

MATEMATIK

2022

TINGKATAN 5

KERTAS 2

2 1/2 JAM



SEKOLAH MENENGAH JENIS KEBANGSAAN SAN MIN

PEPERIKSAAN PERCUBAAN SPM TAHUN 2022

MATEMATIK KERTAS 2

1. Kertas soalan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C. 2. Jawab semua soalan dalam Bahagian A dan B dan hanya satu soalan daripada Bahagian C.	Bahagian	Soalan	Markah Penuh	Markah Diperoleh
	A	1	5	
		2	4	
		3	4	
		4	3	
		5	4	
		6	2	
		7	5	
		8	5	
		9	4	
		10	4	
	B	11	9	
		12	8	
		13	10	
		14	9	
		15	9	
	C	16	15	
		17	15	
	Jumlah			

Section A [40 marks] Answer **all** questions in this section

1) The diagram 1 below shows a graph.

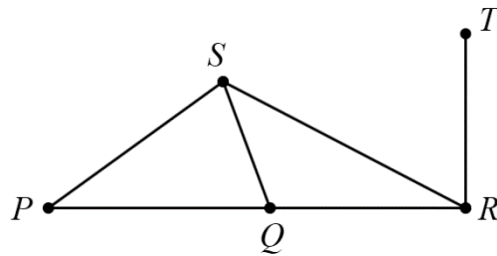


Diagram 1

- (a) Calculate $n(E)$ and $n(V)$.
- (b) (i) State the number of edges that needs to be removed so that becomes a tree.
(ii) Then, draw two variations of the tree.

[5 marks]

Answer:

(a)

(b) (i)

(ii)

2(a) Write down **one** implication based on the following compound statement:

$\sin \theta = \cos \theta \text{ if and only if } \theta = 45^\circ.$
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(b) Write down Premise 2 to complete the following argument:

Premise 1	:	If $x - y > 0$, then $x > y$.
Premise 2	:	
Conclusion	:	$x - y \leq 0$

- (c) Make a general conclusion by induction for the sequence of numbers 3, 14, 33, 60, ... which follows the following pattern: [4 marks]

$$3 = 4(1) - 1$$

$$14 = 4(4) - 2$$

$$33 = 4(9) - 3$$

$$60 = 4(16) - 4$$

.

.

.

Answer:

a) Implication:

b) Premise 2:

c)

- 3) On 1st January 2019, Encik Abdul invested 6 000 units worth RM1.00 per unit in Amanah Saham Bumiputera (ASB). On 31st December 2019, ASB pays a dividend of 6.5%. On 1st January 2020, Encik Abdul sold all his shares with a price of RM1.20 per unit. What is the return amount on his investment?

[4 marks]

Answer:

- 4) The diagram 2 in the answer space shows a regular hexagon PQRSTU. X and Y are two moving points in the hexagon. On the diagram, draw

(i) the locus of point X such that $PX = XR$. [1 mark]

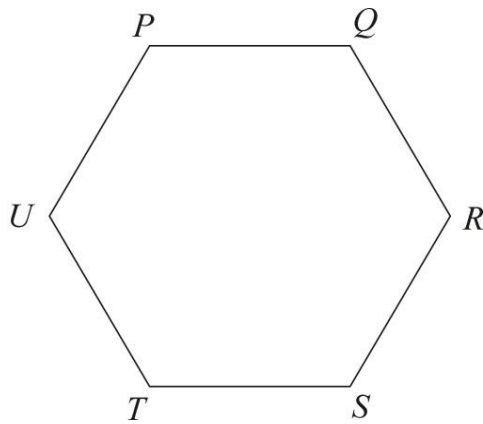
(ii) the locus of point Y such that $SY = YT$. [1 mark]

(iii) Mark with the symbol $\otimes$ the intersection of locus X and locus Y. [1 mark]

Answer :

(i), (ii), (iii)

Diagram 2



5) Find the values of x when $\tan x = -2$ for $0^\circ \leq x \leq 360^\circ$.

[4 marks]

Answer:

6) Diagram 3 shows the plate number for Hayati's car. The plate number in base 7 is 1536.



Diagram3

State the number of the plate in base ten.

[2 marks]

Answer:

7) Table 1 shows the premium rates under the Motor Tariff for motor policies issued in Peninsular Malaysia, Sabah and Sarawak.

Table 1

Kapasiti enjin tidak melebihi <i>Engine capacity not exceeding</i> (cc)	Semenanjung Malaysia <i>Peninsular Malaysia</i>		Sabah dan Sarawak	
	Polisi komprehensif <i>Comprehensive policy</i> (RM)	Polisi pihak ketiga <i>Third party policy</i> (RM)	Polisi komprehensif <i>Comprehensive policy</i> (RM)	Polisi pihak ketiga <i>Third party policy</i> (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

*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.

Sumber : Jadual Tarif Motor 2015

Source: Schedule of Motor Tariff 2015

Natasya owns a car to be used in Terengganu. She wants to renew motor insurance for her car from AIZ Insurance Company. The information of her car is as follows.

Sum insured : RM60 000
Age of vehicle : 5 years
Engine capacity : 1500 cc
NCD : 30%

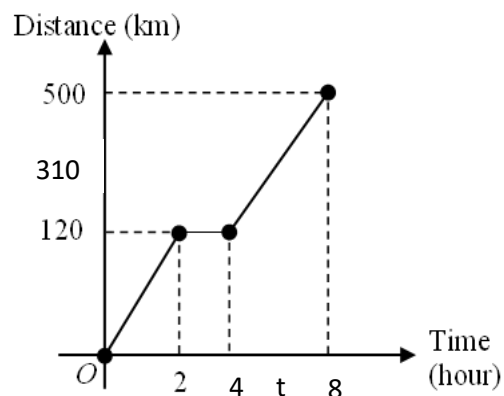
Calculate the gross premium that Natasya has to pay if she buys a comprehensive policy.

[5 marks]

Answer:

8) The distance-time graph shows the motion of a bus for a period of 8 hours.

[5 marks]



Calculate,

- the duration, in hour, when the bus is stationary.
- The value of t , if the rate of change in distance of the bus for the last 4 hours is 95 kmh^{-1} .
- the average speed, in kmh^{-1} , of the bus for the period of 8 hours.

Answer:

a)

b)

c)

9) The length of a book marker is $(x + 1)$ cm as shown in diagram 4. If the width is 5 cm less than its length and the area of the book marker is 24 cm^2 , calculate the perimeter of the book marker.

[4 marks]



Diagram 4

$(x + 1)$ cm

Answer:

10) Encik Kamarul and Encik Farhan went to the market to buy shrimp and squid. The table 2 below shows the weight of shrimp and squid purchased by them.

Table 2

	Shrimp	Squid
Encik Kamarul	2 kg	4 kg
Encik Farhan	3 kg	5 kg

Encik Kamarul and Encik Farhan paid RM26 and RM35 respectively for the purchase of shrimp and squid. Calculate the price per kilogram of shrimp and per kilogram of squid by using the matrix method. [4 marks]

Answer:

Section B [45 marks] Answer **All** questions in this section

11) a)(i) Diagram 5 shows set P, set Q and set R such that the universal set, $\xi = P \cup Q \cup R$.

On the diagram in the answer space, shade the set $P \cap (Q \cup R)'$. [2 marks]

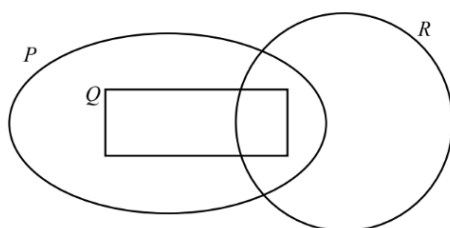


Diagram 5

(ii) Given that $n(P) = 15$, $n(Q) = 5$, $n(R) = 12$, $n(P \cap R) = 6$, and $n(P \cap Q \cap R) = 2$. Find $n(\xi)$.

[2 marks]

b) Given the universal set, $\xi = \{x : 3 \leq x \leq 20, x \text{ is an integer}\}$, set $K = \{x : x \text{ is an odd number}\}$, set $L = \{x : x \text{ is a prime number}\}$, and set $M = \{x : x \text{ is a factor of } 40\}$.

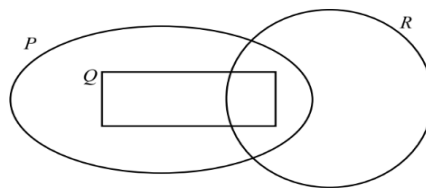
(i) List all elements of sets K, L and M.

(ii) Thus, list all element of $(K \cup M) \cap L'$.

[5 marks]

Answer:

a) (i)

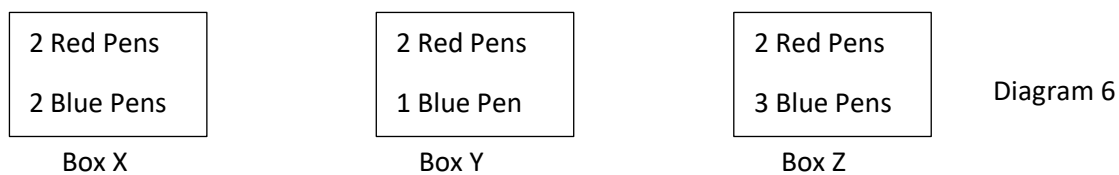


(ii)

b) (i)

(ii)

12) The diagram 6 below shows the number of red pens and blue pens in three boxes.



- a) A pen is randomly chosen from box X. If a red pen is chosen, the pen is put into box Y and then a pen is chosen at random from box Y. If a blue pen is chosen, the pen is put into box Z and then a pen is chosen at random from box Z. Calculate the probability that [4 marks]
- a red pen is chosen from box X.
 - two blue pens are chosen.
 - a red pen from box X or a blue pen from box Z.
- b) A pen is chosen at random from box X and box Y respectively. [4 marks]
- Draw a tree diagram to show all outcomes and the respective probabilities.
 - Hence, calculate the probability that at least a red pen are chosen.

Answer: a) (i)

(ii)

(iii)

b)(i)

(ii)

13) In the diagram 7 below, triangle K is the image of triangle J under transformation AB.

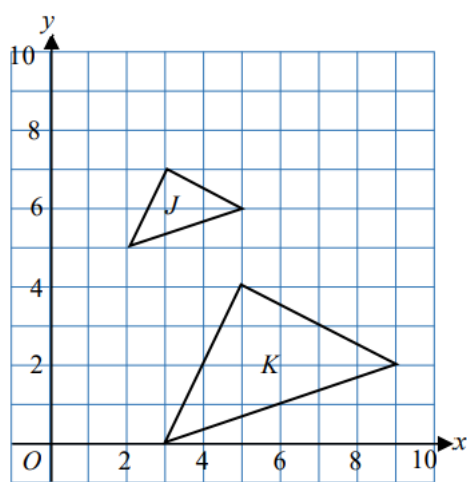


Diagram 7

- a) Describe in full transformation (i) A, (ii) B. [5 marks]
- b) Describe the single transformation which is equivalent to transformation AB. [3 marks]
- c) Given that area of triangle K is 10 unit^2 , calculate area of triangle J. [2 marks]

Answer:

a) (i)

(ii)

b)

c)

- 14) Encik Azman works as a factory supervisor with the salary of RM4 200 per month. He saves 10% of his monthly income as the fixed monthly savings and RM250 as the savings for emergency fund. Table 3 shows his estimated expenses for October.

Expenses	RM
Food	1050
Water, electricity and telephone bill	270
Personal insurance	85
Car loan payment	550
House rent	600
Gas dan petrol	120
Groceries	50

Table 3

- a) Complete, in the answer space, the financial plan for Encik Azman. [7 marks]
- b) Encik Azman plans to buy a dryer costs RM1 700 within 6 months. Based on Encik Azman's financial plan, will Encik Azman be able to buy the dryer within the time estimated? Explain your answer. [2 marks]

Answer:

a)

Income and Expenditure	RM	
net income :		
net salary	4200	
passive income	0	
total monthly income	4200	
minus fixed monthly savings (10% of the monthly income)		
minus savings for emergency fund	250	
income balance		
minus monthly fixed expenses:		
total monthly fixed expenses		
minus monthly variable expenses:		
total monthly variable expenses		
surplus of income		

b)

15) Table 3 shows the scores of the two participants of the shooting competition in the final round of The Perak State Level Shooting Competition.

<i>Participant</i>	<i>Scores</i>							
<i>A</i>	8.4	9.5	7.2	9.9	9.8	8.7	9.4	8.9
<i>B</i>	9.1	9.3	8.1	8.0	7.5	8.6	8.4	9.8

Table 3

- a) State the measure of dispersion used to select more consistent participant. [1 mark]
- b) Calculate the values of mean, variance and standard deviation for the participant A.
[6 marks]
- c) Given the values of mean and variances of participant B are 8.6 and 0.505 respectively.
Hence, determine who is the most consistent in the competition. State your justification.
[2 marks]

Answer:

- a)
b)

c)

Section C [15 marks] Answer **one** questions in this section

16. Puan Lim teaches two classes for History subject in SMK Tun Abdul Razak.

a) Table 4 shows the time, in minutes, taken to answer 20 objective questions in a History test by a group of students.

Time taken (min)	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60
Number of students	8	16	22	28	6

Table 4

i) Based on the table 4, complete the table 5 in the answer space. [2 marks]

ii) Use graph paper for this part of the questions. You may use a flexible ruler.

By using a scale of 2 cm to 10 minutes on the horizontal axis and 2 cm to 10 students on the vertical axis, draw an ogive for the data. [4 marks]

iii) Based on the ogive in 16 a(ii), find the 40th percentile, P_{40} . [2 marks]

Answer:

a)(i)

Table 5

Time taken	Number of students	Upper boundary	Cumulative frequency
1 - 10	0	10.5	0
11 - 20	8		
21 - 30	16		
31 - 40	22		
41 - 50	28		
51 - 60	6		

(ii) Use graph paper

(iii)

b) In the test, the probability of Kah Wen and Joe getting Distinction grade in History subject is $\frac{3}{5}$ and $\frac{1}{5}$ respectively. Find the probability of Kah Wen or Joe getting Distinction grade in History.

[3 marks]

Answer:

b)

- c) Puan Lim wants to give presents for students who achieved Distinction grade in the test and History project work. Table 6 shows the number of students who achieved Distinction grade and the price of a present bought.

	Test	Project work
Number of students with Distinction grades	8	10
Price of the present (RM)	y	x

Table 6

Puan Lim has spent RM 212 to buy all the presents. The price of a present for student with Distinction grade in the test is RM 5 cheaper than the price of the present for project work. Find the values of x and y without using matrix method.

[4 marks]

Answer:

c)

17. Ain sewed washable face masks and fabric gloves and sold both items online. She started her project with a budget of RM 80. The cost of making a face mask and a pair of gloves are RM 1 and RM 2 respectively. y pairs of gloves that she made is at most two times the number of face masks, x. She earns a profit of RM 3 for a face masks and RM 9.50 for a pair of gloves during the Movement Control Order (MCO).

a) (i) Write two linear inequalities, other than $x \geq 0$ and $y \geq 0$, that represent the situation.

(ii) By using a scale of 2 cm to 10 units of face masks in the x- axis and 2 cm to 10 pairs of gloves in the y- axis , draw and shade the region that satisfies the linear inequality system stated in 17 (a)(i).

[6 marks]

Answer:

a) (i)

(ii) Use graph paper

- b) From the graph in 17 a)(ii),
- (i) Find the range of the number of face masks if the number of gloves made is 20 pairs.
 - (ii) Calculate the maximum total sales, in RM, of face masks and gloves.
 - (iii) Is it possible for Ain to sell 50 pieces of face masks and 20 pairs of gloves? Justify your answer. [5 marks]

Answer: (i)

(ii)

(iii)

- c) Diagram 8 shows the cloth design used by Ain for the face mask. It is given that the perimeter of the rectangular cloths is 112cm. The ratio of length to the width of the cloth is 4 : 3. The kite -shaped printing is a batik pattern.

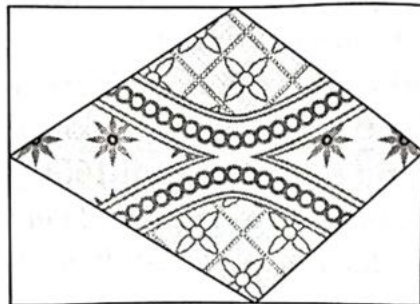


Diagram 8

Find the area, in cm^2 , of the cloth.

[4 marks]

Answer:

c)