

MODUL
KECEMERLANGAN
MATEMATIK

SPM 2023

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DISEDIAKAN OLEH:
CIKGU FADHILAH
MASHRI
GKMP SAINS & MATEMATIK
SMK ALAM MEGAH 2

**RUMUS MATEMATIK
MATHEMATICAL FORMULAE**

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

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

**NOMBOR DAN OPERASI
NUMBERS AND OPERATIONS**

- | | |
|--|---|
| 1 $a^m \times a^n = a^{m+n}$ | 2 $a^m \div a^n = a^{m-n}$ |
| 3 $(a^m)^n = a^{mn}$ | 4 $a^{\frac{m}{n}} = (a^{\frac{1}{n}})^m$ |
| 5 Faedah mudah / <i>Simple interest</i> , $I = Prt$ | |
| 6 Nilai matang/ <i>Maturity value</i> , $MV = P \left(1 + \frac{r}{n}\right)^{nt}$ | |
| 7 Jumlah bayaran balik / <i>Total repayment</i> , $A = P + Prt$ | |

**PERKAITAN
RELATIONS**

- 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 Purata laju = $\frac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$
Average speed = $\frac{\text{distance travelled}}{\text{time taken}}$
- 4 $m = \frac{y_2 - y_1}{x_2 - x_1}$
- 5 $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$
 $m = -\frac{\text{y-intercept}}{\text{x-intercept}}$
- 6 $A^{-1} = \frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

SUKATAN DAN GEOMETRI
MEASUREMENT AND GEOMETRY

- 1 Teorem Pythagoras / *Pythagoras Theorem* $c^2 = a^2 + b^2$
- 2 Hasil tambah sudut pedalaman poligon / *Sum of interior angles of a polygon*
 $= (n - 2) \times 180^\circ$
- 3 Lilitan bulatan = $\pi d = 2\pi j$
Circumference of circle = $\pi d = 2\pi r$
- 4 Luas bulatan = πj^2
Area of circle = πr^2
- 5 Panjang lengkok = $\frac{\theta}{360^\circ} \times 2\pi j$
Arc length = $\frac{\theta}{360^\circ} \times 2\pi r$
- 6 Luas sektor = $\frac{\theta}{360^\circ} \times \pi j^2$
Area of sector = $\frac{\theta}{360^\circ} \times \pi r^2$
- 7 Luas layang = $\frac{1}{2} \times$ hasil darab panjang dua pepenjuru
Area of kite = $\frac{1}{2} \times$ product of two diagonals
- 8 Luas trapezium = $\frac{1}{2} \times$ hasil tambah dua sisi selari \times tinggi
Area of trapezium = $\frac{1}{2} \times$ sum of parallel sides \times height
- 9 Luas permukaan silinder = $2\pi j^2 + 2\pi jt$
Surface area of cylinder = $2\pi r^2 + 2\pi rh$
- 10 Luas permukaan kon = $\pi j^2 + \pi js$
Surface area of cone = $\pi r^2 + \pi rs$
- 11 Luas permukaan sfera = $4\pi j^2$
Surface area of sphere = $4\pi r^2$
- 12 Isipadu prisma tegak = luas keratan rentas \times tinggi
Volume of right prism = cross sectional area \times height
- 13 Isipadu silinder = $\pi j^2 t$
Volume of cylinder = $\pi r^2 h$

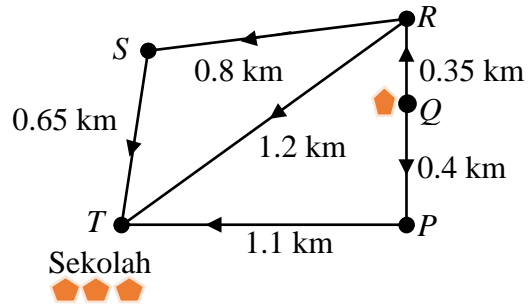
- 14 Isipadu kon = $\frac{1}{3}\pi j^2 t$
Volume of cone = $\frac{1}{3}\pi r^2 h$
- 15 Isipadu sfera = $\frac{4}{3}\pi j^3$
Volume of sphere = $\frac{4}{3}\pi r^3$
- 16 Isipadu piramid tegak = $\frac{1}{3} \times \text{luas tapak} \times \text{tinggi}$
Volume of right pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$
- 17 Faktor skala, $k = \frac{PA'}{PA}$
Scale factor, $k = \frac{PA'}{PA}$
- 18 Luas imej = $k^2 \times \text{luas objek}$
Area of image = $k^2 \times \text{area of object}$

STATISTIK DAN KEBARANGKALIAN
STATISTICS AND PROBABILITY

- 1 Min / Mean, $\bar{x} = \frac{\sum x}{N}$
- 2 Min / Mean, $\bar{x} = \frac{\sum fx}{f}$
- 3 Varians / Variance, $\sigma^2 = \frac{\sum(x - \bar{x})^2}{N} = \frac{\sum x^2}{N} - \bar{x}^2$
- 4 Varians / Variance, $\sigma^2 = \frac{\sum f(x - \bar{x})^2}{f} = \frac{\sum fx^2}{f} - \bar{x}^2$
- 5 Sisihan piawai / Standard deviation, $\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$
- 6 Sisihan piawai / Standard deviation, $\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{f}} = \sqrt{\frac{\sum fx^2}{f} - \bar{x}^2}$
- 7 $P(A) = \frac{n(A)}{n(S)}$
- 8 $P(A') = 1 - P(A)$

Jawab **semua** soalan
Answer all questions

1. Bundarkan 0.00497 betul kepada dua angka bererti.
Round off 0.00497 correct to two significant figures.
 - A 0.0040
 - B 0.0049
 - C 0.0050
 - D 0.00050
2. Diberi $x = 1.5 \times 10^3$ dan $y = 3.2 \times 10^4$. Kirakan nilai bagi $2xy$ dalam bentuk piawai.
Given $x = 1.5 \times 10^3$ and $y = 3.2 \times 10^4$. Find the value of $2xy$ in standard form.
 - A 4.8×10^{-7}
 - B 4.8×10^7
 - C 9.6×10^{-7}
 - D 9.6×10^7
3. Tentukan bilangan bucu satu pokok, jika pokok tersebut mempunyai 5 tepi.
Determine the number of vertices of a tree if it has 5 edge.
 - A 4
 - B 5
 - C 6
 - D 7
4. Rajah 4 menunjukkan graf terarah dari rumah Azlan di Q , ke sekolah di T . Tentukan laluan terbaik yang dipilih oleh Azlan untuk ke sekolah dengan mengambil kira jarak terpendek.
Diagram 4 shows a directed graph from Azlan's house in Q to the school in T . Determine the best route Azlan chooses go to school taking the shortest distance.



Rajah / Diagram 4

- A $Q \longrightarrow R \longrightarrow S \longrightarrow T$
 B $Q \longrightarrow P \longrightarrow R \longrightarrow T$
 C $Q \longrightarrow R \longrightarrow T$
 D $Q \longrightarrow P \longrightarrow T$

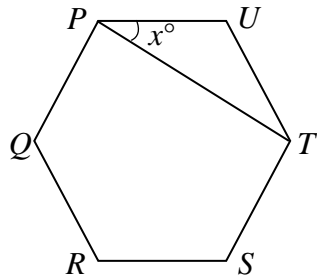
5. Tukarkan $4 \times 5^3 + 2 \times 5^1 + 3$ kepada satu nombor dalam asas lima.
 Convert $4 \times 5^3 + 2 \times 5^1 + 3$ to a number in base five.

- A 423_5
 B 4023_5
 C 4230_5
 D 40203_5

6. $427_8 - 37_8 =$

- A 370_8
 B 474_8
 C 570_8
 D 770_8

7. Dalam Rajah 7, $PQRSTU$ ialah heksagon sekata. PT ialah garis lurus.
In Diagram 7, $PQRSTU$ is a regular hexagon. PT is a straight line.

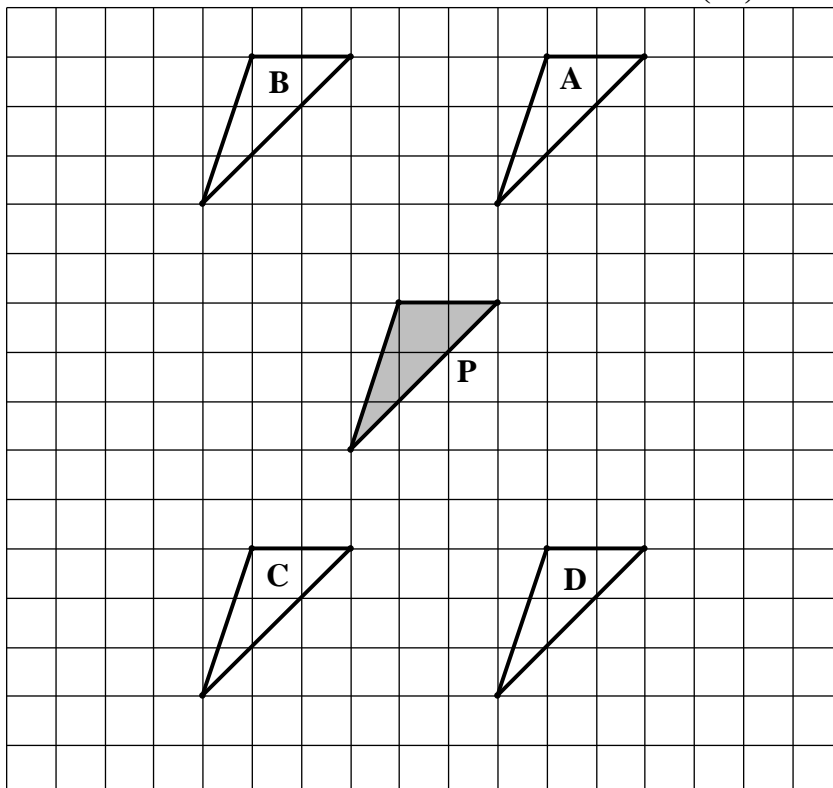


Rajah / Diagram 7

Cari nilai x .
Find the value of x .

- A 20°
 - B 30°
 - C 40°
 - D 50°
8. Antara yang berikut, manakah imej bagi sisi tiga P dibawah satu translasi $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$?

Which of the following is the image of triangle P under a translation $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$?



9. Cik Hani mempunyai polisi perubatan dengan deduktibel sebanyak RM 2 000 setahun. Beliau dimasukkan ke hospital dan dikenakan kos rawatan sebanyak RM 13 000. Hitung kos perubatan yang ditanggung oleh pihak syarikat insurans.

Miss Hani has a medical insurance policy with a deductible of RM 2 000 per year. She had been hospitalised and the treatment cost was RM 13 000. Calculate the amount paid by the insurance company.

- A RM 2 000
- B RM 11 000
- C RM 13 000
- D RM 15 000

10. Diberi kadar faedah mudah ialah 4% setahun. Cari bilangan tahun yang diperlukan untuk simpanan sebanyak RM5 000 meningkat kepada RM5 800.

Given the rate of simple interest is 4% per annum. Find the number of years required for the savings of RM5 000 to increase to RM5 800.

- A 3
- B 4
- C 5
- D 6

11. Antara berikut yang manakah **bukan** satu komponen penting dalam matlamat kewangan SMART?

*Which of the following is **not** a key component in the SMART financial goals?*

- A Belanjawan yang ketat
Tight budget
- B Bersifat realistic
Realistic
- C Boleh di capai
Attainable
- D Khusus
Spesific

12. Jadual 16 menunjukkan kadar premium tahunan per RM 1 000 nilai muka insurans hayat boleh baharu yang ditawarkan oleh sebuah syarikat insurans.
The table 16 shows the annual premium rate per RM 1 000 face value of renewable life insurance offered by an insurance company.

Umur <i>Age</i>	Lelaki / <i>Male</i> (RM)		Perempuan / <i>Female</i> (RM)	
	Bukan perokok <i>Non smoker</i>	Perokok <i>Smoker</i>	Bukan perokok <i>Non smoker</i>	Perokok <i>smoker</i>
27	2.13	2.72	1.18	1.40
28	2.13	2.73	1.19	1.42
29	2.13	2.75	1.21	1.44
30	2.13	2.79	1.23	1.46

Jadual / *Table 16*

Dengan nilai muka sebanyak RM 140 000. Hitung premium tahunan bagi seorang lelaki berumur 28 tahun yang tidak merokok.

Based on the face value of RM 140 000. Calculate the annual premium for a 28 year old man who does not smoke.

- A RM 166.60
 B RM 198.80
 C RM 298.20
 D RM 382.20
13. Aina makan malam di sebuah restoran. Dia telah makan sepinggan mee goreng, tiga ketul ayam goreng dan secawan milo. Jadual di bawah menunjukkan harga makanan dan minumannya.
Aina had dinner at a restaurant. She had eat a plate of fried noodle, three pieces of fried chicken and a cup of milo. The table below shows the price the food and drink.

Makanan dan Minuman <i>Food and drink</i>	Harga <i>Price</i>
Mee Goreng <i>Fried Noodle</i>	RM 5.50 / pinggan RM 5.50 / <i>plate</i>
Ayam Goreng <i>Fried Chicken</i>	RM 4.50 / ketul RM 4.50 / <i>piece</i>
Milo <i>Milo</i>	RM 4.00 / cawan RM 4.00 / <i>cup</i>

Diberi bahawa restoran itu mengenakan cukai perkhidmatan 6%.

Hitung bil Aina.

It is given that the restaurant charges 6% on service tax.

Calculate Aina's bill.

- A RM 14.00
 B RM 14.84
 C RM 21.62
 D RM 24.38

14. Rajah 18 menunjukkan sebuah kipas. Apabila suiz kipas dihidupkan, lokus bagi titik X yang bergerak ialah

Diagram 18 shows a fan. When the fan is switched on, the locus of moving point X is

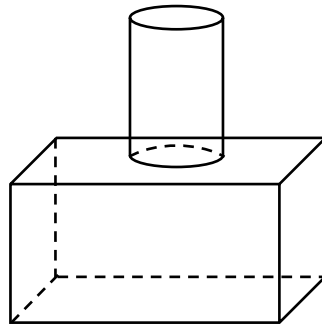


Rajah / Diagram 18

- A Sama jarak / *equidistant*
B Garis lurus / *a straight line*
C Bulatan / *a circle*
D Lengkok / *arc*
15. Diberi $\frac{r}{2} - s = rs$, r dalam sebutan s ialah
Given that $\frac{r}{2} - s = rs$, then r in terms of s is

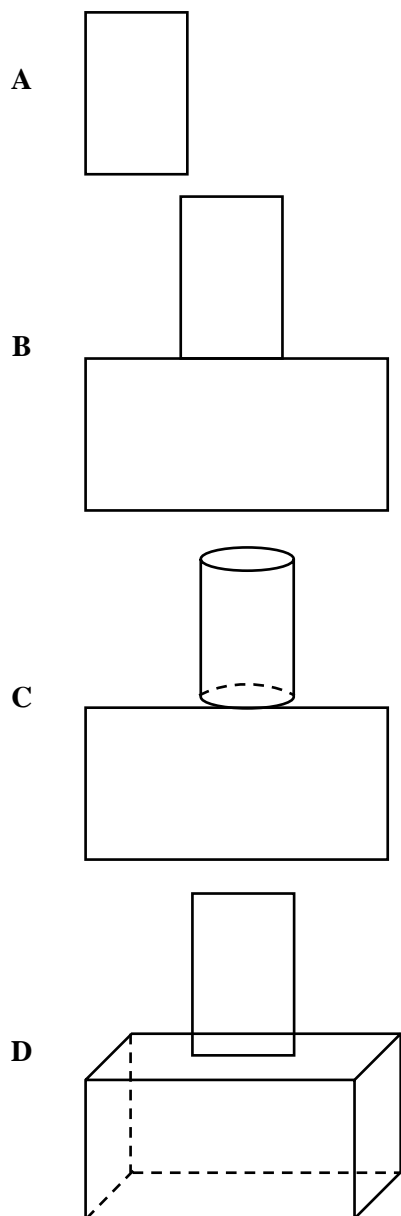
- A $\frac{2s}{1-s}$
B $\frac{2s}{1-2s}$
C $\frac{s}{1-2s}$
D $2s - 1$

16. Rajah 19 menunjukkan sebuah pepejal gabungan yang terdiri daripada kuboid dan silinder.
Diagram 19 shows a composite solid consisting of a cuboid and cylinder.



Rajah / Diagram 19

Tentukan lukisan dongakan hadapan bagi gabungan pepejal di atas.
Determine the front elevation drawing for the above solid combination.



17. Nyatakan $\frac{x}{3} - \frac{x^2 - 4}{6x}$ dalam pecahan terendah.

Express $\frac{x}{3} - \frac{x^2 - 4}{6x}$ as a single fraction in its simplest form.

A $\frac{x^2 + 4}{6x}$

B $\frac{x^2 - 4}{6x}$

C $\frac{x - 4}{6x}$

D $\frac{x + 4}{6x}$

18. Diberi $1 - p = \frac{2p + 7}{5}$, cari nilai p .

Given $1 - p = \frac{2p + 7}{5}$, find the value of p .

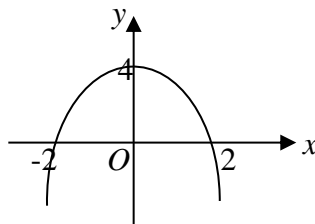
A $-\frac{2}{7}$

B $-\frac{2}{3}$

C $\frac{2}{7}$

D $\frac{2}{3}$

19. Antara berikut, yang manakah merupakan fungsi bagi graf dalam rajah 31?
Which of the following is a function of the graph in diagram 31?



Rajah / Diagram 31

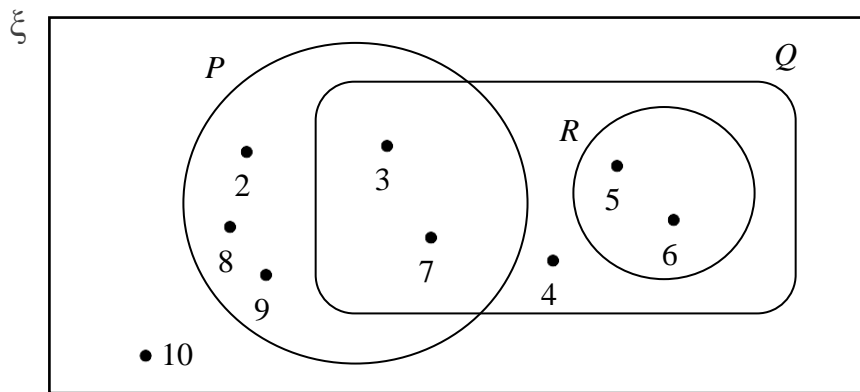
A $y = -x^2 + 4x + 4$

- B** $y = -x^2 - 4x - 4$
- C** $y = -x^2 - 4$
- D** $y = -x^2 + 4$

20. Faktorkan $x^2 - 8x + 15$
 Factorise $x^2 - 8x + 15$

- A** $(x - 3)(x - 5)$
- B** $(x + 3)(x + 5)$
- C** $(x + 15)(x - 1)$
- D** $(x + 7)(x + 1)$

21. Rajah 33 menunjukkan gambar rajah Venn dengan set semesta, $\xi = P \cup Q \cup R$.
 Diagram 33 shows a Venn diagram with the universal set, $\xi = P \cup Q \cup R$.



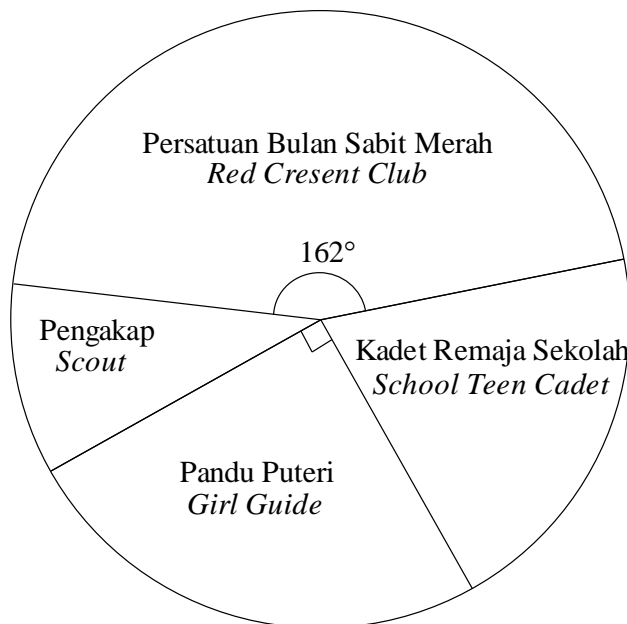
Rajah / Diagram 33

Senaraikan semua elemen set Q'
 List all the elements of set Q'

- A** $\{ 2, 8, 9 \}$
- B** $\{ 2, 8, 9, 10 \}$
- C** $\{ 2, 5, 6, 8, 9 \}$
- D** $\{ 2, 5, 6, 8, 9, 10 \}$

22. Rajah 27 ialah carta pai yang menunjukkan komposisi keahlian untuk empat unit beruniform utama di sebuah sekolah.

Diagram 27 is a pie chart of composition of four major uniform clubs in a school.



Rajah / Diagram 27

Bilangan ahli Kadet Remaja Sekolah adalah dua kali ganda ahli Pengakap.
Hitungkan peratus keahlian Pengakap.

*The number of members of School Teen Cadet is twice the number of members of Scout.
Calculate the percentage of Scout.*

- A 10
 - B 20
 - C 36
 - D 72
23. Rajah 28 menunjukkan satu set data.

Diagram 28 shows a set of data.

19	16	17	18	18	16	19	16
18	17	18	18	16	19	17	19

Rajah / Diagram 28

Cari mod bagi data itu.
Find the mode of the data

- A 16
- B 17
- C 18
- D 19

24. Diberi bahawa y berubah secara songsang dengan kuasa dua x apabila $y = 2$ and $x = 3$.
Hitung nilai y apabila $x = 5$.

*Given that y varies inversely as the square of with x and $y = 2$ when $x = 3$.
Calculate the value of y when $x = 5$*

- A $\frac{18}{25}$
- B $3\frac{3}{5}$
- C 40
- D 200

25. Hubungan di antara W , z dan r ialah $W \propto \frac{\sqrt{z}}{r}$. Diberi bahawa $W = 10$ apabila $z = 4$ dan $r = 2$.

Hitung nilai W apabila $z = 9$ dan $r = 6$.

The relation between W , z and r is $W \propto \frac{\sqrt{z}}{r}$. It is given that $W = 10$ when $z = 4$ and $r = 2$. Calculate the value of W when $z = 9$ and $r = 6$.

- A 24
- B 10
- C 5
- D 3

26. P berubah secara songsang dengan punca kuasa dua Q .

P varies inversely as square root of Q

Hubungan yang mengaitkan P dan Q ialah.

The relationship between P and Q is

- A $P = kQ^{\frac{1}{2}}$, k adalah pemalar / are constant.
- B $P = kQ^2$, k adalah pemalar / are constant.
- C $P = \frac{k}{Q^{\frac{1}{2}}}$, k adalah pemalar / are constant.
- D $P = \frac{k}{Q^2}$, k adalah pemalar / are constant.

27. Jadual 40 menunjukkan sebahagian daripada nilai-nilai bagi pembolehubah w , x dan y , yang memuaskan hubungan $w \propto \frac{x}{y^2}$.

Table 40 shows some of the values for the variables w , x and y , which satisfy the relationship

$$w \propto \frac{x}{y^2}$$

w	2	9
x	6	r
y	3	-2

Jadual / Table 40

Hitungkan nilai r ,
Calculate the value of r ,

- A 12
- B 18
- C 27
- D 36
28. Diberi bahawa y berubah secara songsang dengan $(x-3)^{\frac{1}{2}}$ dan $y = 2$ bila $x = 7$.
Cari nilai x bila $y = 4$.

Given y varies inversely as $(x-3)^{\frac{1}{2}}$ and $y = 2$ when $x = 7$.

Find the value of x when $y = 4$.

- A 1
- B 2
- C 4
- D 5

29. $(1 \ -3) \begin{pmatrix} -1 & 2 \\ 3 & -5 \end{pmatrix} =$

A $(-10 \ 17)$

B $(8 \ 17)$

C $\begin{pmatrix} -10 \\ 17 \end{pmatrix}$

D $\begin{pmatrix} 8 \\ 17 \end{pmatrix}$

30. $\begin{pmatrix} x \\ 5 \end{pmatrix} + 2 \begin{pmatrix} -2 \\ 4 \end{pmatrix} = \begin{pmatrix} 5 \\ 11 \end{pmatrix}$

Nilai x ialah
Value of x is

A 1

B 5

C 7

D 9

31. $\begin{pmatrix} -1 \\ 2 \end{pmatrix} (1 \ 3) =$

A $\begin{pmatrix} -1 & 6 \\ 2 & -3 \end{pmatrix}$

B $\begin{pmatrix} -1 & -3 \\ 2 & 6 \end{pmatrix}$

C $\begin{pmatrix} -1 \\ 6 \end{pmatrix}$

D (5)

32. Jadual 37 menunjukkan nilai P , Q dan R . Diberi bahawa P berubah secara langsung dengan Q dan berubah secara songsang dengan kuasa dua R .

Table 37 shows the values of P , Q and R . Given that P varies directly as Q and varies inversely as the square of R .

P	Q	R
15	3	4
16	5	m

Jadual / Table 37

Cari nilai bagi m .

Find the value of m .

- A 2.5
B 6.25
C 5
D 25
33. Diberi $A = \begin{pmatrix} 8 & -2 \\ 1 & 4 \end{pmatrix}$ dan $AX = \begin{pmatrix} 12 \\ 10 \end{pmatrix}$.

Given that $A = \begin{pmatrix} 8 & -2 \\ 1 & 4 \end{pmatrix}$ and $AX = \begin{pmatrix} 12 \\ 10 \end{pmatrix}$.

Tentukan peringkat matriks X .

State the order of matrix X .

- A 1×1
B 1×2
C 2×2
D 2×1

34. Diberi $2\begin{pmatrix} 3 & -1 \\ y & 5 \end{pmatrix} - \begin{pmatrix} -9 & 4 \\ 12 & -2 \end{pmatrix} = \begin{pmatrix} 15 & x \\ y & 12 \end{pmatrix}$. Cari nilai x dan y .

Given $2\begin{pmatrix} 3 & -1 \\ y & 5 \end{pmatrix} - \begin{pmatrix} -9 & 4 \\ 12 & -2 \end{pmatrix} = \begin{pmatrix} 15 & x \\ y & 12 \end{pmatrix}$. Find the values of x and of y .

A $x = -6, y = 12$

B $x = -6, y = -4$

C $x = 6, y = 12$

D $x = 6, y = -4$

35. Apa itu risiko?

What is risk?

A Kemungkinan mengalami kerugian

Possibility to loss

B Tanggungan

Liability

C Insurans hayat

Life insurance

D Perjalanan

Travel

36. Khoder memiliki sebuah rumah dengan keluasan 200 m^2 . Diberi bahawa kadar cukai tanah yang dikenakan ialah RM0.45 setiap meter persegi. Hitung cukai tanah yang dibayar oleh Khoder setiap tahun.

Khoder owns a house with an area of 200 m^2 . It is given that the quit rent rate levied is RM0.45 per square meter. Calculate the quit rent payable by Khoder each year.

A RM 45

B RM 60

C RM 90

D RM 105

37. Berikut ialah polisi-polisi bagi insurans motor di Malaysia, **kecuali**

The following are the policies for motor insurance in Malaysia, except

- A Polisi pihak ketiga
Third party policy
- B Polisi komprehensif
Comprehensive policy
- C Polisi kemalangan diri
Personal accident policy
- D Polisi pihak ketiga, kebakaran dan kecurian
Third party, fire and theft policy

38. Nilai boleh insurans rumah Zaleha ialah RM350 000. Polisi insurans yang ingin dibelinya mempunyai peruntukan ko-insurans untuk menginsuranskan 80% daripada nilai boleh insurans dengan deduktibel sebanyak RM10 000. Beliau menginsuranskan rumahnya dengan jumlah RM250 000 sahaja namun rumahnya terbakar dengan kerugian menyeluruh. Hitung kerugian yang ditanggung oleh Zaleha.

The insurable value of Zaleha's house is RM350 000. The insurance policy she wants to buy has a co-insurance provision to insure 80% of the insurable value with a deductible of RM10 000. She insures her house for only RM250 000 but her house burns with total loss. Calculate the loss borne by Zaleha.

- A RM90 000
- B RM110 000
- C RM 240 000
- D RM 260 000

39. Antara berikut, yang manakah **bukan** tujuan percukaian?

Which of the following is not the purposes of taxation?

- A Sumber pendapatan kerajaan
Source of government revenue
- B Alat kewangan untuk menstabilkan ekonomi
Financial tool to stabilise the economy
- C Kawalan penjualan barangan atau perkhidmatan
Control of sales of goods or services
- D Alat mengukur tahap kemampuan ekonomi negara
A tool to measure the level of economic capability of a country

40. Nadirah memiliki sebuah rumah kediaman di Kuala Nerang. Dia menerima bil cukai pintu daripada Majlis Daerah Padang Terap. Diberi bahawa nilai tahunan ialah RM5 406 dan kadar cukai pintu ialah 5%. Hitung cukai pintu yang perlu dibayar oleh Nadirah untuk setiap setengah tahun.

Nadirah owns a residential house in Kuala Nerang. She receives property assessment tax bill from Padang Terap District Council. It is given that the annual value is RM5 406 and the property assessment tax rate is 5%. Calculate the property assessment tax payable by Nadirah for each half year.

- A RM105.15
- B RM135.15
- C RM270.30
- D RM2 703.00

KERTAS SOALAN TAMAT
END OF QUESTION