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

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

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 0.3768 betul kepada dua angka bererti.
Round off 0.3768 *correct to two significant figures.*

A 0.30

B 0.38

C 0.37

D 0.40

2. $\sqrt{16} \times \sqrt{16} \times \sqrt{16} =$

A $\sqrt{16}$

B 16

C 64

D 8

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

$$369\ ,\ 347\ ,\ x\ ,\ 303\ ,\ 281$$

Rajah 1
Diagram 1

Hitung nilai bagi x.
Calculate the value of x.

A 325

B 345

C 335

D 349

4. Hani membeli 5kg durian dengan harga RM120. Berapakah kg durian yang boleh dibeli dengan harga RM240?
Hani bought 5kg *of durian for* RM120*. How many* kg *of durian can be bought for* RM240*?*

A 2

B 3

C 6

D 10

5. Antara berikut, yang manakah persamaan linear dalam satu pemboleh ubah?
Which of the following is a linear equation in one variable?

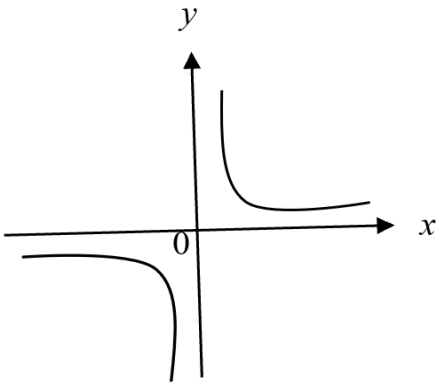
A $x + 2 = 10$

B $x - y = 12$

C $2x = 5 + y$

D $x = 2y$

6. Rajah 2 menunjukkan graf bagi fungsi $y = ax^n$.
Diagram 2 *shows the graph of a function* $y = ax^n$.



Rajah 2
Diagram 2

A $a = 1, n = 2$

B $a = 1, n = -1$

C $a = -1, n = 1$

D $a = 1, n = -2$

7. Diberi bahawa $x = \frac{2-y}{1+3y}$. Ungkapkan *y* dalam sebutan *x*.

Given that $x = \frac{2-y}{1+3y}$. *Express y in terms of x.*

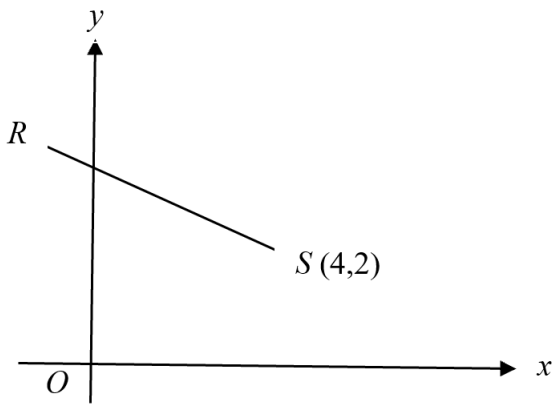
A $\frac{2+x}{1+3x}$

B $\frac{x-2}{3x+1}$

C $\frac{2-x}{3x+1}$

D $\frac{3x+1}{2-x}$

8. Rajah 3 menunjukkan garis lurus *RS* yang memintas paksi-*y* pada titik (0,8). *O* ialah asalan.
Diagram 3 *shows the straight-line RS which intersects the y-axis at the point* (0,8). *O is the origin.*



Rajah 3
Diagram 3

Antara berikut, yang manakah kecerunan bagi garis lurus *RS?*
Which of the following is the gradient of the straight-line RS?

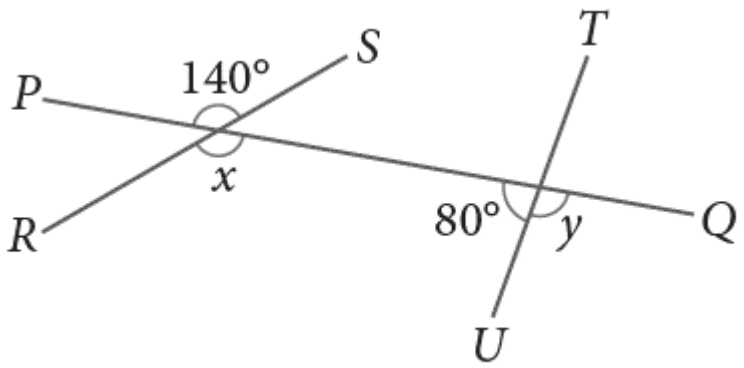
A $-\frac{3}{2}$

B $\frac{3}{2}$

C 2

D -2

9. Rajah 4 menunjukkan *PQ, RS* dan *TU* ialah garis lurus.
Diagram 4 *shows that PQ, RS and TU are straight lines.*



Rajah 4
Diagram 4

Cari nilai $x - y$.
Find the value of $x - y$.

A 260°

B 80°

C 20°

D 40°

10. Diberi titik *A*(2,9) dan titik *B*(0,7). Cari jarak di antara titik *A* dan *B*.
Given point A(2,9) *and B*(0,7)*. Find the distance between point A and point B.*

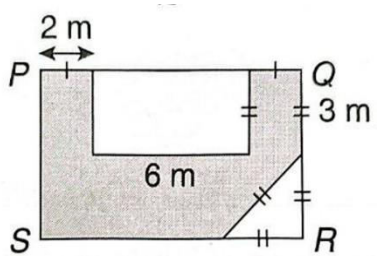
A 1.85 unit / *units*

B 2.81 unit / *units*

C 2.83 unit / *units*

D 2.85 unit / *units*

11. Rajah 5 menunjukkan PQRS ialah sebuah segi empat tepat.
Diagram 5 shows PQRS is a rectangle.



Rajah 5
Diagram 5

Hitung luas bagi kawasan berlorek?
Calculate the area of the shaded region?

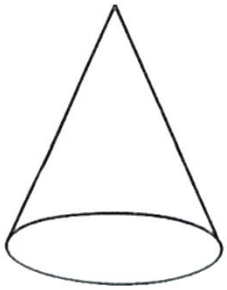
A 22.5 m^2

B 37.5 m^2

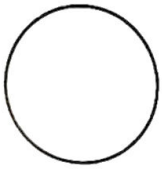
C 60 m^2

D 82.5 m^2

12. Antara berikut, yang manakah menunjukkan unjuran ortogon yang betul bagi kon di bawah pada satah mencancang?
Which of the following is the correct orthogonal projection of the cone below onto the vertical plane?



A



C

B

D

13. Terdapat 15 biji guli di dalam sebuah bekas. 10 biji daripadanya ialah guli berwarna biru. Sebiji guli diambil secara rawak daripada bekas itu. Hitung kebarangkalian bukan guli biru dipilih.
There are 15 *marbles in a container.* 10 *of them are blue marbles. One marble is randomly taken from the container. Calculate the probability that a non-blue marble is chosen.*

A $\frac{1}{3}$

B $\frac{2}{3}$

C $\frac{1}{2}$

D $\frac{1}{5}$

14. Markah min bagi satu kumpulan murid seramai 10 orang dalam satu ujian ialah 45. Seorang dari mereka yang markahnya 90 markah telah dikeluarkan dari kumpulan tersebut. Apakah min markah baharu?
The mean score for a group of 10 *students in a test is* 45. *One of them, who scored* 90 *marks, was removed from the group. What is the new mean score?*

A 36

B 40

C 46

D 50

15. Ungkapkan 7.827×10^{-5} sebagai satu nombor tunggal.

Express 7.827×10^{-5} *as a single number.*

A 78 270

B 782 700

C 0.0007827

D 0.00007827

16. Ringkaskan:
Simplify:

$$\frac{125^{\frac{2}{3}} \times (p^4 q^{-4})^{\frac{1}{2}}}{625^{\frac{1}{4}} \times (p^{\frac{1}{4}})^{-8} q^{-6}}$$

A $5p^4q^4$

B $5p^4q^{-8}$

C $\frac{1}{5}p^4q^4$

D $\frac{1}{5}p^4q^{-8}$

17. Diberi bahawa $s \times s \times s \times s \times s \times s \times s \times s = 6^t$, cari nilai *s* dan nilai *t*.

It is given that $s \times s \times s \times s \times s \times s \times s \times s = 6^t$, *find the value of s and of t.*

A $s = 8, t = 8$

B $s = 8, t = 6$

C $s = 6, t = 8$

D $s = 6, t = 6$

18. Kelas Sahsiah mempunyai 123_5 orang murid. Kelas Takwa mempunyai 14_5 orang murid kurang daripada kelas Sahsiah. Hitung bilangan murid kelas Takwa.

Class Sahsiah has 123_5 *pupils. Class Takwa has* 14_5 *pupils less than class Sahsiah. Calculate the number of class Takwa's pupils.*

A 100_5

B 104_5

C 124_5

D 125_5

19. Encik Kamal bercadang untuk membeli sebuah rumah dengan harga jualan RM306 000 dalam masa 3 tahun akan datang. Wang pendahuluan sebanyak 10% perlu dibayar sekiranya dia membeli rumah itu. Jumlah pendapatan bulanan Encik Kamal ialah RM5 800. Jumlah perbelanjaan tetap dan tidak tetap bulanan Encik Kamal ialah RM3 400. Jika dia menyimpan wang pendahuluan itu secara bulanan, berapakah baki pendapatan bulanan Encik Kamal?

Mr. Kamal plans to buy a house with a selling price of RM306 000 *in the next* 3 *years. A down payment of* 10% *is required if he buys the houset. Mr. Kamal's total monthly income is* RM5 800. *Mr. Kamal's total monthly fixed and variable expenses are* RM3 400. *If he saves the down payment monthly, how much will Mr. Kamal's remaining monthly income be?*

A RM150

B RM1 125

C RM1 550

D RM2 400

20. Jadual 1 di bawah menunjukkan sebahagian maklumat polisi insurans perubatan yang dibeli oleh Maznah. Fasal penyertaan peratusan ko-insurans dalam polisi perubatan Maznah tidak ditunjukkan.

Table 1 *below shows some information about the medical insurance policy purchased by Maznah. The co-insurance percentage participation clause in Maznah medical policy is not shown.*

Deduktibel *Deductible*	RM1 000
Peratusan ko-insurans *Co-insurance percentage*	*x*
Had tahunan *Anual limit*	RM500 000

Jadual 1

Table 1

Maznah telah menjalani suatu pembedahan dengan jumlah kos RM247 000. Bayaran kos yang ditanggung oleh Maznah ialah RM25 600. Hitung nilai *x*.

Maznah underwent a surgery with a total cost of RM247 000*. The cost paid by Maznah is* RM25 600*. Calculate the value of x.*

A 90/10

B 85/15

C 80/20

D 75/25

21. Siva memiliki sebuah rumah kediaman di Bandar A yang mempunyai nilai tahunan RM7 800. Diberi bahawa kadar cukai pintu yang dikenakan oleh Majlis Perbandaran ialah 5%. Berapakah cukai pintu yang perlu dibayar oleh Siva untuk setiap enam bulan.

Siva owns a residential house in Bandar A which has an annual value of RM7 800. *Given that the rate of gate tax imposed by the Municipal Council is* 5%. *How much gate tax does Siva have to pay for every six months?*

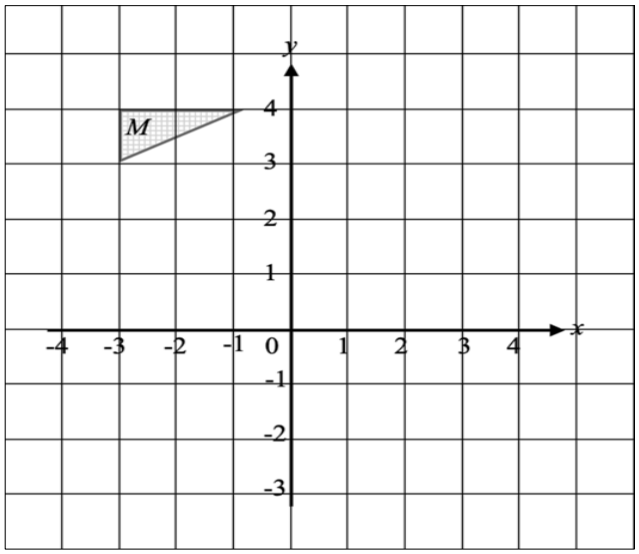
A RM390

B RM195

C RM130

D RM39

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



Rajah 6

Diagram 6

Diberi bahawa transformasi *P* ialah satu pantulan pada garis $x = -1$ dan transformasi *Q* ialah satu pantulan pada garis $y = 3$. Segi tiga *M* menjalani gabungan transformasi *PQ*. Nyatakan transformasi tunggal yang setara dengan gabungan transformasi *PQ*.
Given that transformation P is a reflection on the line $x = -1$ *and transformation Q is a reflection on the line* $y = 3$. *Triangle M undergoes the combination of transformations PQ. State the single transformation that is equivalent to the combination of transformations PQ.*

A Translasi $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$
Translation $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$

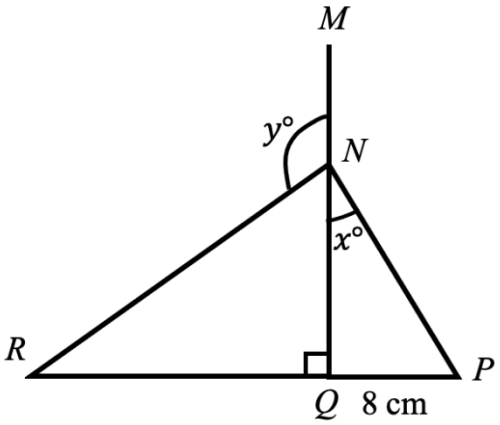
B Pantulan pada garis $y = x$
Reflection in the line $y = x$

C Putaran 90° ikut arah jam pada pusat (-1, 3)
Rotation 90° *clockwise at the centre* (-1, 3)

D Putaran 180° pada pusat (-1, 3)
Rotation 180° *at the centre* (-1, 3)

23. Dalam rajah 7 di bawah, *MNQ* dan *RQP* ialah garis lurus.

In the diagram 7*, MNQ and RQP are straight line.*



Rajah 7

Diagram 7

Diberi tan $x° = \frac{1}{2}$ dan kos $y° = -\frac{4}{5}$, hitung panjang, dalam cm, bagi *RP*.

Given $\tan x° = \frac{1}{2}$ *and* $\cos y° = -\frac{4}{5}$*, calculate the length, in* cm*, of RP.*

A 12

B 16

C 20

D 24

24. Sebuah blok logam berbentuk sfera dengan jejari 14 cm dileburkan untuk menghasilkan beberapa biji logam berbentuk kubus yang bersaiz 5cm. Berapakah jumlah blok kubus sempurna yang akan terhasil daripada cairan logam berbentuk sfera tersebut?

A spherical metal block with a radius of 14 cm *is melted to produce several* 5cm *cube-shaped metal pieces. How many perfect cube blocks will be produced from the spherical metal liquid?*

A 91

B 92

C 459

D 460

25. Antara yang berikut, yang manakah bukan kaedah pengumpulan data?
Which of the following is not a method of data collection?

A Temu bual / *Interview*

B Tinjauan / *Survey*

C Eksperimen / *Experiment*

D Melukis / *Drawing*

26. Satu nombor dipilih secara rawak daripada set kad berlabel "1, 2, 3, 4, 5, 6, 7, 8, 9". Hitung kebarangkalian memilih satu nombor genap atau nombor perdana.
A number is chosen at random from a set of cards labelled "1, 2, 3, 4, 5, 6, 7, 8, 9". Calculate the probability of choosing an even number or a prime number.

A $\frac{4}{9}$

B $\frac{5}{9}$

C $\frac{7}{9}$

D $\frac{8}{9}$

27. Jadual kekerapan di bawah menunjukkan umur pekerja di sebuah kilang.
The frequency table below shows the ages of the workers in a factory.

Umur (tahun) *Age (years)*	Titik tengah *Midpoint*	Kekerapan *Frequency*
21 – 30	25.5	8
31 – 40	35.5	7
41 – 50	45.5	6
51 – 60	55.5	3

Jadual 2
Table 2

Hitung varians bagi data tersebut.
Calculate the variance of the data.

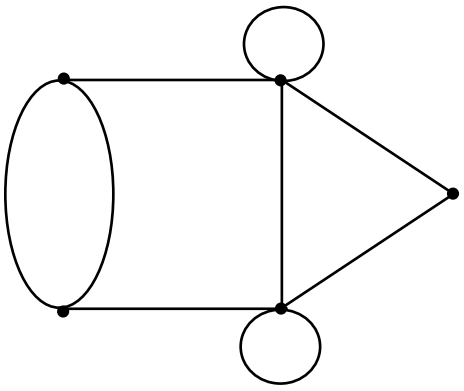
A 1449.75

B 105.56

C 38.08

D 10.27

28. Rajah 8 menunjukkan sebuah graf.
Diagram 8 *shows a graph.*



Rajah 8
Diagram 8

Tentukan nilai $\sum d(v)$.
Determine the value of $\sum d(v)$.

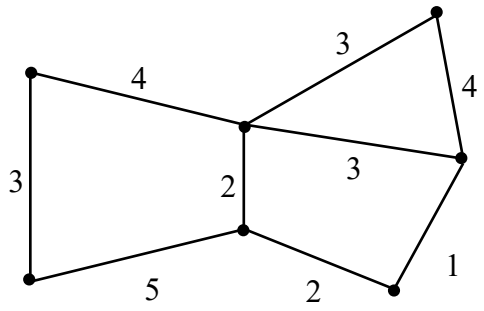
A 9

B 14

C 16

D 18

29. Rajah 9 menunjukkan satu graf tak berarah dan berpemberat.
Diagram 9 shows an undirected and weighted graph.



Rajah 9

Diagram 9

Berdasarkan graf di atas, satu subgraf dengan 7 bucu dan 6 tepi boleh dilukis.
Tentukan jumlah pemberat yang minimum bagi subgraf itu.
Based on the above graph, a subgraph with 7 vertices and 6 edges can be drawn.
Determine the minimum total weight of the subgraph.

A 12

B 15

C 18

D 22

30. Antara berikut, yang manakah satu pernyataan?
Which of the following is a statement?

A Sila berdiri.
Please stand up.

B Berapakah jumlah bagi 5 dan 6?
What is the total of 5 and 6?

C $2x + 3 = 15$

D $5^0 = 1$

31. Diberi implikasi 'Jika x ialah faktor bagi 3, maka x ialah faktor bagi 9'.
Kontrapositif bagi implikasi ini ialah
Given implication 'If x is a factor of 3, then x is a factor of 9'.
The contrapositive for this implication is

A Jika x bukan faktor bagi 9, maka x bukan faktor bagi 3.
If x is not a factor of 9, *then x is not a factor of* 3.

B Jika x ialah faktor bagi 9, maka x ialah faktor bagi 3.
If x is a factor of 9, *then x is a factor of* 3.

C Jika x ialah faktor bagi 3, maka x bukan faktor bagi 9.
If x is a factor of 3, *then x is not a factor of* 9.

D Jika x bukan faktor bagi 3, maka x bukan faktor bagi 9.
If x is a not factor of 3, *then x is not a factor of* 9.

32. Diberi set semesta, $\xi = \{x: 1 \leq x \leq 15\}$, set $P = \{2, 5, 8, 13, 15\}$ dan set Q = {nombor perdana}. Cari bilangan subset bagi $P \cap Q$.
It is given the universal set, $\xi = \{x: 1 \leq x \leq 15\}$, *set* $P = \{2, 5, 8, 13, 15\}$ *and set* Q = {*prime numbers*}. *Find the number of subsets of* $P \cap Q$.

A 2

B 4

C 8

D 16

33. Diberi set R dan set S adalah dengan keadaan $R \cap S = \{3, 7\}$, $(R \cap S)' = \{2, 4, 6, 9\}$ dan $(R \cup S)' = \{9\}$. Nyatakan semua unsur bagi $R \cup S$.

It is given that set R and set S are such that $R \cap S = \{3, 7\}$, $(R \cap S)' = \{2, 4, 6, 9\}$ *and* $(R \cup S)' = \{9\}$. *State all the elements of* $R \cup S$.

A {2, 3, 7}

B {2, 4, 6, 7}

C {2, 3, 4, 6, 7}

D {2, 3, 4, 6, 7, 9}

34. Diberi dua ketaksamaan linear serentak $2x + 3 < 8$ dan $8 \leq y < 17$ dengan keadaan x dan y ialah integer positif. Cari nilai terbesar bagi $\frac{y}{x}$.

Given two simultaneous linear inequalities $2x + 3 < 8$ *and* $8 \leq y < 17$, *where x and y are positive integers. Find the largest value of* $\frac{y}{x}$.

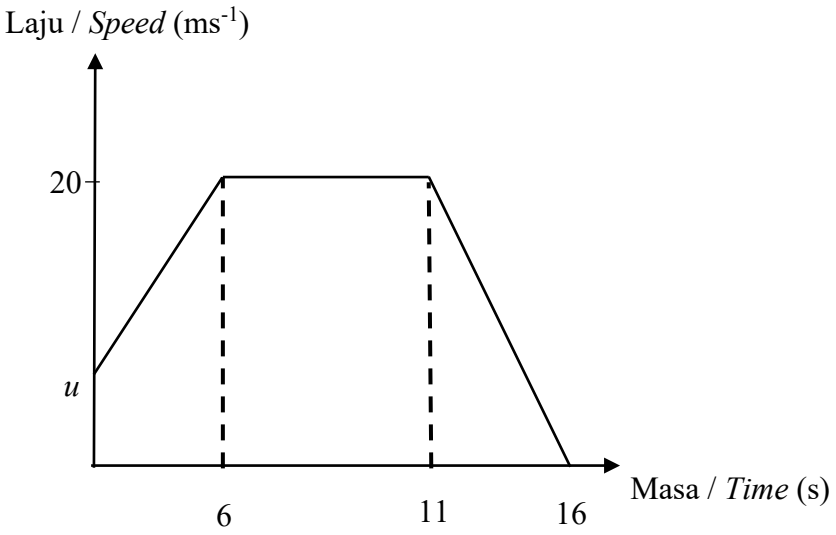
A 4

B 8

C 12

D 16

35. Rajah 10 menunjukkan satu graf laju-masa bagi satu objek dalam 16 saat.
Diagram 10 *shows a speed-time graph of an object in* 16 *seconds.*



Rajah 10
Diagram 10

Diberi kadar perubahan laju dalam 6 saat yang pertama ialah 2.5 ms^{-2}. Hitung nilai *u*.
Given the rate of change of speed in the first 6 *seconds is* 2.5 ms^{-2}*, calculate the value of u.*

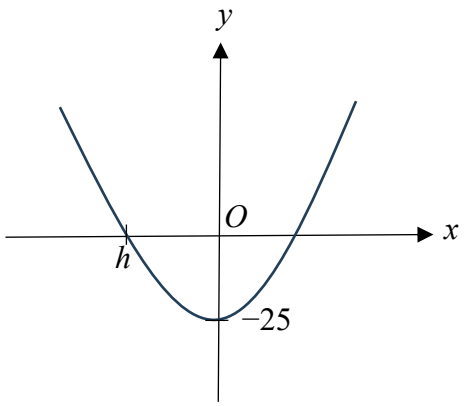
A 5

B 6

C 8

D 10

36. Rajah 11 menunjukkan sebuah graf $y = x^2 + k$ pada suatu satah Cartes.
Diagram 11 *shows a graph of* $y = x^2 + k$ *on a Cartesian plane*.



Rajah 11
Diagram 11

Tentukan nilai *h* dan nilai *k*.
Determine the value of h and of k.

A $h = -5, k = -15$

B $h = -5, k = -25$

C $h = -5, k = -30$

D $h = -25, k = -5$

37. *D* berubah secara langsung dengan *L* dan secara songsang dengan punca kuasa dua *A*, dan *k* ialah pemalar. Tentukan hubungan dalam bentuk persamaan antara *D, L* dan *A*.

D varies directly as L and inversely as square root of A, and k is the constant. Determine the relationship in the form of an equation between D, L and A.

A $D = \frac{kL}{\sqrt{A}}$

B $D = \frac{kL}{A^2}$

C $D = \frac{k\sqrt{A}}{L}$

D $D = \frac{kA}{\sqrt{L}}$

38. Diberi m berubah secara songsang dengan n^3 , dan $m = 2$ apabila $n = \frac{1}{4}$. Hitung nilai n apabila $m = \frac{1}{8}$.

It is given m varies inversely as n^3 *and* $m = 2$ *that when* $n = \frac{1}{4}$. *. Calculate the value of n when* $m = \frac{1}{8}$.

A $\frac{1}{8}$

B $\sqrt[3]{\frac{1}{4}}$

C $\sqrt[3]{4}$

D 8

39. Antara berikut yang manakah tidak mempunyai matriks songsang?

Which of the following matrices does not have the inverse matrix?

A $\begin{pmatrix} 1 & 2 \\ -4 & 8 \end{pmatrix}$

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

C $\begin{pmatrix} -4 & 2 \\ -6 & 3 \end{pmatrix}$

D $\begin{pmatrix} -5 & 3 \\ 4 & -2 \end{pmatrix}$

40. Diberi $(5h \quad 7)\begin{pmatrix} -7 & -9 \\ 5h & -5 \end{pmatrix} = (0 \quad 145)$, cari nilai *h*.

Given $(5h \quad 7)\begin{pmatrix} -7 & -9 \\ 5h & -5 \end{pmatrix} = (0 \quad 145)$, *find the value of h.*

A 4

B $\frac{9}{4}$

C $-\frac{9}{4}$

D -4