RUMUS MATEMATIK
MATHEMATICAL FORMULAE

Rumus-rumus berikut boleh membantu anda 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
NUMBER 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 $a^{\frac{m}{n}} = (a^m)^{\frac{1}{n}}$

5 Faedah mudah / *Simple interest, I = Prt*

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

7 Jumlah bayaran balik / *Total repayment*, *A = P + Prt*

PERKAITAN DAN ALGEBRA
RELATIONSHIP AND ALGEBRA

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 Laju purata = $\frac{\text{Jumlah jarak}}{\text{Jumlah masa}}$

Average speed = $\frac{\textit{Total distance}}{\textit{Total time}}$

4 $m = \frac{y_2 - y_1}{x_2 - x_1}$

5 $m = -\frac{\text{pintasan}-y}{\text{pintasan}-x}$

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

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,*
$= (n - 2) \times 180^0$

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 $$\frac{\text{Panjang lengkok}}{2\pi j} = \frac{\theta}{360°}$$

$$\frac{Arc\ length}{2\pi r} = \frac{\theta}{360°}$$

6 $$\frac{\text{Luas sektor}}{\pi \text{j}^2} = \frac{\theta}{360°}$$

$$\frac{Area\ of\ sector}{\pi r^2} = \frac{\theta}{360°}$$

7 Luas lelayang = $\frac{1}{2}$ x hasil darab panjang dua pepenjuru

Area of kite = $\frac{1}{2}$ x *product of two diagoonals*

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

Area of trapezium = $\frac{1}{2}$ x *sum of two parallel sides* x *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 Isi padu prisma = luas keratan rentas x tinggi

Volume of prism = area of cross section x *height*

13 Isi padu silinder = $\pi j^2 t$

Volume cylinder = $\pi r^2 h$

14 Isi padu kon = $\frac{1}{3}\pi j^2 t$

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

15 Isi padu sfera = $\frac{4}{3}\pi j^3$

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

16 Isi padu piramid = $\frac{1}{3}\times$ luas tapak $\times$ tinggi

Volume of pyramid = $\frac{1}{3}\times$ *base area* $\times$ *height*

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

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

18 Luas imej = $k^2 \times$ luas objek

Area of image = $k^2 \times$ *area of object*

STATISTIK DAN KEBARANGKALIAN
STATISTICS AND PROBABILITY

1 Min / *Mean*, $\bar{x} = \frac{\sum x}{N}$

2 Min / *Mean*, $\bar{x} = \frac{\sum fx}{\sum f}$

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

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

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*, $\sigma = \sqrt{\frac{\sum f(x-\bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

7 $P(A) = \frac{n(A)}{n(S)}$

8 $P(A') = 1 - n(A)$

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

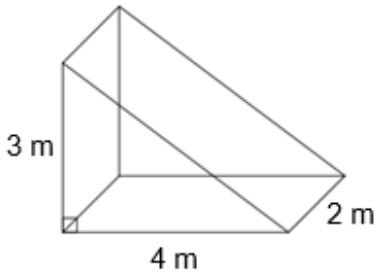
1 Bundarkan 4.068 betul kepada dua angka bererti.
Round off 4.068 *correct to two significant figures.*

A 4.0 **C** 4.06
B 4.1 **D** 4.07

2 $\frac{520.8 \times 10^{-3}}{10^{-5}}$

A 5.208 x 10^{8} **C** 5.208 x 10^{4}
B 5.208 x 10^{-8} **D** 5.208 x 10^{-4}

3 Rajah 1 menunjukkan sebongkah logam berbentuk prisma.
Diagram 1 *shows a prism shaped piece of metal.*



Rajah 1 / *Diagram* 1

Logam itu dileburkan untuk membentuk beberapa kubus kecil yang berjisim 5 g setiap satu. Diberi bahawa ketumpatan logam itu ialah 3 100 kg/m^3, cari bilangan kubus yang dapat dibentuk. $\left[\text{Ketumpatan} = \frac{\text{Jisim}}{\text{1sipadu}}\right]$.
The metal is melted to form several small cubes weighing 5 g *each. Given that the density of the metal is* 3 100 kg/m^3*, find the number of cubes that can be formed.* $\left[\text{Density} = \frac{\text{Mass}}{\text{Volume}}\right]$.

A 3.72 x 10^{4} **C** 7.44 x 10^{6}
B 3.72 x 10^{-4} **D** 7.44 x 10^{-6}

4 Diberi $P_5 = 356_8$, cari nilai *P*.

Given that $P_5 = 356_8$*, find the value of P.*

A 1234 **C** 1342

B 1324 **D** 1423

5 Diberi bahawa $452_7 - M_7 = 166_7$, maka $M_7 =$

Given that $452_7 - M_7 = 166_7$*, then* $M_7 =$

A 235 **C** 325

B 253 **D** 352

6 Diberi $2^p \times 2^3 = 64$. Cari nilai *p*.

Given that $2^p \times 2^3 = 64$. *Find the value of p*.

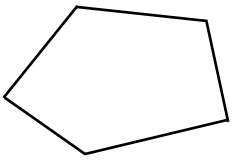
A 3 **C** 8

B 4 **D** 9

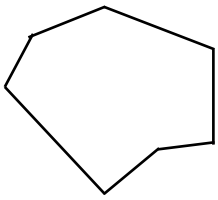
7 Manakah antara poligon di bawah mempunyai jumlah sudut pendalaman 720^0?

Which of the following polygons has a total of 720^0 *interior angles*?

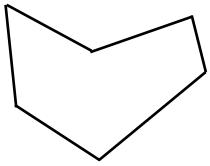
A



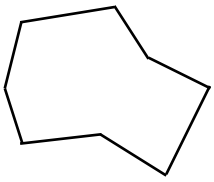
C



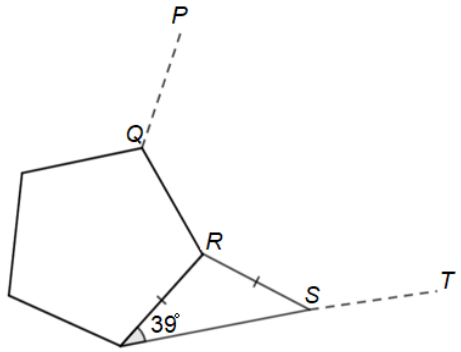
B



D



8 Rajah 2 menunjukkan sebuah pentagon sekata dan sebuah segi tiga sama kaki. *PQRST* ialah sebahagian daripada sebuah poligon sekata yang tidak lengkap.
Diagram 2 shows a regular pentagon and an isosceles triangle. PQRST is part of an incomplete regular polygon.



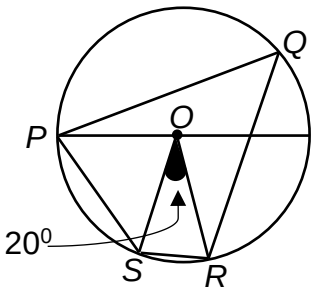
Rajah 2 / *Diagram* 2

Cari bilangan sisi bagi poligon sekata yang tidak lengkap itu.
Find the number of sides of the incomplete regular polygon.

A 9 **C** 11

B 10 **D** 12

9 Rajah 3 menunjukkan bulatan berpusat di *O*. Jika *POS* ialah segi tiga sama sisi dan $\angle SOR = 20^o$, hitung nilai $\angle PQR$.
Diagram 3 shows a circle centered at O. If POS is an equilateral triangle and $\angle SOR = 20^o$*, calculate the value of* $\angle PQR$.

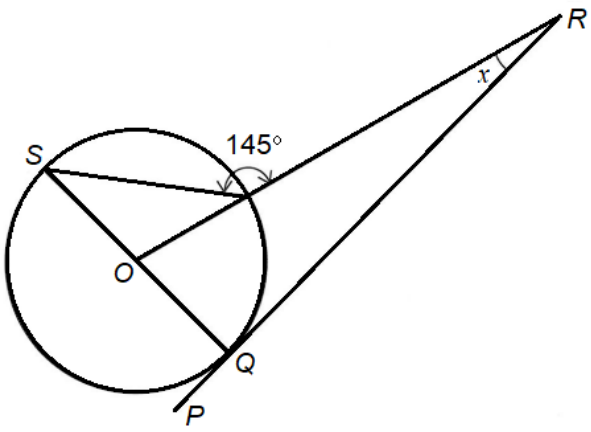


Rajah 3 / *Diagram* 3

A 20^0 **C** 40^0

B 30^0 **D** 50^0

10 Dalam Rajah 4, *PQR* ialah tangen kepada bulatan dengan pusat *O* pada titik *Q*. Diberi bahawa *SOQ* ialah diameter bulatan.
In Diagram 4, *PQR is a tangent to the circle with centre O, at point Q. Given that SOQ is a diameter of the circle.*

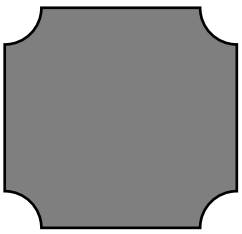


Rajah 4 / *Diagram* 4

Find the value of *x*.
Cari nilai x.

A 20 **C** 35
B 40 **D** 55

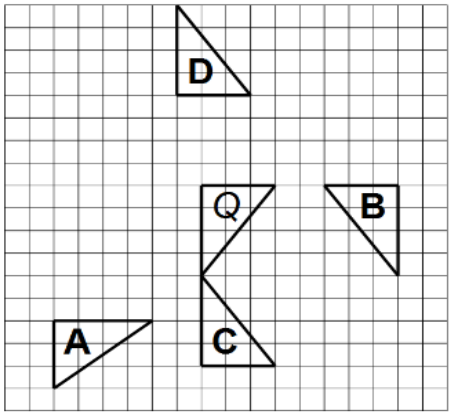
11 Nyatakan peringkat simetri putaran bagi Rajah 5.
State the order of rotational symmetry of the Diagram 5.



Rajah 5 / *Diagram* 5

A 4 **C** 2
B 3 **D** 1

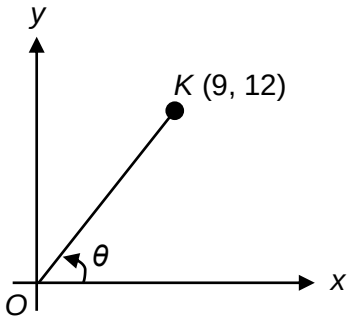
12 Rajah 6 menunjukkan lima segi tiga yang dilukis pada grid segi empat sama.
Diagram 6 *shows five triangles drawn on square grids.*



Rajah 6 / *Diagram* 6

Antara segi tiga ***A***, ***B***, ***C*** dan ***D***, yang manakah **bukan** imej bagi *Q* di bawah suatu pantulan?
Which of the triangles ***A***, ***B***, ***C*** *and* ***D*** *is* ***not*** *the image of Q under a certain reflection?*

13 Rajah 7 menunjukkan titik *K* yang diplot pada suatu satah Cartes.
Diagram 7 *shows point K plotted on a Cartesian plane*.



Rajah 7 / *Diagram* 7

Hitung nilai sin *θ*.
Calculate the value of sin *θ*.

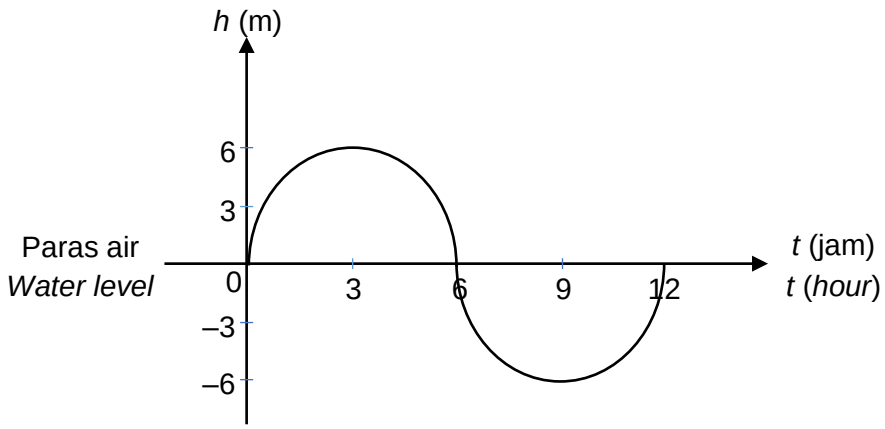
A $\frac{4}{3}$

B $\frac{4}{5}$

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

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

14 Rajah 8 menunjukkan ketinggian air laut ketika pasang surut.
Diagram 8 *shows the height of an ocean tide*.

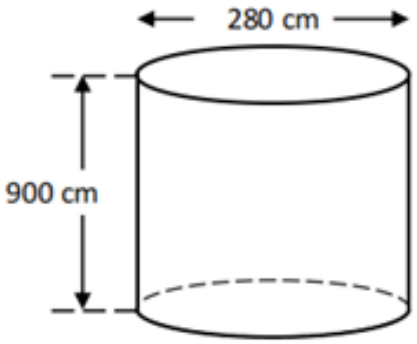


Rajah 8 / *Diagram* 8

Antara berikut, yang manakah fungsi trigonometri yang mewakili ketinggian pasang surut air itu.
Which of the following a trigonometric function that represents the height of the tide.

A 12 sin 6*t* **C** 6 sin 30*t*
B 12 cos 6*t* **D** 6 cos 30*t*

15 Rajah 9 menunjukkan sebuah silinder. Hanna memasukkan air ke dalam silinder itu sehingga penuh.
Diagram 9 *shows an empty cylinder. Hanna fills up the cylinder full with water.*



Rajah 9 / *Diagram* 9

Hitung isipadu, dalam cm^3, air yang perlu dimasukkan ke dalam lima bekas silinder yang sama saiz.
Calculate the volume, in cm^3*, of water needed to fill up five cylinders of the same size.*

A 2.772×10^8 **C** 1.764×10^8
B 5.544×10^7 **D** 7.056×10^7

16 Antara berikut, yang manakah bukan sejenis insurans am?
Which of the following is not a type of general insurance?

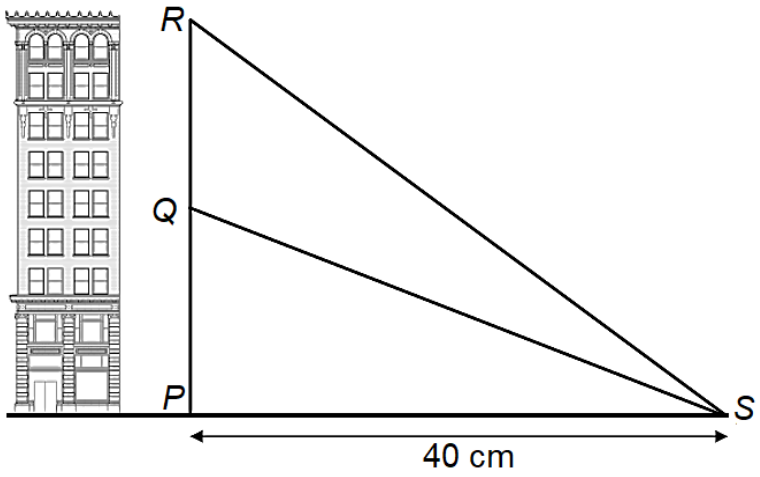
A Insurans perjalanan
Travel insurance
B Insurans kemalangan diri
Personal accident insurance
C Insurans perubatan dan kesihatan
Medical and health insurance
D Insurans kematian
Death insurance

17 Puan Kumari telah membuat potongan cukai bulanan (PCB) sebanyak RM145 daripada pendapatannya setiap bulan. Selepas mengira cukai yang perlu dibayarnya, terdapat lebihan potongan yang akan dipulangkan oleh LHDN. Antara berikut, yang manakah cukai pendapatan yang mungkin bagi Puan Kumari?
Puan Kumari has made monthly tax deduction (PCB) for RM145 *of her monthly income*. *After calculating the tax that has to be paid, there is an excess deduction that will be refunded by IRB. Which of the following is the possible income tax of Puan Kumari*?

A RM1 630 **C** RM1 850
B RM1 740 **D** RM2 300

18 Dalam Rajah 11, *P* dan *S* adalah dua titik pada permukaan mengufuk. *P, Q dan R* ialah tiga titik yang terletak pada sebuah replika bangunan. Diberi sudut dongakan *Q* dari *S* ialah 38° dan sudut dongakan *R* dari *S* ialah 55°.

In Diagram 11*, P and S are two points on a horizontal surface. P, Q and R are three points located on a replica of a building. Given the elevation angle of Q from S is* 38° *and the elevation angle of point R from S is* 55°*.*



Rajah 11 / *Diagram* 11

Hitung jarak, dalam sentimeter, bagi *QR*.

Calculate the distance, in centimeter, of QR.

A 31.25 **C** 25.88

B 57.13 **D** 28.26

19 Selesaikan / Solve $\frac{p}{3m} - \frac{1-p}{m}$.

A $\frac{pm-3m-p}{3m^2}$ **C** $\frac{4p-3}{3m}$

B $\frac{pm-3m+p}{3m^2}$ **D** $\frac{-2p-3}{3m}$

20 $3x(x - 2y) - (3x - y)^2 =$

A $-6xy + y^2$

B $-6x^2 - 6xy + y^2$

C $-6x^2 - y^2$

D $-3x^2 - 9xy - y^2$

21 Diberi $T = \frac{1}{3}\sqrt{\frac{m}{K}}$, ungkapkan *m* dalam sebutan *T* dan *K*.

Given that $T = \frac{1}{3}\sqrt{\frac{m}{K}}$ *express m in terms of T and K.*

A $m = 9KT^2$

B $m = \frac{T^2}{9K}$

C $m = 3KT^2$

D $m = \frac{T^2}{3K}$

22 Puan Fatimah mendepositkan sejumlah wang ke dalam akaun simpanannya yang memberi kadar faedah 2% setahun dan dikompaun setiap suku tahun. Berapakah deposit Puan Fatimah sekiranya wang yang terkumpul pada akhir tahun kelima adalah sebanyak RM7 734.26?

Puan Fatimah deposits a sum of money into her savings account which gives an interest rate of 2% per annum and is compounded quarterly. What is Puan Fatimah's deposit if the money accumulated at the end of the fifth year is RM7 734.26?

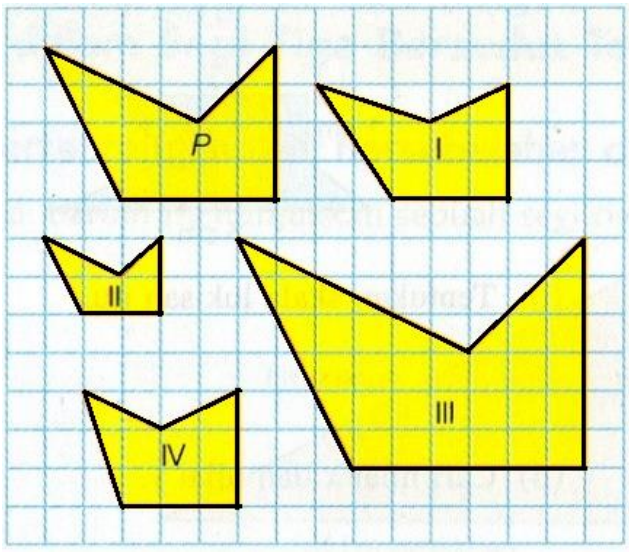
A RM7 000

B RM 7 100

C RM8 000

D RM8 200

23 Rajah 12 dilukis pada grid segiempat sama bersisi 1 unit.
Diagram 12 *is drawn on square grid sided by* 1 *unit.*



Rajah 12 / *Diagram* 12

Yang manakah merupakan lukisan berskala bagi rajah *P*?
Which is a scale drawing of figure P?

A II sahaja
II only

B I dan II sahaja
I and II only

C II dan III sahaja.
II and III only.

D II, III dan IV
II, III and IV

24 $(2m^{-2})^3 \div 2m^{-3} =$

A $4m^3$

B $\frac{m^3}{4}$

C $8m^3$

D $\frac{4}{m^3}$

25 Diberi $125^n \times \frac{1}{25} = 625^n$, cari nilai *n*.

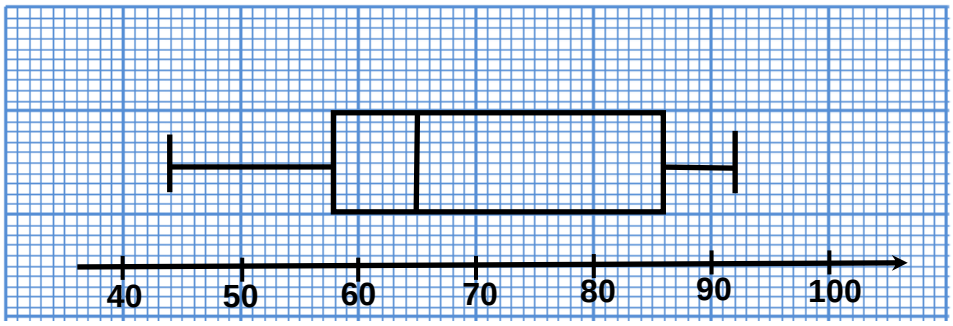
Given that $125^n \times \frac{1}{25} = 625^n$, *find the value of n.*

A -2 **C** 3

B 2 **D** -1

26 Rajah 13 menunjukkan plot kotak bagi markah Matematik yang diperolehi oleh sekumpulan murid.

Diagram 13 *shows a box plot for the Mathematics marks obtained by a group of students.*



Rajah 13 / *Diagram* 13

Hitung julat antara kuartil.

Calculate the interquartile range.

A 20 **C** 28

B 21 **D** 48

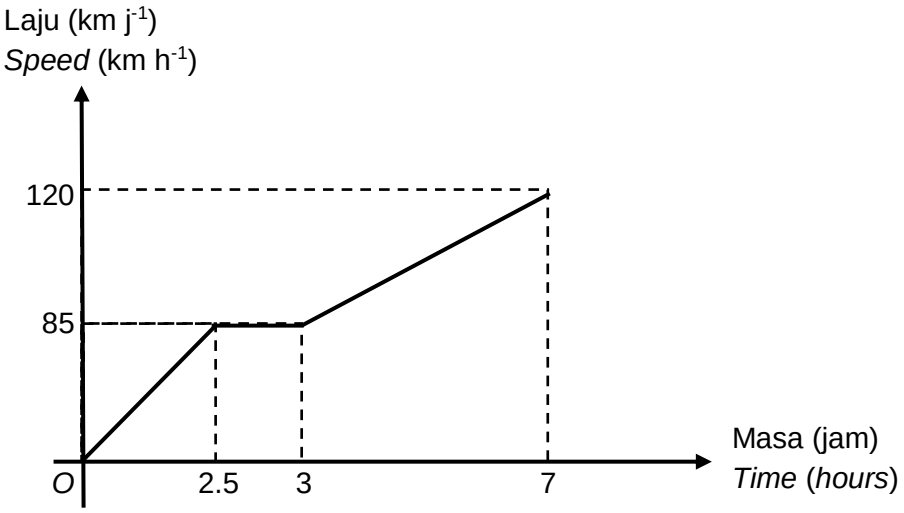
27 Senaraikan semua integer *x* yang memuaskan kedua-dua ketaksamaan linear $5x - 4 < 6$ dan $4 - x \leq 7$.

List all the integer values of x that satisfy both simultaneous linear inequalities $5x - 4 < 6$ and $4 - x \leq 7$.

A -2, -1, 0, 1 **C** -3, -2, -1, 0

B -2, -1, 0, 1, 2 **D** -3, -2, -1, 0, 1

28 Rajah 14 menunjukkan graf laju-masa gerakan sebuah kereta dari Masjid Tanah ke Kemaman.
Diagram 14 *shows the speed-time graph for the movement of a car from Masjid Tanah to Kemaman.*



Rajah 14 / *Diagram* 14

Hitung kadar perubahan laju terhadap masa, dalam km j^{-2}, bagi 4 jam terakhir.
Calculate the rate of change of speed, in km h^{-2}*, for the last* 4 *hours.*

A 7.77 **C** 17.14
B 8.75 **D** 18.46

29 Diberi bahawa satu set data terdiri daripada 9, *m*, *m*, 7, 7, 12 dan 10. Mod dan median bagi data itu masing-masing ialah 12 dan 10. Tiga nombor, 11, 13 dan 15 ditambah ke dalam set data tersebut. Hitung nilai min bagi set data yang baharu.
Given that a set of data consists of 9*, m, m,* 7, 7*,* 12 *and* 10*. The mode and the median of the data are* 12 *and* 10 *respectively. Three numbers,* 11*,* 13 *and* 15 *are added into the set of data. Calculate the mean of the new set of data.*

A 10.4 **C** 11.6
B 10.8 **D** 12.1

30 Jadual 1 menunjukkan kekerapan bagi skor yang diperolehi dalam satu permainan.
Table 1 *shows the frequency of the score obtained in a game.*

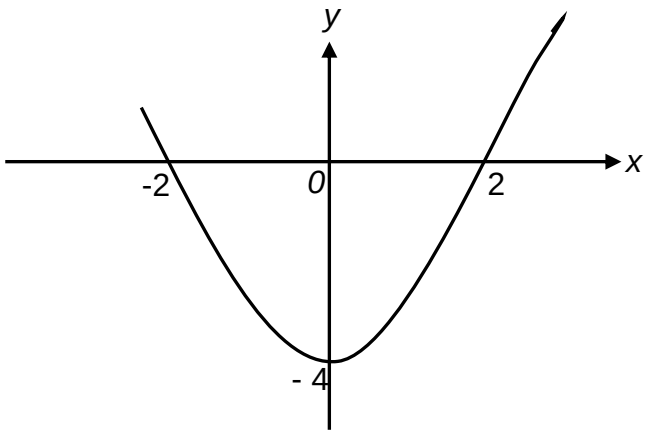
Skor / *Score*	0	1	2	3	4
Bilangan murid / *Number of students*	*x*	4	2	3	6

Jadual 1 / *Table* 1

Diberi bahawa skor median ialah 2, cari nilai *x* yang mungkin.
Given that the median score is 2*, find the possible value of x.*

A 1 **C** 3
B 2 **D** 4

31 Rajah 16 menunjukkan suatu fungsi kuadratik yang dilukis pada satu satah Cartes.
Diagram 16 *shows a quadratic equation drawn on a Cartesian plane.*



Rajah 16 / *Diagram* 16

Cari persamaan bagi graf itu.
Find the equation of the graph.

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

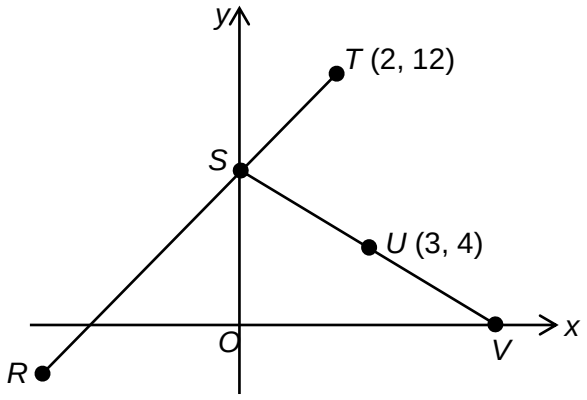
32 Diberi bahawa set $P = \{3, 4, 5, 7\}$ dan set $Q = \{1, 2, 4, 5, 7, 8\}$. Senaraikan semua unsur bagi set $P \cap Q$.
It is given that set $P = \{3, 4, 5, 7\}$ and set $Q = \{1, 2, 4, 5, 7, 8\}$. List all the elements of set $P \cap Q$.

A {4,5,7} **C** {4,5,8}
B {3,4,5} **D** {3,4,5,7}

33 Diberi set semesta, $\xi = \{x : 10 \leq x \leq 30, x$ ialah integer$\}$, set $J = \{x : x$ mempunyai digit 2 atau 6$\}$, set $K = \{x : x$ ialah nombor perdana$\}$ dan set $L = \{x : x$ ialah nombor dengan hasil tambah digitnya sama dengan 4$\}$. Cari $n(J \cup K \cup L)'$.
Given the universal set, $\xi = \{x : 10 \leq x \leq 30, x$ is an integer$\}$, set $J = \{x : x$ has digit 2 or 6$\}$, set $K = \{x : x$ is a prime number$\}$ and set $L = \{ x : x$ is a number with the sum of its digits which equals to 4$\}$. Find $n(J \cup K \cup L)'$.

A 3 **C** 8
B 5 **D** 16

34 Rajah 17 menunjukkan dua garis lurus *RST* dan *SUV*, pada suatu satah Cartes.
Diagram 17 *shows two straight line RST and SUV*, *on a Cartesian plane*.



Rajah 17 / *Diagram* 17

U ialah titik tengah *SV*. Carikan pintasan-*x* bagi garis lurus *RST*.
U is a midpoint of SV. Find x–intercept of a straight line RST.

A -2 **C** -4
B -3 **D** -5

35 Rajah 18 menunjukkan sebuah peti keselamatan. Untuk membuka peti keselamatan itu, satu kod terdiri daripada lima digit perlu dimasukkan. Amy masih ingat digit pertama hingga digit keempat tetapi terlupa digit terakhir kod tersebut. Bagaimanapun dia pasti digit terakhir itu ialah satu nombor perdana. Jika Amy menekan nombor ganjil secara rawak bagi digit akhir kod itu, apakah kebarangkalian bahawa dia berjaya membuka peti keselamatan itu dengan satu percubaan?

Diagram 18 *shows a safety box. To open the safety box, a code consists of five digits needs to be keyed in. Amy remembered the first to the fourth digit of the code but she forgot the last one. However, Amy was sure that the last digit was an odd number. If Amy tried to key in the prime number randomly as the last digit, what is the probability that she can succeeded opening the box in one try?*

Rajah 18 / *Diagram* 18

A $\frac{1}{4}$

B $\frac{3}{5}$

C $\frac{4}{9}$

D $\frac{5}{9}$

36 $\begin{pmatrix}-1\\4\end{pmatrix}-\frac{1}{2}\begin{pmatrix}8\\-2\end{pmatrix}+\begin{pmatrix}3\\-5\end{pmatrix}=$

A $\begin{pmatrix}6\\-3\end{pmatrix}$

B $\begin{pmatrix}6\\0\end{pmatrix}$

C $\begin{pmatrix}-2\\0\end{pmatrix}$

D $\begin{pmatrix}-2\\-3\end{pmatrix}$

37 Diberi $\begin{pmatrix}2\\p\end{pmatrix}(-3 \quad 1) = \begin{pmatrix}-6 & 2\\6 & -2\end{pmatrix}$, hitung nilai *p.*

Given $\begin{pmatrix}2\\p\end{pmatrix}(-3 \quad 1) = \begin{pmatrix}-6 & 2\\6 & -2\end{pmatrix}$*, calculate the value of p.*

A 6 **C** 4

B -2 **D** -3

38 Sebuah kotak mengandungi 150 keping kad yang setiap satunya ditanda dengan satu huruf abjad. Jika sekeping kad dicabut secara rawak dari kotak itu, kebarangkalian memilih sekeping kad berhuruf *M* ialah $\frac{3}{10}$. Kemudian, 15 keping kad berhuruf *M* ditambahkan ke dalam kotak itu. Jika sekeping kad dicabut secara rawak dari kotak itu, cari kebarangkalian memilih sekeping kad berhuruf *M*.

A box contains 150 *cards where each card is marked with a letter of the alphabet. If a card is chosen at random from the box, the probability of choosing a card marked with the letter M is* $\frac{3}{10}$ *. Next,* 15 *cards marked with the letter M are added to the box. If a card is chosen at random from the box, find the probability of choosing a card marked with the letter M.*

A $\frac{1}{10}$ **C** $\frac{3}{10}$

B $\frac{1}{5}$ **D** $\frac{4}{11}$

39 Diberi $h \propto \frac{1}{k}$. antara berikut yang manakah benar?

Given that $h \propto \frac{1}{k}$ *. Which of the following is correct*?

I Apabila *h* meningkat, maka *k* meningkat.
When h increases, then k increases.

II Graf *h* melawan $\frac{1}{k}$ adalah satu garis lurus melalui asalan.
Graph h against $\frac{1}{k}$ *is a straight line passing through the origin.*

III Hasil darab *h* dan *k* adalah satu pemalar.
The product of h and k is a constant.

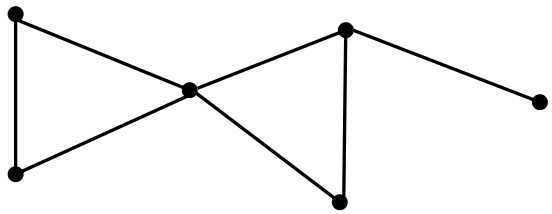
A I sahaja
I *only*

B II sahaja
II *only*

C I dan II sahaja
I *and* II *only*

D II dan III sahaja
II *and* III *only*

40 Rajah 19 menunjukkan satu graf mudah.
Diagram 19 *shows a simple graph.*



Rajah 19 / *Diagram* 19

Nyatakan bilangan darjah graf tersebut.
State the sum of degrees of the graph.

A 14

B 12

C 7

D 6

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER