

ULTIMATE A+ SPM SEMINAR 2021

MATEMATIK

12/12/2021

11.15 - 1.15 PTG



*YM TENGIKU
NOORHALINA*

*BINTI YM TENGIKU
AHMAD PUTRA*

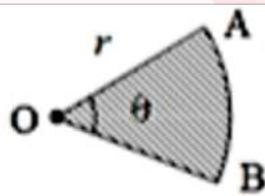
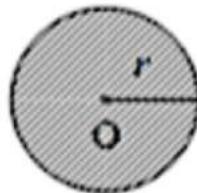
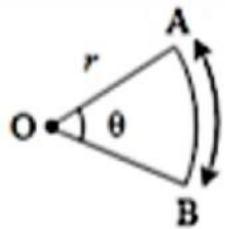
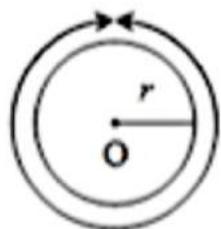
GURU

CEMERLANG

MATEMATIK



Bulatan / Circle



(a) the Circumference / perimeter of circle = $2\pi r$
 (Perimeter bulatan)

(b) the length of arc AB = $\frac{\theta}{360} \times 2\pi r$
 (Lengkok AB)

(a) the Area of circle = πr^2
 (Luas bulatan)

(b) the Area of sector AOB = $\frac{\theta}{360} \times \pi r^2$
 (Luas Sektor AOB)



Rajah 2 menunjukkan satu pizza dengan luas 346.5 cm^2 telah dipotong sama rata kepada 6 keping.

Diagram 2 shows a pizza with an area of 346.5 cm^2 is equally cut into 6 slices.

- (a) Cari jejari, dalam cm, piza itu.
Find the radius, in cm, of the pizza.
 [Guna / Use $\pi = \left(\frac{22}{7}\right)$]

[2 markah/marks]

- (b) Seterusnya, cari perimeter, dalam cm, bagi sekeping pizza.
Hence, find the perimeter, in cm, of a slice of pizza.

[2 markah/marks]

Jawapan / Answer :



Rajah 2 menunjukkan satu pizza dengan luas 346.5 cm^2 telah dipotong sama rata kepada 6 keping.

Diagram 2 shows a pizza with an area of 346.5 cm^2 is equally cut into 6 slices.

- (a) Cari jejari, dalam cm, piza itu.

Find the radius, in cm, of the pizza.

[Guna / Use $\pi = \left(\frac{22}{7}\right)$]

[2 markah/marks]

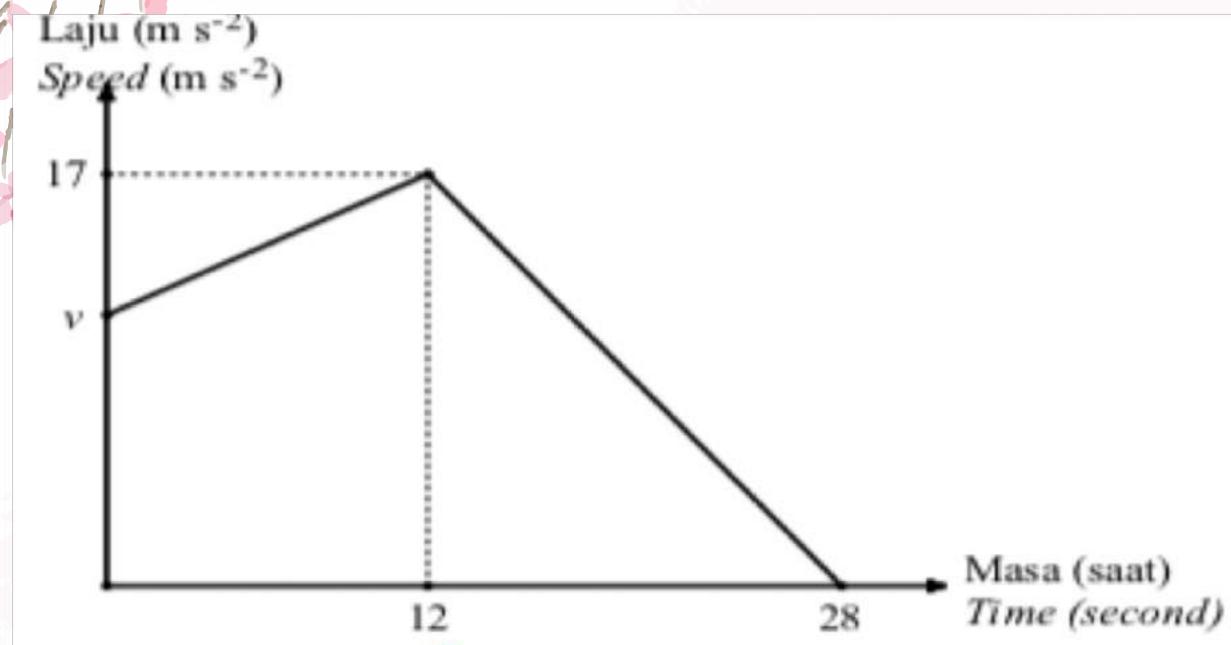
- (b) Seterusnya, cari perimeter, dalam cm, bagi sekeping piza.

Hence, find the perimeter, in cm, of a slice of pizza.

[2 markah/marks]

Graphs Of Motion

Rajah 9 menunjukkan graf laju-masa bagi sebuah kereta dalam tempoh 28 saat.



(a) Tentukan nilai v jika pecutan kereta itu dalam 12 saat yang pertama ialah 4 ms^{-2}

(b) Hitungkan kadar perubahan laju terhadap masa, dalam m s^{-2} , bagi 16 saat terakhir.

Measures Of Dispersion

➤ Find the range, interquartile range , Standard deviation and variance. *Cari julat, julat kuartile, sisihan piawai dan varian*

➤ Example:-

- 1) 8, 25, 16, 11, 24, 18, 22

\bar{x}	= 17.71428571
$\sum x$	= 124
$\sum x^2$	= 2450
$\sigma^2 x$	= 36.20408163
σx	= 6.016982768
$s^2 x$	= 42.23809524

Solution:

Rearrange in ascending / susun secara menaik :

$$8, 11, 16, 18, 22, 24, 25$$

sx	= 6.499084185
n	= 7
$\min(x)$	= 8
Q_1	= 11
Med	= 18
Q_3	= 24

- Range / Julat: $\text{Max} - \text{Min} = 25 - 8 = 17$
- Interquartile range / Julat kuartile : $Q_3 - Q_1 = 24 - 11 = 13$

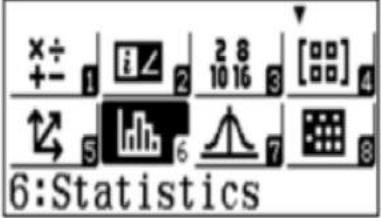
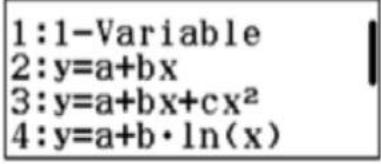
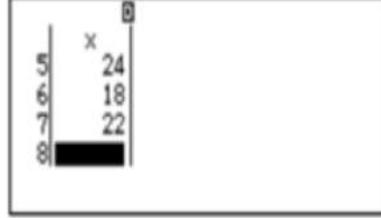
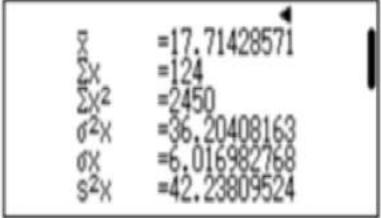
- Standard deviation/ Sisihan Piawai : $\sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$

$$\max(x) = 25$$

$$\sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2} = \sqrt{\frac{2450}{7} - 17.7143^2} = 6.017$$

- Variance/ Varian : $\sigma^2 = \frac{\sum x^2}{N} - \bar{x}^2 = \frac{2450}{7} - 17.7143^2 = 36.204$

For Ungrouped Data

Command	Screenshot
Converts 'Menu' to 'Statistics' Tukarkan 'Menu' kepada 'Statistics'	
Choose 1: 1-Variable Pilih 1:1- Variable	
Key in all the values of data / Masukkan semua data 8 = 2 5 = 1 6 = 1 1 = 2 4 = 1 8 = 2 2 =	
To get the information / Dapatkan maklumat OPTN 3	

**MODE 2X ==> SD 1 ==>
MASUKKAN SETIAP DATA DAN M+
TEKAN SHIFT 2 ==> .1 (MIN) ==>
SHIFT 2 (SISIHAN PIAWAI)**

Example 1:

Min bagi suatu data ialah $x + 6$, $2x + 4$, $6x + 5$, $4x + 3$ dan $x + 1$ ialah 15. Cari nilai bagi :
The mean of a data is $x + 6$, $2x + 4$, $6x + 5$, $4x + 3$ and $x + 1$ is 15. Find the value of :

- (i) x
- (ii) the interquartile range / julat antara kuartil
- (iii) variance / varians
- (iv) standard deviation / sisisan piawai

- Find the range, interquartile range , Standard deviation and variance. *Cari julat, julat kuartile, sisihan piawai dan varian*
- Example:-

Diameter (cm)	6.0	6.2	6.4	6.6	6.8	7.0	7.2
No. of Orange Bil. Limau	6	9	12	18	20	10	5

Solution:

- Range / Julat: $\text{Max} - \text{Min} = 7.2 - 6.0 = 1.2$
- Interquartile range / Julat kuartile : $Q_3 - Q_1 = 6.8 - 6.4 = 0.4$

$$\begin{aligned}\bar{x} &= 6.6175 \\ \sum x &= 529.4 \\ \sum x^2 &= 3511.56 \\ \sigma^2 x &= 0.10319375 \\ \sigma x &= 0.3212378402 \\ s^2 x &= 0.1045\end{aligned}$$

- Standard deviation/ Sisihan Piawai : $\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$
- $\therefore \sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} = \sqrt{\frac{3511.56}{80} - 6.6175^2} = 0.321$
- Variance/ Varian : $\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2 = \frac{3511.56}{80} - 6.6175^2 = 0.103$

$$\begin{aligned}sx &= 0.3232645975 \\ n &= 80 \\ \min(x) &= 6 \\ Q_1 &= 6.4 \\ \text{Med} &= 6.6 \\ Q_3 &= 6.8\end{aligned}$$

$$\max(x) = 7.2$$

**MODE 2X=> SD 1=> MASUKKAN DATA
TEKAN SHIFT , => M+
SHIFT 2=> 1 (MIN)=> 2 (S/PIAWAI)**

Let's Try

Score	0	1	2	3	4	5
Frequency	3	2	5	6	3	1

For Grouped Data

i) Range / Julat

= Midpoint of highest class – midpoint of lower class

= Titik tengah kelas tertinggi – Titik tengah kelas terendah

$$= \text{Max}(x) - \text{min}(x) = 204.5 - 154.5$$

$$= 50$$

i) Mean / Min, \bar{x}

$$= \frac{\sum fx}{\sum f}$$

$$= \frac{\sum x}{n} = \frac{17417.5}{95} = 183.34$$

i) Variance / Varians, σ^2

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

$$= \frac{\sum x^2}{n} - \bar{x}^2 = \frac{3215133.75}{95} - \left(\frac{17417.5}{95}\right)^2 = 229.19$$

i) Standard deviation / Sisihan piawai, σ

$$= \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} = \sqrt{229.1855956} = 15.14$$

\bar{x}	= 183.3421053
$\sum x$	= 17417.5
$\sum x^2$	= 3215133.75
$\sigma^2 x$	= 229.1855956
σx	= 15.13887696
$s^2 x$	= 231.6237402

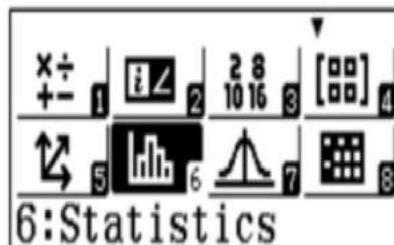
$s x$	= 15.21918987
n	= 95
$\text{min}(x)$	= 154.5
Q_1	= 174.5
Med	= 184.5
Q_3	= 194.5

$$\max(x) = 204.5$$

Command

Screenshot

Converts 'Menu' to 'Statistics'
Tukarkan 'Menu' kepada 'Statistics'

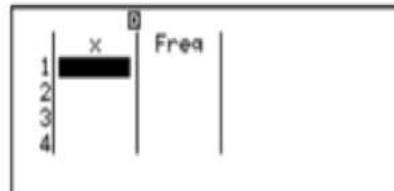


Choose 1: 1-Variable
Pilih 1:1- Variable

1:1-Variable
2:y=a+bx
3:y=a+bx+cx²
4:y=a+b·ln(x)

On Frequency column / Buka column kekerapan

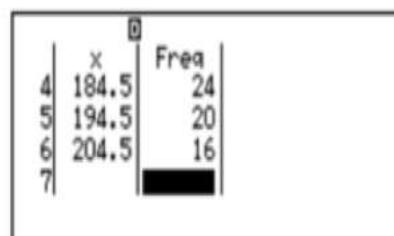
SHIFT MENU ▾ 3 1



Key in all data / Masukkan semua data

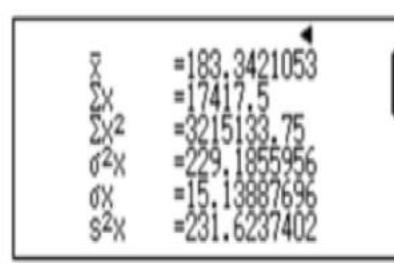
x - Midpoint / titik tengah

f - Frequency / kekerapan



To get the information / Dapatkan maklumat

OPTN 3



**MODE 2X=> SD 1=>
MASUKKAN DATA TEKAN
SHIFT , => M+
SHIFT 2=> 1 (MIN)=> 2
(S/PIAWAI)**

Remember

x – midpoint / titik tengah
 $\sum x$ - Frequency x
midpoint
 $\sum x^2 - fx^2$
 $\sigma^2 x$ - Variance
 σx – Standard Deviation

English	Bahasa
Class interval	Selang kelas
Lower limit	Had bawah
Upper Limit	Had atas
Midpoint	Titik tengah
Lower Boundary	Semapadan bawah
Upper boundary	Sempadan atas
Cumulative frequency	Longgokan kekerapan

Reminder!

- The answer of first quartile, median and third quartile can not be used as references because need to get from ogive graph (CF against upper boundary)
- Jawapan bagi kuartil pertama, median dan kuartil ketiga tidak boleh dijadikan rujukan kerana perlu menggunakan graf ogif (Longgokan kekerapan lawan sempadan atas)

From the grouped data, find:-

- Range / Julat
- Mean / Min
- Variance / Varians, σ^2
- Standard deviation / Sisihan piawai, σ

Volume of water, L Isi padu air	Number of families Bilangan keluarga
150-159	8
160-169	12
170-179	15
180-189	24
190-199	20
200-209	16

Let's Try

Time(s)	Frequency
21-25	5
26-30	11
31-35	15
36-40	7
41-45	2

- 1) The table shows the times taken by a grouped of students to complete a task. Find:-
Jadual menunjukkan masa yang diambil oleh sekumpulan pelajar untuk menyelesaikan ujian. Cari :-
- i) Range / Julat (Ans : 20)
 - ii) Mean / Min, \bar{x} (Ans: 31.75 s)
 - iii) Variance / Varians, σ^2 (Ans: 27.19 s^2)
 - iv) Standard deviation / Sisihan piawai , σ (Ans: 5.214s)

**DATA TERKUMPUL / GROUPED DATA
CARI NILAI P JIKA DIBERI MIN IALAH $24 \frac{2}{3}$
FIND THE VALUE OF P, GIVEN MEAN IS $24 \frac{2}{3}$**

Mass	Frequency
10-14	
P	
15-19	4
20-24	6
25-29	8
30-34	9

LET'S TRY

Set data di bawah telah disusun dalam tertib menaik.

Given that the set of data which is arranged in ascending order.

$$12, m, 15, 16, 17, n, 24$$

Diberi bahawa julat antara kuartil dan min bagi set data di atas masing-masing ialah 9 dan 17. Kirakan

Given that the interquartile range and mean of that data above is 9 and 17. Calculate

- (a) Nilai m dan n .
Values of m and n .
- (b) Hitung sisihan piawai bagi set data tersebut.
Value of standard deviation of the data.

CONGRUENCY, ENLARGEMENT AND COMBINED TRANSFORMATION

Diagram 10 shows a triangle FGH drawn on a Cartesian plane.

Rajah 10 menunjukkan segi tiga FGH dilukis pada suatu satah Cartes.

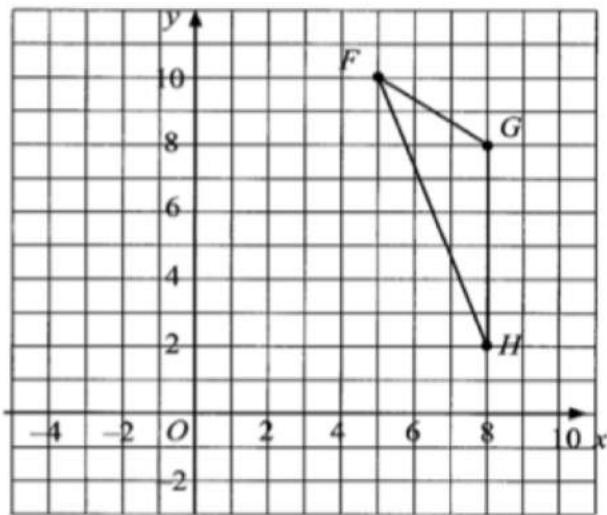


Diagram 10
Rajah 10

Transformation **T** is a translation $\begin{pmatrix} -4 \\ 1 \end{pmatrix}$.

Transformation **P** is a rotation of 90° anticlockwise about the centre $(2, 6)$.

State the coordinates of the image of

Penjelmaan **T** ialah satu translasi $\begin{pmatrix} -4 \\ 1 \end{pmatrix}$.

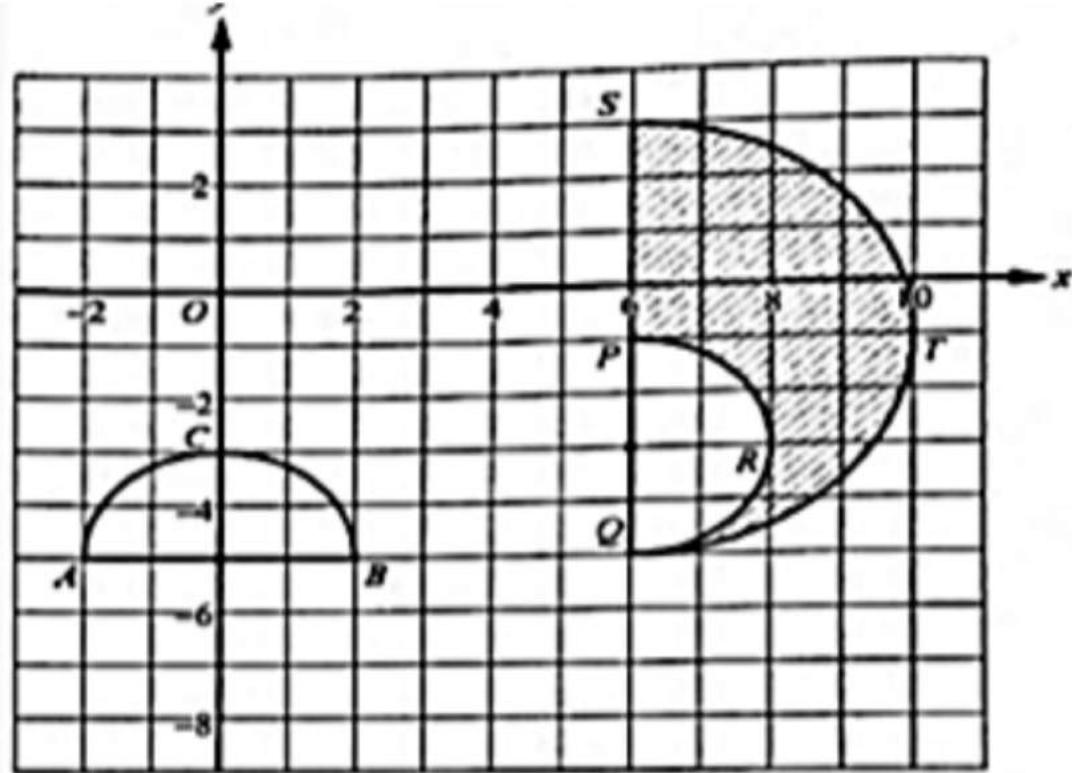
Penjelmaan **P** ialah satu putaran 90° lawan arah jam pada pusat $(2, 6)$.

Nyatakan koordinat imej bagi

- (i) point H under the combined transformations **PT**,
*titik H di bawah gabungan penjelmaan **PT**,*

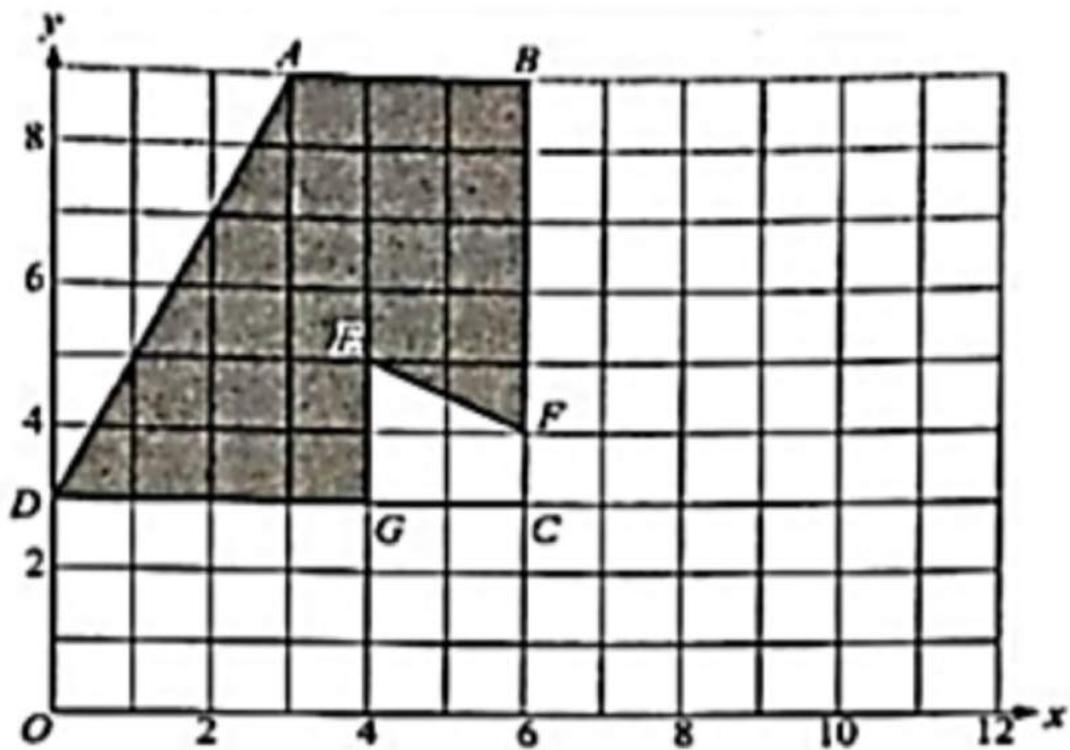
- (ii) point F under the combined transformations **P**².
*titik F di bawah gabungan penjelmaan **P**².*

[4 marks]
[4 markah]



QST is the image of ABCD under combined transformation XY

ABCD is the image of EFGH under combined transformation PQ.



(b) Diagram 9 showing sides M and N, drawn on a Cartesian plane.
 Rajah 9 menunjukkan sisiempat M dan N, dilukis pada suatu satah Cartesan.

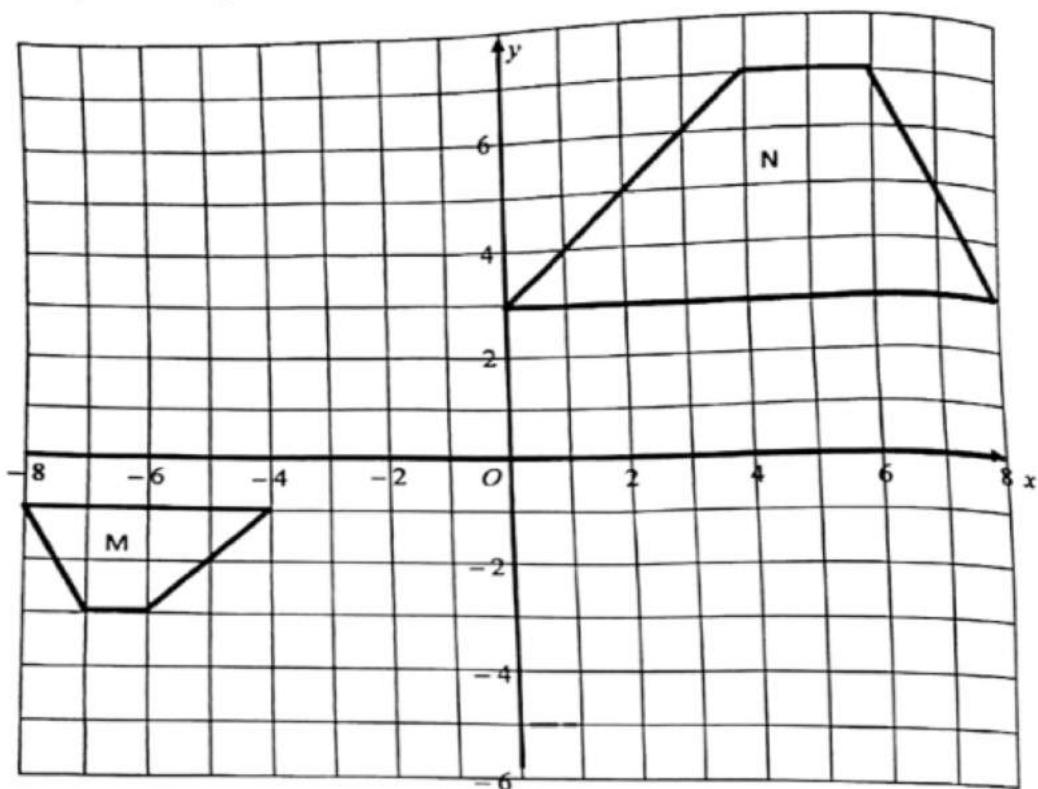


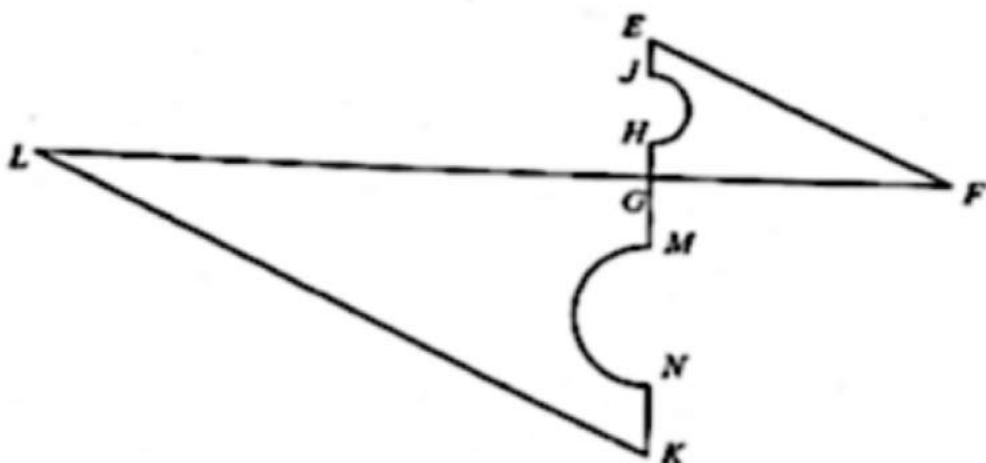
Diagram 9

KELANTAN

Rajah 9

- The four sides of M are images of the four sides of N under the combination of UV illumination. Describe more about U and V. (6 marks)
Sisi empat M ialah imej bagi sisi empat N di bawah gabungan penjelmaan UV. Huraikan selengkapnya penjelmaan U dan penjelmaan V. (6 markah)
- Given that the four sides of N represent an area of 30 m^2 , compute the area, in m^2 , of the area represented by M
Diberi bahawa sisi empat N mewakili suatu kawasan yang mempunyai luas 30 m^2 , hitung luas, dalam m^2 , kawasan yang diwakili M [3 markah]

- (b) Diagram 9.2 shows the geometrical shape $KLMN$ and $EFGHJ$. Given that $LG : GF = 2 : 1$, where line LGF is perpendicular to the line HGM .
- Rajah 9.2 menunjukkan bentuk geometri $KLMN$ dan $EFGHJ$. Diberi $LG : GF = 2 : 1$, di mana garis LGF berserenjang dengan garis HGM .



- (i) $KLMN$ is the image of $EFGHJ$ under transformation V followed by transformation W , where both transformation centred at G .
Describe in full the transformation :

*KLGMN ialah imej bagi EFGHJ di bawah penjelmaan V dan W, di mana kedua-dua penjelmaan itu berpusat di G.
Huraikan selengkapnya penjelmaan :*

(a) V .

(b) W .

- (ii) Describe in full a single transformation which is equivalent to transformation WV .

Huraikan dengan penuh satu penjelmaan tunggal yang sama dengan penjelmaan WV.

[7 marks]
[7 markah]

- (c) Given that the area of $EFGHJ$ is 9.425 unit^2 , calculate the area of $KLMN$.

Diberi luas EFGHJ ialah 9.425 unit^2 , kirakan luas imej bagi KLGMN.

INSURANCE

1. Jadual kadar premium tahun bagi setiap RM1 000 nilai muka insurans sementara boleh baharu tahunan yang ditawarkan oleh Syarikat Insurans ABC adalah seperti berikut.

The annual premium rate schedule per RM 1000 face value of a yearly renewable term insurance offered by Syarikat Insurans ABC is as follow.

Kos insurans tahunan bagi setiap RM 1000 nilai muka
The annual cost of insurance per RM 1000 face value.

Umur	Bukan Perokok (RM)		Perokok (RM)	
	Lelaki	Perempuan	Lelaki	Perempuan
41	2.86	1.92	3.74	2.43
42	3.08	2.04	4.06	2.60
43	3.35	2.19	4.44	2.81
44	3.66	2.36	4.87	3.04
45	4.03	2.56	5.39	3.30

Encik Wong berumur 43 tahun, seorang yang sihat dan tidak merokok . Dia ingin membeli satu pelan insurans untuk dirinya.

Mr. Wong is 43 years old, healthy and a non-smoker. He wants to buy an insurance plan for himself.

- (i) Dengan menggunakan jadual di atas, anggarkan premium tahunan yang Encik Wong perlu bayar untuk nilai muka sebanyak RM 350 000.

By using the table above, estimate the annual premium that Mr. Wong has to pay for a face value of RM 350 000.

[2 markah/marks]

- (ii) Syarikat insurans ABC menawarkan polisi penyakit kritikal dengan perlindungan sebanyak 40% nilai muka asas. Diberi kadar premium bagi setiap RM 1000 ialah RM 3.86 mengikut umur dan status kesihatan Encik Wong. Hitung premium tahunan yang baru bagi Encik Wong jika dia ingin menambah polisi penyakit kritikal.

Syarikat insurance ABC offers a critical illness policy with a coverage of 40% of the basic face value. The premium rate is RM 3.86 per RM 1000 based on Mr. Wong's age and health status.

Calculate the new annual premium of Mr. Wong if he wants to add the critical illness policy.

[4 markah/marks]

Premium for a life insurance formula

For life insurance, the amount of premium paid depends on the chosen face value, age, gender and smoking status. This premium calculation is based on a premium rate schedule for every RM x face value.

$$\text{Premium} = \frac{\text{Face value of policy}}{\text{RM } x} \times (\text{Premium rate per RM } x)$$

Kos perubatan Jonas yang dilindungi polisi insuransnya berjumlah RM 17 500. Dia ingin menuntut pampasan daripada polisi insurans perubatan utamanya yang mempunyai peruntukan deduktibel sebanyak RM 600 dan penyertaan peratusan koinsurans 75/25. Hitung kos insurans yang ditanggung oleh Jonas.

Jonas's medical cost covered by his insurance policy is RM 17 500. He wants to claim compensation from his major medical insurance policy with a deductible allocation of RM 600 and co-insurance percentage participation of 75/25. Calculate the cost borne by Jonas.

[4 markah/marks]

Jawapan/ Answer:

What is deductible?

Deductible is a an amount that must be borne by the policyholder before they can make a claim from the insurance company. Deductible is commonly found in the contract of property insurance, medical and health insurance and motor insurance. This provision is not in the life insurance and personal liability insurance.

What is co-insurance in health insurance?

In health insurance contracts, co-insurance is stipulated by the percentage participation clause, particularly for the major medical insurance policy. In this clause, policyholder is required to bear a portion of the medical costs covered by the contract at an agreed rate after taking into account the deductible provisions, if any. For example, 80/20 co-insurance percentage participation means that the insurance company will bear 80% of the medical costs covered by the policy and 20% will be borne by the policyholder.

3. Encik Sapawi menetap di Semenanjung Malaysia dan memiliki sebuah kereta jenama Proton X70. Dia ingin membeli satu polisi insurans motor dan berikut ialah maklumat kenderaan yang ingin diinsuranskannya.

Mr. Sapawi stays in Peninsular Malaysia and owns a Proton X70. He wants to buy a motor insurance policy. The following is the information regarding the vehicle he wants to insure.



Jumlah yang ingin diinsuranskan <i>Sum insured</i>	:	RM 122 800
Kapasiti engine <i>Engine capacity</i>	:	1 799 cc
NCD	:	30%

Hitung premium kasar bagi Encik Sapawi untuk
Calculate the gross premium for

- (a) polisi komprehensif
the comprehensive policy
- (b) polisi pihak ketiga, kebakaran dan kecurian
the third party, fire and theft policy
- (c) polisi pihak ketiga
the third party policy

berdasarkan Jadual Tarif Motor 2015 di bawah
based on the Schedule of Motor Tariff 2015

[8 markah/marks]

Premiums for motor insurance
(a) Is the rate for the first RM1000 <i>[refer to premium table]</i>
(b) is
<i>For peninsular Malaysia = RM 26.00 ×</i> <i>Total Premium – 1000</i> 1000
<i>For Sabah and Sarawak = RM 20.30 ×</i> <i>Total Premium – 1000</i> 1000
(c) Is the base premium = (a) + (b)
(d) Is ned (%) { refer to ncd table }
(e) Is the gross premium = (c) – (d)

Kapasiti engin tidak melebihi (cc) Engine capacity not exceeding (cc)	Semenanjung Malaysia Peninsular Malaysia		Sabah dan Sarawak	
	Polisi komprehensif Comprehensive policy (RM)	Polisi pihak ketiga Third party policy (RM)	Polisi komprehensif Comprehensive policy (RM)	Polisi pihak ketiga Third party policy (RM)
1 400	273.80	120.60	196.20	67.50
1 650	305.50	135.00	220.00	75.60
2 200	339.10	151.20	243.90	85.20
3 050	372.60	167.40	266.50	93.60
4 100	404.30	181.80	290.40	101.70
4 250	436.00	196.20	313.00	110.10
4 400	469.60	212.40	336.90	118.20
Melebihi 4 400	501.30	226.80	359.50	126.60
Over 4 400				

- ❖ Bagi polisi komprehensif, kadar yang dikenakan adalah bagi RM1 000 pertama daripada jumlah yang diinsuranskan.
- ❖ For comprehensive policy, the rate charged is for the first RM1 000 of the sum insured.

2. Encik Jee ingin membeli insurans kebakaran untuk rumahnya. Syarikat insurans menetapkan bahawa nilai boleh insurans rumah tersebut ialah RM 1.55 juta. Polisi insurans kebakaran yang ingin dibelinya mempunyai peruntukan ko-insurans untuk menginsuranskan 75% daripada nilai boleh insurans hartanya dan deduktibel sebanyak RM 4000.

Mr. Jee wants to buy a fire insurance for his house. The insurance company estimates that the house's insurable value is RM 1.55 million. The fire insurance policy that he wants to buy has co-insurance provision of 75% of his property insurable value and a deductible of RM 4000.

- (a) Hitung jumlah insurans yang harus dibeli oleh Encik Jee bagi rumahnya itu.
Calculate the amount of insurance required by Mr. Jee for the house.
- (b) Rumah Encik Jee telah mengalami kebakaran dan jumlah kerugiannya adalah sebanyak RM45 500. Hitung bayaran pampasan yang akan diterima Encik Jee jika dia menginsuranskan rumahnya.
Mr. Jee's house caught on fire and the amount of loss is RM45 500. Calculate the amount of compensation that Mr. Jee will received if he insures his house.
- (i) pada jumlah insurans yang harus dibelinya
at the amount of required insurance
- (ii) dengan jumlah RM 950 000. Seterusnya, hitung nilai penalty ko-insurans.
at a sum of RM 950 000. Hence, calculate the co-insurance penalty.
- (c) Rumah Encik Jee telah mengalami kerugian menyeluruh. Jika dia menginsuranskan rumahnya dengan jumlah RM 850 000, hitung bayaran pampasan yang diterimanya.
Mr. Jee's house suffered a total loss. If he insured his house at a sum of RM 850 000, calculate the amount compensation he will receive.

[9 markah/ marks]

What is co-insurance in property insurance?

Co-insurance is the cost sharing of the loss between the insurance company and the policyholder. For the co-insurance clause in property insurance, the policyholder is required to insure his property at a certain amount based on the percentage of co-insurance determined by the insurance company from the insurable value of the property. If this co insurance provision is not met, the policyholder will have to bear some of the losses together with the insurance company. Therefore, if the policyholder wishes to recover full compensation for the partial loss incurred, he must insure the property in accordance with his co-insurance provisions.

$$\begin{aligned}\text{Amount of required insurance} \\ = \text{Percentage of co-insurance} \times \text{Insurable value of property}\end{aligned}$$

1) If the insured value = amount of required insurance

$$\begin{aligned}\text{Amount of compensation} \\ = \text{Amount of loss} - \text{Deductible} \\ \text{where the amount of loss} < \text{the amount of insurance purchased.}\end{aligned}$$

2) If the insured value < amount of required insurance

$$\begin{aligned}\text{Amount of compensation} \\ = \frac{\text{Amount of insurance purchased}}{\text{Amount of required insurance}} \times \text{Amount of loss} - \text{Deductible}\end{aligned}$$

3) Suffered a total loss

$$\begin{aligned}\text{Amount of compensation} \\ = \text{Amount of insurance purchased} - \text{Deductible}\end{aligned}$$

PERCUKAIAN / TAXATION

Mr Halim is single and he works as a clerk. His monthly income is RM4 200. He wants to calculate his income tax for the Assessment Year of 2020. Table 13.1 shows the tax exemption and tax relief items for Mr Halim.

Perkara Item	Had (RM) Limit (RM)	Amaun (RM) Amount (RM)
Individu / Individual		9 000
Gaya hidup / Lifestyle	5 000	3 500
Insurans hayat dan KWSP <i>Life insurance and EPF</i>	7 000	7 800
Insurans perubatan dan Pendidikan <i>Medical and education insurance</i>	3 000	2 650
Perkeso / Socso	250	125

Jadual 13.1
Table 13.1

Diberi bahawa dalam tahun yang sama:

It is given that in the same year:

- I : Dia menerima bonus sebanyak RM2 100 pada akhir tahun.
He received a bonus of RM2 100 at the end of the year.
- II : Dia menderma RM150 kepada sebuah pusat kebajikan yang diluluskan oleh LHDN.
He donated RM150 to an IRB-approved welfare centre.
- III : Dia membayar zakat berjumlah RM30.
He paid zakat RM30.
- IV : Potongan Cukai Bulanan (PCB) Encik Halim ialah RM18.50.
Mr Halim's Monthly Tax Deduction (PCB) was RM18.50.

Berdasarkan maklumat di atas:

Based on the above information:

- (a) Hitung pendapatan bercukai Encik Halim.
Calculate Mr Halim's chargeable income.

How to calculate income tax?

1. Calculate Chargeable Income

Chargeable amount = Total annual income - Tax exemption - Tax relief

Total annual income

-includes all forms of wages, salaries, bonuses, dividends, interest, rentals, royalties, premiums Tax exemption

-all personal expenses in the forms of gifts, donations, contributions to government or various organisations

Tax reliefs

- items or expenses, which are not taxed, for the benefit of the individual or family members, for example Employees' Provident Fund (EPF), medical treatment and education fees

[kah/marks]

Table 13.2 shows part of the individual income tax rates for Assessment Year of 2020.

Banjaran pendapatan bercukai (RM) <i>Chargeable income (RM)</i>	Pengiraan (RM) <i>Calculations (RM)</i>	Kadar (%) <i>Rate (%)</i>	Cukai (RM) <i>Tax (RM)</i>
20 001 – 35 000	20 000 pertama <i>On the first 20 000</i>		150
	15 000 berikutnya <i>Next 15 000</i>	3	450

Berdasarkan Jadual 13.2, hitung cukai pendapatan yang perlu dibayar oleh Encik Halim.

Based on Table 13.2, calculate the income tax to be paid by Mr Halim.

[3 markah/marks]

2. Calculate Income Tax

Income Tax = Amount of base tax + Tax on next balance

-refer table of Individual Income Tax Rates for Assessment

3. Subtract Tax Rebate

Payable income tax = Income Tax - Tax rebates

Tax rebates

- Tax rebate of RM400 given to taxpayer if the chargeable less than RM35 000
- The amount of zakat or fitrah paid by Muslim citizens

- (c) Adakah Encik Halim perlu membuat bayaran baki cukai pendapatan, atau dia akan menerima lebihan potongan PCB yang dipulangkan oleh pihak LDHN? Jelaskan jawapan anda.

Does Mr Halim need to pay any additional income tax, or will he receive excess deduction of PCB refunded by IRB? Explain your answer.

[3 markah/marks]

Monthly tax deduction (Potongan Cukai Bulanan, PCB)

- salary deduction of an employee for income tax payment of current year
- based on the table of monthly tax deduction or PCB computational calculation method provided by Inland Revenue Board (IRB).

There are two conditions:

1. Tax payable > PCB

$$\text{Tax} - \text{PCB} = \text{Insufficient tax payment}$$

Insufficient tax payment must be made to IRB

2. Tax payable < PCB

$$\text{PCB} - \text{Tax} = \text{Excess deduction}$$

Excess deduction of PCB will be refunded by IRB to taxpayer's bank account

PROBABILITY

1. Halimah memasukkan sebatang pen hitam (R), sebatang pen hijau (G) dan dua batang pen biru (B) ke dalam sebuah beg. Dia memilih dua batang pen secara rawak satu demi satu dari beg itu tanpa pemulangan.

Halimah puts a black pen (R), a green pen (G), and two blue pens (B) into a bag. She chooses two pens randomly one by one from the bag without replacement.

- (a) Tulis ruang sampel bagi peristiwa bergabung itu.
Write the sample space of the combined events.
- (b) Hitung kebarangkalian memilih dua batang pen yang sama warna.
Calculate the probability of choosing two pens of the same colour.

Diagram 9 shows the menu at Oked Cafe.

Rajah 9 menunjukkan menu di Kafe Oked.

Ice cream <i>Aiskrim</i>			Fruit juice <i>Jus buah</i>		
Strawberry <i>Strawberi</i> RM3.00 (S)	Vanilla <i>Vanila</i> RM2.50 (V)	Chocolate <i>Coklat</i> RM3.50 (C)	Mango <i>Mangga</i> RM6.00 (M)	Watermelon <i>Tembikai</i> RM5.00 (W)	Apple <i>Epal</i> RM4.00 (A)

Diagram 9

Rajah 9

A customer chooses at random the combination menu of an ice cream and then a fruit juice.

Seorang pelanggan memilih secara rawak gabungan menu, iaitu satu aiskrim dan kemudian satu jus buah.

- (a) List down the sample space for the combination. You **must** use a capital letter such as S for Strawberry and so on. [2 marks]

Senaraikan ruang sampel bagi gabungan itu. Anda **mesti** menggunakan huruf seperti S untuk Strawberi dan seterusnya. [2 markah]

- (b) By listing all the possible outcomes of the event, find the probability that

Dengan menyenaraikan semua kesudahan yang mungkin bagi peristiwa itu, cari kebarangkalian bahawa

- (i) a customer who buys with the price more than RM8,

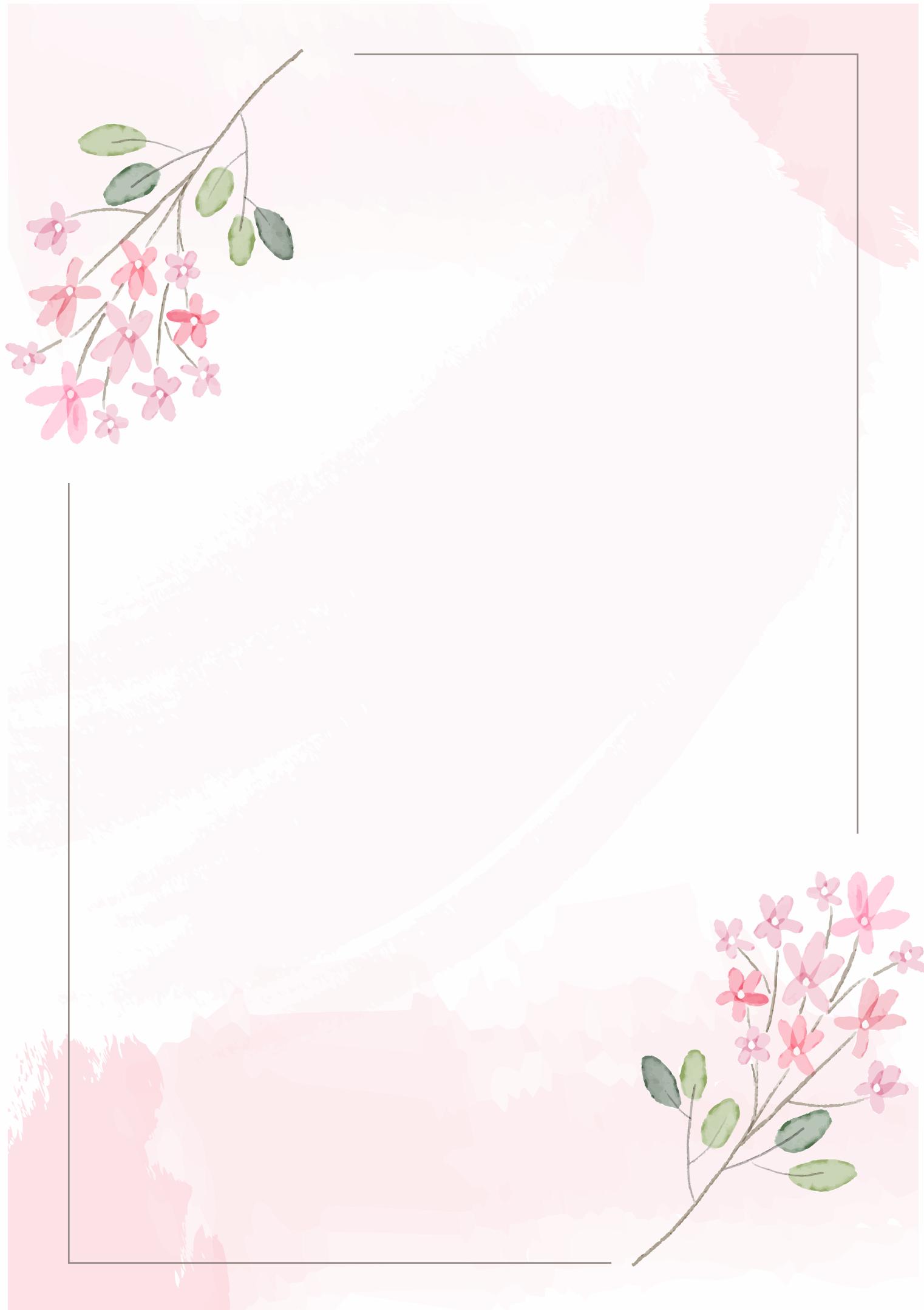
seorang pelanggan yang membeli dengan harga lebih daripada RM8,

- (ii) a customer who does not choose a mango juice.

seorang pelanggan yang tidak memilih jus mangga.

[4 marks]

[4 markah]



Kedai Pizza Bagus telah menjual 12 keping pizza Chicago, 8 keping pizza Italian dan x keping pizza New York dalam satu hari.

Good Pizza Shop has sold 12 pieces of Chicago pizza, 8 pieces of Italian pizza and x pieces of New York pizza in one day.

- (a) Sekeping pizza dipilih secara rawak, kebarangkalian sekeping pizza Chicago atau sekeping pizza New York dipilih ialah $\frac{11}{15}$. Hitung nilai x .

A piece of pizza is chosen at random, the probability of a piece of Chicago pizza or a piece of New York pizza being chosen is $\frac{11}{15}$. Calculate the value of x .

[2 markah / marks]

Konstruk : Memahami

- (b) Linden ingin membeli 2 keping pizza. Hitung kebarangkalian bahawa

Linden wants to buy 2 slices of pizza. Calculate the probability that

- (i) kedua-dua keping pizza yang dibeli adalah sama jenis
the two slices of pizza purchased were of the same type

[3 markah / marks]

Konstruk : Mengaplikasi

- (ii) piza New York tidak dipilih.
New York pizza was not selected.

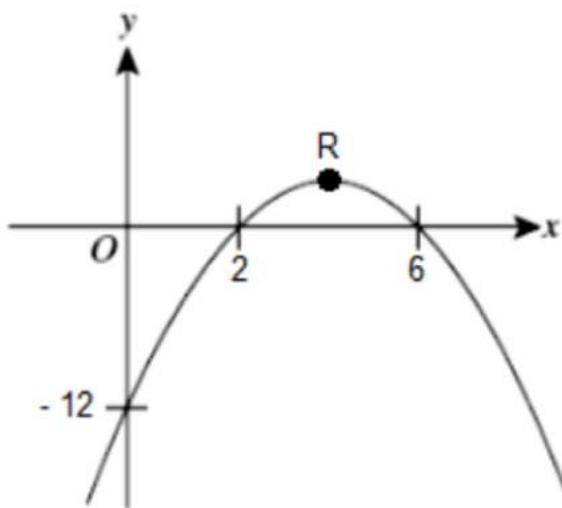
[3 markah / marks]

Konstruk : Mengaplikasi

QUADRATIC EQUATION

Rajah di bawah menunjukkan sebahagian daripada graf bagi fungsi kuadratik $f(x) = a(x - p)(x - q)$ dengan keadaan $p < q$. Titik R ialah titik maximum bagi graf fungsi kuadratik tersebut.

The diagram below shows part of the graph of the quadratic function $f(x) = a(x - p)(x - q)$ where $p < q$. Point R is the maximum point of the graph of the quadratic function.



Sebuah kereta bertolak dari Tanjung Malim ke Taiping dalam masa $(3t - 5)$ jam.

A car travels from Tanjung Malim to Taiping in $(3t - 5)$ hours.

- a) Jika purata laju kereta itu ialah $30t$ km/j, bentukkan satu ungkapan kuadratik, dalam sebutan t , untuk mewakili jumlah jarak yang dilalui oleh kereta itu.

If the average speed of the car is $30t$ km/h, form a quadratic expression, in terms of t , to represent the total distance travelled by the car.

[2 markah / marks]

(Konstruk: Mengaplikasi)

- b) Diberi jarak antara Tanjung Malim ke Taiping ialah 187.5 km, cari jumlah masa dalam minit yang diambil oleh kereta tersebut.

Given that the distance between Tanjung Malim to Taiping is 187.5 km, find the total time in minutes taken by the car.

[4 markah / marks]

(Konstruk: Mengaplikasi)

- c) Jika kereta tersebut berhenti untuk berehat di Ipoh selama 30 minit, kirakan purata laju kereta tersebut dalam km/j.

If the car stops to rest in Ipoh for 30 minutes, calculate the average speed of the car in km/h.

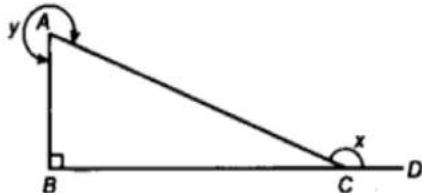
[3 markah / marks]

(Konstruk: Mengaplikasi)

TRIGONOMETRIC FUNCTION

1. a) Dalam rajah di bawah, ABC ialah segi tiga bersudut tegak dan BCD ialah satu garis lurus.

In the diagram below, ABC is a right-angled triangle and BCD is a straight line.



Diberi nisbah bagi $AB : AC = 5 : 13$, tentukan

Given the ratio of $AB : AC = 5 : 13$, determine

- (i) $\tan x$,
(ii) $\cos y / \cos y$.

[2 markah / marks]

Konstruk : Mengaplikasi

- b) (i) Jika $\cos x = -\cos 58^\circ$ dan $180^\circ \leq x \leq 360^\circ$, cari nilai x .

If $\cos x = -\cos 58^\circ$ and $180^\circ \leq x \leq 360^\circ$, find the value of x .

- (ii) Diberi $\sin x = 0.4641$ dan x ialah sudut tirus, cari nilai $\sin(x + 180^\circ)$.

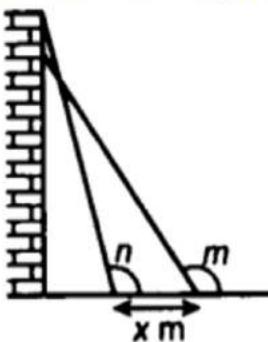
Given $\sin x = 0.4641$ and x is an acute angle, find the value of $\sin(x + 180^\circ)$.

[3 markah / marks]

Konstruk : Menganalisis

- c) Dalam rajah di bawah, sebuah tangga sepanjang 9 m disandarkan pada dinding mencancang dengan kakinya di atas lantai mengufuk. Apabila tangga itu tergelincir sebanyak x m, sudut cakah n bertambah sebanyak 10° menjadi sudut cakah m .

In the diagram below, a ladder of length 9 m is leaned against a vertical wall with the other end on a horizontal floor. When the ladder slipped by x m, the obtuse angle n increased by 10° to become an obtuse angle m .



Diberi $\sin n = 0.9659$, hitung nilai x .

Given $\sin n = 0.9659$, calculate the value of x .

[4 markah / marks]

Konstruk : Menganalisis

Sukuan 2 Quadrant 2	Sukuan 1 Quadrant 1
$\sin \theta = \sin(180^\circ - \theta)$	$\sin \theta$
$\cos \theta = -\cos(180^\circ - \theta)$	$\cos \theta$
$\tan \theta = -\tan(180^\circ - \theta)$	$\tan \theta$
Sukuan 3 Quadrant 3	Sukuan 4 Quadrant 4
$\sin \theta = -\sin(\theta - 180^\circ)$	$\sin \theta = -\sin(360^\circ - \theta)$
$\cos \theta = -\cos(\theta - 180^\circ)$	$\cos \theta = \cos(360^\circ - \theta)$
$\tan(\theta) = \tan(\theta - 180^\circ)$	$\tan \theta = -\tan(360^\circ - \theta)$

GRAPH OF FUNCTION

1. a) Lengkapkan jadual di dalam ruangan jawapan di bawah bagi persamaan $y = 2x^2 - 2x - 5$.
- b) Dengan menggunakan skala 2 cm kepada 1 unit pada paksi x dan 2 cm kepada 5 unit pada paksi y , lukiskan graf $y = 2x^2 - 2x - 5$ untuk $-2 \leq x \leq 5$.
- c) Daripada graf tersebut, cari
 - i) nilai y apabila $x = 3.5$
 - ii) nilai x apabila $y = 5$
- d) Lukiskan satu garis lurus yang sesuai pada graf yang sama untuk mencari semua nilai x yang memuaskan persamaan $3x = x^2 - 2$ bagi $-2 \leq x \leq 5$. Nyatakan nilai-nilai x itu.

Jawapan :

a)

x	-2	-1	0	1	2	3	4	5
y		-1	-5	-5		7		35

b) Rujuk pada kertas graf di halaman sebelah.

c) i) $y = \dots\dots\dots\dots$ ii) $x = \dots\dots\dots\dots$

d) Persamaan bagi garis lurus :
 $x = \dots\dots\dots\dots$



3. a) Lengkapkan jadual di dalam ruangan jawapan di bawah bagi persamaan $y = -x^3 + 4x + 5$.
- b) Dengan menggunakan skala 2 cm kepada 1 unit pada paksi x dan 2 cm kepada 10 unit pada paksi y , lukiskan graf $y = -x^3 + 4x + 5$ untuk $-4 \leq x \leq 4$.
- c) Daripada graf tersebut, cari
- nilai y apabila $x = 3.5$
 - nilai x apabila $y = -15$
- d) Lukiskan satu garis lurus yang sesuai pada graf yang sama untuk mencari semua nilai x yang memuaskan persamaan $x^3 = 9x + 5$ bagi $-4 \leq x \leq 4$. Nyatakan nilai-nilai x itu.

Jawapan :

a)

x	-4	-3	-2	-1	0	1	2	3	4
y	53	20		2	5	8	5		-43

b) Rujuk pada kertas graf di halaman sebelah.

c) i) $y = \dots\dots\dots$ ii) $x = \dots\dots\dots$

d) Persamaan bagi garis lurus :

$x = \dots\dots\dots$

4. a) Lengkapkan jadual di dalam ruangan jawapan di bawah bagi persamaan $y = -\frac{6}{x}$
- b) Dengan menggunakan skala 2 cm kepada 1 unit pada paksi x dan 2 cm kepada 2 unit pada paksi y , lukiskan graf $y = -\frac{6}{x}$ untuk $-4 \leq x \leq 4$.
- c) Dari pada graf tersebut, cari
- nilai y apabila $x = 1.8$
 - nilai x apabila $y = 4.4$
- d) Lukiskan satu garis lurus yang sesuai pada graf yang sama untuk mencari semua nilai x yang memuaskan persamaan $x^2 + x = 3$ untuk $-4 \leq x \leq 4$. Nyatakan nilai-nilai x itu.

Jawapan :

a)

x	-4	-2	-1	-0.6	0.6	1	2	3	4
y	1.5	3		10		-6	-3		-1.5

b) Rujuk pada kertas graf di halaman sebelah.

c) i) $y = \dots\dots\dots\dots$ ii) $x = \dots\dots\dots\dots$

d) Persamaan bagi garis lurus :
 $x = \dots\dots\dots\dots$

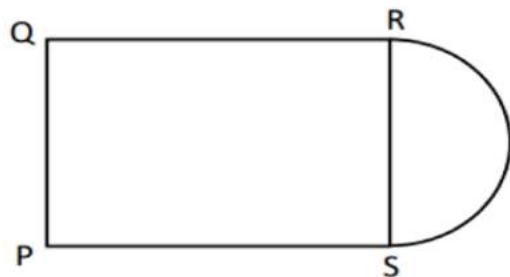
SECTION C

**2 QUESTIONS
(SELECT 1)**

15 MARKS

- (a) Khusairi merancang untuk membina sebuah model dengan plan lantai seperti dalam Rajah 16.1

Khusairi planned to build a model with a floor plane as in the Diagram 16.1



Rajah 16.1
Diagram 16.1

Diberi panjang PS ialah 2 cm lebih panjang daripada PQ dan jumlah luas permukaan plan lantai tersebut ialah $62\frac{1}{7}\text{ cm}^2$.

Hitung panjang sisi PQ .

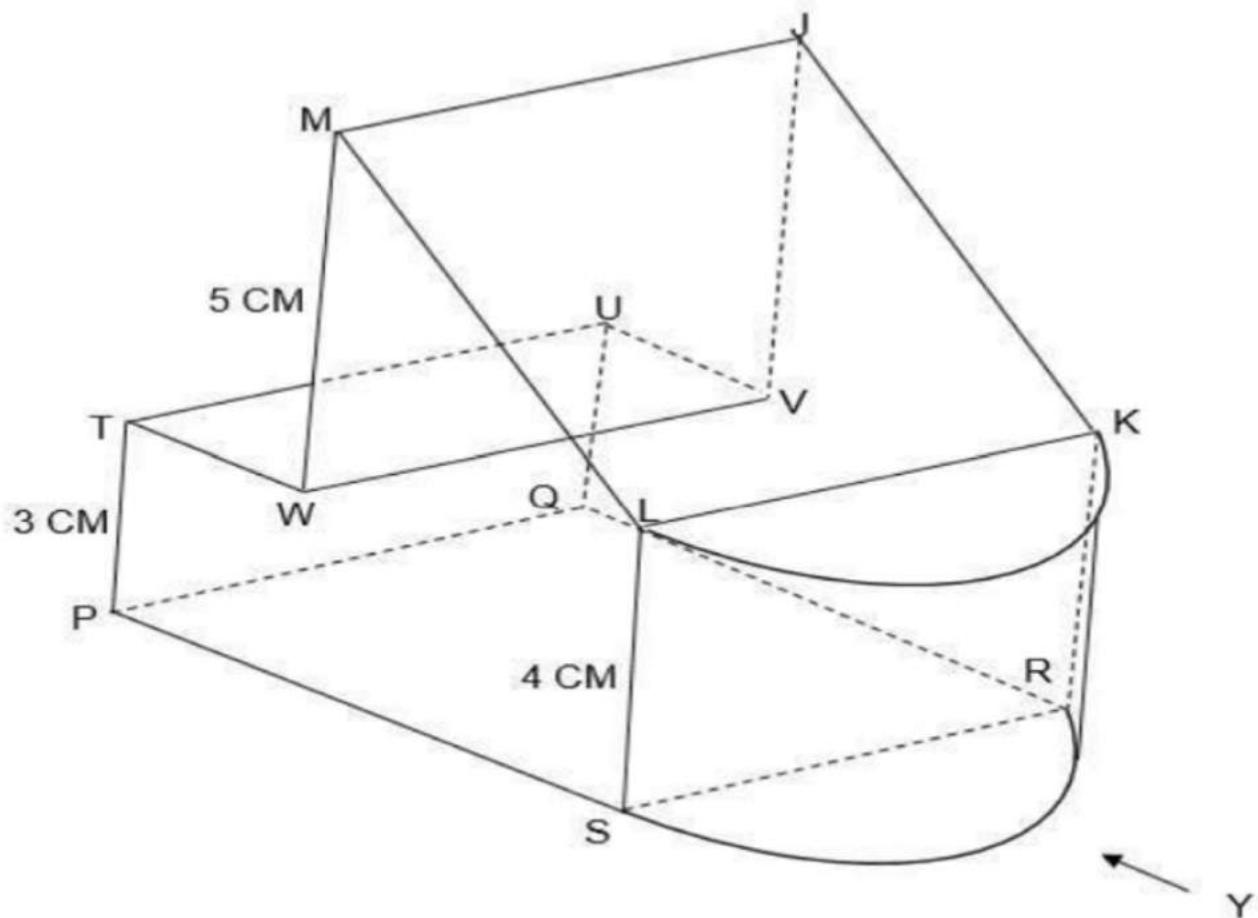
Given the length of PS is 2 cm longer than PQ and total area of the floor plan is $62\frac{61}{7}\text{ cm}^2$.

Calculate the length of PQ .

[5 markah/marks]

Rajah 16.2 menunjukkan sebuah prisma tegak dengan tapak segiempat tepat $PQRS$ di atas satah mengufuk. Permukaan $SPTWML$ adalah keratan seragamnya. Segiempat tepat $MJKL$ ialah satah condong. Segi empat $TUVW$ ialah satah mengufuk. Tepi PT , QU , SL , RK , WM dan VJ adalah tepi menegak. Diberi $TW=UV=3\text{cm}$. Semi silinder bergabung dengan pepejal di satah $RSLK$ untuk membentuk pepejal gabungan seperti yang ditunjukkan.

Diagram 16.2 shows a right prism with rectangular base $PQRS$ on a horizontal plane. The surface $SPTWML$ is its uniform cross-section. The rectangle $MJKL$ is an inclined plane. The rectangle $TUVM$ is a horizontal plane. The edges PT , QU , SL , RK , WM and VJ are vertices edges. Given $TW=UV=3\text{cm}$. A half-cylinder is joined to the solid at the plane $RSLK$ to form a combined solid as shown.



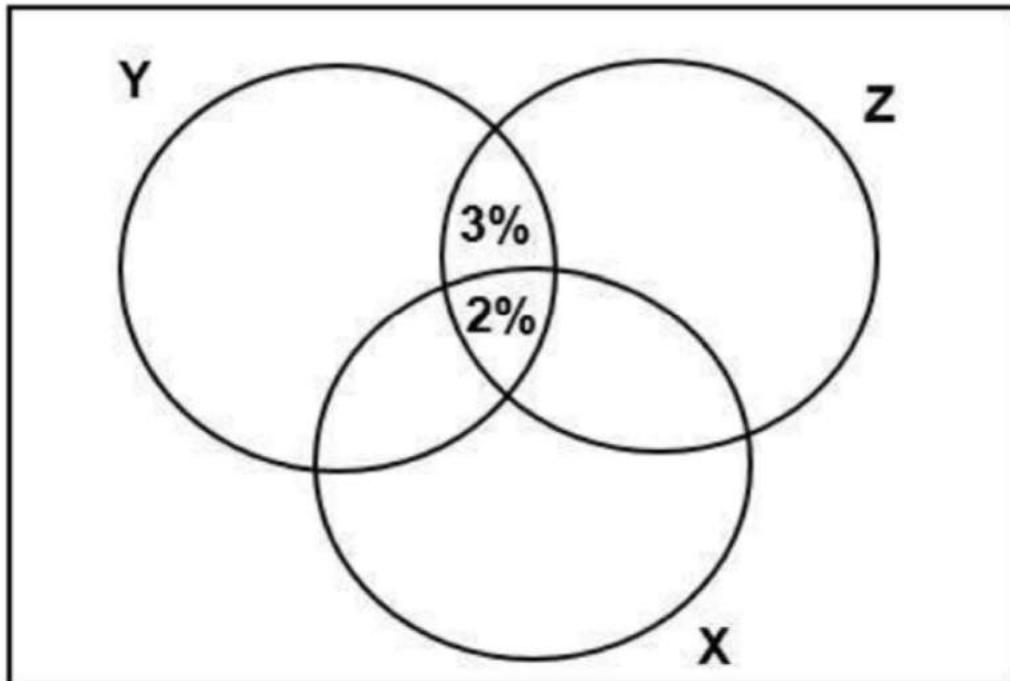
Rajah 16.2
Diagram 16.2

- (a) Satu kajian telah dijalankan terhadap 200 orang pembeli di Syarikat Sheng Light untuk mengetahui pilihan bulb jenama X,Y dan Z yang dibeli. Kajian menunjukkan bahawa 35% pembeli membeli mentol jenama X, 15% membeli mentol jenama Y dan 10% membeli mentol jenama Z. Daripada jumlah itu, 8 % membeli mentol jenama X dan Y, 5% membeli jenama mentol Y dan Z dan 3% membeli mentol jenama X dan Z manakala 2% membeli ketiga-tiga mentol itu.

A study was conducted on 200 buyers at Sheng Light Company to find out the choice of X, Y and Z brand bulbs purchased. Studies show that 35% of buyers buy X brand bulbs, 15% buy Y brand bulbs and 10% buy Z brand bulbs. Of that number, 8% buy X and Y brand bulbs, 5% buy Y and Z brand bulbs and 3% buy X and Z brand bulbs while 2% buy all three bulbs.

- (i) Lengkapkan gambar rajah Venn di Rajah 17 yang menghubungkan set X, Y dan Z.
Complete the Venn at Diagram 17 to show the relationship between the sets X, Y and Z.

ξ Type equation here.



Rajah 17
Diagram 17

- 
- 
- (ii) Cari bilangan pembeli yang membeli mentol jenama X sahaja.
Find the number of buyers who bought X brand bulbs only.
- (iii) Cari bilangan pembeli yang tidak membeli mentol X, Y dan Z sahaja.
Find the number of buyers who do not bought X, Y dan Z brand bulb.
- (iv) Cari bilangan pembeli, $n(Y \cup Z \cap X')$.
Find the number of buyers, $n(Y \cup Z \cap X')$.

[5 markah/marks]

- (b) Jadual 17 menunjukkan jangka hayat bagi dua jenama mentol baharu yang dihasilkan oleh Syarikat Sheng Light.

The Table 17 shows the lifespan of two new brands of light bulbs produced by Sheng Light Company.

Jangka hayat (tahun) <i>Lifespan (years)</i>	0 - 0.9	1.0 - 1.9	2.0 - 2.9	3.0 - 3.9	4.0 - 4.9
Jenama Philips <i>Brand Philips</i>	5	7	16	15	7
Jenama Hua Xing <i>Brand Hua Xing</i>	7	12	12	14	5

Jadual 17
Table 17

Dengan menggunakan sukatan yang sesuai, tentukan jenama yang manakah lebih baik dan tahan lama sebelum dipasarkan untuk dijual. Justifikasikan jawapan anda dengan sukatan yang sesuai.

By using suitable measures, determine which brand of light bulb is better and long-lasting before being marketed for sale. Justify your answer using suitable measures.

[9 markah/marks]

IKLAN ADVERTISEMENT	
Pembekal Kasut ABC (Direct Kilang) <i>ABC Shoes Supplier (Direct factory)</i>	
Kasut Lelaki <i>Men shoes</i>	Kasut Perempuan <i>women shoes</i>
* RM 100	* RM150
* harga tidak termasuk cukai jualan 10% <i>* exclusive of 10% sale tax</i>	

Rajah 16
Diagram 16

Encik K ingin memulakan perniagaan menjual kasut. Dia ternampak iklan dalam surat khabar seperti dalam Rajah 16. Encik K mempunyai modal sebanyak RM45 000. Perbelanjaan keseluruhan termasuk sewa kedai, pengubahsuaian kedai dan rak kasut adalah sebanyak RM34 275. Kesemua baki duit selepas perbelanjaan akan digunakan untuk membeli kasut-kasut daripada pembekal kasut ABC untuk dijual di kedai. Encik K membuat keputusan untuk membeli 80 pasang kasut kerana rak kasut cuma boleh memuatkan 80 pasang kasut.

Mr K intended to start a business of selling shoes. He saw an advertisement from the newspaper as shown in Diagram 16. The capital amount of Mr K is RM45 000. The total expenses are RM34 275 including the shop rental, renovations of the shop and custom made of the shoes rack. The remaining of the money will be used in buying shoes from the ABC Shoes Supplier. Mr K decided to purchase 80 pairs of shoes due to the size of the shoes rack.

- (a) Dengan menggunakan kaedah matriks, hitung bilangan pasang kasut lelaki dan kasut perempuan yang dapat dibeli oleh Encik K.

By using matrix method, calculate the number of men shoes and women shoes that can be bought by Mr K.

[5 markah / marks]

- (b) Sempena hari pembukaan kedai, Encik K telah membuat acara cabutan bertuah untuk pelanggan yang membeli kasut. Pelanggan mempunyai peluang untuk membuat satu kali cabutan bagi setiap pembelian. Terdapat 4 jenis hadiah untuk dimenangi iaitu, baucar tunai RM5, baucar tunai RM20, sepasang stokin dan sepasang selipar.

In conjunction with the grand opening of the shop, there is a lucky draw for every purchases. Those who buy either a pair of men's shoes or pair of women's shoes are eligible to join the lucky draw and draw once. A RM5 Cash voucher, RM20 Cash voucher, a pair of socks and a pair of sandals are among the gift to be won.

(i) Senaraikan semua gabungan kesudahan yang mungkin dalam ruang sampel ini.

List all the possible outcomes of the event in this sample space.

(ii) Cari kebarangkalian yang membeli kasut lelaki dan dapat hadiah cabutan baukar RM5.

Find the probability that one who buys men's shoes and gets RM5 cash voucher.

(iii) Cari kebarangkalian yang membeli kasut perempuan atau mendapat hadiah cabutan sepasang selipar.

Find the probability that one who buys women's shoes or gets a pair of sandals as a gift.

[3 markah / marks]

(c) Pada tahun berikutnya, Encik K perlu mentaksir, melapor dan membayar cukai pendapatannya. Diberi bahawa perniagaan Encik K adalah dibawah perniagaan milikan tunggal (Kadar cukai pendapatan adalah sama dengan kadar cukai pendapatan individu). Encik K mempunyai jumlah pendapatan tahunan sebanyak RM92 540 pada tahun lalu. Dia telah mendermakan RM3 000 kepada sebuah badan kebajikan yang diluluskan oleh kerajaan dan juga telah membayar zakat berjumlah RM700. Jadual di bawah menunjukkan pelepasan cukai yang dituntutnya.

In the following year, Mr K needs to assess, declare and pay for the income tax. It is given that the business of Mr K is under sole proprietorship (income tax rate is the same with the personal income tax rate). Last year yearly income of Mr K was RM92 540. He donated RM3 000 to a charity which is approved by the government and paid RM700 for Zakat. Table below shows the claimed tax relief.

Pelepasan cukai <i>Tax Relief</i>	Amaun (RM) <i>Amount</i>
Individu <i>Individual</i>	9 000
Gaya hidup (had RM2 500) <i>Lifestyle (limit RM2 500)</i>	3 000
Insurans hayat (had RM7 000) <i>Life insurance (limit RM7 000)</i>	5 830
Insurans perubatan (had RM3 000) <i>Medical insurance (limit RM3 000)</i>	1 550

CATATAN

