

**SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING**  
**LEMBAGA PEPERIKSAAN**  
**PEPERIKSAAN PERCUBAAN SPM 2011**

**MATEMATIK TAMBAHAN**  
**Kertas 1**  
**Dua jam**

**JANGAN BUKA KERTAS SOALAN INI**  
**SEHINGGA DIBERITAHU**

1. *This question paper consists of **25** questions.*
2. *Answer **all** questions.*
3. *Give only **one** answer for each question.*
4. *Write your answers clearly in the spaces provided in the question paper.*
5. *Show your working. It may help you to get marks.*
6. *If you wish to change your answer, cross out the work that you have done. Then write down the new answer.*
7. *The diagrams in the questions provided are not drawn to scale unless stated.*
8. *The marks allocated for each question and sub-part of a question are shown in brackets.*
9. *A list of formulae is provided on pages 2 to 3.*
10. *A booklet of four-figure mathematical tables is provided.*
11. *You may use a non-programmable scientific calculator.*
12. *This question paper must be handed in at the end of the examination.*

| For examiner's use only |             |                |
|-------------------------|-------------|----------------|
| Question                | Total Marks | Marks Obtained |
| 1                       | 2           |                |
| 2                       | 3           |                |
| 3                       | 4           |                |
| 4                       | 3           |                |
| 5                       | 3           |                |
| 6                       | 3           |                |
| 7                       | 3           |                |
| 8                       | 4           |                |
| 9                       | 3           |                |
| 10                      | 3           |                |
| 11                      | 4           |                |
| 12                      | 3           |                |
| 13                      | 3           |                |
| 14                      | 3           |                |
| 15                      | 3           |                |
| 16                      | 3           |                |
| 17                      | 4           |                |
| 18                      | 3           |                |
| 19                      | 3           |                |
| 20                      | 3           |                |
| 21                      | 3           |                |
| 22                      | 3           |                |
| 23                      | 4           |                |
| 24                      | 3           |                |
| 25                      | 4           |                |
| <b>TOTAL</b>            | <b>80</b>   |                |

Kertas soalan ini mengandungi 16 halaman bercetak

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

## ALGEBRA

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

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

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

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

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

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

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

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

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

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

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

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

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

## CALCULUS

$$1 \quad y = uv,$$

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

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

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

4 Area under a curve

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

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

5 Volume generated

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

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

## GEOMETRY

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

2 Midpoint

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

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

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

5 A point dividing a segment of a line

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

6 Area of triangle

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

## STATISTIC

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## TRIGONOMETRY

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

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

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

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

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

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

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

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

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

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

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

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

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

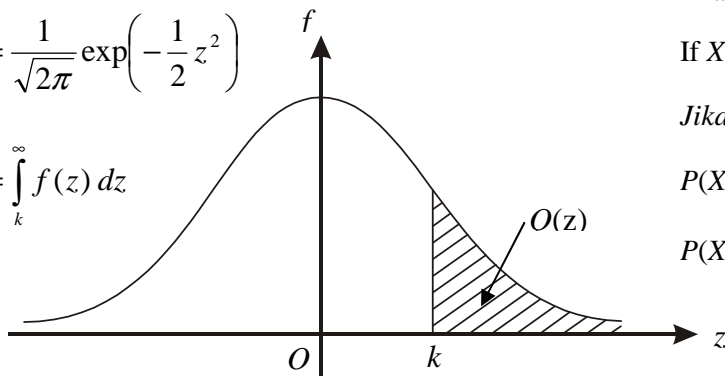
$$14 \quad \text{Area of triangle} = \frac{1}{2}ab \sin C$$

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

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

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

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



Example / Contoh:

If  $X \sim N(0, 1)$ , then

Jika  $X \sim N(0, 1)$ , maka

$$P(X > k) = Q(k)$$

$$P(X > 2.1) = Q(2.1) = 0.0179$$

Answer **all** questions.

1. Diagram 1 shows the graph of the function  $f(x) = (x - 1)^2$ .

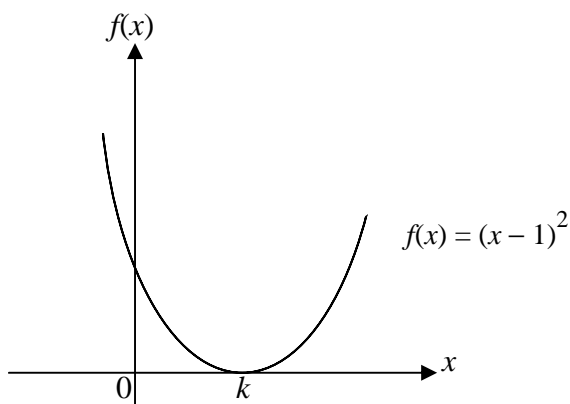


Diagram 1

State

- (a) the type of relation,  
(b) the value of  $k$ .

[2 marks]

Answer :

(a)

(b)

1

|   |
|---|
|   |
| 2 |

2. The function  $f^{-1}$  is defined by  $f^{-1}(x) = \frac{3}{x-2}$ ,  $x \neq k$ .

- (a) State the value of  $k$ .  
(b) Find the function  $f$ .

[3 marks]

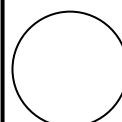
Answer :

(a)

(b)

2

|   |
|---|
|   |
| 3 |



3. Given the function  $f : x \rightarrow 2x - 3$  and composite function  $fg : x \rightarrow 6x^2 - 4x + 1$ .

Find

- (a)  $g(x)$ ,
- (b) the value of  $gf(-1)$ .

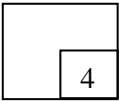
[4 marks]

Answer :

(a)

(b)

3

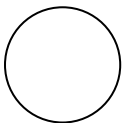
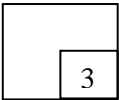


4. Given the equation  $x^2 + 2x = -k$  has two distinct roots, find the range of values of  $k$ .

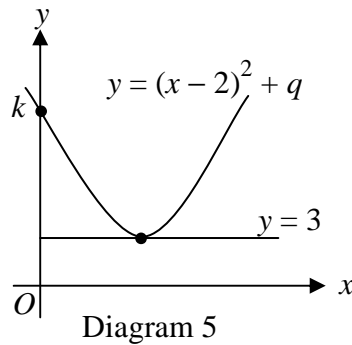
[3 marks]

Answer :

4



5. Diagram 5 shows the graph of function  $y = (x - 2)^2 + q$ , where  $q$  is a constant. Given that the line  $y = 3$  is the tangent to the curve.



- (a) State the equation of axis of symmetry.  
 (b) State the value of  $q$ .  
 (c) Find the value of  $k$ .

[3 marks]

Answer :

- (a)  
 (b)  
 (c)

5

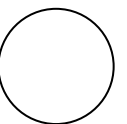


6. Find the range of values of  $x$  which satisfies  $4x - 5x^2 \leq -1$

[3 marks]

Answer :

6



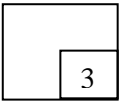
For  
examiner's  
use only

7. Solve the equation  $64^{x+3} = 8^x 4^{x+1}$ .

[3 marks]

Answer :

7

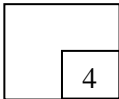


8. Given that  $\log_2 m = r$  and  $\log_2 n = t$ , express  $\log_8 \left( \frac{m}{16n^3} \right)$  in terms of  $r$  and / or  $t$ .

[4 marks]

Answer :

8

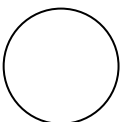


9. If 3,  $x$ ,  $y$  and 15 are consecutive terms of an arithmetic progression, find the value of  $x$  and  $y$ .

[3 marks]

Answer :

9





10. The third and sixth terms of a geometric progression are 1 and 8 respectively. Find the first term and common ratio of the progression. [3 marks]

Answer :

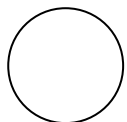
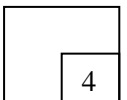
10



- 
11. Express 0.363636... in the form of  $\frac{p}{q}$  where  $p$  and  $q$  are positive integers. Hence express 2.363636... as a single fraction. [4 marks]

Answer :

11



12. The variables  $x$  and  $y$  are related by the equation  $y = 7x - 2x^2$ . A straight line graph is obtained by plotting  $\frac{y}{x}$  against  $x$ , as shown in Diagram 12.

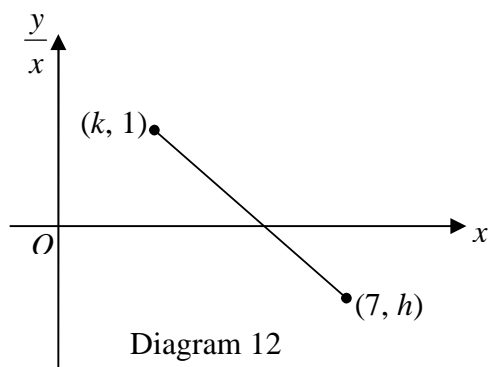


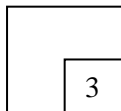
Diagram 12

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

[3 marks]

Answer :

12



13. Diagram 13 shows a quadrilateral  $PQRS$ .

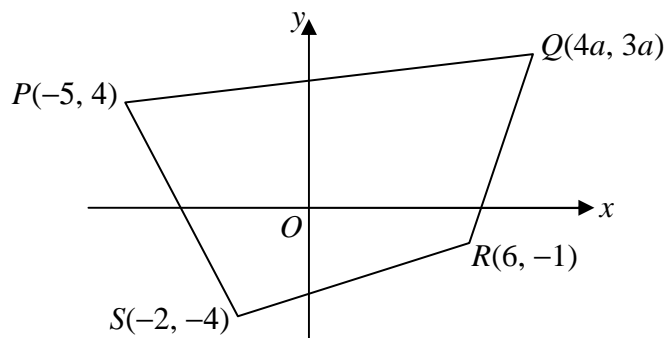


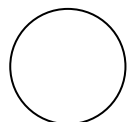
Diagram 13

Given the area of the quadrilateral is  $80 \text{ unit}^2$ , find the value of  $a$ .

[3 marks]

Answer :

13



14. Given  $A(-5, k)$ ,  $B(-1, 6)$ ,  $C(1, -5)$ . Find the possible values of  $k$  if  $AB = 2BC$ .

[3 marks]

Answer :

14

3

15. Diagram 15 shows vector  $\vec{OA}$  drawn on a Cartesian plane.

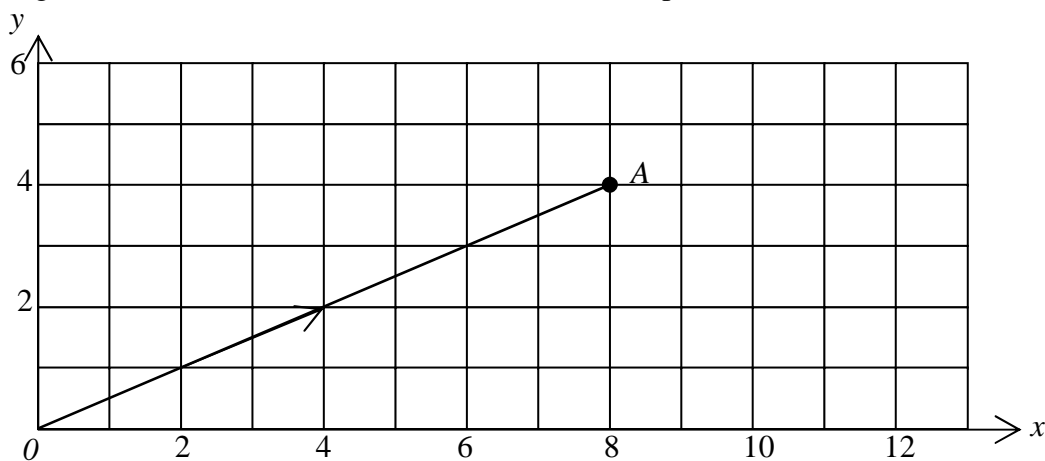


Diagram 15

- (a) Express  $\vec{OA}$  in the form  $\begin{pmatrix} x \\ y \end{pmatrix}$ .
- (b) Find the unit vector in the direction of  $\vec{OA}$ .

[3 marks]

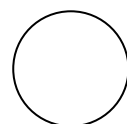
Answer :

(a)

(b)

15

3



For  
examiner's  
use only

16. Given that  $\underline{\mathbf{a}} = (2k - 1)\underline{\mathbf{i}} + 3\underline{\mathbf{j}}$  and  $\underline{\mathbf{b}} = 4\underline{\mathbf{i}} + 5\underline{\mathbf{j}}$ .

Find the value of  $k$  if  $2\underline{\mathbf{a}} + 3\underline{\mathbf{b}}$  is parallel to  $y$ -axis.

[3 marks]

Answer :

16



17. It is given that  $\tan \theta = \frac{5}{12}$  and  $\theta$  is an acute angle.

Find the value of each of the following

(a)  $\tan(-\theta)$ ,

(b)  $\sec \theta + \sin \theta$ .

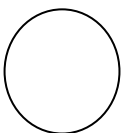
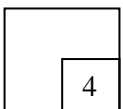
[4 marks]

Answer :

(a)

(b)

17



18.

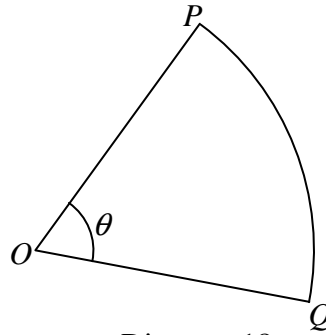


Diagram 18

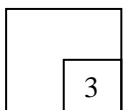
Diagram 18 above shows a sector  $POQ$  with centre  $O$ . The perimeter of sector  $POQ$  is 40 cm. Given that the radius of the sector is 15 cm, find the value of  $\theta$ , in radians.

[3 marks]

Answer :

*For  
examiner's  
use only*

18

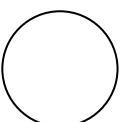


19. Given that  $y = 6x^2 - 4x$ , find the small approximate change in  $y$  when  $x$  increases from 1 to 1.05.

[3 marks]

Answer :

19



20. Given  $\int_2^5 f(x) dx = 6$  and  $-\int_0^2 f(x) dx = 2$ . Find  $\int_5^0 f(x) dx$ .

[3 marks]

Answer :

20

|   |
|---|
| 3 |
|---|

21. Diagram 21 shows the graph of  $y^2 = (x - 3)$  and  $x = 5$ .

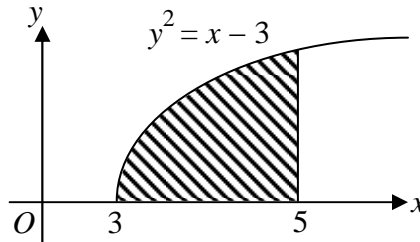


Diagram 21

Find the volume generated when the shaded region is rotated through  $360^\circ$  about  $x$ -axis.

[3 marks]

Answer :

21

|   |
|---|
| 3 |
|---|

22. Given that the mean and the standard deviation of a set of numbers are 7 and 2. If each of the numbers is multiplied by 3, find

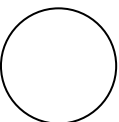
- (a) the mean,
  - (b) the variance
- of the new set of numbers.

[3 marks]

Answer :

22

|   |
|---|
| 3 |
|---|



- 23.** The number of ways in which a group of 4 men and 3 women can be seated in a row of
- (a) 8 chairs,
  - (b) 8 chairs if the first two chairs in the row are occupied by the men.

[4 marks]

Answer :

**23**

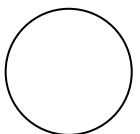


- 
- 24.** A box contains 40 marbles. The colours of the marbles are yellow and blue. If a marble is drawn from the box, the probability that a yellow marble drawn is  $\frac{2}{5}$ . Find the number of blue marbles that have to be added to the box such that the probability of obtaining a blue marble becomes  $\frac{5}{7}$ .

[3 marks]

Answer :

**24**



For  
examiner's  
use only

**SULIT**

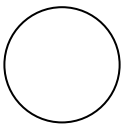
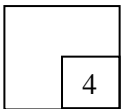
**16**

**3472/1**

- 25.** The continuous random variable  $X$  is distributed normally with mean  $\mu$  and variance 25. Given that  $P(X < 20) = 0.7881$ , find the value of  $\mu$ . [4 marks]

Answer :

25



**END OF QUESTION PAPER**

**3472/1**

© ZON A KUCHING 2011

**Lihat sebelah  
SULIT**

<http://www.chngtuition.blogspot.com>



**SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING**

---

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2011**

---

**MATEMATIK TAMBAHAN**

Kertas 2

Dua jam tiga puluh minit

---

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

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

---

Kertas soalan ini mengandungi **13** halaman bercetak

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

**ALGEBRA**

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

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

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

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

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

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

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

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

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

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

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

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

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

**CALCULUS**

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

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

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

4 Area under a curve

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

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

5 Volume generated

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

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

**GEOMETRY**

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

2 Midpoint

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

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

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

5 A point dividing a segment of a line

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

6. Area of triangle =

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

## STATISTICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## TRIGONOMETRY

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

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

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

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

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

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

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

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

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

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

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

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

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

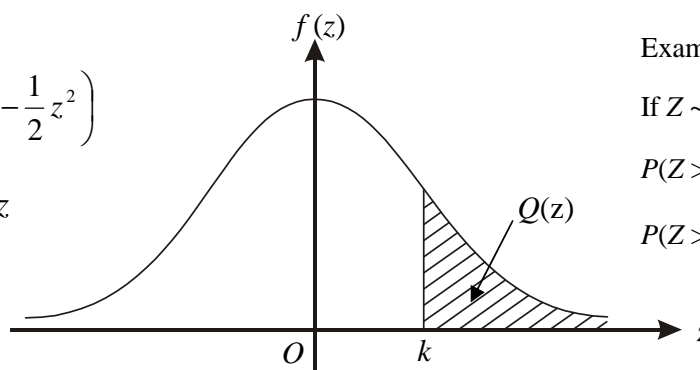
$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

THE UPPER TAIL PROBABILITY  $Q(z)$  FOR THE NORMAL DISTRIBUTION  $N(0, 1)$

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

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

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



Example:

If  $Z \sim N(0, 1)$ , then

$$P(Z > k) = Q(k)$$

$$P(Z > 2.1) = Q(2.1) = 0.0179$$

## SECTION A

[40 marks]

Answer **all** questions.

- 1 Solve the simultaneous equations  $x - 2y = 1$  and  $x^2 - xy = 3$ . [5 marks]
- 2 Given the quadratic function  $f(x) = 3x^2 - 12x + 7$ .
- (a) By using completing the square method, express  $f(x)$  in the form  $a(x + p)^2 + q$  where  $a, p$  and  $q$  are constants. [2 marks]
- (b) State the minimum / maximum point. [1 mark]
- (c) Sketch the graph of  $f(x) = 3x^2 - 12x + 7$  for  $-1 \leq x \leq 4$ . [3 marks]
- 3 Diagram 3 shows several rectangles with a fixed base of 8 cm. The height of the first rectangle is 100 cm, and the height of each subsequent rectangle decreases by 4 cm.

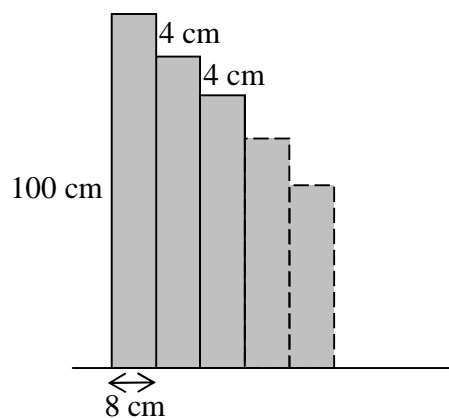


Diagram 3

- (a) Calculate the area, in  $\text{cm}^2$ , of the 10<sup>th</sup> rectangle. [2 marks]
- (b) Determine how many rectangles can be formed. [2 marks]
- (c) Given that the total area of the first  $n^{\text{th}}$  rectangles is  $8\,640 \text{ cm}^2$ , find the value of  $n$ . [3 marks]

- 4 (a) Sketch the graph of  $y = 1 - 2 \sin x$  for  $0 \leq x \leq 2\pi$ . [4 marks]
- (b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation  $5\pi(1 - 2 \sin x) = 4x$  for  $0 \leq x \leq 2\pi$ . State the number of solutions. [3 marks]
- 5 Table 5 shows the length of leaves collected from a type of tree.

| Length (cm) | Frequency |
|-------------|-----------|
| 41 – 45     | 2         |
| 46 – 50     | 4         |
| 51 – 55     | 8         |
| 56 – 60     | 11        |
| 61 – 65     | 9         |
| 66 – 70     | 4         |
| 71 – 75     | 2         |

Table 5

- (a) Find the mean lengths of leaves collected from the tree. [3 marks]
- (b) Without drawing an ogive, find the interquartile range of the distribution. [4 marks]
- 6 Diagram 6 shows a sector  $OABC$  with centre  $O$  and the arc  $OB$  with centre  $C$  where  $\angle AOC = 100^\circ$ . It is given that  $OC = 10$  cm. [Use  $\pi = 3.142$ ]

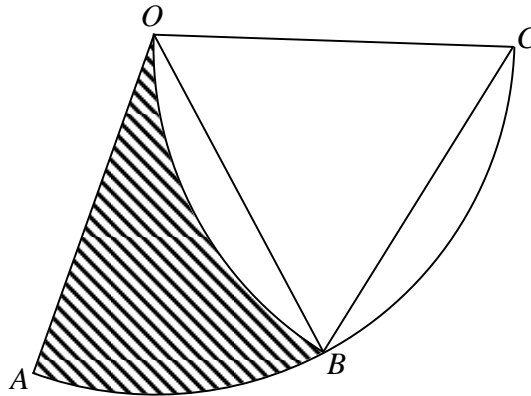


Diagram 6

Calculate

- (a)  $\angle BCO$  and  $\angle AOB$  in radians, [3 marks]
- (b) the area, in  $\text{cm}^2$ , of the sector  $OCB$  and the sector  $AOB$ , [2 marks]
- (c) the area, in  $\text{cm}^2$ , of the shaded region. [3 marks]

## SECTION B

[40 marks]

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

7 Use graph paper to answer this question.

Table 7 shows the value of two variables,  $x$  and  $y$ , obtain from an experiment. The variables  $x$  and  $y$  are related by the equation  $y = (p + 1)x^n$ , where  $p$  and  $n$  are constants.

|     |     |    |    |    |     |     |
|-----|-----|----|----|----|-----|-----|
| $x$ | 2   | 3  | 4  | 6  | 7   | 9   |
| $y$ | 8.5 | 20 | 37 | 87 | 118 | 203 |

Table 7

- (a) Based on Table 1, construct a table for the values of  $\log_{10} x$  and  $\log_{10} y$ . [1 mark]
- (b) Plot  $\log_{10} y$  against  $\log_{10} x$ , using a scale of 2 cm to 0.10 unit on the  $\log_{10} x$  - axis and 2 cm to 0.20 unit on the  $\log_{10} y$  - axis. Hence, draw the line of best fit. [4 marks]
- (c) Use the graph in 7(b) to find the value of
- $y$  when  $x = 5.6$ ,
  - $n$ ,
  - $p$ .

[5 marks]

8 Solution by scale drawing is not accepted.

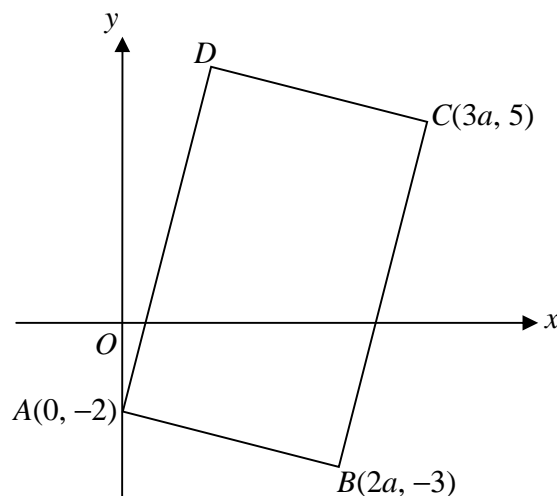
Diagram 8 shows a rectangle  $ABCD$ .

Diagram 8

- (a) Find
- the value of  $a$ ,
  - the coordinates of point  $D$ . [5 marks]
- (b) A point  $P$  moves such that its distance from point  $A$  is always 5 units.
- Find the equation of the locus of  $P$ ,
  - Determine whether this locus intersects straight line  $BC$ . [5 marks]

- 9 Diagram 9 shows a parallelogram  $OLMN$ . The midpoint of  $MN$  is  $P$  and  $LP$  meets  $OM$  at  $Q$ .

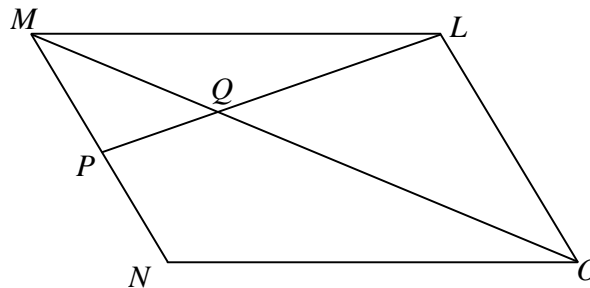


Diagram 9

Given that  $\vec{OL} = \underline{x}$ ,  $\vec{ON} = \underline{y}$ ,  $\vec{OQ} = \mu \vec{OM}$  and  $\vec{LQ} = \lambda \vec{LP}$ .

- Express  $\vec{OP}$  in terms of  $\underline{x}$  and  $\underline{y}$ . [1 mark]
- Express  $\vec{OQ}$  in terms of
  - $\lambda$ ,  $\underline{x}$  and  $\underline{y}$ ,
  - $\mu$ ,  $\underline{x}$  and  $\underline{y}$ .

[4 marks]

Hence, find the value of  $\lambda$  and of  $\mu$ .

[3 marks]

- Given that the area of triangle  $OQL$  is  $24 \text{ cm}^2$ , find the area of the parallelogram  $OLMN$ . [2 marks]



- 10 (a) Water is being poured into an inverted conical tank as shown in Diagram 10(a), at rate of  $0.8 \text{ m}^3 \text{ s}^{-1}$ . Find the rate of change in the height of the water when the height is 5 m.

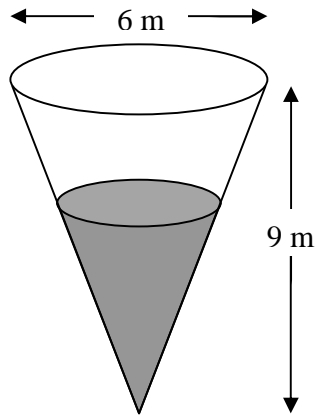


Diagram 10(a)

[4 marks]

- (b) Diagram 10(b) show the curve of  $x = y(y + 1)(y - 1)$ .

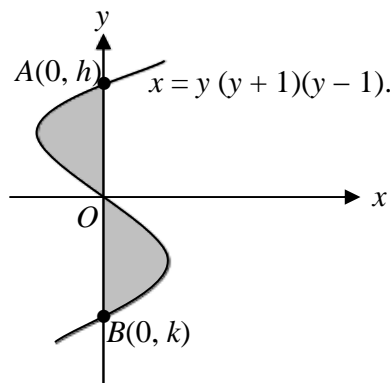


Diagram 10(b)

Find

- (i) the value of  $h$  and of  $k$ . [1 mark]
- (ii) the area of the shaded region. [5 marks]

11. (a) The probability that a pen drawn at random from a box of pens is defective is 0.2. If a sample of 5 pens is taken, find the probability that it will contain

- (i) no defective pens,  
 (ii) less than 2 defective pens.

[5 marks]

- (b) A commuter train is scheduled to arrive at the station at 8.05 am but the actual times of arrival are normal distributed about a mean of 8.08 am with a standard deviation of 3.7 minutes.

Find the probability that the train is

- (i) late,  
 (ii) late and arrive before 8.12 am.

[5 marks]

### SECTION C

[20 marks]

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

- 12 Diagram 12 shows the positions and directions of motion of two objects, *A* and *B*, moving along a straight line and passing through a fixed point *O* at the same time.

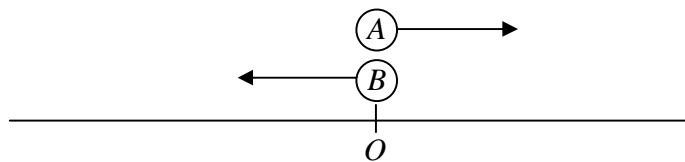


Diagram 12

The velocity of *A*,  $v_A \text{ ms}^{-1}$ , is given by  $v_A = t^2 - 6t + 8$  and the velocity of *B*,  $v_B \text{ ms}^{-1}$ , is given by  $v_B = -t^2 + 5t - 4$ , where *t* is the time, in seconds, after leaving point *O*.

[Assume motion to the right is positive]

Find

- (a) the initial velocity object *A*, [1 mark]  
 (b) the minimum velocity object *B*, [3 marks]  
 (c) the values of time, *t*, in seconds, when both the objects stop instantaneously at the same time, [3 marks]  
 (d) the distance, in m, of object *A* from *O* when it stops for the first time. [3 marks]

- 13 Table 13 shows the price indices and respective weightages, in the year 2008 based on the year 2006, on four materials,  $A$ ,  $B$ ,  $C$ ,  $D$  in the production of a type of foaming cleanser.

| Material | Price index in the year 2008 based on the year 2006 | Weightage |
|----------|---|-----------|
| $A$      | 125   | 4         |
| $B$      | 120   | $n$       |
| $C$      | 80  | 5         |
| $D$      | 150   | $n + 3$   |

Table 13

- (a) If the price of material  $A$  in the year 2006 was RM 60.00, calculate its price in the year 2008. [2 marks]
- (b) Given that the composite index for the production cost of the foaming cleanser in the year 2008 based on the year 2006 is 120.  
Find
- the value of  $n$ , [3 marks]
  - the price of the foaming cleanser in the year 2006 if the price in the year 2008 is RM 30.00. [2 marks]
- (c) Given that the price of material  $B$  is estimated to increase by 15 % from the year 2008 to the year 2009, while the others remain unchanged. Calculate the composite index of the foaming cleanser in the year 2009 based on the year 2006. [3 marks]
- 14 The diagram 14 shows a quadrilateral  $PQRS$ .

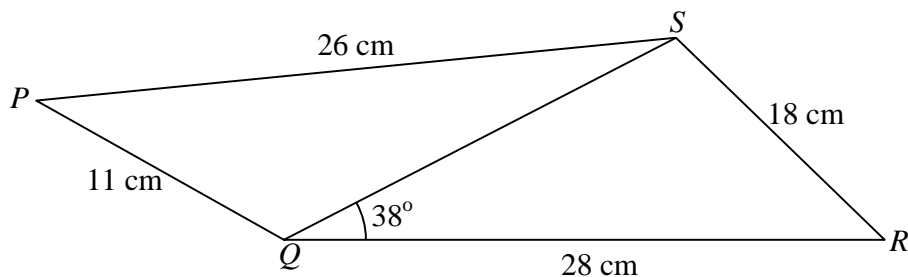


Diagram 14

Given that  $\angle QSR$  is an obtuse,  $PQ = 11$  cm,  $QR = 28$  cm,  $RS = 18$  cm,  $PS = 26$  cm and  $\angle RQS = 38^\circ$ .

Calculate

- $\angle QSR$ , [3 marks]
- the length  $QS$ , [3 marks]
- the area of triangle  $PQR$ . [4 marks]

**15** Use the graph paper provided to answer this question.

A factory produces two types of robot  $P$  and  $Q$  using two machines,  $A$  and  $B$ . Given that machine  $A$  requires 2 hours to produce one unit of robot  $P$  and 3 hours to produce one unit of robot  $Q$  while machine  $B$  requires  $2\frac{1}{2}$  hour to produce one unit of robot  $P$  and 4 hours to produce one unit of robot  $Q$ . The machines produce  $x$  units of robot  $P$  and  $y$  units of robot  $Q$  in a particular day according to the following constraints :

- I Machine  $A$  is function for not more than 2 days.
  - II Machine  $B$  is function for at least 1 day.
  - III The number of robot  $P$  produced is not more than three times the number of robot  $Q$  produced.
- (a) Write down three inequalities, other than  $x \geq 0$  and  $y \geq 0$ , which satisfy the above conditions. [3 marks]
- (b) By using a scale of 2cm to 2 units of commodity on both axes, construct and shade the region  $R$  that satisfies all the above constraints. [3 marks]
- (c) By using your graph in (b), find
- (i) the maximum profit obtained if the profit from the sale of one unit of robot  $P$  and one unit of robot  $Q$  are RM 500 and RM 300 respectively, assuming all the robots produced are sold.
  - (ii) The maximum number of units of robot  $Q$  that can be produced if the factory produced 12 units of robot  $P$ .

[4 marks]

**END OF QUESTION PAPER**

NO. KAD PENGENALAN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

ANGKA GILIRAN

|  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|

**Arahan Kepada Calon**

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

| <i>Kod Pemeriksa</i> |           |                |              |  |
|----------------------|-----------|----------------|--------------|--|
| Bahagian             | Soalan    | Soalan Dijawab | Markah Penuh | Markah Diperoleh<br>(Untuk Kegunaan Pemeriksa) |
| <b>A</b>             | <b>1</b>  |                | 5            |  |
|                      | <b>2</b>  |                | 6            |  |
|                      | <b>3</b>  |                | 7            |  |
|                      | <b>4</b>  |                | 7            |  |
|                      | <b>5</b>  |                | 7            |  |
|                      | <b>6</b>  |                | 8            |  |
| <b>B</b>             | <b>7</b>  |                | 10           |  |
|                      | <b>8</b>  |                | 10           |  |
|                      | <b>9</b>  |                | 10           |  |
|                      | <b>10</b> |                | 10           |  |
|                      | <b>11</b> |                | 10           |  |
| <b>C</b>             | <b>12</b> |                | 10           |  |
|                      | <b>13</b> |                | 10           |  |
|                      | <b>14</b> |                | 10           |  |
|                      | <b>15</b> |                | 10           |  |
| Jumlah               |           |                |              |  |

3472/1  
Matematik  
Tambahan  
Kertas 1  
2 jam  
Sept 2011

SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING

---

PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2011

---

MATEMATIK TAMBAHAN

Kertas 1

Dua jam

---

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

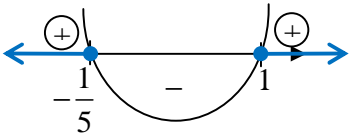
**MARKING SCHEME**

---

Skema Pemarkahan ini mengandungi 7 halaman bercetak

**MARKING SCHEME FOR PAPER 1 -2011  
ZON A**

| No | Solution and marking scheme  | Sub Marks                             | Total Marks |
|----|--|---------------------------------------|-------------|
| 1. | <p>(a) many to one relation</p> <p>(b) 1</p>   | <p>1</p> <p>1</p>                     | <p>2</p>    |
| 2. | <p>(a) <math>k = 2</math></p> <p>(b) <math>f(x) = \frac{3+2x}{x}, x \neq 0.</math></p> <p><math>y = \frac{3}{x-2}</math></p>   | <p>1</p> <p>2</p> <p>B1</p>           | <p>3</p>    |
| 3. | <p>(a) <math>g(x) = 3x^2 - 2x + 2</math></p> <p><math>2g(x) - 3 = 6x^2 - 4x + 1</math> @ <math>f^{-1}(fg(x)) = f^{-1}(6x^2 - 4x + 1)</math></p> <p>(b) 87</p> <p><math>f(-1) = -5</math></p> | <p>2</p> <p>B1</p> <p>2</p> <p>B1</p> | <p>4</p>    |
| 4. | <p><math>k &gt; 1</math></p> <p><math>-4k &gt; -4</math> or <math>4 &lt; 4k</math></p> <p><math>(2)^2 - 4(1)(-k) &gt; 0</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>          | <p>3</p>    |

| No | Solution and marking scheme   | Sub Marks                              | Total Marks |
|----|---|--|-------------|
| 5. | <p>(a) <math>x = 2</math></p> <p>(b) <math>q = 3</math></p> <p>(c) <math>k = 7</math></p>   | <p>1</p> <p>1</p> <p>1</p>             | 3           |
| 6. | <p><math>x \leq -\frac{1}{5}, x \geq 1</math></p> <p><math>(5x+1)(x-1) \geq 0</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>           | 3           |
| 7. | <p><math>x = -16</math></p> <p><math>6x + 18 = 5x + 2</math></p> <p><math>2^{6(x+3)} = 2^{3x} 2^{2x+2}</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>           | 3           |
| 8. | <p><math>\frac{r-4-3t}{3}</math></p> <p><math>\frac{r - \log_2 2^4 - 3 \log_2 n}{3}</math></p> <p><math>\frac{\log_2 m - \log_2 16 - \log_2 n^3}{3}</math></p> <p><math>\frac{\log_2 \left( \frac{m}{16n^3} \right)}{\log_2 2^3}</math></p> | <p>4</p> <p>B3</p> <p>B2</p> <p>B1</p> | 4           |
| 9. | <p><math>x = 7, y = 11</math></p> <p>Solving equation or <math>x = 7 @ y = 11</math></p> <p><math>x - 3 = y - x</math> or <math>x - 3 = 15 - y</math> or <math>d = 4</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>           | 3           |



| No  | Solution and marking scheme   | Sub Marks  | Total Marks |
|-----|---|--|-------------|
| 10. | $r = 2, a = \frac{1}{4}$ $r = 2 \quad @ \quad a = \frac{1}{4}$ $ar^2 = 1 \text{ ----- (1) \quad or \quad } ar^5 = 8 \text{ -----(2)}$                                   | <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>B2</b></p> <p style="text-align: center;"><b>B1</b></p>  | <b>3</b>    |
| 11. | $\frac{26}{11}$ $2.363636... = 2 + 0.363636... = 2 + 4/11$ $S_{\infty} = \frac{0.36}{1-0.01} \quad @ \quad \frac{4}{11}$ $a = 0.36 \text{ and } r = 0.0036/0.36 = 0.01$ | <p style="text-align: center;"><b>4</b></p> <p style="text-align: center;"><b>B3</b></p> <p style="text-align: center;"><b>B2</b></p> <p style="text-align: center;"><b>B1</b></p> | <b>4</b>    |
| 12. | $h = -7, \quad k = 3$ $h = -7 \quad @ \quad k = 3$ $\frac{y}{x} = 7 - 2x \quad \text{or} \quad \frac{y}{x} = -2x + 7$   | <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>B2</b></p> <p style="text-align: center;"><b>B1</b></p>  | <b>3</b>    |
| 13. | $a = 2$ $\frac{1}{2}(53a + 54) = 80$ $\frac{1}{2}[-5(-4) + (-2)(-1) + 6 \times 3a + 4a \times 4 - (-2)4 - 6(-4) - 4a(-1) - (-5)(3a)] = 80$                              | <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>B2</b></p> <p style="text-align: center;"><b>B1</b></p>  | <b>3</b>    |
| 14. | $k = -16, 28$ $(k - 6)^2 = 484 \quad @ \quad k - 6 = \pm 22 \quad @ \quad (k + 16)(k - 28) = 0$ $\sqrt{(-5 - (-1))^2 + (k - 6)^2} = 2\sqrt{(-1 - 1)^2 + (6 - (-5))^2}$  | <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>B2</b></p> <p style="text-align: center;"><b>B1</b></p>  | <b>3</b>    |

| No  | Solution and marking scheme   | Sub Marks                             | Total Marks |
|-----|---|---------------------------------------|-------------|
| 15. | <p>(a) <math>\overrightarrow{OA} = \begin{pmatrix} 8 \\ 4 \end{pmatrix}</math> or <math>8\mathbf{i} + 4\mathbf{j}</math></p> <p>(b) <math>\frac{1}{\sqrt{80}} \begin{pmatrix} 8 \\ 4 \end{pmatrix}</math> @ <math>\frac{8\mathbf{i} + 4\mathbf{j}}{\sqrt{80}}</math></p> <p><math> \overrightarrow{OA}  = \sqrt{8^2 + 4^2} = 4\sqrt{5}</math> @ <math>\sqrt{80}</math></p>          | <p>1</p> <p>2</p> <p>B1</p>           | 3           |
| 16. | <p><math>k = -\frac{5}{2}</math></p> <p><math>4k + 10 = 0</math></p> <p><math>2\mathbf{a} + 3\mathbf{b} = (4k + 10)\mathbf{i} + 21\mathbf{j}</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>          | 3           |
| 17. | <p>(a) <math>\tan(-\theta) = -\tan \theta</math></p> <p><math>= -\frac{5}{12}</math></p> <p>(b) <math>1\frac{73}{156}</math> or <math>\frac{229}{156}</math></p> <p><math>\sec \theta = \frac{13}{12}</math> or <math>\sec \theta + \sin \theta = \frac{13}{12} + \frac{5}{13}</math></p> <p><math>\sin \theta = \frac{5}{13}</math> @ <math>\cos \theta = \frac{12}{13}</math></p> | <p>1</p> <p>3</p> <p>B2</p> <p>B1</p> | 4           |
| 18. | <p><math>\theta = \frac{2}{3} \text{ rad}</math></p> <p><math>10 = 15\theta</math></p> <p><math>s_{PQ} = 10 \text{ cm}</math></p>   | <p>3</p> <p>B2</p> <p>B1</p>          | 3           |

| No  | Solution and marking scheme   | Sub Marks  | Total Marks |
|-----|---|--|-------------|
| 19. | $\partial y \approx 0.4$<br>$\partial y \approx (12(1) - 4)(0.05)$<br>$\frac{dy}{dx} = 12x - 4$ or $\partial x = 1.05 - 1 = 0.05$             | <b>1</b><br><br><b>B2</b><br><br><b>B1</b>                 | <b>3</b>    |
| 20. | $-4$<br>$\int_0^2 f(x)dx - \int_5^2 f(x)dx$<br>$\int_0^2 f(x)dx + \int_2^5 f(x)dx$  | <b>3</b><br><br><b>B2</b><br><br><b>B1</b>                 | <b>3</b>    |
| 21. | $2$<br>$\left(\frac{5^2}{5} - 3 \times 5\right) - \left(\frac{3^2}{5} - 3 \times 3\right)$<br>$\left(\frac{x^2}{2} - 3x\right)_3^5$           | <b>3</b><br><br><b>B2</b><br><br><b>B1</b>                 | <b>3</b>    |
| 22. | variance = 36, mean = 21<br>Variance = 36 @ Mean = 21<br>Variance = $3^2 \times 2^2$ @ Mean = $3 \times 7$ @ SD = $3 \times 2$ @ $\sigma = 6$ | <b>3</b><br><br><b>B2</b><br><br><b>B1</b>                 | <b>3</b>    |
| 23. | (a) 40320<br>${}^8P_7$<br>(b) 8640<br>${}^4P_2 \times {}^6P_5$  | <b>2</b><br><br><b>B1</b><br><br><b>2</b><br><br><b>B1</b> | <b>4</b>    |

| No         | Solution and marking scheme  | Sub Marks  | Total Marks     |
|------------|--|--|-----------------|
| <b>24.</b> | <p>16</p> $168 + 7x = 200 + 5x \quad @ \quad \frac{24+x}{40+x} = \frac{5}{7}$ <p><math>n(B) = 24 + x</math> and <math>n(S) = 40 + x</math></p>   | <p><b>3</b></p> <p><b>B2</b></p> <p><b>B1</b></p>                  | <p><b>3</b></p> |
| <b>25.</b> | <p><math>\mu = 16</math></p> <p><math>\frac{20 - \mu}{5} = 0.8</math> (from table)</p> <p><math>P(Z \geq \frac{20 - \mu}{5}) = 0.2119</math></p> <p><math>P(X \geq 20) = 0.2119</math></p> | <p><b>4</b></p> <p><b>B3</b></p> <p><b>B2</b></p> <p><b>B1</b></p> | <p><b>4</b></p> |

3472/2  
Matematik  
Tambahan  
Kertas 2  
2 ½ jam  
Sept 2011

**SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING**

---

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2011**

---

---

**MATEMATIK TAMBAHAN**

**Kertas 2**

**Dua jam tiga puluh minit**

---

---

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

**MARKING SCHEME**

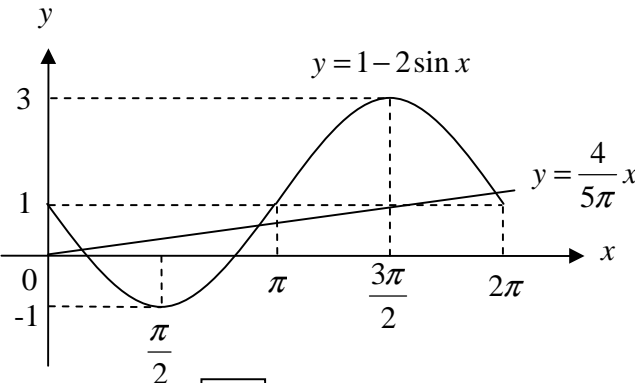
---

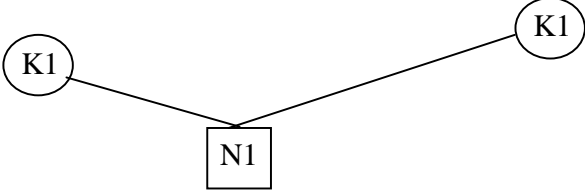
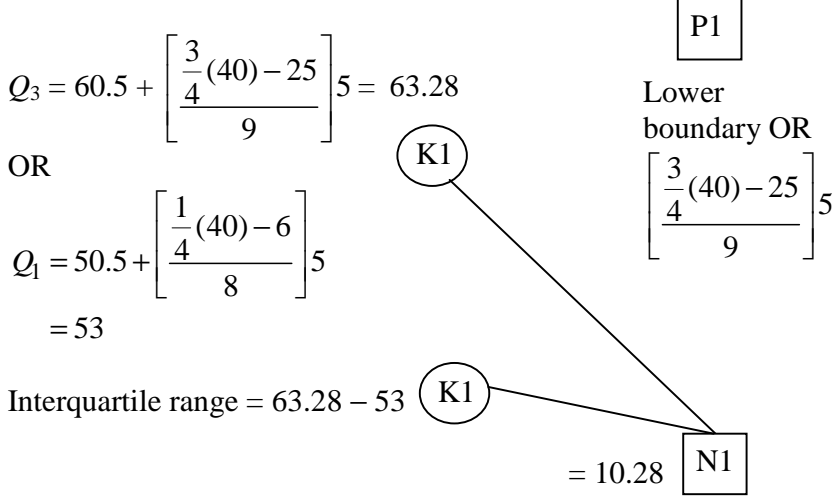
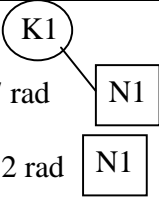

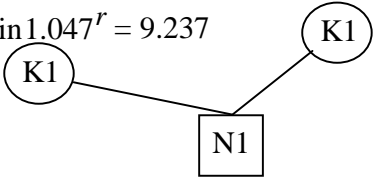
Skema Pemarkahan ini mengandungi **13** halaman bercetak

## ADDITIONAL MATHEMATICS MARKING SCHEME

TRIAL SPM exam Zon A Kuching 2011 – PAPER 2

| QUESTION NO.                              | SOLUTION   | MARKS  |
|---|--|--|
| 1   | $x = 2y + 1$ <div style="text-align: right; margin-right: 100px;"><span style="border: 1px solid black; padding: 2px;">P1</span></div> $(2y + 1)^2 - (2y + 1)y = 3$ <div style="text-align: right; margin-right: 100px;"><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> Eliminate <math>x</math> or <math>y</math></div> $(2y - 1)(y + 2) = 0$ <div style="text-align: right; margin-right: 100px;"><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> Solve the quadratic equation by using the factorization @ quadratic formula @ completing the square must be shown</div> $y = \frac{1}{2}, y = -2$ <p>@</p> $x = 2, x = -3$ <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"><span style="border: 1px solid black; padding: 2px;">N1</span></div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Note :</b><br/> <b>OW-1</b> if the working of solving quadratic equation is not shown.</p> </div> </div> <div style="text-align: center; margin-top: 10px;"><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">N1</span></div> | <p><b>5</b></p> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; text-align: center; line-height: 40px;"><b>5</b></div>                                 |
| <p>2</p> <p>(a)</p> <p>(b)</p> <p>(c)</p> | $f(x) = 3[x^2 + 2(-2)x + (-2)^2 - (-2)^2] + 7$ $\text{or } 3[(x-2)^2 - 4] + 7 \text{ or } 3[(x-2)^2 - \frac{5}{3}]$ <div style="text-align: right; margin-right: 100px;"><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></div> $= 3(x-2)^2 - 5$ <div style="text-align: right; margin-right: 100px;"><span style="border: 1px solid black; padding: 2px;">N1</span></div> <p>(2, -5)<sub>min</sub> <span style="border: 1px solid black; border-radius: 50%; padding: 2px; margin-left: 20px;">N1</span></p> <p>Shape <span style="border: 1px solid black; padding: 2px; margin-left: 20px;">N1</span></p> <p>(2, -5) and (0, 7) <span style="border: 1px solid black; padding: 2px; margin-left: 20px;">N1</span></p> <p>(-1, 22) and (4, 7) <span style="border: 1px solid black; padding: 2px; margin-left: 20px;">N1</span></p> <div style="text-align: center; margin-top: 20px;"> </div>   | <p><b>2</b></p> <p><b>1</b></p> <p><b>3</b></p> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; text-align: center; line-height: 40px;"><b>6</b></div> |

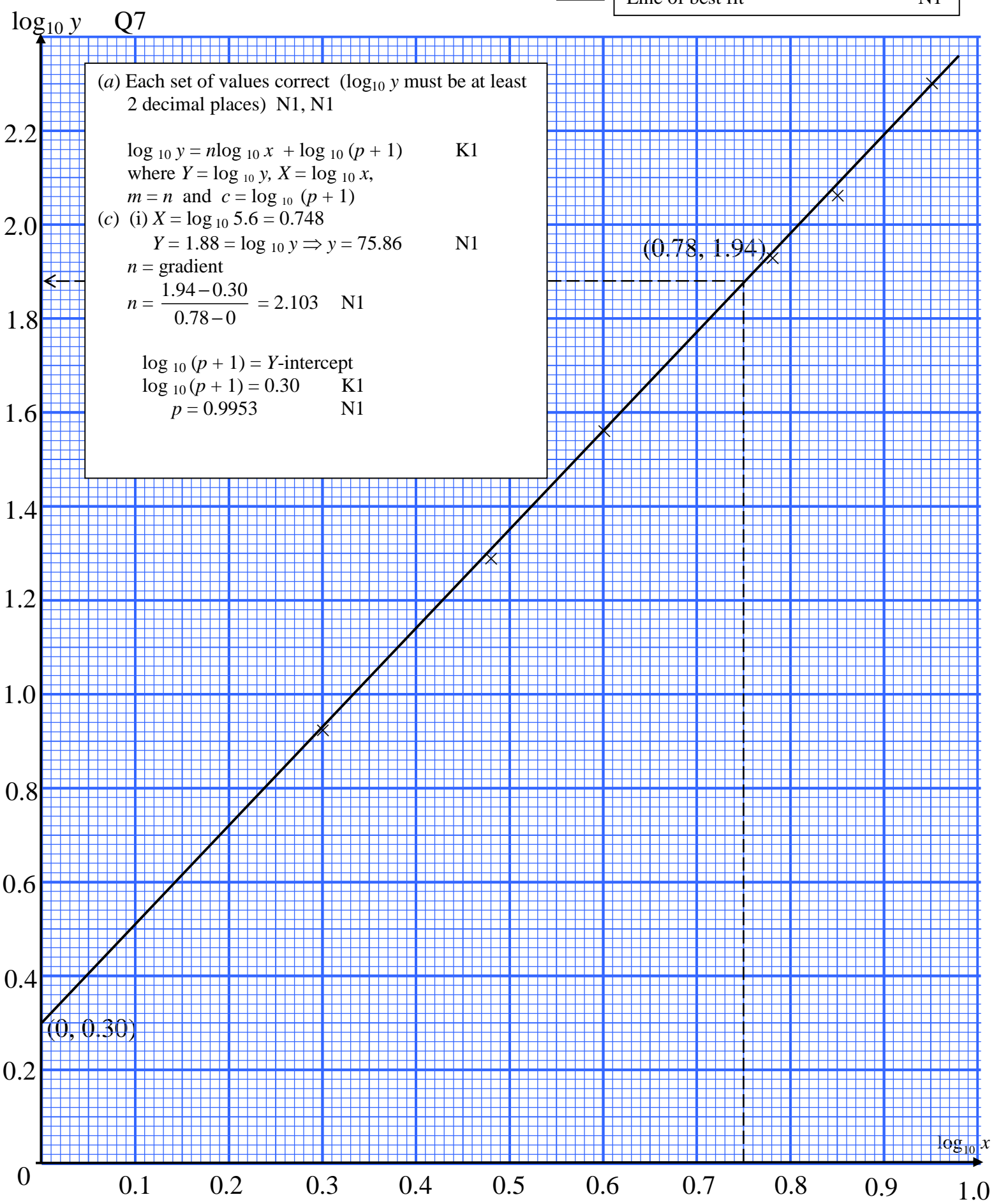
| QUESTION NO. | SOLUTION  | MARKS  |
|--------------|---|--|
| 3<br>(a)     | $T_{10} = 100 + 9(-4)$ or 64 (K1)<br>Area = 512 (N1)  | 2  |
| (b)          | $100 + (n - 1)(-4) = 4$ or $\frac{100}{4}$ (K1) @ $100 + (n - 1)(-4) > 0$<br>$n = 25$ (N1)  | 2  |
| (c)          | $\frac{n}{2}[2(100) + (n - 1)(-4)] = \frac{8640}{8}$ or 1080 (K1)<br>$(n - 36)(n - 15) = 0$ (K1)<br>$n = 15$ (N1)   | 3<br><div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block; text-align: center; line-height: 20px;">7</div>              |
| 4<br>(a)     |  <p style="text-align: center;"><math>y = 1 - 2 \sin x</math><br/><math>y = \frac{4}{5\pi} x</math></p> <p>Shape of sine curve (P1)</p> <p>Modulus (P1)</p> <p>Amplitude or period (P1)</p> <p>Translation (P1)</p> <p>(b) <math>y = \frac{4}{5\pi} x</math> (K1) Sketch straight line correctly (P1)</p> <p>Number of solutions = 3 (N1)</p> | 4<br><br>3<br><br><div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block; text-align: center; line-height: 20px;">7</div> |

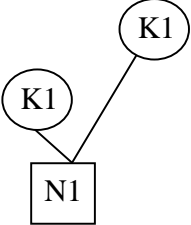
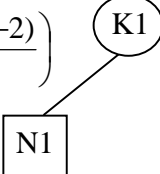
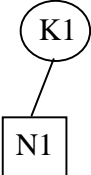
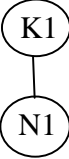
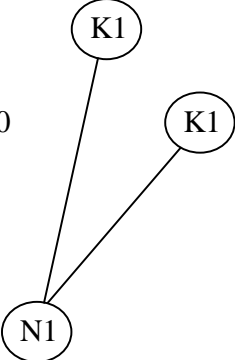
| QUESTION NO. | SOLUTION   | MARKS |
|--------------|--|-------|
| 5<br>(a)     | $\sum fx = 43 \times 2 + 48 \times 4 + 53 \times 8 + 58 \times 11 + 63 \times 9 + 68 \times 4 + 73 \times 2 = 2325$ $\bar{x} = \frac{2325}{40} = 58.125$   | 3     |
| (b)          | $Q_3 = 60.5 + \left[ \frac{\frac{3}{4}(40) - 25}{9} \right] 5 = 63.28$ <p>OR</p> $Q_1 = 50.5 + \left[ \frac{\frac{1}{4}(40) - 6}{8} \right] 5 = 53$ <p>Interquartile range = <math>63.28 - 53 = 10.28</math></p>  | 4     |
| 6<br>(a)     | $\angle BCO = 60^\circ = 1.047 \text{ rad}$ $\angle AOB = 0.6982 \text{ rad}$   | 3     |
| (b)          | $\frac{1}{2}(10)^2(1.047) \text{ or } 52.35$ $\frac{1}{2}(10)^2(0.6982) \text{ or } 34.91$    | 2     |
| (c)          | $\text{Area of segment } BC = 52.35 - \frac{1}{2}(10)^2 \sin 1.047^r = 9.237$ $\text{Area of the shaded region} = 25.673$    | 3     |



|               |      |      |      |      |      |      |           |
|---------------|------|------|------|------|------|------|-----------|
| $\log_{10} x$ | 0.30 | 0.48 | 0.60 | 0.78 | 0.85 | 0.95 | <b>N1</b> |
| $\log_{10} y$ | 0.93 | 1.30 | 1.57 | 1.94 | 2.07 | 2.31 | <b>N1</b> |

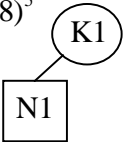
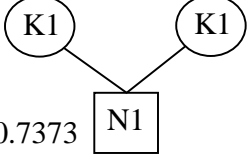
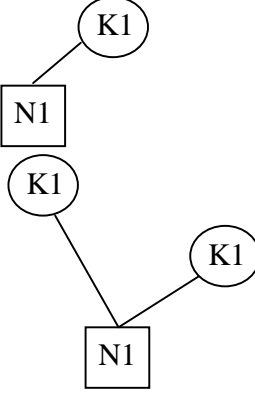
|                                   |           |
|-----------------------------------|-----------|
| Correct both axes (Uniform scale) | <b>K1</b> |
| All points are plotted correctly  | <b>N1</b> |
| Line of best fit                  | <b>N1</b> |



| QUESTION NO. | SOLUTION  | MARKS |
|--------------|---|-------|
| 8<br>(a) (i) | $\frac{8}{a} \times \left(-\frac{1}{2a}\right) = -1$ $2a^2 = 8$ $a = \pm 2$ $a > 0, a = 2$   | 3     |
| (ii)         | $\left(\frac{x+4}{2}, \frac{y-3}{2}\right) = \left(\frac{6+0}{2}, \frac{5+(-2)}{2}\right)$ $D(2, 6)$  <p>@</p> <p>Solving the equations <math>y = 4x - 2</math> and <math>y = -\frac{1}{4}x + \frac{13}{2}</math></p> $D(2, 6)$  | 2     |
| (b) (i)      | $\sqrt{(x-0)^2 + (y+2)^2} = 5$ $x^2 + y^2 + 4y - 21 = 0$   | 2     |
| (ii)         | <p>Get equation of <math>BC</math>, <math>y = 4x - 19</math></p> $x^2 + (4x - 19)^2 + 4(4x - 19) - 21 = 0$ $17x^2 - 136x + 264 = 0$ $b^2 - 4ac$ $= (-136)^2 - 4(17)(264)$ $= 544 > 0$ <p>The locus intersects the line <math>BC</math>.</p>   | 3     |
|              |   | 10    |

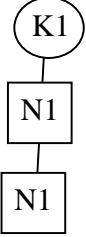
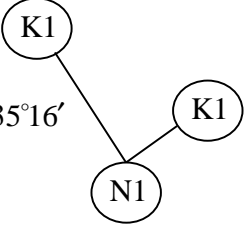
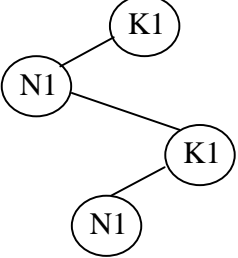
| QUESTION NO.           | SOLUTION  | MARKS     |
|------------------------|---|-----------|
| 9<br>(a)               | $\vec{OP} = \frac{1}{2}\underline{x} + \underline{y}$ <div style="text-align: right; margin-right: 100px;">(P1)</div>   | <b>1</b>  |
| (b)<br>(i)<br><br>(ii) | $\vec{OQ} = \lambda \underline{x} + \lambda \underline{y}$ <div style="text-align: right; margin-right: 100px;">(N1)</div><br>$\vec{OQ} = \vec{OL} + \vec{LQ}$ <div style="text-align: right; margin-right: 100px;">(K1)</div> $= \underline{x} + \mu \vec{LP}$ $= \underline{x} + \mu (\vec{LM} + \vec{MP})$ <div style="text-align: right; margin-right: 100px;">(K1)</div> $= \underline{x} + \mu \left( \underline{y} - \frac{1}{2}\underline{x} \right)$ <div style="text-align: right; margin-right: 100px;">(N1)</div> $= \left( 1 - \frac{1}{2}\mu \right) \underline{x} + \mu \underline{y}$ | <b>4</b>  |
|                        | $\underline{x} : \lambda = 1 - \frac{1}{2}\mu$ <div style="text-align: right; margin-right: 100px;">(K1)</div> $\underline{y} : \lambda = \mu$<br>$\mu = 1 - \frac{1}{2}\mu$ <div style="text-align: right; margin-right: 100px;">(K1)</div><br>$\mu = \lambda = \frac{2}{3}$ <div style="text-align: right; margin-right: 100px;">(N1)</div>   | <b>3</b>  |
| (c)                    | $\text{Area of triangle } OLM = \frac{3}{2} \times 24 = 36$ <div style="text-align: right; margin-right: 100px;">(K1)</div><br>$\text{Therefore area of parallelogram } OLMN = 72$ <div style="text-align: right; margin-right: 100px;">(N1)</div>  | <b>2</b>  |
|                        |   | <b>10</b> |

| QUESTION NO.           | SOLUTION  | MARKS     |
|------------------------|---|-----------|
| 10<br>(a)              | $\frac{r}{3} = \frac{h}{9} \Rightarrow r = \frac{h}{3} \quad \text{K1}$ $\frac{dV}{dh} = \frac{\pi h^2}{9} \quad \text{K1}$ $0.8 = \frac{\pi h^2}{9} \times \frac{dh}{dt}$ $0.8 = \frac{\pi h^2}{9} \times \frac{dh}{dt}$ <div style="text-align: right; margin-right: 50px;">N1</div>  | <b>4</b>  |
| (b)<br>(i)<br><br>(ii) | $h = 1 \text{ and } k = -1 \quad \text{N1} \quad \text{N1}$ <p>Area of the shaded region</p> $= \left  \int_0^1 (y^3 - y) dy \right  + \int_{-1}^0 (y^3 - y) dy$ $= \left[ \left( \frac{y^4}{4} - \frac{y^2}{2} \right) \right]_0^1 + \left( \frac{y^4}{4} - \frac{y^2}{2} \right)_{-1}^0 \quad \text{K1}$ $= \left[ \left( \frac{1}{4} - \frac{1}{2} - (0 - 0) \right) \right] + \left( 0 - 0 - \left( \frac{(-1)^4}{4} - \frac{1}{2} \right) \right) \quad \text{K1}$ $= \frac{1}{2}$ <div style="text-align: right; margin-right: 50px;">N1</div> <p><b>Note:</b> OW – 1 once only for correct answer without showing the process of intergration.</p> | <b>6</b>  |
|                        |   | <b>10</b> |

| QUESTION NO.         | SOLUTION  | MARKS     |
|----------------------|---|-----------|
| 11(a)<br>(i)<br>(ii) | $P(X = 0) = {}^5C_0(0.2)^0(0.8)^5$ $= 0.3277$ <br>$P(X < 2) = {}^5C_0(0.2)^0(0.8)^5 + {}^5C_1(0.2)^1(0.8)^4$ $= 0.7373$  | <b>5</b>  |
| (b)<br>(i)<br>(ii)   | $P(Z > -0.811) @ R(-0.811)$ $= 0.7913 @ 0.79132$<br>$P(-0.811 < Z < 1.081)$ $= 1 - P(Z \geq 0.811) - P(Z \geq 1.081)$ $@ R(-0.811) - R(1.081)$ $= 0.6514 @ 0.65147$                                      | <b>5</b>  |
|                      |   | <b>10</b> |

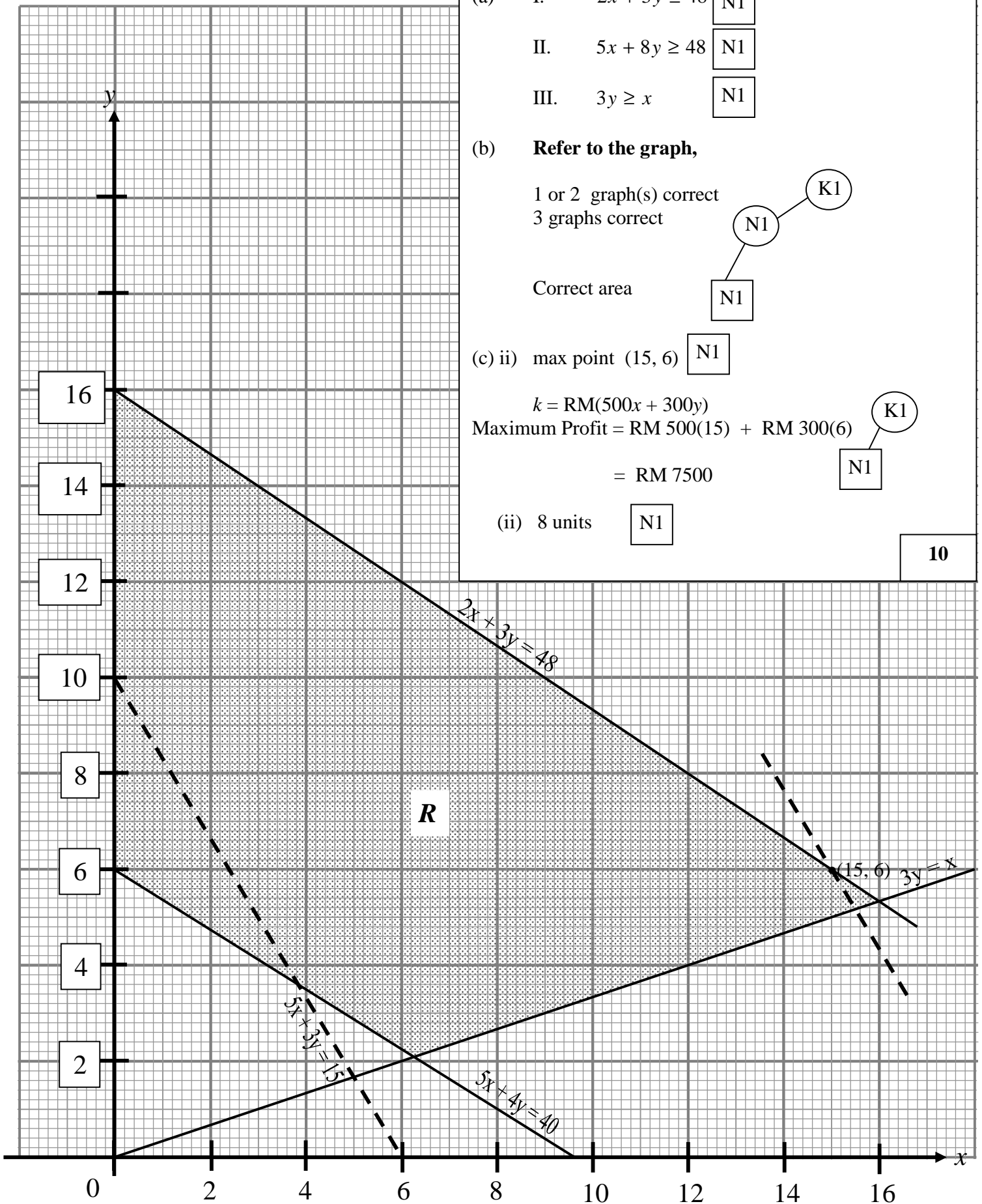
| QUESTION NO. | SOLUTION  | MARKS     |
|--------------|---|-----------|
| 12<br>(a)    | Initial velocity $v_A = 8$ <span style="border: 1px solid black; padding: 2px;">N1</span>   | <b>1</b>  |
| (b)          | $\frac{dv}{dt} = -2t + 5 = 0$ <span style="margin-left: 150px;">(K1)</span><br>$t = \frac{5}{2}$<br>$v_B = -\left(\frac{5}{2}\right)^2 + 5\left(\frac{5}{2}\right) - 4$<br>$= 2\frac{1}{4}$ <div style="margin-left: 150px;">(K1)</div> <div style="margin-left: 100px;">(N1)</div> | <b>3</b>  |
| (c)          | $v_A = (t-2)(t-4) = 0$ <span style="margin-left: 150px;">(K1)</span><br>$v_B = -(t-1)(t-4) = 0$ <span style="margin-left: 150px;">(K1)</span><br>$\therefore t = 4$ <div style="margin-left: 100px;">(N1)</div>   | <b>3</b>  |
| (d)          | $s_A = \int t^2 - 3t + 8dt$<br>$= \frac{t^3}{3} - 3t^2 + 8t$ <span style="margin-left: 150px;">(K1)</span><br>$= \frac{(2)^3}{3} + 3(2)^2 + 8(2)$ <span style="margin-left: 150px;">(K1)</span><br>$= 6\frac{2}{3}$ <div style="margin-left: 100px;">(N1)</div>                     | <b>3</b>  |
|              |   | <b>10</b> |

| QUESTION NO. | SOLUTION   | MARKS     |
|--------------|--|-----------|
| 13<br>(a)    | $A : \frac{P_{08}}{60} \times 100 = 125$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $P_{08} = \text{RM}75$ <div style="text-align: right; margin-right: 50px;">(N1)</div>  | <b>2</b>  |
| (b)(i)       | $120 = \frac{(125 \times 4) + (120n) + (80 \times 5) + 150(n+3)}{12 + 2n}$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $1440 + 240n = 1350 + 270n$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $n = 3$ <div style="text-align: right; margin-right: 50px;">(N1)</div>                          | <b>3</b>  |
| (ii)         | $\frac{\text{RM}30}{P_{06}} \times 100 = 120$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $= \text{RM}25$ <div style="text-align: right; margin-right: 50px;">(N1)</div>  | <b>3</b>  |
| (c)          | $120 + (120 \times 0.15) = 138$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $\bar{I}_{09/06} = \frac{(125 \times 4) + (138 \times 3) + (80 \times 5) + (150 \times 6)}{18}$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $= 123$ <div style="text-align: right; margin-right: 50px;">(N1)</div> | <b>3</b>  |
|              |  | <b>10</b> |

| QUESTION NO. | SOLUTION  | MARKS     |
|--------------|---|-----------|
| 14<br>(a)    | $\frac{18}{\sin 38^\circ} = \frac{28}{\sin \angle QSR}$ $\angle QSR = 180^\circ - (73^\circ 16')$ $= 106^\circ 44'$    | 3         |
| (b)          | $\angle QRS = 35^\circ 16'$ $PS^2 = 28^2 + 18^2 - 2(28)(18)\cos 35^\circ 16'$ <p>@ Sine Rule</p> $QS = 16.88$   | 3         |
| (c)          | $26^2 = 11^2 + 16.88^2 - 2 \times 11 \times 16.88 \times \cos \angle PQS$ $\angle PQS = 136^\circ 39'$ $\text{Area of triangle } PQR = \frac{1}{2} \times 11 \times 28 \times \sin 176^\circ 39'$ $= 8.999$  | 2         |
|              |   | <b>10</b> |



Answer for question 15



(a) I.  $2x + 3y \geq 48$  N1

II.  $5x + 8y \geq 48$  N1

III.  $3y \geq x$  N1

(b) **Refer to the graph,**

1 or 2 graph(s) correct N1 K1

3 graphs correct

Correct area N1

(c) ii) max point (15, 6) N1

$k = \text{RM}(500x + 300y)$

Maximum Profit =  $\text{RM } 500(15) + \text{RM } 300(6)$  K1

$= \text{RM } 7500$  N1

(ii) 8 units N1

**10**