

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

ALGEBRA

1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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. $\log_a \frac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \frac{\log_c b}{\log_c a}$
9. $T_n = a + (n-1)d$
10. $S_n = \frac{n}{2} [2a + (n-1)d]$
11. $S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$
12. $Tn = ar^{n-1}$
13. $S_\infty = \frac{a}{1-r}, |r| < 1$

KALKULUS (CALCULUS)

1. $y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$
2. $y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$
3. $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
4. Luas di bawah lengkung (Area under a curve)
 $= \int_a^b y dx$ atau (or) $\int_a^b x dy$
5. Isipadu janaan (Volume generated)
 $= \int_a^b \pi y^2 dx$ atau (or) $\int_a^b \pi x^2 dy$

STATISTIK (STATISTICS)

1. $\bar{x} = \frac{\sum x}{N}$
2. $\bar{x} = \frac{\sum fx}{\sum f}$
3. $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$
4. $\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$
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. ${}^n P_r = \frac{n!}{(n-r)!}$
9. ${}^n C_r = \frac{n!}{(n-r)! r!}$
10. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
11. $P(X = r) = {}^n C_r p^r q^{n-r}, p + q = 1$
12. Min (Mean), $\mu = np$
13. $\sigma = \sqrt{npq}$
14. $Z = \frac{X - \mu}{\sigma}$

3 GEOMETRI (GEOMETRY)

1. Jarak (Distance) = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2. Titik tengah (Midpoint)
 $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
3. Titik yang membahagi suatu tembereng garis
(A point dividing a segment of a line)
 $(x, y) = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$
4. Luas segitiga (Area of triangle)
 $= \frac{1}{2} |(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)|$
5. $|r| = \sqrt{x^2 + y^2}$
6. $\hat{r} = \frac{x\hat{i} + y\hat{j}}{\sqrt{x^2 + y^2}}$

TRIGONOMETRI (TRIGONOMETRY)

1. Panjang lengkok, $s = j\theta$
Arc length, $s = r\theta$
2. Luas sektor, $L = \frac{1}{2} j^2\theta$
Area of sector, $A = \frac{1}{2} r^2\theta$
3. $\sin^2 A + \text{kos}^2 A = 1$
 $\sin^2 A + \cos^2 A = 1$
4. $\text{sek}^2 A = 1 + \tan^2 A$
 $\sec^2 A = 1 + \tan^2 A$
5. $\text{kosek}^2 A = 1 + \text{kot}^2 A$
 $\text{cosec}^2 A = 1 + \cot^2 A$
6. $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \cos A$
7. $\text{kos} 2A = \text{kos}^2 A - \sin^2 A$
 $= 2\text{kos}^2 A - 1$
 $= 1 - 2\sin^2 A$

 $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2\cos^2 A - 1$
 $= 1 - 2\sin^2 A$
8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
9. $\text{kos}(A \pm B) = \text{kos} A \text{kos} B \mp \sin A \sin B$
 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
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. $a^2 = b^2 + c^2 - 2bc \text{kos} A$
 $a^2 = b^2 + c^2 - 2bc \cos A$
14. Luas segitiga (Area of triangle)
 $= \frac{1}{2} ab \sin C$

Section A

[40 marks]

Answer *all* questions in this section.

1. Solve the simultaneous equations $x + y = 2$ and $x^2 + 5y - 15 = 0$. Give your answer correct to 4 significant figures.

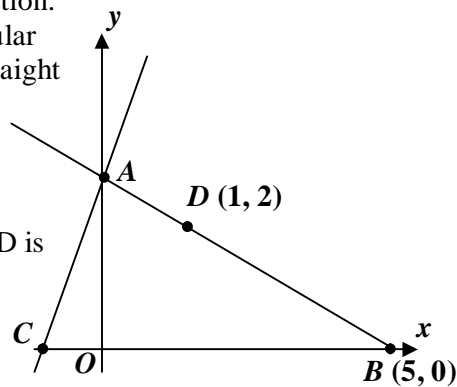
2. Solutions by scale drawing will not be accepted for this question. The *diagram 1* shows a straight line AB which is perpendicular to the straight line AC at point A. Point D(1,2) lies on the straight line AB

a) find the coordinates of

- i) point A
ii) point C

b) P is a moving point such that its distance from point D is always 2 units.

- i) Find the equation of the locus of point P
ii) Find the equation of the line BD



3. a) Sketch the graph of $y = 1 - \sin 2x$ for $0 \leq x \leq \pi$.
b) Hence, by sketching a suitable straight line on the same axes, find the **number of solutions** to the equation $2\pi \sin x \cos x = \pi - 2x$ for $0 \leq x \leq \pi$

4. The gradient function of a curve is $3x^2 + x - 2$. Given that the curve passes through the point (2, 5), find

- a) the **equation** of the curve
b) the **coordinates** of the turning points of the curve and **determine** whether **each** turning point is a maximum or a minimum point.

5. The values of a set of data are shown in the following table.

Class Intervals	0 – 10	11 – 20	21 – 30	31 – 40	41 – 50
Frequency	10	12	34	12	12

By taking mid-interval values, estimate the

- a) **mean**,
b) **standard deviation** of the distribution

6. a) The sum of the first n terms, S_n of an arithmetic progression is given by $S_n = n(n + 1)$. Find the common difference of the progression.
b) The first three consecutive terms of a geometric progression are $x - 3$, $x + 2$ and $3x - 4$. If all the terms are positive, find the value of x .

5
Section B
[40 marks]

Answer **four** questions from this section.

7. Use the graph paper provided to answer this question.

Table 1 below shows the values of two variables, x and y , that are related using the equation $yx^m = k$, where m and k are constants.

x	3	4	5	6	7
y	103	87	76	68	62

Table 1

- a) Using a scale of 2cm to 0.1 unit on the $\log_{10} x$ -axis and 2 cm to 0.2 units on the $\log_{10} y$ -axis, plot the graph of $\log_{10} y$ against $\log_{10} x$. Hence, draw the line of best fit.
(Begin the vertical axis from 1.0)
- b) From your graph, find
- i) the value of m and of k
 - ii) the value of y when $x = 2$

8. In diagram 3, $\overline{OA} = 2\mathbf{a}$, $\overline{OB} = 6\mathbf{b}$ and $OP = \frac{1}{3}\overline{OB}$. M is the midpoint of AB .

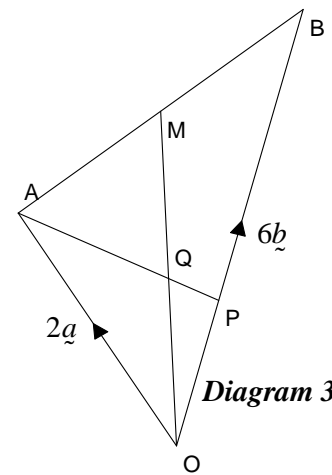


Diagram 3

- a) express each of the following vectors in terms of \mathbf{a} and \mathbf{b}
 - i) \overline{AP}
 - ii) \overline{OM}
- b) Given that $\overline{OQ} = p\overline{OM}$, express \overline{OQ} in terms of p , \mathbf{a} and \mathbf{b} .
- c) Given that $\overline{AQ} = k\overline{AP}$, express \overline{OQ} in terms of k , \mathbf{a} and \mathbf{b} .
- d) Hence, find the value of p and of k .

9. In the **diagram 4**, OAB is a sector of a circle with center O of radius 8 cm. It is given that $\angle AOB = 0.9$ radians. The straight line AD is perpendicular to the straight line OC .

The straight line AC is perpendicular to the straight line OA and meets OB produced at C . Find

- a) the perimeter of the region ADB , marked X
- b) the area of the region ABC , marked Y .

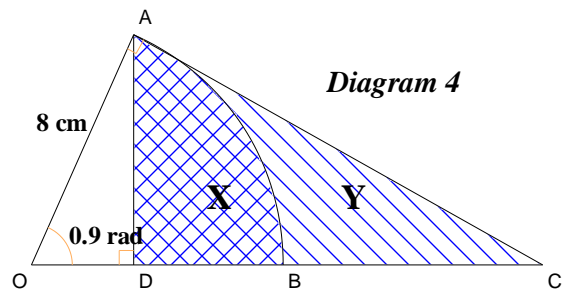


Diagram 4

10. The **diagram 5** shows part of the curve $y = \frac{1}{4x-2}$.

- a) The normal to the curve at point A intersects the x -axis at point P . Find the coordinates of point P .
- c) If the volume generated when the shaded Region is revolved through 360° about the x -axis is $\frac{1}{10}\pi$ units³, find the value of k .

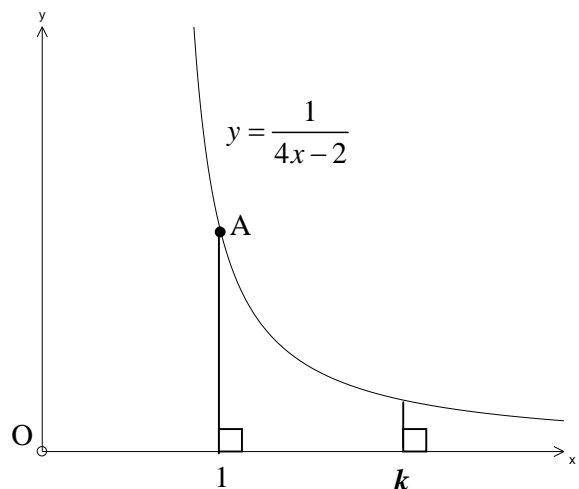


Diagram 5

11. a) In a survey carried out in a secondary school, it is found that one out of six students can swim. A sample of 5 students is chosen at random. Find the probability that at least 2 students can swim.
- b) The masses of durians plucked from an orchard are normally distributed with a mean of 2.5 kg and a standard deviation of 0.5kg. If a durian is chosen at random, calculate the probability that its mass is
- less than 2 kg
 - between 2 kg and 3 kg
- Hence, if there are 3413 durians with masses between 2kg and 3kg, calculate the total number of durians plucked from the orchard.

Section C

[20 marks]

Answer two questions from this section.

12. Particle P moves along a straight line with a velocity of v m/s, which is given by $v = 3 + 5t - 2t^2$, where t is the time in seconds, after leaving a fixed point O. Particle Q moves along the same straight line, beginning from O with a velocity of -3 m/s at the moment particle P passes through O. Particle Q moves with an acceleration of a m/s, which is given by $a = 4t - 2$. Find
- the time when particle P begins to reverse its direction
 - the total distance travelled by particle P in the first 4 seconds after leaving O,
 - the velocity of particle Q when the velocity of particle P is a maximum.
13. The following table shows the prices of four items in the years 2000, 2001 and 2002, together with the weightage of each item.

Item	Price (RM)			Weightage
	2000	2001	2002	
<i>A</i>	4	6	12	<i>a</i>
<i>B</i>	4	5	8	1
<i>C</i>	10	12	15	4
<i>D</i>	5	8	<i>b</i>	2

Based on the year 2000, the composite index for the years 2001 and 2002 are 137.5 and 210 respectively.

- Find the values of
 - a*,
 - b*.
- From the year 2002 to the year 2004, the price of each item increased by 30%. Calculate the composite index for
 - the year 2004 based on the year 2002
 - the year 2004 based on the year 2000

14.

Vehicle toy	Operation time of machine A (minutes)	Operation time of machine B (minutes)
Kancir car	50	25
Ruxa Van	40	30

A factory produces two models of vehicle toys, i.e. the Kancir cars and the Ruxa van, using machine A and machine B. The operation time to make each model is as shown in the above table.

The maximum time for the usage of the machine A is 10 hours and the usage time of the machine B is at least 5 hours. The ratio of the number of Ruxa vans produced to the number of Kancir cars produced does not exceed 3: 1. In a certain period of time, the factory produces x units of Kancir toys car and y units of the Ruxa toy vans.

- State three inequalities, other than $x \geq 0$ and $y \geq 0$, that satisfy the above constraints.
- Using a scale of 1 cm to 1 unit on both axes, draw the graphs of all the three inequalities. Hence, construct and shade the feasible region R that satisfies the above constraints.
- Based of your graph, find the maximum profit that can be obtained in that period of time if the profits from the sale of a unit of Kancir toy car and a unit of Ruxa toy van are RM8 and RM10 respectively.

15. In the *diagram 6* AEC and BED are straight lines and $BE = ED$. It is given that $AB = 9$ cm, $AD = 14$ cm, $CD = 15$ cm, $\angle AED = 115^\circ$ and $\angle ACD = 35^\circ$. Calculate

- the length of BD
- $\angle BAD$
- the area of the whole diagram.

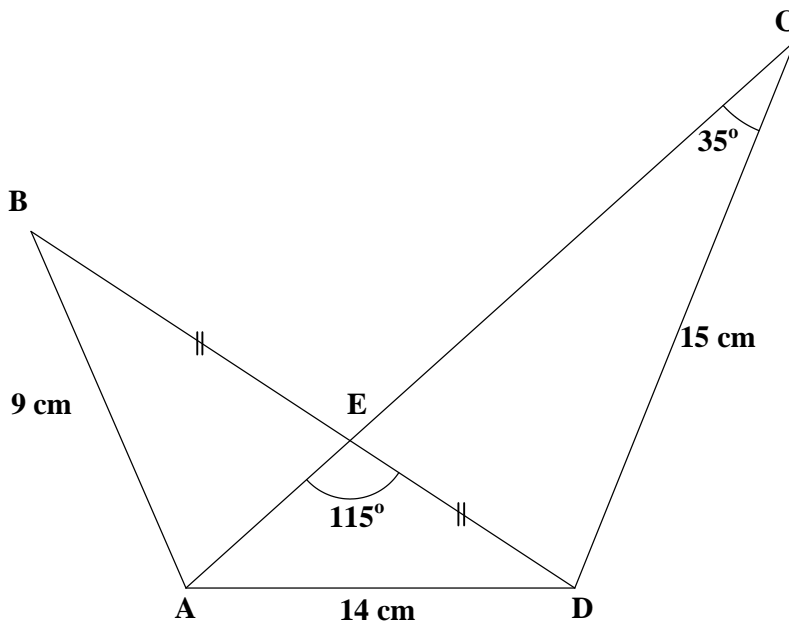


Diagram 6