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

PERKAITAN
RELATIONS

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 $A^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

5 Jarak / *Distance* = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

6 Titik Tengah / *midpoint* $(x, y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

7 Purata laju = $\frac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$

Average speed = $\frac{\textit{distance travelled}}{\textit{time taken}}$

8 Min = $\frac{\text{hasil tambah nilai data}}{\text{bilangan data}}$

Mean = $\frac{\textit{sum of data}}{\textit{number of data}}$

9 Min = $\frac{\text{hasil tambah (nilai titik tengah kelas} \times \text{kekerapan)}}{\text{hasil tambah kekerapan}}$

$Mean = \frac{sum\,of\,(midpoint \times frequency)}{sum\,of\,frequencies}$

10 Varians / *Variance*, $\sigma^2 = \frac{\Sigma(x-\bar{x})^2}{N} = \frac{\Sigma x^2}{N} - \bar{x}^2$

11 Varians / *Variance*, $\sigma^2 = \frac{\Sigma f(x-\bar{x})^2}{\Sigma f} = \frac{\Sigma f x^2}{\Sigma f} - \bar{x}^2$

12 Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{N}} = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$

13 Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{\Sigma f}} = \sqrt{\frac{\Sigma f x^2}{\Sigma f} - \bar{x}^2}$

14 TeoremPithagoras/*Pythagoras Theorem* $c^2 = a^2 + b^2$

15 $P(A) = \frac{n(A)}{n(S)}$

16 $P(A') = 1 - P(A)$

17 $m = \frac{y_2-y_1}{x_2-x_1}$

18 $m = -\frac{\text{pintasan-}y}{\text{pintasan-}x}$

$m = -\frac{y\text{-}intercept}{x\text{-}intercept}$

19 Faedah mudah / Simple interest, $I = Prt$

20 Nilai matang / *Maturity value* $MV = P\left(1+\frac{r}{n}\right)^{nt}$

21 Jumlah bayaran balik / *Total amount payable*
$A = P + \text{Prt}$

BENTUK DAN RUANG
SHAPES AND SPACE

1 Luas trapezium = $\frac{1}{2}$ ×hasil tambah dua sisi selari×tinggi

Area of trapezium = $\frac{1}{2} \times sum\ of\ parallel\ sides \times height$

2 Lilitan bulatan = $\pi d = 2\pi j$
Circumference of circle = $\pi d = 2\pi r$

3 Luas bulatan = πj^2
Area of circle = πr^2

4 Luas permukaan melengkung silinder = $2\pi jt$
Curved surface area of cylinder = $2\pi rh$

5 Luas permukaan sfera = $4\pi j^2$
Surface area of sphere = $4\pi r^2$

6 Isipadu prisma tegak = Luas keratan rentas×panjang
Volume of right prism = cross sectional area×length

7 Isipadu silinder = $\pi j^2 t$
Volume of cylinder = $\pi r^2 h$

8 Isipadu kon = $\frac{1}{3}\pi j^2 t$

Volume of cone = $\frac{1}{3}\pi r^2 h$

9 Isipadu sfera = $\frac{4}{3}\pi j^3$

Volume of sphere = $\frac{4}{3}\pi r^3$

10 Isipadu piramid tegak
= $\frac{1}{3} \times$ luas tapak × tinggi
Volume of right pyramid
= $\frac{1}{3} \times base\ area \times height$

11 Hasil tambah sudut pedalaman poligon = $(n-2) \times 180^o$
Sum of interior angles of a polygon = $(n-2) \times 180^o$

12 $$\frac{\text{panjang lengkok}}{\text{lilitan bulatan}} = \frac{\text{sudut pusat}}{360^o}$$
$$\frac{arc\ length}{circumference\ of\ circle} = \frac{angle\ subtended\ at\ centre}{360^\circ}$$

13 $$\frac{\text{luas sektor}}{\text{luas bulatan}} = \frac{\text{sudut pusat}}{360^o}$$
$$\frac{area\ of\ sector}{area\ of\ circle} = \frac{angle\ subtended\ at\ centre}{360^\circ}$$

14 Faktor skala, $k = \frac{PA'}{PA}$

Scale factor, $k = \frac{PA'}{PA}$

15 Luas imej = k^2×luas objek
Area of image = k^2×*area of object*

Jawab **semua** soalan
*Answer **all** questions*

1. Bundarkan 45 782 betul kepada dua angka bererti.
Round off 45 782 *correct to two significant figures.*

A 45 780

B 46 000

C 45 700

D 40 000

2. $\sqrt[3]{\frac{64}{125}} =$

A $\frac{8}{11}$

B $\frac{5}{4}$

C $\frac{4}{5}$

D $\frac{8}{5}$

3. Rajah 1 menunjukkan satu jujukan nombor
Diagram 1 *shows a number sequence*

$$\frac{3}{5}, \frac{3}{10}, \frac{3}{20}, \frac{3}{40}, \frac{3}{80}$$

Rajah 1
Diagram 1

Nyatakan pola bagi jujukan itu.
State the pattern of the sequence.

A Mendarab $\frac{1}{2}$
Multiply $\frac{1}{2}$

B Menambah $\frac{3}{5}$
Add $\frac{3}{5}$

C Menambah $\frac{1}{3}$
Add $\frac{1}{3}$

D Mendarab $\frac{1}{10}$
Multiply $\frac{1}{10}$

4. Irfan membeli 5 kotak jus anggur dengan harga RM15.80. Berapakah harga bagi 24 kotak jus anggur yang sama?
Irfan bought 5 *boxes of grape juice for* RM15.80. *What is the price of* 24 *boxes of the same grape juice?*

A RM78.50

B RM72.00

C RM75.80

D RM75.84

5. Dalam sebutan $-4xy^2z$, nyatakan pekali bagi $4x$.
In the expression $-4xy^2z$, *state the coefficient of* $4x$.

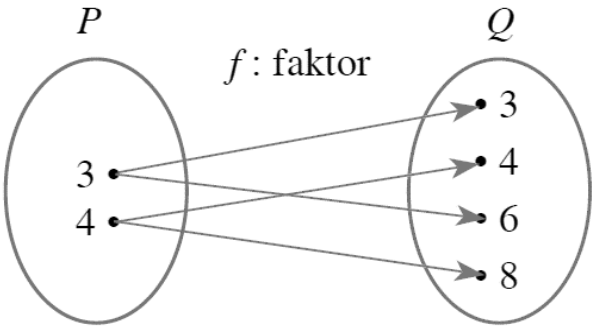
A $-y^2z$

B $-xyz$

C y^2z

D xy

6. Rajah 2 menunjukkan hubungan bagi suatu fungsi.
Diagram 2 *shows the relationship for a function.*



Rajah 2
Diagram 2

Nyatakan jenis hubungan bagi fungsi tersebut.
State the type of relationship for the function.

A Banyak kepada banyak
Many to many

B Satu kepada banyak
One to many

C Banyak kepada satu
Many to one

D Satu kepada satu
One to one

7. Diberi bahawa $2x + 4y = 20$. Ungkapkan *y* dalam sebutan *x*.
Given that $2x + 4y = 20$. *Express y in terms of x.*

A $-2x + 20$

B $5x + 10$

C $-\frac{1}{2}x + 5$

D $-\frac{1}{2}x + 10$

8. Antara berikut yang manakah merupakan kecerunan dan pintasan-*y* bagi persamaan $2y = -4x + 10$.
Which of the following is the gradient and y-intercept of the equation $2y = -4x + 10$.

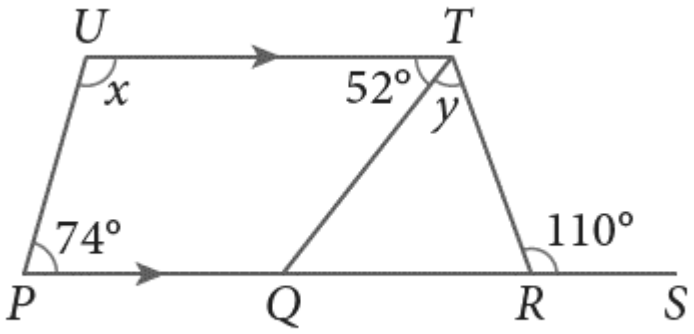
A $m = -2\,, c = 5$

B $m = 2, c = 5$

C $m = \frac{1}{2}\,, c = 5$

D $m = -\frac{1}{2}\,, c = 5$

9. Rajah 3 menunjukkan *PQRS* adalah garis lurus.
Diagram 3 *shows that PQRS is a straight line.*



Rajah 3
Diagram 3

Hitung nilai bagi $x + y$.
Find the value of $x + y$.

A 48

B 106

C 124

D 164

10. Titik *B* ialah titik tengah bagi garis lurus *AC*. Diberi koordinat *A* ialah (18,8) dan koordinat *B* ialah (12,6). Hitung koordinat *C*.
Point B is the midpoint on the straight line AC. Given coordinates of A (18,8) *and coordinates of B* (12,6)*. Calculate the coordinates of C.*

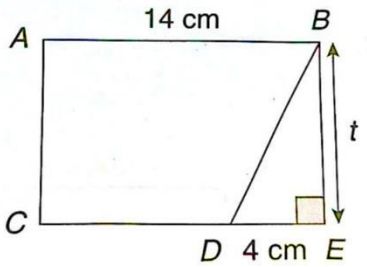
A (2,3)

B (3,5)

C (6,4)

D (5,6)

11. Rajah 4 menunjukkan *ABCD* ialah sebuah trapezium dan *BED* ialah sebuah segi tiga bersudut tegak.
Diagram 4 *shows ABCD is a trapezium and BED is a right-angled triangle.*



Rajah 4
Diagram 4

Diberi luas *BED* ialah 10 cm^2, hitung perimeter trapezium *ABCD*.
Given that area of BED is 10 cm^2*, calculate the perimeter trapezium of ABCD.*

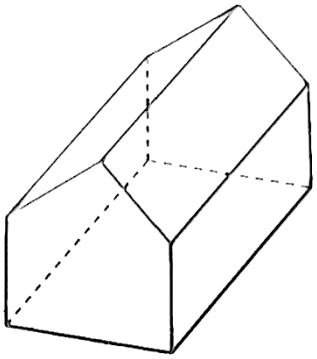
A 15.4 cm

B 35.4 cm

C 38 cm

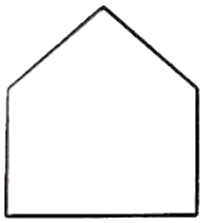
D 60 cm

12. Rajah 5 menunjukkan model sebuah bangsal. Antara berikut yang manakah menunjukkan pelan bangsal itu?
Diagram 5 shows a model of a shed. Which of the following shows the plan view of the shed?



Rajah 5
Diagram 5

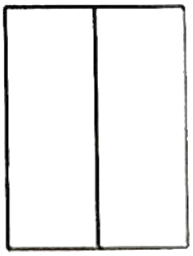
A



B

C

D



13. Terdapat 8 biji guli kuning dan beberapa biji guli hijau di dalam sebuah kotak. Sebiji guli dipilih secara rawak daripada kotak itu. Kebarangkalian memilih sebiji guli kuning ialah $\frac{2}{5}$. Hitung bilangan guli hijau di dalam kotak itu.

There are 8 *yellow marbles and some green marbles in a box. One marble is randomly chosen from the box. The probability of selecting a yellow marble is* $\frac{2}{5}$. *Calculate the number of green marbles in the box.*

A 12

B 15

C 17

D 20

14. Min markah bagi 25 orang murid dalam satu ujian ialah 75. Dua orang murid meninggalkan kelas itu.Min markah bagi murid yang tinggal tidak berubah. Nyatakan jumlah markah dua orang murid yang meninggalkan kelas itu.

The mean mark of 25 *pupils in a test is* 75. *Two of the pupils left the class. The mean mark of the remaining pupils remains unchanged. State the total marks of the two students who left the class.*

A 145

B 150

C 155

D 160

15. Ungkapkan 378.4 dalam bentuk piawai.

Express 378.4 *in standard form.*

A 3.784×10^{-1}

B 3.784×10^{-2}

C 3.784×10^{1}

D 3.784×10^{2}

16. Ringkaskan:

Simplify:

$$\frac{64^{\frac{1}{2}} \times (x^6 y^{-3})^{\frac{1}{3}}}{64^{\frac{1}{3}} \times (x^{\frac{1}{3}})^{-6} y^{-4}}$$

A $2x^4y^3$

B $2x^1y^{-5}$

C $\frac{1}{2}x^5y^3$

D $\frac{1}{2}x^1y^{-5}$

17. $34^{-\frac{1}{2}} =$

A $\frac{1}{34^2}$

B $-\frac{1}{34^2}$

C $\frac{1}{34^{\frac{1}{2}}}$

D $-\frac{1}{34^{\frac{1}{2}}}$

18. Diberi $354_7 + m = 1062_7$, cari nilai m dalam asas tujuh.

Given $354_7 + m = 1062_7$, *find the value of m in base seven*.

A 403_7

B 405_7

C 413_7

D 415_7

19. Yana bercadang untuk membeli sebuah kereta dengan harga jualan RM135 000 dalam masa 2 tahun akan datang. Wang pendahuluan sebanyak 10% perlu dibayar sekiranya dia membeli kereta itu. Jumlah pendapatan bulanan Yana ialah RM4 800. Jumlah perbelanjaan tetap dan tidak tetap bulanan Yana ialah RM2 450. Jika dia menyimpan wang pendahuluan itu secara bulanan, berapakah baki pendapatan bulanan Yana?

Yana plans to buy a car with a selling price of RM135 000 *in the next* 2 *years. A down payment of* 10% *is required if she buys the car. Yana's total monthly income is* RM4 800*. Yana's total monthly fixed and variable expenses are* RM2 450*. If she saves the down payment monthly, how much will Yana's remaining monthly income be?*

A RM562.50

B RM1 125

C RM1 787.50

D RM2 350

20. Jadual 1 di bawah menunjukkan kadar premium tahunan bagi setiap RM1 000 nilai muka insurans hayat boleh baharu yang ditawarkan oleh sebuah syarikat insurans.
The table 1 *below shows the annual premium rate for every* RM1 000 *face value of renewable life insurance offered by an insurance company.*

Umur ***Age***	**Lelaki / *Male* (RM)**	
	Bukan perokok ***Non-smoker***	**Perokok** ***Smoker***
34	2.12	2.72
35	2.19	2.79
36	2.25	2.90
37	2.30	3.00

Jadual 1
Table 1

Faiz ialah seorang perokok. Dia telah membeli polisi insurans hayat boleh baharu bernilai RM250 000 dengan jumlah premium tahunan RM680. Berapakah umur Faiz?
Faiz is a smoker. He has purchased a renewable life insurance policy worth RM250 000 *with an annual premium of* RM680. *How old is Faiz?*

A 34

B 35

C 36

D 37

21. Encik Ravi menyewa tiga bilik di sebuah hotel dengan harga RM240 setiap bilik satu malam. Keluarga Encik Ravi menginap di hotel itu selama empat malam. Hitung cukai perkhidmatan yang perlu dibayar oleh Encik Ravi jika hotel itu mengenakan cukai perkhidmatan sebanyak 6%.

Mr. Ravi rents three rooms in a hotel at RM240 *per room per night. Mr. Ravi's family stays at the hotel for four nights. Calculate the service tax payable by Mr. Ravi if the hotel charges a service tax of* 6%.

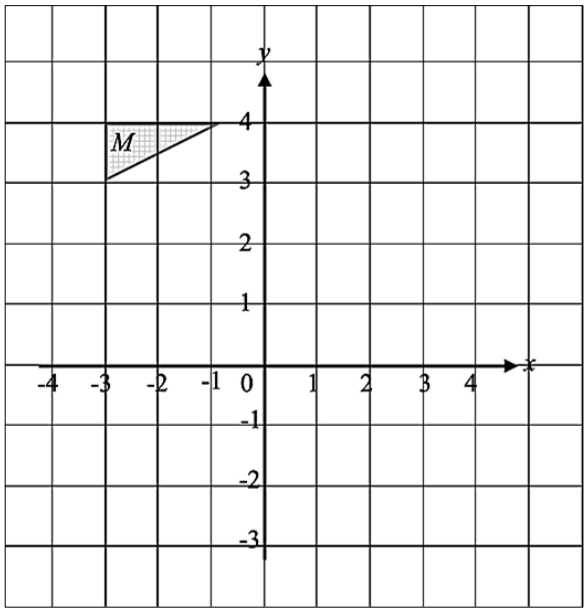
A RM230.40

B RM172.80

C RM57.60

D RM43.20

22. Rajah 6 di bawah menunjukkan segi tiga *M* yang dilukis pada satah Cartes.
Diagram 6 *below shows a triangle M drawn on the Cartesian plane.*



Rajah 6

Diagram 6

Diberi bahawa transformasi *S* ialah satu pantulan pada paksi-*y* dan transformasi *T* ialah satu pantulan pada garis $y = 2$. Segi tiga *M* menjalani gabungan transformasi *ST*. Nyatakan transformasi tunggal yang setara dengan gabungan transformasi *ST*.
Given that the transformation S is a reflection on the y-axis and the transformation T is a reflection on the line $y = 2$. *Triangle M undergoes the combination of transformations ST. State the single transformation that is equivalent to the combination of transformations ST.*

A Translasi $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$
Translation $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$

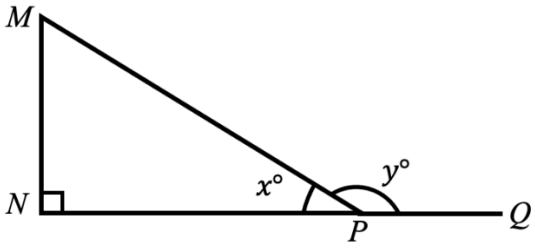
B Pantulan pada garis $y = 2x$
Reflection in the line $y = 2x$

C Putaran 90° ikut arah jam pada pusat (2, 2)
Rotation 90° *clockwise at the centre* (2, 2)

D Putaran 180° pada pusat (0, 2)
Rotation 180° *at the centre* (0, 2)

23. Dalam rajah 7 di bawah, *NPQ* ialah garis lurus.

In the diagram 7*, NPQ is a straight line.*



Rajah 7

Diagram 7

Diberi $sin\ x° = \frac{9}{15}$, cari nilai kos $y°$.

Given $sin\ x° = \frac{9}{15}$, *find the value of* $cos\ y°$.

A $\frac{3}{4}$

B $\frac{4}{5}$

C $-\frac{4}{5}$

D $-\frac{3}{4}$

24. Sebuah blok logam berbentuk kon dengan jejari 14 cm dan tingginya 9 cm dileburkan untuk menghasilkan beberapa biji logam berbentuk piramid yang mempunyai tapak segi empat sama bersaiz 5 cm dan tingginya 6 cm. Berapakah jumlah blok kon yang diperlukan untuk menghasilkan 435 biji logam berbentuk piramid?

A cone-shaped metal block with a radius of 14 cm *and a height of* 9 cm *is melted to produce several pyramid-shaped metal pieces with a square base of* 5 cm *and a height of* 6 cm. *How many cone blocks are needed to produce* 435 *pyramid-shaped metal pieces?*

A 11

B 12

C 13

D 14

25. Antara yang berikut, yang manakah bukan perwakilan data?
Which of the following is not a data representation?

A Carta lukis / *Draw chart*

B Plot titik / *dot plot*

C Carta pai / *Pie chart*

D Plot batang-dan-daun / *Stem-and-leaf plot*

26. Satu huruf dipilih secara rawak daripada set kad berlebel "BRILLIANT". Hitung kebarangkalian memilih satu huruf vokal.
A letter is chosen at random from a set of cards labelled "BRILLIANT". Calculate the probability of choosing a vowel.

A $\frac{2}{3}$

B $\frac{2}{9}$

C $\frac{1}{3}$

D $\frac{1}{9}$

27. Jadual 2 di bawah menunjukkan maklumat berdasarkan jadual kekerapan bagi satu data terkumpul.

Table 2 below shows information based on a frequency table for a set of grouped data.

Jumlah kekerapan *Sum of frequencies*	20
$\sum fx$	170
$\sum f x^2$	1 625

Jadual 2

Table 2

Hitung min dan varians bagi data tersebut.

Calculate the mean and variance of the data.

A Min / *mean* = 8.5, Varians / *variance* = 3

B Min / *mean* = 9.5, Varians / *variance* = 9

C Min / *mean* = 9.5, Varians / *variance* = 3

D Min / *mean* = 8.5, Varians / *variance* = 9

28. Tentukan yang manakah bilangan darjah berikut yang tidak boleh dilukis graf?
Determine which of the following number of degrees is not possible to draw a graph?

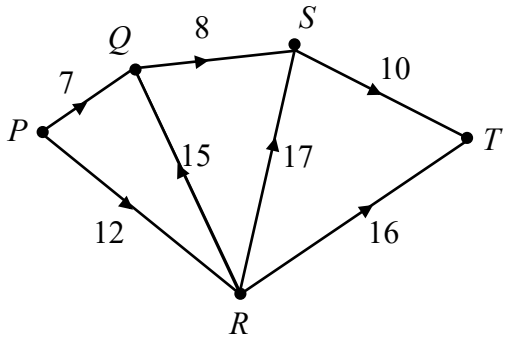
A 3, 2, 4, 5, 2

B 2, 3, 2, 4, 3

C 2, 3, 2, 4, 2

D 4, 3, 1, 2, 2

29. Rajah 8 menunjukkan satu graf dengan keadaan pemberat ialah jarak, dalam km.
Diagram 8 *shows a graph such that the weightage is distance, in* km.



Rajah 8

Diagram 8

Cari laluan terpendek dari *P* ke *T*.
Find the shortest path from P to T.

A P → R → Q → S → T

B P → Q → S → T

C P → R → S → T

D P → R → T

30. Antara berikut, yang manakah adalah penafian bagi pernyataan di bawah?
Which of the following is the negation of the statement below?

6 ialah faktor bagi 72. 6 *is a factor of* 72.

A 6 ialah gandaan bagi 72.
6 *is a multiple of* 72.

B 72 bukan gandaan bagi 6.
72 *is not a multiple of* 6.

C 72 ialah faktor bagi 6.
72 *is a factor of* 6.

D 6 bukan faktor bagi 72.
6 *is not a factor of* 72.

31. Rajah 9 ialah suatu implikasi.
Diagram 9 *is an implication*.

Jika $x = 5$, maka $x^3 = 125$. *If* $x = 5$, *then* $x^3 = 125$.

Rajah 9
Diagram 9

Apakah antejadian bagi implikasi itu?
What is the antecedent of the implication?

A $x = 5$

B $x \neq 5$

C $x^3 = 125$

D $x^3 \neq 125$

32. Diberi set $\xi = \{x: x \text{ ialah integer}, 40 \leq x < 50\}$, set $R = \{x: x \text{ ialah nombor genap}\}$, set $S = \{x: x \text{ ialah nombor di mana hasil tambah antara dua digit ialah lebih daripada } 10\}$ dan set $T = \{x: x \text{ ialah nombor gandaan } 4\}$.
Senaraikan unsur bagi $(R \cup T) \cap S'$.

Given set $\xi = \{x: x \text{ is an integer}, 40 \leq x < 50\}$, *set* $R = \{x: x \text{ is an even number}\}$, *set* $S = \{x: x \text{ is a number where the sum of between its two digits is more than } 10\}$ *and set* $T = \{x: x \text{ is a multiple of } 4\}$.
List the elements of $(R \cup T) \cap S'$.

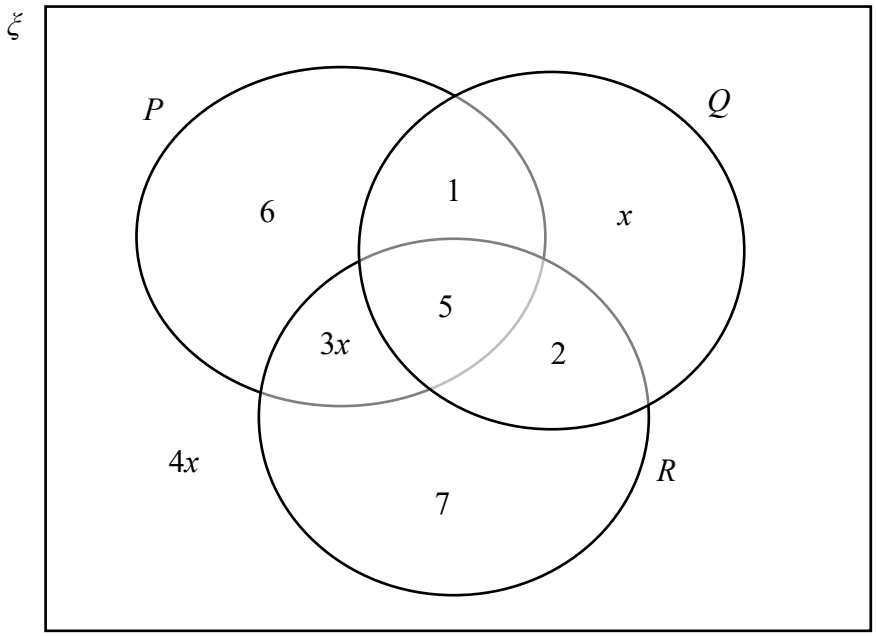
A {40, 44, 48}

B {40, 42, 44, 48}

C {42, 44, 48}

D {48}

33. Gambar rajah Venn dalam Rajah 10 menunjukkan set P, set Q, set R dan set semesta, ξ. Diberi $n(R) = n(P \cup R)'$.
The Venn diagram in Diagram 10 *shows set P*, *set Q*, *set R and the universal set*, ξ. *Given* $n(R) = n(P \cup R)'$.



Rajah 10
Diagram 10

Apakah nilai bagi x?
What is the value of x?

A 5

B 6

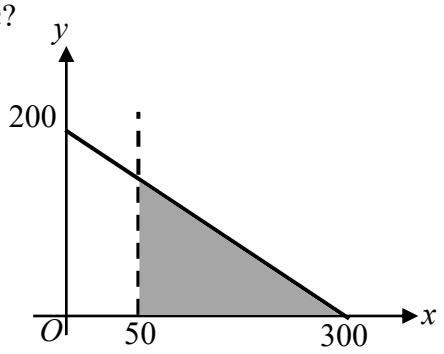
C 7

D 8

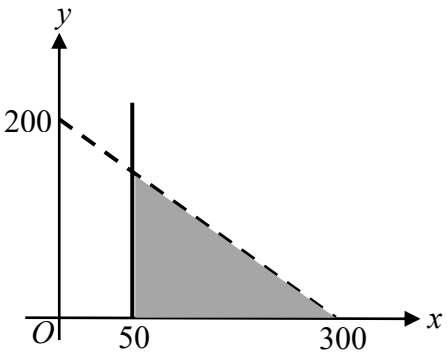
34. Arissa menjual nasi lemak dan mi kari untuk sumbangan sekolahnya. Harga bagi sebungkus nasi lemak dan sebungkus mi kari masing-masing ialah RM2 dan RM3. Dia perlu menjana sekurang-kurangnya RM600. Arissa tahu bahawa dia akan menjual lebih banyak daripada 50 bungkus nasi lemak. Antara kawasan berlorek berikut, yang manakah mewakili penyelesaian yang memuaskan situasi Arissa itu?

Arissa sells nasi lemak and curry noodles for her school donations. The price of a packet nasi lemak and curry noodle are RM2 *and* RM3 *respectively. She needs to make at least* RM600*. Arissa knows that she will sell more than* 50 *packets of nasi lemak. Which of the following shaded region represent the solution that satisfies the Arissa's situation*?

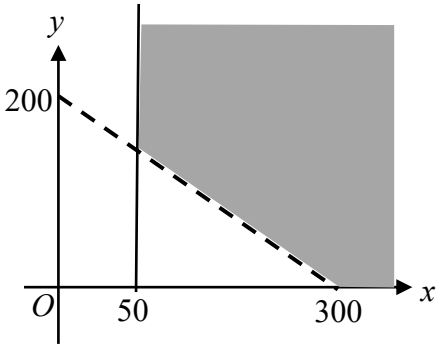
A



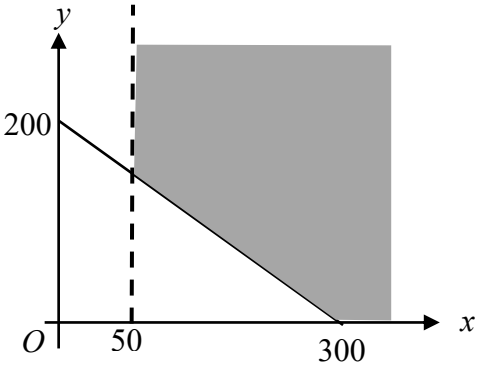
B



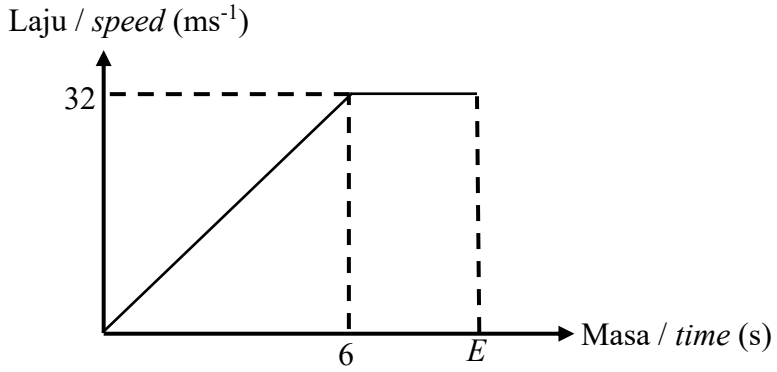
C



D



35. Graf laju-masa dalam Rajah 11 menunjukkan gerakan sebuah motosikal untuk tempoh *E* saat.
The speed-time graph in Diagram 11 *shows the motion of a motorcycle for a period of E seconds.*



Rajah 11
Diagram 11

Diberi jumlah jarak yang dilalui oleh motosikal itu ialah 192 m. Hitung nilai *E*.
Given the total distance travelled by the motorcycle is 192 m. *Calculate the value of E*.

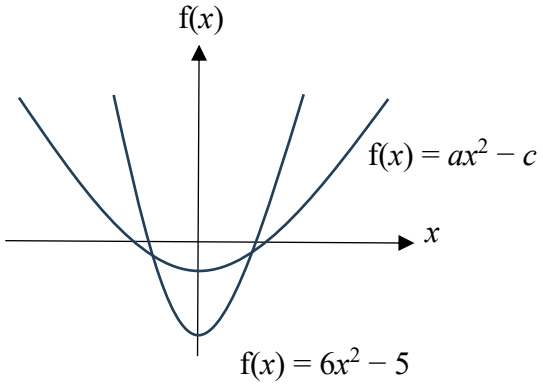
A 3

B 7

C 8

D 9

36. Rajah 12 menunjukkan graf bagi dua fungsi kuadratik.
Diagram 12 *shows the graphs of two quadratic functions*.



Rajah 12
Diagram 12

Apakah nilai *a* dan *c* yang mungkin?
What are the possible values of a and c?

A a = 4, c = −3

B a = 4, c = −6

C a = 7, c = −3

D a = 7, c = −6

37. Diberi bahawa $D \propto \frac{L^m}{A^n}$ dan *D* berubah secara langsung dengan punca kuasa tiga *L* dan secara songsang dengan kuasa dua *A*. Nyatakan nilai *m* dan nilai *n*.
It is given that $D \propto \frac{L^m}{A^n}$ *and D varies directly as the cube root of L and inversely as the square of A. State the value of m and n.*

A $m = \frac{1}{3}, n = 2$

B $m = \frac{1}{3}, n = -2$

C $m = 3, n = 2$

D $m = 3, n = -2$

38. Sebuah pam vakum dapat mengosongkan sebuah tangki air dalam masa 2 jam 30 minit dengan kadar 1 600 liter per minit. Masa, *t,* yang diperlukan untuk mengosongkan sebuah tangka air berubah secara songsang dengan kadar pengepaman, *p*.

Berapakah masa diambil untuk mengosongkan tangki air itu dengan kadar 2 500 liter per minit?

A vacuum pump can empty water tank in 2 *hours* 30 *minutes at a rate of* 1 600 *litres per minute.*

The time, t, required to empty a water tank varies inversely as the rate of pumping, p.

How long will it take to empty the tank at the rate of 2 500 *litres per minute?*

A 1 jam 30 minit / 1 *hour* 30 *minutes*

B 1 jam 36 minit / 1 *hour* 36 *minutes*

C 1 jam 45 minit / 1 *hour* 45 *minutes*

D 2 jam 6 minit / 2 *hour* 6 *minutes*

39. $\begin{pmatrix}2\\3\end{pmatrix}+\begin{pmatrix}1\\-5\end{pmatrix}-\frac{1}{2}\begin{pmatrix}2\\4\end{pmatrix}=$

A $\begin{pmatrix}1\\0\end{pmatrix}$

B $\begin{pmatrix}2\\0\end{pmatrix}$

C $\begin{pmatrix}2\\-4\end{pmatrix}$

D $\begin{pmatrix}2\\2\end{pmatrix}$

40. Cari nilai *t* dalam persamaan matriks berikut:

Find the value of t in the following matrix equation:

$$\begin{pmatrix}t-1\\2\end{pmatrix}(0 \quad 1)=\begin{pmatrix}0 & 8\\0 & 2\end{pmatrix}$$

A 3

B 4

C 7

D 9