 + 2$.

Rajah 17 *menunjukkan sebahagian daripada graf* $y = x^2 + 2$.

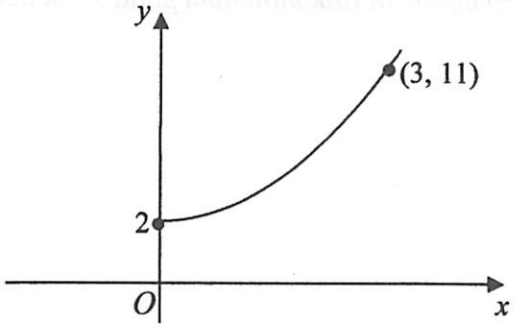


Diagram / *Rajah* 17

(*a*) Using the diagram given in the answer space, shade the region of $\int_2^{11} x\,dy$.

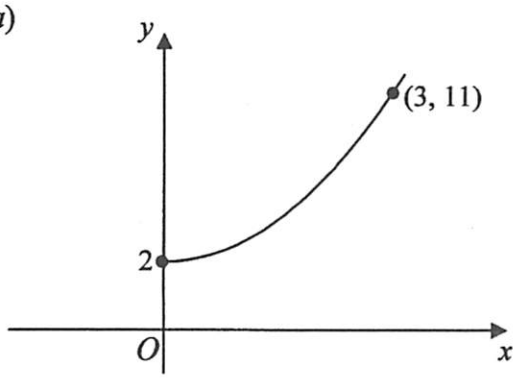
Dengan menggunakan rajah di ruang jawapan, lorek rantau bagi $\int_2^{11} x\,dy$.

(*b*) Hence, evaluate / *Seterusnya, cari nilai* $\int_0^3 y\,dx + \int_2^{11} x\,dy$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)



(*b*)

17

3

For Examiner's Use

18 Given that $\int_0^3 h(x)\,dx = 6$ and $\int_2^5 m(x)\,dx = 10$, find the values of

Diberi bahawa $\int_0^3 h(x)\,dx = 6$ *dan* $\int_2^5 m(x)\,dx = 10$, *cari nilai*

(*a*) $\int_3^0 5h(x)\,dx$,

(*b*) k if $\int_2^5 [m(x) - kx]\,dx = 3$.

k *jika* $\int_2^5 [m(x) - kx]\,dx = 3$.

[4 *marks*]
[4 *markah*]

Answer/*Jawapan*:

(a)

(b)

18

4

For Examiner's Use

19 Solve the trigonometric equation $\cos 2x + 2\cos x = \cos 180°$ for $0° \le x \le 360°$.
[4 *marks*]

Selesaikan persamaan trigonometri $\text{kos}\, 2x + 2\,\text{kos}\, x = \text{kos}\, 180°$ *untuk* $0° \le x \le 360°$.
[4 *markah*]

Answer/*Jawapan*:

19

4

For Examiner's Use

20 Diagram 20 shows a straight line graph of $\frac{y}{x}$ against x.

Rajah 20 *menunjukkan satu garis lurus* $\frac{y}{x}$ *melawan* x.

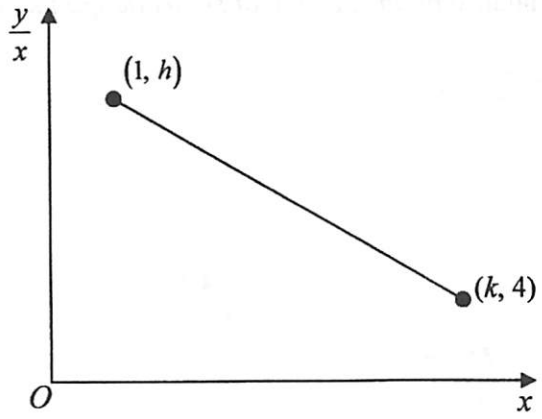


Diagram 20/ *Rajah* 20

Given that $y = -2x^2 + 10x$. Calculate the value of h and of k.

Diberi bahawa $y = -2x^2 + 10x$. *Hitung nilai h dan nilai k.*

[3 *marks*]
[3 *markah*]

Answer/*Jawapan*:

20

3

For Examiner's Use

21 In Diagram 21, $OPQR$ is a parallelogram such that $\overrightarrow{OR} = 2\underset{\sim}{i}+4\underset{\sim}{j}$ and $\overrightarrow{OQ} = 7\underset{\sim}{i}+6\underset{\sim}{j}$.

Dalam Rajah 21, $OPQR$ ialah *sebuah segi empat selari dengan keadaan* $\overrightarrow{OR} = 2\underset{\sim}{i}+4\underset{\sim}{j}$ *dan* $\overrightarrow{OQ} = 7\underset{\sim}{i}+6\underset{\sim}{j}$.

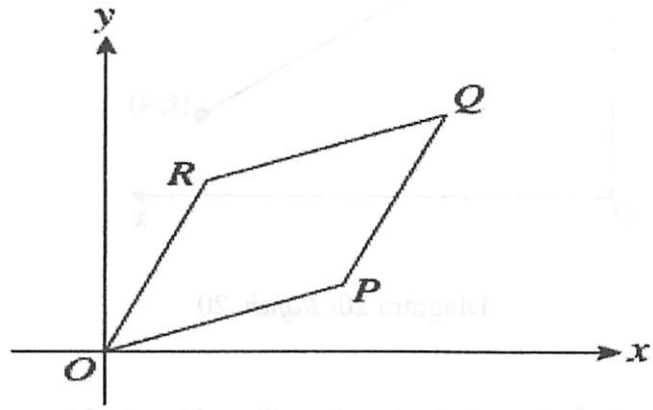


Diagram 21/ *Rajah* 21

Find the unit vector in the direction of $\overrightarrow{OP}$.

Cari vektor unit dalam arah $\overrightarrow{OP}$.

[3 *marks*]
[3 *markah*]

Answer/*Jawapan*:

21

3

For Examiner's Use

22 In an athletic tournament, the probability that an athlete is being chosen to take part in the 100 m event is $\frac{3}{5}$ and in the 400 m event is $\frac{1}{3}$.

Dalam satu kejohanan olahraga, kebarangkalian bahawa seorang peserta dipilih untuk mengambil bahagian dalam acara 100 *m ialah* $\frac{3}{5}$ *dan acara* 400 *m ialah* $\frac{1}{3}$.

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

Cari kebarangkalian peserta itu dipilih untuk mengambil bahagian dalam

(*a*) both events,
kedua-dua acara,

(*b*) at least one event.
sekurang-kurangnya satu acara.

[4 *marks*]
[4 *markah*]

Answer/*Jawapan*:

(a)

(b)

22

4

For Examiner's Use

23 A badminton team that consists of 6 students is to be chosen from a group of 8 male students and 5 female students. Calculate the number of different teams that can be formed if each team must consist of

Satu pasukan badminton yang mengandungi 6 orang *pelajar dipilih daripada satu kumpulan* 8 *pelajar lelaki dan* 5 *pelajar perempuan. Hitungkan bilangan pasukan yang berlainan dapat dibentuk jika pasukan itu mesti mengandungi*

(*a*) exactly 4 male students,

tepat 4 *pelajar lelaki*,

(*b*) not more than 2 female students.

tidak lebih daripada 2 *pelajar perempuan.*

[4 *marks*]
[4 *markah*]

Answer/*Jawapan*:

(a)

(b)

23

4

For Examiner's Use

24 Diagram 24 shows seven letter cards.

Rajah 24 *menunjukkan tujuh keeping kad huruf.*

Q	U	A	L	I	T	Y

Diagram 24 / *Rajah* 24

A seven-letter code is formed using seven of these cards.

Suatu kod tujuh huruf hendak dibentukkan dengan menggunakan tujuh daripada kad-kad itu.

Find / *Cari*

(*a*) the number of seven-letter codes that can be formed,
bilangan kod tujuh huruf yang berlainan yang dapat dibentuk,

(*b*) the number of seven-letter codes, if the vowels are side by side.
bilangan kod tujuh huruf, jika huruf vokal adalah bersebelahan.

[3 *marks*]
[3 *markah*]

Answer/*Jawapan*:

(a)

(b)

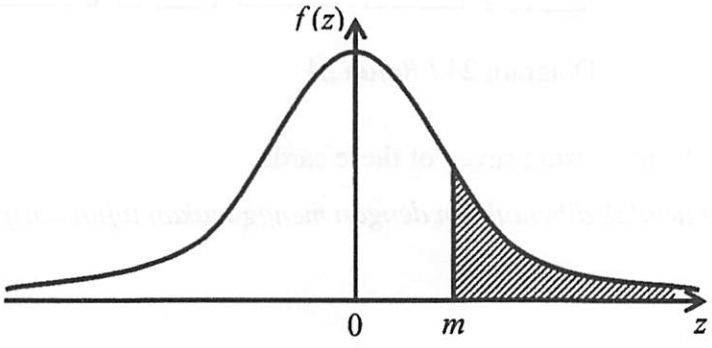
24

3

For Examiner's Use

25 Diagram 25 shows the graph of the standard normal distribution. Given that the area of the shaded region is 0·2242.

Rajah 25 menunjukkan graf taburan normal piawai. Diberi luas bagi rantau berlorek ialah 0·2242.



Rajah 25 / *Diagram* 25

Find / *Cari*

(*a*) the value of *m*

nilai m

(*b*) $P(-m < z < m)$

[3 *marks*]
[3 *markah*]

Answer/*Jawapan*:

(*a*)

(*b*)

25

3

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

BLANG PAGE

HALAMAN KOSONG

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. Ia boleh membantu anda untuk mendapatkan markah.

5. If you wish to change your answer, cross out the answer work that you have done. Then write down the new answer.
   Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. The diagrams in the questions provided are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. The marks allocated for each question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.

8. A list of formulae is provided on pages 3 to 5.
   Satu senarai rumus disediakan di halaman 3 hingga 5.

9. Graph paper is provided.
   Kertas graf 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.

PENTAKSIRAN SUMATIF 3 SPM 2013 3472/2
MATEMATIK TAMBAHAN
Kertas 2
Ogos 2013
2 ½ jam **Dua jam tiga puluh 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.*
4. *Calon dikehendaki menceraikan halaman 23 dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.*

Kertas soalan ini mengandungi 24 halaman bercetak.

TERENGGANU NEGERI ANJUNG ILMU

Disediakan Oleh:
Kerajaan Negeri Terengganu

Dicetak oleh:
Percetakan Yayasan Islam Terengganu Sdn. Bhd.
Telefon: 609-666 8611/6652/8601 Faks: 609-666 0611/0063

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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. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

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

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

6. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

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

8. $\log_a b = \dfrac{\log_c b}{\log_c a}$

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

10. $S_n = \dfrac{n}{2}\{2a + (n-1)d\}$

11. $T_n = ar^{n-1}$

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

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

CALCULUS / KALKULUS

1. $y = uv$

$$\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$$

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

3. $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

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
Isipadu janaan

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

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

STATISTICS / STATISTIK

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

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. ${}^nP_r = \frac{n!}{(n-r)!}$

9. ${}^nC_r = \frac{n!}{(n-r)!\,r!}$

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

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

12. Mean / *Min* $= np$

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

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

GEOMETRI (GEOMETRY)

1. Distance / *Jarak*

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

2. 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. Area of triangle / *Luas segi tiga*

   $\frac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

5. $|\mathbf{r}| = \sqrt{x^2 + y^2}$

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

TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$

   Panjang lengkok, $s = j\theta$

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

   Luas sektor, $L = \frac{1}{2} j^2\theta$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

14. Area of triangle / *Luas segi tiga*

    $= \frac{1}{2} ab \sin C$

UPPER TAIL PROBABILITIES $Q(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9	1 2 3	4 5 6	7 8 9
											SUBTRACT		
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4 8 12	16 20 24	28 32 36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4 8 12	16 20 24	28 32 36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4 8 12	15 19 23	27 31 35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4 7 11	15 19 22	26 30 34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4 7 11	14 18 22	25 29 32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3 7 10	14 17 20	24 27 31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3 7 10	13 16 19	23 26 29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3 6 9	12 15 18	21 24 27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3 5 8	11 14 16	19 22 25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3 5 8	10 13 15	18 20 23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2 5 7	9 12 14	16 19 21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2 4 6	8 10 12	14 16 18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2 4 6	7 9 11	13 15 17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2 3 5	6 8 10	11 13 14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1 3 4	6 7 8	10 11 13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1 2 4	5 6 7	8 10 11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1 2 3	4 5 6	7 8 9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1 2 3	4 4 5	6 7 8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1 1 2	3 4 4	5 6 6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1 1 2	2 3 4	4 5 5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0 1 1	2 2 3	3 4 4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0 1 1	2 2 2	3 3 4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0 1 1	1 2 2	2 3 3
2.3	.0107	.0104	.0102								0 1 1	1 1 2	2 2 2
				$.0^2990$	$.0^2964$	$.0^2939$	$.0^2914$				3 5 8	10 13 15	18 20 23
								$.0^2889$	$.0^2866$	$.0^2842$	2 5 7	9 12 14	16 18 21
2.4	$.0^2820$	$.0^2798$	$.0^2776$	$.0^2755$	$.0^2734$						2 4 6	8 11 13	15 17 19
						$.0^2714$	$.0^2695$	$.0^2676$	$.0^2657$	$.0^2639$	2 4 6	7 9 11	13 15 17
2.5	$.0^2621$	$.0^2604$	$.0^2587$	$.0^2570$	$.0^2554$	$.0^2539$	$.0^2523$	$.0^2508$	$.0^2494$	$.0^2480$	2 3 5	6 8 9	11 12 14
2.6	$.0^2466$	$.0^2453$	$.0^2440$	$.0^2427$	$.0^2415$	$.0^2402$	$.0^2391$	$.0^2379$	$.0^2368$	$.0^2357$	1 2 3	5 6 7	8 9 10
2.7	$.0^2347$	$.0^2336$	$.0^2326$	$.0^2317$	$.0^2307$	$.0^2298$	$.0^2289$	$.0^2280$	$.0^2272$	$.0^2264$	1 2 3	4 5 6	7 8 9
2.8	$.0^2256$	$.0^2248$	$.0^2240$	$.0^2233$	$.0^2226$	$.0^2219$	$.0^2212$	$.0^2205$	$.0^2199$	$.0^2193$	1 1 2	3 4 4	5 6 6
2.9	$.0^2187$	$.0^2181$	$.0^2175$	$.0^2169$	$.0^2164$	$.0^2159$	$.0^2154$	$.0^2149$	$.0^2144$	$.0^2139$	0 1 1	2 2 3	3 4 4
3.0	$.0^2135$	$.0^2131$	$.0^2126$	$.0^2122$	$.0^2118$	$.0^2114$	$.0^2111$	$.0^2107$	$.0^2104$	$.0^2100$	0 1 1	2 2 2	3 3 4
3.1	$.0^3968$	$.0^3935$	$.0^3904$								3 6 9	13 16 19	22 25 28
				$.0^3874$	$.0^3845$	$.0^3816$	$.0^3789$				3 6 8	11 14 17	20 22 25
								$.0^3762$	$.0^3736$	$.0^3711$	2 5 7	10 12 15	17 20 22
3.2	$.0^3687$	$.0^3664$	$.0^3641$	$.0^3619$	$.0^3598$						2 4 7	9 11 13	15 18 20
						$.0^3577$	$.0^3557$	$.0^3538$	$.0^3519$	$.0^3501$	2 4 6	8 9 11	13 15 17
3.3	$.0^3483$	$.0^3466$	$.0^3450$	$.0^3434$	$.0^3419$						2 3 5	6 8 10	11 13 14
						$.0^3404$	$.0^3390$	$.0^3376$	$.0^3362$	$.0^3349$	1 3 4	5 7 8	9 10 12
3.4	$.0^3337$	$.0^3325$	$.0^3313$	$.0^3302$	$.0^3291$	$.0^3280$	$.0^3270$	$.0^3260$	$.0^3251$	$.0^3242$	1 2 3	4 5 6	7 8 9
3.5	$.0^3233$	$.0^3224$	$.0^3216$	$.0^3208$	$.0^3200$	$.0^3193$	$.0^3185$	$.0^3178$	$.0^3172$	$.0^3165$	1 1 2	3 4 4	5 6 7
3.6	$.0^3159$	$.0^3153$	$.0^3147$	$.0^3142$	$.0^3136$	$.0^3131$	$.0^3126$	$.0^3121$	$.0^3117$	$.0^3112$	0 1 1	2 2 3	3 4 5
3.7	$.0^3108$	$.0^3104$	$.0^3100$	$.0^496$	$.0^492$	$.0^488$	$.0^485$	$.0^482$	$.0^478$	$.0^475$			
3.8	$.0^472$	$.0^469$	$.0^467$	$.0^464$	$.0^462$	$.0^459$	$.0^457$	$.0^454$	$.0^452$	$.0^450$			
3.9	$.0^448$	$.0^446$	$.0^444$	$.0^442$	$.0^441$	$.0^439$	$.0^437$	$.0^436$	$.0^434$	$.0^433$			

For negative z use the relation:

$$Q(z) = 1 - Q(-z) = P(-z)$$

Example: if $u \sim N(0,1)$, *find* (*a*) Prob $(u > 2)$, (*b*) Prob $(0 < u < 2)$, (*c*) Prob $(|u| > 2)$, (*d*) Prob $(|u| < 2)$. The desired probabilities are (*a*) $Q(2) = .0228$, (*b*) $Q(0) - Q(2) = .5000 - .0228 = .4772$, (*c*) $2Q(2) = .0456$, (*d*) $1 - 2Q(2) = .9544$.

If $v \sim N(\mu,\sigma^2)$, Prob $(v > x)$ is given by $Q(z)$ with $z = (x - \mu)/\sigma$.

UPPER QUANTILES $z_{(P)}$ OF THE NORMAL DISTRIBUTION N(0,1)

P	Q	z	P	Q	z	P	Q	z	P	Q	z	Q	z
.50	.50	0.000	.85	.15	1.036	.975	.025	1.960	.990	.010	2.326	$.0^34$	3.353
.55	.45	0.126	.86	.14	1.080	.976	.024	1.977	.991	.009	2.366	$.0^33$	3.432
.60	.40	0.253	.87	.13	1.126	.977	.023	1.995	.992	.008	2.409	$.0^32$	3.540
.65	.35	0.385	.88	.12	1.175	.978	.022	2.014	.993	.007	2.457	$.0^31$	3.719
.70	.30	0.524	.89	.11	1.227	.979	.021	2.034	.994	.006	2.512	$.0^45$	3.891
.75	.25	0.674	.90	.10	1.282	.980	.020	2.054	.995	.005	2.576	$.0^41$	4.265
.76	.24	0.706	.91	.09	1.341	.981	.019	2.075	.996	.004	2.652	$.0^35$	4.417
.77	.23	0.739	.92	.08	1.405	.982	.018	2.097	.997	.003	2.748	$.0^51$	4.753
.78	.22	0.772	.93	.07	1.476	.983	.017	2.120	.998	.002	2.878	$.0^65$	4.892
.79	.21	0.806	.94	.06	1.555	.984	.016	2.144	.999	.001	3.090	$.0^61$	5.199
.80	.20	0.842	.950	.050	1.645	.985	.015	2.170	.9991	$.0^39$	3.121	$.0^75$	5.327
.81	.19	0.878	.955	.045	1.695	.986	.014	2.197	.9992	$.0^38$	3.156	$.0^71$	5.612
.82	.18	0.915	.960	.040	1.751	.987	.013	2.226	.9993	$.0^37$	3.195	$.0^85$	5.731
.83	.17	0.954	.965	.035	1.812	.988	.012	2.257	.9994	$.0^36$	3.239	$.0^81$	5.998
.84	.16	0.994	.970	.030	1.881	.989	.011	2.290	.9995	$.0^35$	3.291	$.0^95$	6.109

The tabulated function is $z_{(P)}$: if $u \sim N(0,1)$, Prob $(u < z_{(P)}) = P$, Prob $(u > z_{(P)}) = 1 - P = Q$, and (for $P > \frac{1}{2}$) Prob $(|u| > z_{(P)}) = 2Q$.

Lower quantiles ($P < \frac{1}{2}$) are given by:

$$z_{(P)} = -z_{(1-P)}$$

PROBABILITY DENSITY $\varphi(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9
0.	0.399	.397	.391	.381	.368	.352	.333	.312	.290	.266
1.	0.242	.218	.194	.171	.150	.130	.111	.094	.079	.066
2.	0.0540	.0440	.0355	.0283	.0224	.0175	.0136	.0104	.0079	.0060
3.	0.00443	.00327	.00238	.00172	.00123	.00087	.00061	.00042	.00029	.00020
4.	0.0^3134	0^489	0^459	0^439	0^425	0^416	0^410	0^364	0^340	0^324

For $z < 0$ use the relation:

$$\varphi(z) = \varphi(-z)$$

The tabulated functions are defined thus:

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

$$Q(z) = \int_z^\infty \varphi(u)\,du$$

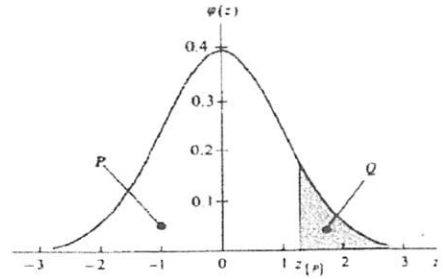
$$\int_{-\infty}^{z_{(P)}} \varphi(u)\,du = P$$

In the figure the probability density is represented by the ordinate of the graph, and the tail probabilities are represented by areas under the graph.

The probability density of the distribution $N(\mu, \sigma^2)$ is

$$f(x) = \frac{1}{\sigma}\varphi(z)$$

with $z = (x - \mu)/\sigma$.



Section *A* / *Bahagian A*

[40 *marks* / 40 *markah*]

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

1 Solve the simultaneous equation $x+2y=3$ and $x^2+y^2+2xy=5$.
Give your answers correct to two decimal places. [5 *marks*]

Selesaikan persamaan serentak $x+2y=3$ dan $x^2+y^2+2xy=5$.
Berikan jawapan anda betul sehingga dua tempat perpuluhan. [5 *markah*]

2 (*a*) Sketch the graph of $y=-4\cos\frac{3}{2}x$ for $0\le x\le\pi$. [4 *marks*]

Lakar graf $y=-4\,\text{kos}\,\frac{3}{2}x$ *untuk* $0\le x\le\pi$. [4 *markah*]

(*b*) (i) Using the same axes, draw a suitable straight line to solve the equation $\cos\frac{3}{2}x=\frac{1}{4\pi}x-\frac{3}{4}$ for $0\le x\le\pi$.

Dengan menggunakan paksi yang sama, lukis satu garis lurus yang sesuai untuk menyelesaikan persamaan $\text{kos}\,\frac{3}{2}x=\frac{1}{4\pi}x-\frac{3}{4}$ *untuk* $0\le x\le\pi$.

(ii) Hence, state the number of solutions.
Seterusnya, nyatakan bilangan penyelesaian.

[3 *marks*]
[3 *markah*]

3 Diagram 3 shows a part of a series of circular sectors drawn with an angle of 1·5 radians with centre O. The radius of the first sector is 4 cm. The radius of each subsequent sector is 2 cm more than the preceding sector.

Rajah 3 *menunjukkan sebahagian daripada siri sektor bulatan yang dilukis dengan sudut* 1·5 radian *pada pusat* O. *Jejari sektor pertama ialah* 4 cm. *Jejari bagi sektor yang berturutan yang berikutnya ialah* 2 cm *lebih daripada sektor yang sebelumnya.*

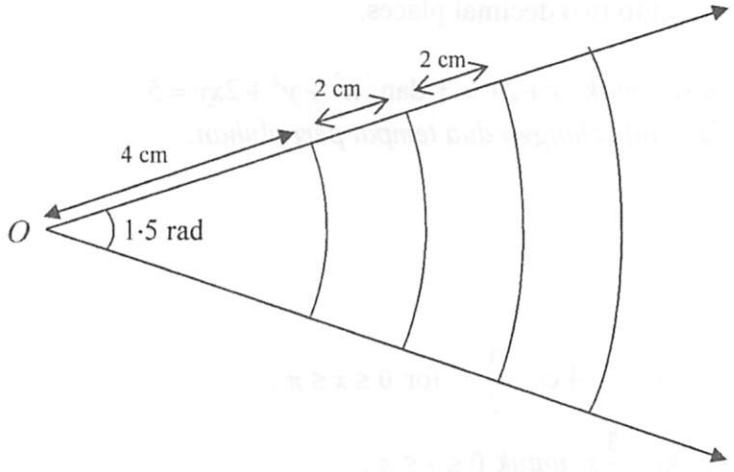


Diagram 3 / *Rajah* 3

Given that the length of the arc of the n^{th} sector is 30 cm, find

Diberi panjang lengkok bagi sektor ke-n ialah 30 cm, *cari*

(*a*) the radius of the n^{th} sector [2 *marks*]
jejari bagi sektor ke-n [2 *markah*]

(*b*) the value of n [3 *marks*]
nilai n [3 *markah*]

(*c*) the sum of the length of arc arc of the first 20 sectors. [2 *marks*]
hasil tambah panjang lengkok bagi 20 *sektor yang pertama.* [2 *markah*]

4 Given that the curve $y = x^3 - 5x^2 + 8$ passes through $P(-1, 2)$.

Diberi lengkung $y = x^3 - 5x^2 + 8$ *melalui* $P(-1, 2)$.

(*a*) If x decreases from 3 to 2·99,
Jika x menyusut daripada 3 *kepada* 2·99,

(i) find the small change in y,
cari perubahan kecil dalam y,

(ii) Hence, find the approximate value of y.
Seterusnya, cari nilai hampir bagi y.

[4 *marks*]
[4 *markah*]

(*b*) Find the rate of change of y when the rate of change of x is 0·4 unit s^{-1} at point P.
[3 *marks*]
Cari kadar perubahan y jika kadar perubahan x pada titik P ialah 0·4 unit s^{-1}.
[3 *markah*]

5 Table 5 shows the frequency distribution of the scores of a group of students in the Science quiz.
Jadual 5 menunjukkan taburan kekerapan bagi skor sekumpulan pelajar dalam kuiz Sains.

Score *Skor*	Number of pupils *Bilangan murid*
11 - 15	3
16 - 20	4
21 - 25	3
26 - 30	6
31 - 35	4
36 - 40	5

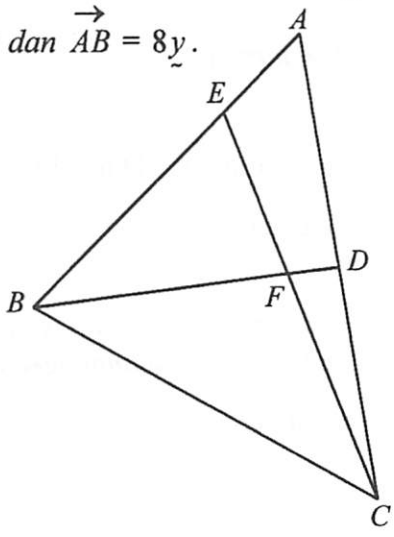
Table 5 / *Jadual 5*

(*a*) Calculate the standard deviation of the distribution. [4 *marks*]
Hitung sisihan piawai bagi taburan markah itu. [4 *markah*]

(*b*) Find the variance if the score of each pupil is multiplied by 2 and then 5 is added to it. [2 *marks*]
Cari varians jika skor setiap murid didarabkan dengan 2 dan kemudian ditambah dengan 5. [2 *markah*]

6 Diagram 6 shows a triangle ABC. D is the midpoint of AC and E is a point on AB such that $AB = 4AE$. The straight lines BD and CE intersect at point F. It is given that $\overrightarrow{BC} = 4\underset{\sim}{x}$ and $\overrightarrow{AB} = 8\underset{\sim}{y}$.

Rajah 6 menunjukkan segitiga ABC. D adalah titik tengah AC dan titik E terletak pada AB dengan keadaan AB = 4AE. Garis lurus BD bersilang dengan garis lurus CE pada titik F. Diberi bahawa $\overrightarrow{BC} = 4\underset{\sim}{x}$ *dan* $\overrightarrow{AB} = 8\underset{\sim}{y}$.



Rajah 6 / *Diagram 6*

(*a*) Express the following in terms of $\underset{\sim}{x}$ and $\underset{\sim}{y}$
Ungkapkan dalam sebutan $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$

(i) $\overrightarrow{BD}$

(ii) $\overrightarrow{CE}$

[3 *marks*]
[3 *markah*]

(*b*) Given that $\overrightarrow{BF} = h\overrightarrow{BD}$ and $\overrightarrow{CF} = k\overrightarrow{CE}$, where h and k are constants. Express $\overrightarrow{BF}$
Diberi $\overrightarrow{BF} = h\overrightarrow{BD}$ *dan* $\overrightarrow{CF} = k\overrightarrow{CE}$, *dengan keadaan h dan k adalah pemalar.*
Ungkapkan $\overrightarrow{BF}$

(i) in terms of h, x and y,
dalam sebutan h, x dan y,

(ii) in terms of k, x and y.
dalam sebutan k, x dan y

[2 *marks*]
[2 *markah*]

(*c*) Hence, find the value of h and of k.
Seterusnya, cari nilai h dan nilai k.

[3 *marks*]
[3 *markah*]

Section *B* / *Bahagian B*

[40 *marks* / 40 *markah*]

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

7 Use graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Table 7 shows the values of two variables, x and y, obtained from an experiment.
The variables x and y are related by the equation $y = hx^2 + \frac{k}{x}$, where h and k are constants.

Jadual 7 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y, yang diperoleh daripada satu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y = hx^2 + \frac{k}{x}$, *dengan keadaan h dan k adalah pemalar.*

x	0·8	1.1	1·4	1·6	1·8	1·9
y	6·28	6.02	6·18	7·62	8·55	9·47

Table 7 / *Jadual 7*

(*a*) Plot xy against x^3, using a scale of 2 cm to 1 unit on the x^3-axis and 2 cm to 2 units on the xy-axis. Hence, draw the line of best fit. [5 *marks*]

Plot xy melawan x^3, *dengan menggunakan skala* 2 cm *kepada* 1 unit *pada paksi-*x^3 *dan* 2 cm *kepada* 2 unit *pada paksi-xy. Seterusnya, lukis garis lurus penyuaian terbaik.*

[5 *markah*]

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

(i) h and k
h *dan* k

(ii) y when $x = 1{\cdot}518$
y *bila* $x = 1{\cdot}518$

[5 *marks*]
[5 *markah*]

8 Diagram 8 shows the curve $y = f(x)$ which passes through point (1, 9).
Rajah 8 menunjukkan lengkung $y = f(x)$ *yang melalui titik* (1, 9).

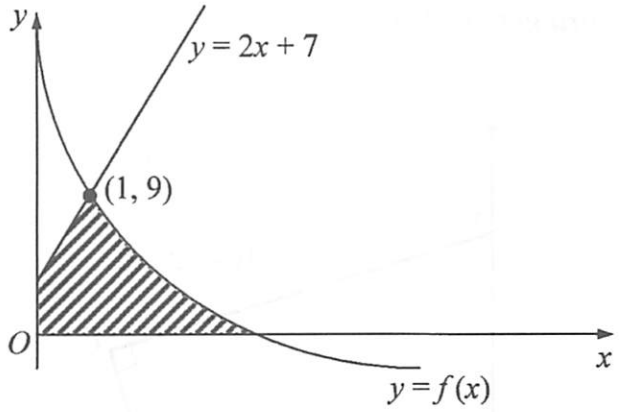


Diagram 8 / *Rajah 8*

The curve $y = f(x)$ has a gradient function of $2x - 8$.
Lengkung $y = f(x)$ *itu mempunyai fungsi kecerunan* $2x - 8$.

(*a*) Show that the equation of the curve is given by $y = (x - 4)^2$. [3 *marks*]
Tunjukkan bahawa persamaan lengkung itu diberi oleh $y = (x - 4)^2$. [3 *markah*]

(*b*) Find the area of the shaded region. [4 *marks*]
Cari luas rantau berlorek. [4 *markah*]

(*c*) Calculate the volume generated when the region bounded by the straight line $x = 1$, the x-axis and the curve is revolved 360° about the x-axis. [3 *marks*]
Hitung isi padu kisaran apabila rantau yang dibatasi oleh garis lurus $x = 1$, *paksi-x dan lengkung diputarkan melalui* 360° *pada paksi-x* . [3 *markah*]

9 *Solution by scale drawing is **not** accepted.*
Penyelesaian secara lukisan berskala **tidak** diterima.

Diagram 9 shows a straight line PQ.
Rajah 9 shows a straight line PQ.

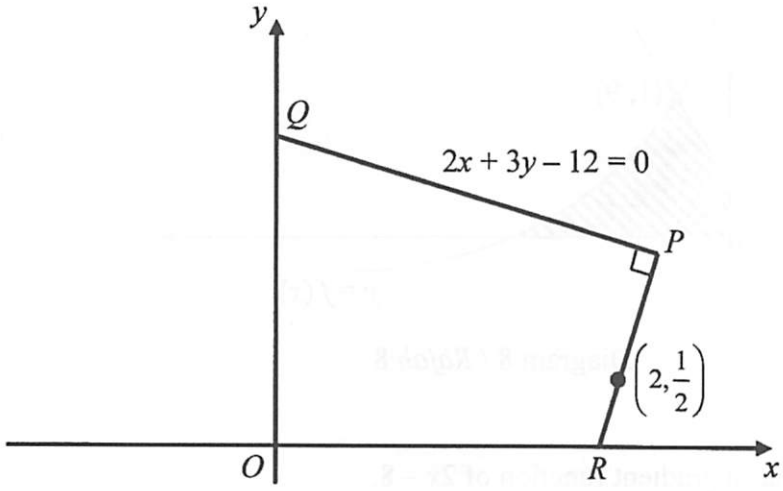


Diagram 9 / *Rajah 9*

(*a*) Find the equation of the straight line PR. [3 *marks*]
Cari persamaan garis lurus PR. [3 *markah*]

(*b*) Find the coordinates of P. [2 *marks*]
Cari koordinat P. [2 *markah*]

(*c*) Calculate the area of triangle PQR. [3 *marks*]
Hitung luas segitiga PQR. [3 *markah*]

(*d*) PQ is extended to T such that $2PQ = 3QT$. Find the coordinates of T. [2 *marks*]
PQ diperpanjangkan ke T supaya $2PQ = 3QT$. Cari koordinat T. [2 *markah*]

10 Diagram 10 shows a circle *OMN*, centre *O* with radius 5 cm and a sector *PQR* centre *P*. The straight lines *MP* and *NP*, are tangents to the circle at point *M* and point *N* respectively.

Rajah 10 *menunjukkan sebuah bulatan OMN, berpusat O dengan jejari* 5 cm *dan sektor PQR berpusat di P. Garis lurus MP dan garis lurus NP adalah tangent kepada bulatan masing-masing di titik M dan titik N.*

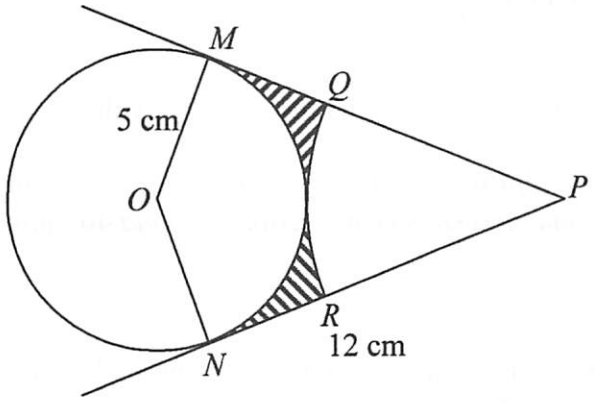


Diagram 10 / *Rajah* 10

[Use / *Guna* $\pi = 3{\cdot}142$]

Calculate / *Hitung*

(*a*) $\angle MON$ and $\angle QPR$ in radian, [3 *marks*]
$\angle MON$ *dan* $\angle QPR$ *dalam* radian, [3 *markah*]

(*b*) the perimeter of the shaded region, [3 *marks*]
perimeter kawasan berlorek, [3 *markah*]

(*c*) area of the shaded region. [4 *marks*]
luas kawasan berlorek. [4 *markah*]

11 (*a*) In a company, 75% of the workers are over 40 years old.
Dalam sebuah syarikat, 75% *daripada pekerjanya berumur lebih daripada* 40 *tahun.*

(i) Given that the mean numbers of workers over 40 years old is 2280, find the total number of workers in the company.
Diberi min bilangan pekerja yang berumur lebih daripada 40 tahun ialah 2280, *cari jumlah pekerja dalam syarikat tersebut.*

(ii) If 8 workers are randomly chosen, find the probability that at least 2 of them are over 40 years old.
Jika 8 *orang pekerja dipilih secara rawak, cari kebarangkalian bahawa sekurang-kurangnya* 2 *daripada mereka berumur lebih daripada* 40 *tahun.*

[4 *marks*]
[4 *markah*]

(*b*) The weight of the workers in biscuit factory follows a normal distribution with a mean 64 kg and variance of 144 kg^2.
Berat bagi pekerja di kilang biskut adalah mengikut taburan normal dengan min 64 kg *dan varians* 144 kg^2.

(i) Calculate the percentage of workers having weight between 58 kg and 67 kg.
Hitung peratus pekerja yang mempunyai berat di antara 58 kg *dan* 67 kg.

(ii) If 97·8% of the workers weight more than *m* kg, find the value of *m*.
Jika 97·8% *daripada pekerja mempunyai berat lebih daripada m* kg, *cari nilai bagi m.*

[6 *marks*]
[6 *markah*]

Section *C* / *Bahagian C*

[20 *marks* / 20 *markah*]

Answer **two** questions from this section.
Jawab **dua** *soalan daripada bahagian ini.*

12 A particle moves along a straight line and passes through a fixed point O, with an initial velocity of 24 ms^{-1}. Its acceleration, a ms^{-2}, is given by $a = 2t - 10$, where t is the time in seconds.
Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui titik tetap O, dengan halaju awal 24 ms^{-1}. *Pecutannya,* a ms^{-2}, *diberi oleh* $a = 2t - 10$ *dengan keadaan t ialah masa dalam saat.*

Find / *Cari*

(*a*) the minimum velocity, in ms^{-1}, of the particle, [4 *marks*]
halaju minimum, dalam ms^{-1}, *zarah itu,* [4 *markah*]

(*b*) the range of values of t during which the particle moves to the left. [3 *marks*]
julat nilai t apabila zarah itu bergerak arah ke kiri. [3 *markah*]

(*c*) the total distance, in m, travelled by the particle in the first 6 seconds. [3 *marks*]
jumlah jarak, dalam m, *yang dilalui oleh zarah itu dalam* 6 *saat pertama.* [3 *markah*]

13 Table 13 shows the price indices and percentage expenditure for three items, *A*, *B* and *C* used in making a certain kind of cake.
Jadual 13 *menunjukkan indeks harga dan peratus perbelanjaan bagi tiga bahan, A, B dan C yang digunakan untuk membuat sejenis kek.*

Item *Bahan*	Price index in the year 2010 based on the year 2008 *Indeks harga pada tahun* 2010 *berasaskan tahun* 2008	Price index in the year 2012 based on the year 2008 *Indeks harga pada tahun* 2012 *berasaskan tahun* 2008	Percentage expenditure *Peratus perbelanjaan*
A	132	142	40
B	116	*h*	25
C	*k*	150	35

Jadual 13 / *Table* 13

(*a*) Find the price index of item *A* in the year 2012 based on the year 2010. [2 *marks*]
Cari indeks harga bahan A pada tahun 2012 *berasaskan tahun* 2010. [2 *markah*]

(*b*) The price of item *B* in the year 2008 is RM12·10 and its price in the year 2012 is RM14·60.
Harga bahan B pada tahun 2008 *ialah* RM12·10 *dan harganya pada tahun* 2012 *ialah* RM14·60.
Find / *Cari*

(i) the value of *h*,
nilai h,

(ii) the price of item *B* in the year 2010.
harga bahan B pada tahun 2010.

[3 *marks*]
[3 *markah*]

(*c*) Given the composite index for the production cost of making the cake in the year 2010 based on the year 2008 is 120. Find the value of *k*. [2 *marks*]
Diberi indeks gubahan untuk kos membuat kek pada tahun 2010 *berasaskan tahun* 2008 *ialah* 120. *Cari nilai k*. [2 *markah*]

(*d*) Given the price of the cake increases 10% from the year 2010 to the year 2012. If its price in the year 2008 is RM38, calculate the corresponding price of the cake in the year 2012. [3 *marks*]
Diberi bahawa harga sebiji kek telah meningkat sebanyak 10% *daripada tahun* 2010 *kepada tahun* 2012. *Jika harganya pada tahun* 2008 *ialah* RM38, *hitung harga yang sepadan bagi kek itu pada tahun* 2012. [3 *markah*]

14 *Use graph paper to answer this question.*
Gunakan kertas graf untuk menjawab soalan ini.

A cooperative purchasing school uniforms and T-shirts from a supplier. Cooperatives have capital RM10 000 to buy x school shirts and y T-shirts.

Sebuah koperasi sekolah membeli baju sekolah dan kemeja-T daripada seorang pembekal. Koperasi itu mempunyai modal RM10 000 *untuk membeli x helai baju sekolah dan y helai kemeja-T.*
Purchase of clothes is based on the following constraints:
Pembelian baju adalah berdasarkan kekangan berikut :

I : The cost of purchasing a school shirt is RM20 and a T-shirt is RM25.
Kos membeli sehelai baju sekolah ialah RM20 *dan sehelai baju kemeja-T ialah* RM25.

II : The number of school shirts cannot exceed twice the number of T-shirts.
Bilangan baju sekolah tidak boleh melebihi dua kali bilangan baju kemeja-T.

III : The number of T-shirts exceed the number of school shirts by at most 40.
Bilangan baju kemeja-T melebihi bilangan baju sekolah selebih-lebihnya 40 *helai.*

(*a*) Write three inequalities that satisfy all the above constraints excluding $x \geq 0$ and $y \geq 0$. [3 *marks*]
Tulis tiga ketaksamaan yang memenuhi semua kekangan di atas selain $x \geq 0$ *dan* $y \geq 0$. [3 *markah*]

(*b*) Using a scale of 2 cm to 40 shirts purchased on both axes, construct and shade the region R which satisfies all the above constraints. [3 *marks*]

Dengan menggunakan skala 2 cm *kepada* 40 *helai baju yang dibeli pada kedua-dua paksi, bina dan lorekkan rantau R yang memenuhi semua kekangan di atas.*
[3 *markah*]

(*c*) Use your graph in **14**(*b*) to find

Gunakan graf anda di **14**(*b*) *untuk mencari*

(i) the maximum number of T-shirts purchased if the cooperative purchase 240 school shirts.
bilangan maksimum baju kemeja-T yang dibeli jika koperasi membeli 240 *helai baju sekolah.*

(ii) the maximum gross profit if the price of a school shirt and a T-shirt are RM30 and RM40 respectively.
jumlah keuntungan kasar maksimum jika harga sehelai baju sekolah dan sehelai baju kemeja-T ialah RM30 *dan* RM40 *masing-masing.*

[4 *marks*]
[4 *markah*]

15 Diagram 15 shows a triangle *ABC*.
Rajah 15 *menunjukkan sebuah segitiga ABC.*

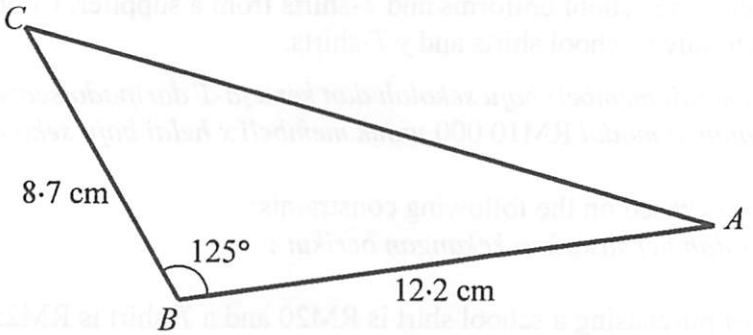


Diagram 15 / *Rajah* 15

(*a*) Calculate / *Hitung*

(i) the length of *AC*,
panjang AC,

(ii) $\angle BCA$.

[5 *marks*]
[5 *markah*]

(*b*) Given that the line *AB* is extended to *B'* such that *B'C* = *BC*, while *AC* and $\angle BAC$ remain unchanged.
Diberi bahawa garis AB diperpanjangkan ke B' supaya B'C = *BC, manakala AC dan* $\angle BAC$ *adalah kekal.*

(i) Sketch the triangle *AB'C*.
Lakar segitiga AB'C.

(ii) Find the area, in cm^2, of the triangle *AB'C*.
Cari luas, dalam cm^2, *bagi segitiga AB'C.*

[5 *marks*]
[5 *markah*]

KERTAS SOALAN TAMAT
END OF QUESTION PAPER

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HALAMAN KOSONG

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HALAMAN KOSONG

NAMA : .....

TINGKATAN : .....

Arahan Kepada Calon

1. Tulis Nama dan Tingkatan anda.
2. Tandakan (✓) untuk soalan yang dijawab.
3. Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.

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

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections : **Section A**, **Section B** and **Section C**.

   Kertas soalan ini mengandungi tiga bahagian : ***Bahagian A***, ***Bahagian B*** *dan* ***Bahagian C***.

2. Answer **all** questions in **Section A**, any **four** questions from **Section B** and any **two** questions from **Section C**.

   Jawab **semua** *soalan dalam* ***Bahagian A***, mana-mana **empat** *soalan daripada* ***Bahagian B*** *dan* mana-mana **dua** *soalan daripada* ***Bahagian C***.

3. Write your answers on the foolscap papers provided.

   Tulis jawapan anda pada kertas jawapan yang disediakan.

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

   Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ia boleh membantu anda untuk mendapatkan markah.

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

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

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

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

7. A list of formulae is provided on pages 3 to 5.

   Satu senarai rumus disediakan di halaman 3 *hingga* 5.

8. Graph paper is provided.

   Kertas graf disediakan.

9. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

10. Tie the 'helaian tambahan' and the graph papers together with the answer sheets and hand in to the invigilator at the end of the examination.

    Ikatkan helaian tambahan dan kertas graf bersama-sama dengan kertas jawapan dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

JABATAN PELAJARAN NEGERI TERENGGANU

PENTAKSIRAN SUMATIF 3 SPM 2013

3472/1

MATEMATIK TAMBAHAN

Kertas 1

Peraturan Pemarkahan

Ogos 2013

Peraturan pemarkahan ini mengandungi 7 halaman bercetak.

INSTRUCTIONS FOR EXAMINERS

1. MARKING GUIDE

1.1 Mark all the answers.

1.2 Do not mark working / answer that has been cancelled.

1.3 Answer written in the answer space or at the end of the working is considered the final answer.

1.4 Full mark is given for the correct answer without referring to the working.

1.5 If the final answer is wrong, award the corresponding maximum mark as stated in the marking scheme.

1.6 If more then one final answer is given, choose the answer with the highest mark unless stated otherwise in the marking scheme.

1.7 If the final answer is correct, but stated wrongly in the answer space, full mark is not awarded.

2. NOTATION

2.1 Full mark for each question in this paper is either 2, 3 or 4.

2.2 If full mark is not awarded, the following system is used :

B3 – 3 marks is awarded if the answer at this stage is correct.

B2 – 2 marks is awarded if the answer at this stage is correct.

B1 – 1 mark is awarded if the answer at this stage is correct.

2.3 Only one out of B3, B2 or B1 is awarded for each question or part of a question.

3. Accept answers correct to 4 significant figures unless stated otherwise in the marking scheme.

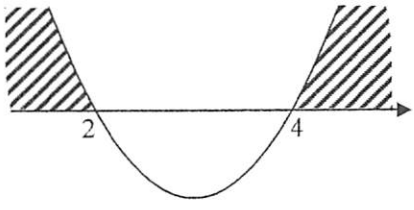
4. Accept other correct methods which are not given in the marking scheme.

5. Accept answers in Bahasa Melayu.

6. Calculating total marks.

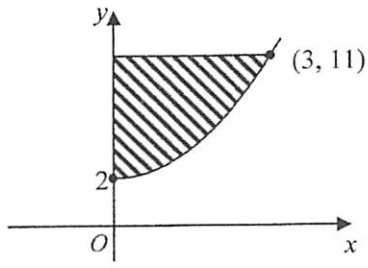
$$\frac{\sum \text{Score for Paper 1} + \sum \text{Score for Paper 2}}{180} \times 100\%$$

PENTAKSIRAN SUMATIF 3 SPM 2013
PERATURAN PEMARKAHAN UNTUK MATEMATIK TAMBAHAN KERTAS 1

No.	Mark Scheme	Σ Mark
1	(a) 1 dan 3 [1] (b) $\{p, q, r, t\}$ [1] ignore the bracket	2
2	(a) $g^{-1}(x) = \frac{x-2}{3}$ [1] (b) 0 [2] $\frac{8-2}{3}$ **B1** follow through	3
3	$4x^2 - 4x - 3 = 0$ [2] $(2x+1)(2x-3) = 0$ **B1**	2
4	$m < -6$ [3] $(2)^2 - 4(1)(-m-5) < 0$ **B2** $(2)^2 - 4(1)(-m-5)$ **B1**	3
5	$x < 2$, $x > 4$ [3]  **B2** $(x-2)(x-4)$ and $x = 2, 4$ **B1**	3
6	(a) $x = 3$ [1] (b) $p = -3$ [1] $q = 6$ [1]	3
7	$3x^2 + 3y^2 + 22x + 42y + 106 = 0$ [3] $\sqrt{(x-3)^2 + (y+1)^2} = 2\sqrt{(x+2)^2 + (y-5)^2}$ **B2** $\sqrt{(x-3)^2 + (y+1)^2}$ or $2\sqrt{(x+2)^2 + (y-5)^2}$ **B1**	3

No.	Mark Scheme	Σ Mark
8	$r = 8$ cm [3] $r + r + 2r = 32$ B2 2 or $r\theta$ or $2r$ seen B1	3
9	(a) -4 [1] (b) 171 [2] $\frac{10}{2}\left[5(10)-13\right]-\frac{4}{2}\left[5(4)-13\right]$ B1	3
10	(a) $\frac{1}{4}$ [2] $128r^3 = 2$ B1 (b) $\frac{512}{3}$ [2] $\frac{128}{1-\frac{1}{4}}$ B1	4
11	$p = -\frac{1}{8}$ [4] $2 + 2(1+p) = 3 - 6p$ B3 $2^{2+2(1+p)} = 2^{3-6p}$ B2 $2^2 \times 2^{2(1+p)} = \frac{1}{2^{3(2p-1)}}$ B1	4
12	$k = \frac{2}{7}$ [3] $\frac{2k}{1-3k} = 2^2$ B2 $\log_2 \frac{2k}{1-3k} = 2$ OR $\log_2 \frac{2k}{1-3k} = \log_2 2^2$ B1 for $\log_2 \frac{2k}{1-3k}$	3

No.	Mark Scheme	Σ Mark
13	$x + 3y - 4$ [4] $\log_2 m + \log_2 n^3 - \log_2 16$ **B2** for 1 logarithm law used **and** ($\log_2 m = x$ or $\log_2 n = y$) **B3** for 2 logarithm laws used **and** ($\log_2 m = x$ or $\log_2 n = y$) $\log_2 m = x$ or $\log_2 n = y$ **B1** (seen anywhere)	4
14	3·5 [3] 8 – 4·5 **B2** $Q_1 = 4{\cdot}5$ or $Q_3 = 8$ **B1**	3
15	$k = \frac{2}{3}$ [3] $x = \frac{2}{3}$ $6x - 4 = 0$ **B2** $\frac{dy}{dx} = 6x - 4$ **B1** **OR** $k = \frac{2}{3}$ [3] $x = \frac{2}{3}$ $3\left(x - \frac{2}{3}\right)^2 + \frac{11}{3}$ **B2** $3\left(x + \frac{-4}{2(3)}\right)^2 + 5 - \frac{(-4)^2}{4(3)}$ **B1**	3
16	$\frac{dy}{dx} = \frac{1}{(1-2x)^2}$ or equivalent [3] $\frac{dy}{dx} = \frac{(1-2x)(1) - x(-2)}{(1-2x)^2}$ **B2** $\frac{du}{dx} = 1$, $\frac{dv}{dx} = -2$ (both) **B1**	3

No.	Mark Scheme	Σ Mark
17	(a)  [1] (b) 33 unit^2 [2] 3×11 B1	3
18	(a) -30 [1] (b) $\frac{2}{3}$ [3] $10 - k[\frac{x^2}{2}]$ B2 $\int_2^5 m(x)\,dx - k\int_2^5 x\,dx$ B1 (separate)	4
19	$x = 90°, 180°, 270°$ [4] Give B3 for any 2 correct answers given $\cos x = 0,\ \cos x = -1$ (both) B3 $2\cos x(\cos x + 1) = 0$ B2 $2\cos^2 x - 1 + 2\cos x = -1$ B1	4
20	$h = 8,\ k = 3$ [3] $h = -2(1) + 10$ or $4 = -2k + 10$ B2 $\frac{y}{x} = -2x + 10$ and ($m = -2$, $c = 10$ used) B1	3
21	Vektor unit $= \frac{1}{\sqrt{29}}(5\underset{\sim}{i} + 2\underset{\sim}{j})$ [3] $\overrightarrow{OP} = 5\underset{\sim}{i} + 2\underset{\sim}{j}$ B2 $\overrightarrow{OP} = \overrightarrow{OQ} + \overrightarrow{QP} = 7\underset{\sim}{i} + 6\underset{\sim}{j} + (-2\underset{\sim}{i} - 4\underset{\sim}{j})$ B	3

No.	Mark Scheme	Σ Mark
22	(a) $\frac{1}{5}$ [2] $\frac{3}{5}\times\frac{1}{3}$ B1 (b) $\frac{11}{15}$ [2] $\frac{3}{5}\times\frac{2}{3}$ or $\frac{2}{5}\times\frac{1}{3}$ or $\frac{3}{5}\times\frac{1}{3}$ **OR** $\frac{2}{5}\times\frac{2}{3}$ B1	4
23	(a) 700 [1] (b) 1008 [3] ${}^5C_2\times{}^8C_4+{}^5C_1\times{}^8C_5+{}^5C_0\times{}^8C_6$ B2 ${}^5C_2\times{}^8C_4$ *or* ${}^5C_1\times{}^8C_5$ *or* ${}^5C_0\times{}^8C_6$ B1	4
24	(a) 5040 [1] (b) 720 [2] ${}^3p_3$ or ${}^5p_4$ or 5! or 3! or $5\times4\times3\times2\times1$ or $3\times2\times1$ B1	3
25	(a) 0·762 [1] (b) 0·5516 [2] 0·2758 or $2\times0{\cdot}2242$ B1	3

END OF MARK SCHEME

JABATAN PELAJARAN NEGERI TERENGGANU

PENTAKSIRAN SUMATIF 3 SPM 2013 3472/2
MATEMATIK TAMBAHAN
Kertas 2
Peraturan Pemarkahan
Ogos 2013

Peraturan pemarkahan ini mengandungi 15 halaman bercetak.

INSTRUCTIONS FOR EXAMINERS

1. MARKING GUIDE

1.1 Mark all the answers.

1.2 Do not mark working / answer that has been cancelled.

1.3 Give the mark P / K / N in line with steps of calculation given by the students.

1.4 Give the mark P0 / K0 / N0 for the incorrect working / answer.

1.5 If more than one final answer is given, mark all the solution and choose the answer with the highest mark.

1.6 Accept other corect methods which are not given in the marking scheme.

2. NOTATION

P – The mark is given if the working / answer in accordance with the **Knowledge** assessed as stated in the marking scheme.

K – The mark is given if the working / answer in accordance with the **Skills** assessed as stated in the marking scheme.

N – The mark is given if the working / answer in accordance with the **Values** assessed as stated in the marking scheme.

PA – Subtract 1 mark (only once) from the **N** mark when students make an early rounding of numbers.

KP – Subtract 1 mark (only once) from the **P** mark or **N** mark when students do not write the important steps of the calculations.

3. Accept answers correct to 4 significant figures unless stated otherwise in the marking scheme.

4. Accept other correct methods which are not given in the marking scheme.

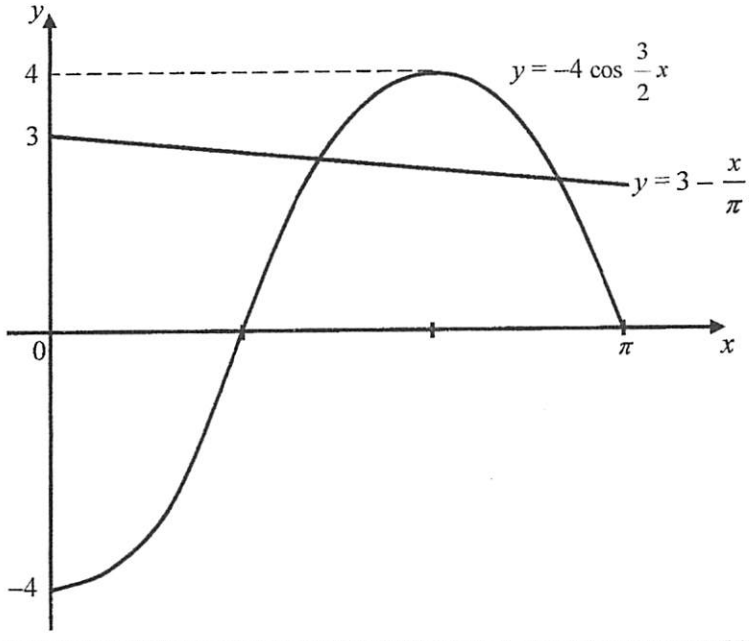
5. Accept answers in Bahasa Melayu.

6. Calculating total marks.

$$\frac{\sum \text{Score for Paper 1} + \sum \text{Score for Paper 2}}{180} \times 100\%$$

PENTAKSIRAN SUMATIF 3 SPM 2013
PERATURAN PEMARKAHAN UNTUK MATEMATIK TAMBAHAN KERTAS 2

SECTION *A* [40 MARKS]		
No.	**MARK SCHEME**	**Σ MARK**
1	$x = 3 - 2y$ or $y = \frac{3-x}{2}$ **P1** $(3-2y)^2 + y^2 + 2(3-2y)y = 5$ or $x^2 + 2x\left(\frac{3-x}{2}\right) + \left(\frac{3-x}{2}\right)^2 = 5$ **K1** $y^2 - 6y + 4 = 0$ or $x^2 + 6x - 11 = 0$ $y = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(4)}}{2(1)}$ or $x = \frac{-6 \pm \sqrt{6^2 - 4(1)(-11)}}{2(1)}$ **K1** $y = 5{\cdot}24,\ 0{\cdot}76$ **N1** (both) $x = -7{\cdot}47,\ 1{\cdot}47$ **N1**(both)	**5**

No.	MARK SCHEME	Σ MARK
2	(a) and (b)  - shape of cosine graph **P1** - amplitude (max = 4) **P1** - negative graph **P1** - period/cycle in $0 \le x \le \pi$ **P1** (ignore range greater than π) $y = 3 - \frac{x}{\pi}$ **K1** (equation of straight line) **K1** (any straight line with negative gradient **or** y-intercept of 3) No. of solutions = 2 **N1** (without any mistake done)	7

No.	MARK SCHEME	Σ MARK
3	(a) $4+(n-1)(2)$ **K1** $2n+2$ **N1** (b) $T_n = 30$ $6+(n-1)3=30$ **P1** ($d=3$) **K1** (use formula) $n=9$ **N1** (c) $\frac{20}{2}[2(6)+(20-1)3]$ **K1** 690 cm **N1**	7
4	(a) (i) $\frac{dy}{dx}=3x^2-10x$ **K1** Use $\delta y = \frac{dy}{dx} \times \delta x$ and substitute $\delta x = -0{\cdot}01$ $=(3x^2-10x)(-0{\cdot}01)$ **K1** $=0{\cdot}03$ **N1** (ii) Approximate value $-10+0{\cdot}03$ $-9{\cdot}97$ **N1** (b) $\frac{dy}{dx}=13$, $\frac{dx}{dt}=0{\cdot}4$ (both) **P1** Use chain rule, $\frac{dy}{dt}=\frac{dy}{dx}\times\frac{dx}{dt}$ $=0{\cdot}4\times13$ **K1** $=5{\cdot}2$ **N1**	7

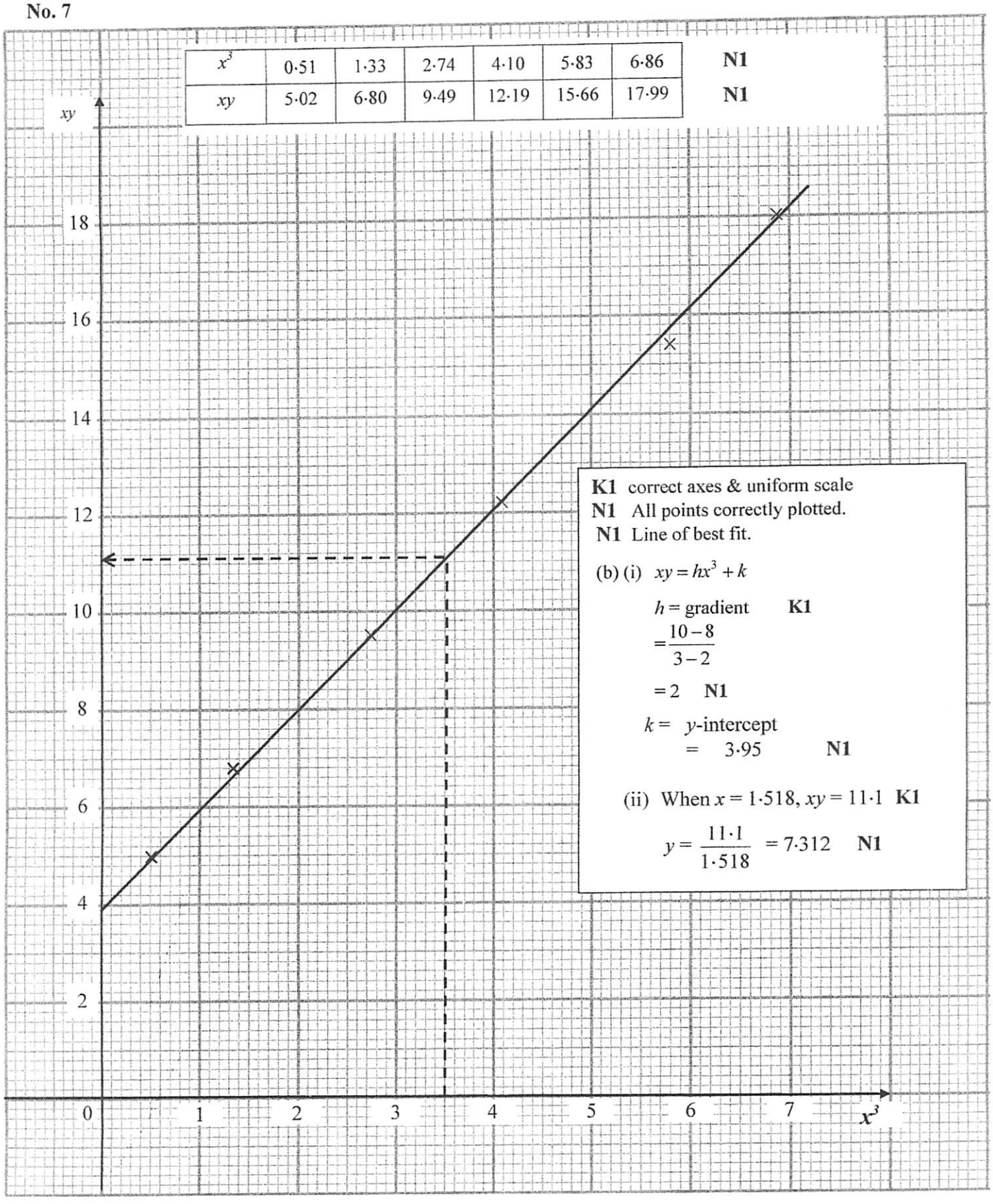
No.	MARK SCHEME	Σ MARK
5	(a) $\bar{x} = \frac{670}{25}$ or 26·8 **K1** 19670 **N1** $\sigma = \sqrt{\frac{19670}{25} - (26\cdot8)^2}$ **K1** = 8·28 **N1** (b) $(8\cdot28 \times 2)^2$ or $(8\cdot28)^2 \times (2)^2$ **K1** = 274·2 **N1**	6
6	(a) (i) $\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD} = -8\underset{\sim}{y} + \frac{1}{2}\overrightarrow{AC}$ $= -8\underset{\sim}{y} + \frac{1}{2}(8\underset{\sim}{y} + 4\underset{\sim}{x})$ $= -4\underset{\sim}{y} + 2\underset{\sim}{x}$ Use triangle law of vector **K1** **N1** (ii) $\overrightarrow{CE} = \overrightarrow{CA} + \overrightarrow{AE} = -8\underset{\sim}{y} - 4\underset{\sim}{x} + 2\underset{\sim}{y}$ $= -4\underset{\sim}{x} - 6\underset{\sim}{y}$ **N1** (b) (i) $\overrightarrow{BF} = h\overrightarrow{BD} = h(-4\underset{\sim}{y} + 2\underset{\sim}{x}) = 2h\underset{\sim}{x} - 4h\underset{\sim}{y}$ **N1** (ii) $\overrightarrow{CF} = k\overrightarrow{CE} = k(-4\underset{\sim}{x} - 6\underset{\sim}{y}) = -4k\underset{\sim}{x} - 6k\underset{\sim}{y}$ **N1** (c) $\overrightarrow{BF} = \overrightarrow{BC} + \overrightarrow{CF} = 4\underset{\sim}{x} - 4k\underset{\sim}{x} - 6k\underset{\sim}{y}$ $= (4-4k)\underset{\sim}{x} - 6k\underset{\sim}{y}$ **K1** for finding $\overrightarrow{BF}$ and compare $2h = 4 - 4k$ $-4h = -6k$ Solve **K1** $k = \frac{4}{7}$ $h = \frac{6}{7}$ **N1** both	8

No. 7

x^3	0·51	1·33	2·74	4·10	5·83	6·86
xy	5·02	6·80	9·49	12·19	15·66	17·99

N1

N1



K1 correct axes & uniform scale
N1 All points correctly plotted.
N1 Line of best fit.

(b) (i) $xy = hx^3 + k$

h = gradient **K1**

$= \dfrac{10-8}{3-2}$

$= 2$ **N1**

k = y-intercept

$= 3{\cdot}95$ **N1**

(ii) When $x = 1{\cdot}518$, $xy = 11{\cdot}1$ **K1**

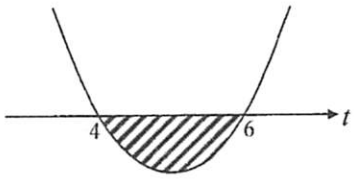
$y = \dfrac{11{\cdot}1}{1{\cdot}518} = 7{\cdot}312$ **N1**

No.	MARK SCHEME	Σ MARK
8	(a) $y=\frac{2x^2}{2}-8x+c$ **K1** for integration (Give **K1** for $\frac{2x^2}{2}$ or $-8x$) $9=\frac{2(1)^2}{2}-8(1)+c$ **K1** for substitution to find c $y=x^2-8x+16$ $y = (x-4)^2$ **N1** (b) $\frac{1}{2}(7+9)(1) + \int_1^4 (x-4)^2\,dx$ **K1** for area of trapezium $=8+\left[\frac{(x-4)^3}{3}\right]_1^4$ **K1** for integration of curve **K1** for $A_1 + A_2$ $= 17$ **N1** (c) *Volume* $= \pi \int_1^4 (x-4)^4\,dx$ **K1** for limit $\int_1^4$ $= \pi \left[\frac{(x-4)^5}{5}\right]_1^4$ **K1** for integration (Ignore π) $= 48\frac{3}{5}\pi$ **N1** (Accept 152·7)	**10**

No.	MARK SCHEME	Σ MARK
9	(a) $m = \frac{3}{2}$ **P1** $y - \frac{1}{2} = \frac{3}{2}(x-2)$ **OR** $\frac{1}{2} = \frac{3}{2}(2) + c$ **K1** $2y = 3x - 5$ or equivalent **N1** (b) Try to solve simultaneous equations : $2x + 3y - 12 = 0$ $2y = 3x - 5$ $13y = 26$ **K1** (until 1 unknown left) $y = 2,\ x = 3$ (3, 2) **N1** (c) $Q(0, 4)$, $R\left(\frac{5}{3}, 0\right)$ Both coordinates seen anywhere **P1** Area $= \frac{1}{2}\begin{vmatrix} 0 & 3 & \frac{5}{3} & 0 \\ 4 & 2 & 0 & 4 \end{vmatrix}$ $= \frac{1}{2}\lvert 0(2) + 3(0) + \frac{5}{3}(4) - 3(4) - \frac{5}{3}(2) - 0 \rvert$ **K1** $= 4\frac{1}{3}$ unit^2 **N1** (Accept 4·333 or $\frac{13}{3}$) (d) $\frac{3x+2(3)}{5} = 0$ or $\frac{3y+2(2)}{5} = 4$ or equivalent **K1** $T\left(-2, \frac{16}{3}\right)$ **N1**	10

No.	MARK SCHEME	Σ MARK
10	(a) $\tan^{-1}\left(\frac{MON}{2}\right)=\frac{12}{5}$ **K1** $\angle MON = 1{\cdot}176 \times 2 = 2{\cdot}352$ radian **N1** $\angle QPR = 0{\cdot}395 \times 2 = 0{\cdot}79$ radian **N1** (b) Perimeter = $2{\cdot}352(5) + 0{\cdot}79(8) + 2(12-8)$ **K1 K1** $= 26{\cdot}08$ cm **N1** (c) Area = Area of 2 triangles – [Area of MON + area of PQR] $= 2 \times \frac{1}{2}\times 12\times 5 - [\frac{1}{2}\times(5)^2(2{\cdot}352) + \frac{1}{2}\times(8)^2(0{\cdot}79)]$ for triangle & sector **K1K1** $= 60 - [29{\cdot}4 + 25{\cdot}28]$ **K1** $= 5{\cdot}32$ cm^2 **N1**	**10**

No.	MARK SCHEME	Σ MARK
11	(a) (i) $2280 = n(0{\cdot}75)$ **K1** $n = 3040$ **N1** (ii) $P(X \geq 2)$ $= 1 - P(X = 0) - P(X = 1)$ $= 1 - {}^8C_0 (0{\cdot}75)^0 (0{\cdot}25)^8 - {}^8C_1 (0{\cdot}75)^1 (0{\cdot}25)^8$ **K1** $= 0{\cdot}9996$ **N1** (b) (i) $P(58 < X < 67)$ $= P\left(\frac{58-64}{12} < Z < \frac{67-64}{12}\right)$ **K1** for using $Z = \frac{X-\mu}{\sigma}$ $= P(-0{\cdot}5 < Z < 0{\cdot}25)$ $= 1 - P(Z < -0{\cdot}5) - P(Z > 0{\cdot}25)$ or $1 - 0{\cdot}3085 - 0{\cdot}4013$ **K1** $= 0{\cdot}2902$ $= 29{\cdot}02\%$ **N1** (ii) $P(X > m) = 0{\cdot}978$ $P\left(Z > \frac{m-64}{12}\right) = 0{\cdot}978$ **K1** $\frac{m-64}{12} = -2{\cdot}014$ **K1** $m = 39{\cdot}83$ **N1**	**10**

SECTION C [20 MARKS]		
No.	MARK SCHEME	Σ MARK
12	(a) $v = \int 2t - 10dt = t^2 - 10t + c$ **K1** $24 = (0)^2 - 10(0) + c\ ;\ c = 24$ **P1** $v = t^2 - 10t + 24$ $a = 0\ ,\ 2t - 10 = 0$ $t = 5\text{s}$ **N1** $v = (5)^2 - 10(5) + 24 = -1$ **N1** (b) $v = t^2 - 10t + 24 < 0$ **P1** $(t-6)(t-4) < 0$ **K1** $4 < t < 6$ **N1**  (c) $Dis = \int_0^4 t^2 - 10t + 24dt + \left\lvert \int_4^6 t^2 - 10t + 24dt \right\rvert$ **K1** for integrate and limit $= \left[\frac{t^3}{3} - \frac{10}{2}t^2 + 24t\right]_0^4 + \left\lvert \frac{t^3}{3} - \frac{10}{2}t^2 + 24t \right\rvert_4^6$ **K1** $= 38\frac{2}{3}\text{m}$ **N1**	10

No.	MARK SCHEME	Σ MARK
13	(a) $\frac{132 \times Q_A}{100} = 142$ **K1** $Q_A = 107{\cdot}6$ **N1** (b) (i) $h = \frac{14{\cdot}60}{12{\cdot}10} \times 100$ **K1** $= 120{\cdot}7$ **N1** (ii) $\frac{P_B}{12{\cdot}10} \times 100 = 116$ **K1 [give once – (i) or (ii)]** $P_B =$ RM14·04 **N1** (c) $\frac{(132 \times 40) + (116 \times 25) + (k \times 35)}{100} = 120$ **K1** $k = 109{\cdot}1$ **N1** (d) $I_{2012/2008} = \frac{120 \times 110}{100}$ $= 132$ **N1** $\frac{P_{2012}}{38} \times 100 = 132$ **K1** $P_{2012} =$ RM50·16 **N1**	**10**

No. 14

(a) $20x + 25y \leq 10\,000$ **or** equivalent **N1**

$x \leq 2y$ **or** equivalent **N1**

$y - x \geq 40$ **or** equivalent **N1**

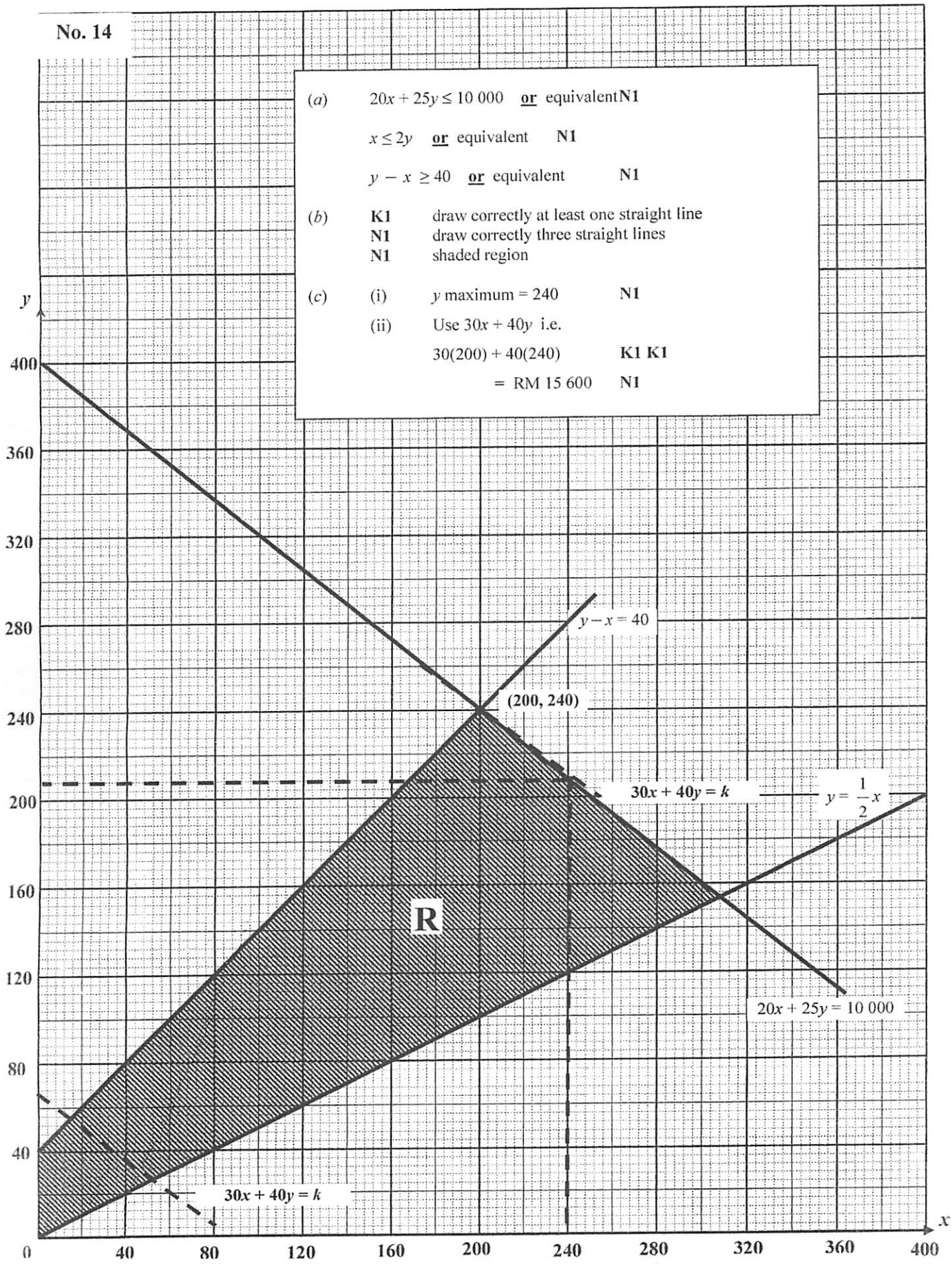
(b) **K1** draw correctly at least one straight line
N1 draw correctly three straight lines
N1 shaded region

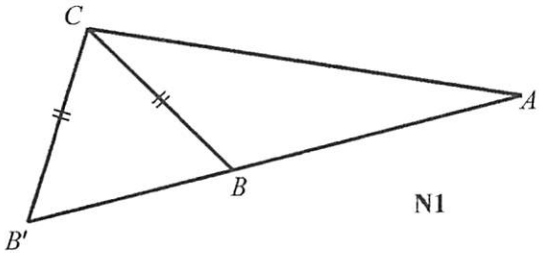
(c) (i) y maximum = 240 **N1**

(ii) Use $30x + 40y$ i.e.

$30(200) + 40(240)$ **K1 K1**

= RM 15 600 **N1**



No.	MARK SCHEME	Σ MARK
15	(*a*) (i) $AC^2 = 8{\cdot}7^2 + 12{\cdot}2^2 - 2(8{\cdot}7)(12{\cdot}2)\cos 125$ **K1** $= 18{\cdot}61$ cm **N1** $AC = 18{\cdot}61$ cm **N1** (ii) $\frac{\sin C}{12{\cdot}2} = \frac{\sin 125}{18{\cdot}61}$ **K1** $\angle BCA = 32{\cdot}48°$ **N1** **OR** $12{\cdot}2^2 = 8{\cdot}7^2 + 18{\cdot}61^2 - 2(8{\cdot}7)(18{\cdot}61)\cos C$ **K1** $\angle BCA = 32{\cdot}48°$ **N1** (*b*) (i)  **N1** (ii) $\frac{BB'}{\sin 70} = \frac{8{\cdot}7}{\sin 55}$ **K1** $BB' = 9{\cdot}98$ cm **N1** Area $= \frac{1}{2}(8{\cdot}7)(9{\cdot}98 + 12{\cdot}2)\sin 55$ **K1** $= 79{\cdot}03$ cm^2 **N1** **OR** $\frac{BB'}{\sin 70} = \frac{8{\cdot}7}{\sin 55}$ **K1** $BB' = 9{\cdot}98$ cm **N1** Area $= \frac{1}{2}(18{\cdot}61)(9{\cdot}98 + 12{\cdot}2)\sin 22{\cdot}52$ **K1** $= 79{\cdot}05$ cm^2 **N1** **OR** Area $= \frac{1}{2}(8{\cdot}7)(18{\cdot}61)\sin(70 + 32{\cdot}48)$ **K1** **P1** for 102·48° **P1** for 70° $= 79{\cdot}04$ cm^2 **N1**	**10**