

MATHEMATICAL FORMULAE
RUMUS MATEMATIK

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

Rumus – rumus berikut boleh membantu anda menjawab soala. Simbol – symbol yang dibeai adalah yang biasa digunakan.

**RELATIONS
PERKAITAN**

$$1 \quad a^m \times a^n = a^{m+n}$$

$$2 \quad a^m \div a^n = a^{m-n}$$

$$3 \quad (a^m)^n = a^{mn}$$

$$4 \quad A^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$5 \quad P(A) = \frac{n(A)}{n(S)}$$

$$6 \quad P(A') = 1 - P(A)$$

$$7 \quad \begin{array}{l} \text{Distance / Jarak} \\ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \end{array}$$

$$8 \quad \begin{array}{l} \text{Midpoint / Titik tengah} \\ (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \end{array}$$

$$9 \quad \text{Average speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

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

$$10 \quad \begin{array}{l} \text{Mean} = \frac{\text{sum of data}}{\text{number of data}} \\ \text{Min} = \frac{\text{hasil tambah nilai data}}{\text{bilangan data}} \end{array}$$

$$11 \quad \text{Mean} = \frac{\text{sum of (class mark} \times \text{frequency)}}{\text{sum of frequencies}}$$

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

$$12 \quad \begin{array}{l} \text{Pythagoras Theorem} \\ \text{Teorem Pithagoras} \\ c^2 = a^2 + b^2 \end{array}$$

$$13 \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$14 \quad \begin{array}{l} m = -\frac{y - \text{intercept}}{x - \text{intercept}} \\ m = -\frac{p \text{ int asan} - y}{p \text{ int asan} - x} \end{array}$$

SHAPES AND SPACE
BENTUK DAN RUANG

1	Area of trapezium = $\frac{1}{2} \times \text{sum of parallel sides} \times \text{height}$ <i>Luas trapezium = $\frac{1}{2} \times \text{hasil tambah dua sisi selari} \times \text{tinggi}$</i>	13	$\frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$ $\frac{\text{luas sektorr}}{\text{luas bulatan}} = \frac{\text{sudut pusat}}{360^\circ}$
2	Circumference of circle = $\pi d = 2\pi r$ <i>Lilitan bulatan = $\pi d = 2\pi j$</i>	14	Scale factor, $k = \frac{PA'}{PA}$ Faktor skala, $k = \frac{PA'}{PA}$
3	Area of circle = πr^2 <i>Luas bulatan = πj^2</i>	15	Area of image = $k^2 \times \text{area of object}$ <i>Luas imej = $k^2 \times \text{luas objek}$</i>
4	Curved area of cylinder = $2\pi r h$ <i>Luas permukaan melengkung silinder = $2\pi j t$</i>		
5	Surface area of sphere = $4\pi r^2$ <i>Luas permukaan sfera = $4\pi j^2$</i>		
6	Volume of right prism = cross sectional area $\times$ length <i>Isi padu prisma tegak = luas keratin rentas $\times$ panjang</i>		
7	Volume of cylinder = $\pi r^2 h$ <i>Isi padu silinder = $\pi j^2 t$</i>		
8	Volume of cone = $\frac{1}{3} \pi r^2 h$ <i>Isi padu kon = $\frac{1}{3} \pi j^2 t$</i>		
9	Volume of sphere = $\frac{4}{3} \pi r^3$ <i>Isi padu sfera = $\frac{4}{3} \pi j^3$</i>		
10	Volume of right pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$ <i>Isi padu prisma tegak = $\frac{1}{3} \times \text{luas tapak} \times \text{tinggi}$</i>		
11	Sum of interior angles of a polygon / <i>Hasil tambah sudut pedalaman polygon</i> $= (n - 2) \times 180^\circ$		
12	$\frac{\text{arc length}}{\text{circumference of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$ $\frac{\text{panjang lengkuk}}{\text{lilitan bulatan}} = \frac{\text{sudut pusat}}{360^\circ}$		

- 1 Round off 6.578 correct to three significant figures.

Bundarkan 6.578 betul kepada tiga angka bererti.

- | | |
|---------------|----------------|
| A 6.58 | B 6.580 |
| C 6.60 | D 6.600 |

- 2 Express 0.00000431 in standard form.

Ungkapkan 0.00000431 dalam bentuk piawai .

- | | |
|-----------------------------|--------------------------------|
| A 43.1×10^7 | B 43.1×10^{-7} |
| C 4.31×10^6 | D 4.31×10^{-6} |

- 3 A rectangular floor of a school hall has a length of 45 m and a width of 25 m.

Square tiles with length 30 cm is used to cover the floor.

Calculate the number of tiles required to cover the floor completely.

Suatu lantai dewan sekolah yang berbentuk segi empat tepat mempunyai panjang

45 m dan lebar 25 m. Jubin bersegi empat sama dengan panjang 30 cm digunakan untuk menutup lantai itu. Hitung bilangan keping jubin yang perlu digunakan untuk menutup seluruh lantai dewan itu.

- | | |
|-----------------------------|-----------------------------|
| A 1.25×10^3 | B 1.25×10^4 |
| C 1.25×10^5 | D 1.25×10^6 |

- 4 Diagram 1 shows a cubical water tank.

Rajah 1 menunjukkan sebuah tangki air berbentuk kuboid.

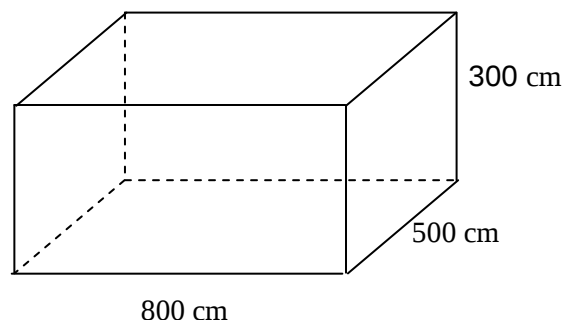


Diagram 1 /Rajah 1

Shanaz used 20% of the water from the tank to watering the plants.

Calculate the remaining volume, in cm^3 , of the water in the tank.

Shanaz menggunakan 20% air dari tangki itu untuk menyiram pokok.

Hitung baki isipadu, dalam cm^3 , air dalam tangki itu.

- | | |
|----------------------------|----------------------------|
| A 1.2×10^6 | B 1.2×10^8 |
| C 9.6×10^7 | D 9.6×10^9 |

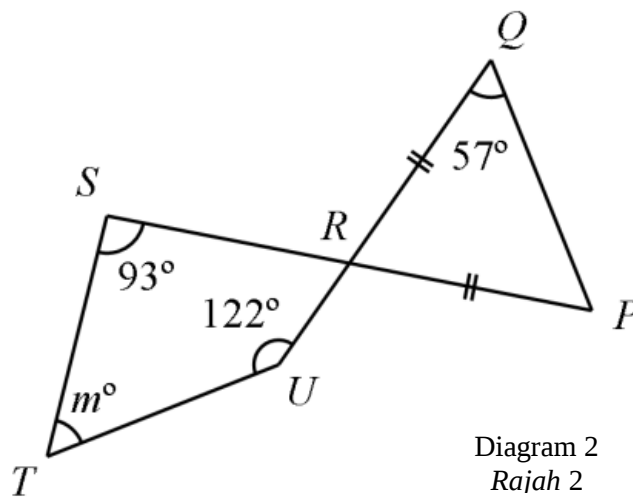
- 5 Express $4 \times 5^3 + 2 \times 5^1 + 3 \times 5^0$ as a number in base five.
 Nyatakan $4 \times 5^3 + 2 \times 5^1 + 3 \times 5^0$ sebagai satu nombor dalam asas lima.

A	4015_5	B	4023_5
C	4030_5	D	4230_5

- 6 $101000_2 - 1100_2 =$

A	10100_2	B	11100_2
C	101001_2	D	111001_2

- 7 In Diagram 2, PRS and QRU are straight lines.
 Dalam Rajah 2, PRS dan QRU ialah garis lurus.

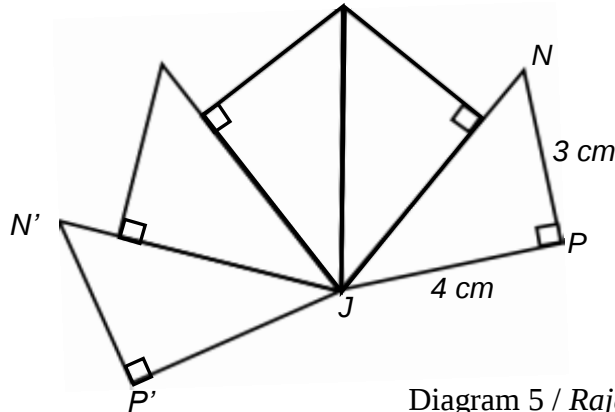


The value of m is
 Nilai m ialah

A	66	B	69
C	79	D	88

- 10 Diagram 5 shows a pattern formed where right-angled triangle $JP'N'$ is the image of right-angled triangle JPN under several types of transformations.

Rajah 5 menunjukkan satu corak yang dihasilkan dengan keadaan segi tiga bersudut tegak JP'N' ialah imej bagi segi tiga bersudut tegak JPN di bawah beberapa jenis penjelmaan.

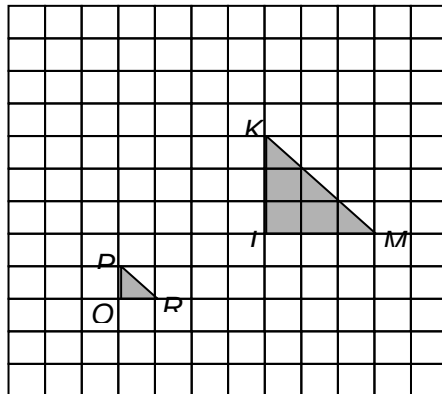


Find the minor angle of PJP' .

Cari sudut minor PJP'. P'

- | | | | |
|----------|-------------|----------|-------------|
| A | $36^0 52'$ | B | $175^0 39'$ |
| C | $184^0 21'$ | D | $195^0 30'$ |

- 11** Diagram 6 shows triangle KLM and triangle PQR drawn on a grid of squares with sides of 1 cm.
Rajah 6 menunjukkan segi tiga KLM dan segi tiga PQR yang dilukis pada satu grid segi empat sama dengan sisi 1 cm.



Triangle KLM is the image of triangle PQR under an enlargement of scale factor 3. Find the distance, in cm, of point L from the centre of enlargement.

Segi tiga KLM ialah imej bagi segi tiga PQR di bawah satu pembesaran dengan faktor skala 3. Cari jarak, dalam cm, titik L dari pusat pembesaran itu.

- | | | | |
|----------|---|----------|------|
| A | 4 | B | 4.47 |
| C | 6 | D | 6.71 |

- 12 Diagram 7 shows $y = \sin x^\circ$.
Rajah 7 menunjukkan $y = \sin x^\circ$.

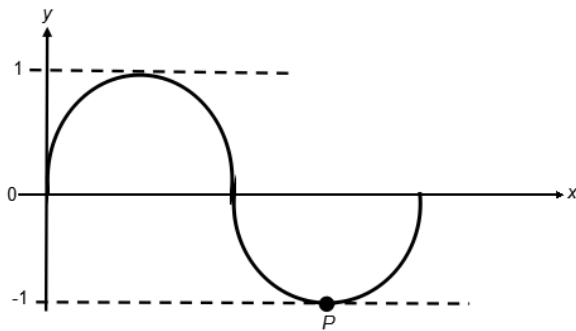


Diagram 7/ *Rajah 7*

Find the coordinates of the point P .

Cari koordinat titik P .

- | | | | |
|----------|-------------------|----------|-------------------|
| A | $(135^\circ, -1)$ | B | $(180^\circ, -1)$ |
| C | $(270^\circ, -1)$ | D | $(360^\circ, -1)$ |

- 13 Diagram 8 shows a unit circle. O is the origin of a Cartesian plane.
Rajah 8 menunjukkan sebuah bulatan unit. O ialah asalan pada suatu satah Cartesian.

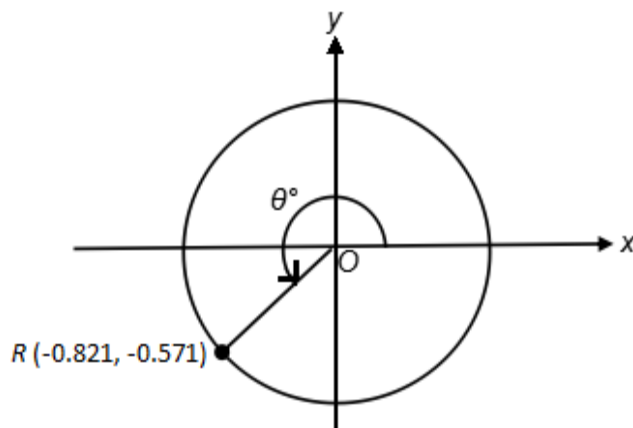


Diagram 8 / *Rajah 8*

Find the value of θ .

Cari nilai θ .

- | | | | |
|----------|----------------|----------|----------------|
| A | 230.15° | B | 223.15° |
| C | 219.85° | D | 214.82° |

- 14 Diagram 9 shows a cuboid with a horizontal base $TUVW$.

Rajah 9 menunjukkan sebuah kuboid yang mempunyai tapak mengufuk $TUVW$.

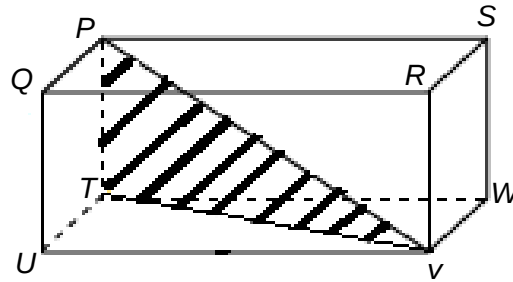


Diagram 9

Rajah 9

The angle between the plane PTV and the plane $PTWS$ is

Sudut di antara satah PTV dengan satah $PTWS$ ialah

A $\angle PVW$

B $\angle SPV$

C $\angle WTV$

D $\angle TWV$

- 15 Diagram 10 shows a vertical pole PQ . R is a point which is 25 m from Q on horizontal plane. The point P is vertically above point Q .

Rajah 10 menunjukkan sebatang tiang tegak PQ . R ialah satu titik yang berjarak 25 m dari Q .

Titik P berada tegak di atas titik Q .

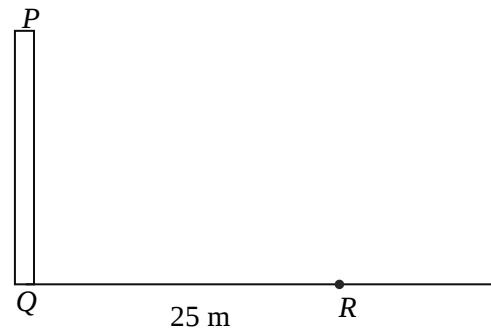


Diagram 10 / *Rajah 10*

The angle of elevation of point P from point R is 50° . Calculate the height, in m, of the pole.

Sudut dongakan titik P dari titik R ialah 50° . Hitung tinggi, dalam m, tiang itu.

A 16.07

C 29.79

B 19.15

D 38.89

- 16 Borhan was a scout who had been assigned to measure the height of the flag before replacing the rope of the flag pole of his school who had appeared to be rotten .

The Diagram 11 shows the position Borhan and flag pole.

Borhan adalah seorang pengakap yang telah ditugaskan untuk mengukur ketinggian bendera sebelum menggantikan tali bagi tiang bendera sekolahnya yang telah kelihatan reput.

Rajah 11 menunjukkan kedudukan Borhan dan tiang bendera.

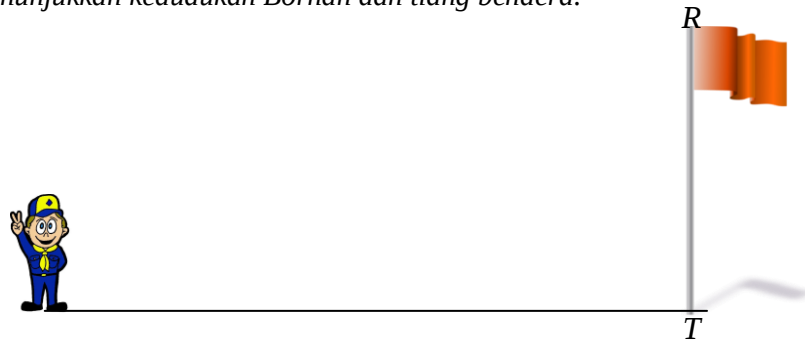


Diagram 11/ Rajah 11

It is given that Borhan height is 1.63 m, Borhan is standing 20 m from flagpole and the angle of elevation of Borhan to the top of the pole is 53° .

Find the height, in m, of the flag pole.

Diberi tinggi Borhan adalah 1.63 m, Borhan berdiri 20 m dari tiang bendera dan sudut dongakan Borhan dengan puncak tiang ialah 53° .

Cari, dalam m, tinggi tiang bendera itu.

- | | | | |
|---|-------|---|-------|
| A | 26.54 | C | 15.71 |
| B | 28.17 | D | 16.70 |

- 17 Diagram 12 shows three points P , Q and R on a horizontal plane. P lies due north of Q and the bearing of point R from P is 226° .

Rajah 12 menunjukkan tiga titik P , Q dan R yang terletak pada suatu satah mengufuk. P berada ke utara Q dan bearing R dari P ialah 226° .

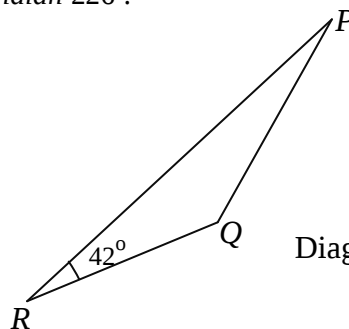


Diagram 12 / Rajah 12

Find the bearing of Q from R .

Cari bearing Q dari R .

- | | | | |
|---|-------------|---|-------------|
| A | 088° | B | 268° |
| C | 092° | D | 272° |

- 18 P (65°S , 50°E), Q and R are three points on the surface of the earth. An airplane took off from P and then flew due east to Q . Given that PQ is the diameter of the parallel of latitude 65°S . Find the location of Q .

$P(65^{\circ}\text{S}$, 50°T), Q dan R ialah tiga titik dipermukaan bumi. Sebuah pesawat berlepas dari P dan terbang ke arah timur mengikut selarian latitudnya hingga tiba di Q . Diberi PQ ialah diameter selarian latitud 65°S .

Cari kedudukan bagi Q .

- | | | | |
|---|--|---|---|
| A | (65°S , 130°W) | B | (65°N , 50°E) |
| | (65°S , 130°B) | | (65°U , 50°T) |
| C | (65°N , 130°W) | D | (25°N , 50°T) |
| | (65°U , 130°B) | | (25°U , 50°T) |

- 19 Factorise completely $5p^3 - 125p$
Faktorkan selengkapnya $5p^3 - 125p$

- | | | | |
|---|--------------------|---|-------------------|
| A | $5p(p^2 - 25)$ | B | $p(p + 5)(p - 5)$ |
| C | $5p(p + 5)(p - 5)$ | D | $5(p - 5)(p - 5)$ |

- 20 Express $\frac{4m + 3}{5n} - \frac{2mn - 6n}{10n^2}$ as a single fraction in its simplest form.

Ungkapkan $\frac{4m + 3}{5n} - \frac{2mn - 6n}{10n^2}$ sebagai pecahan tunggal dalam bentuk terendah.

- | | | | |
|---|---------------------|---|---------------------|
| A | $\frac{3m + 6}{5n}$ | B | $\frac{3m - 6}{5n}$ |
| C | $\frac{m + 2}{5n}$ | D | $\frac{m - 2}{5n}$ |

- 21 Given that $3g = \frac{h - 4}{2 - h}$, express h in terms of g .

Diberi $3g = \frac{h - 4}{2 - h}$, ungkapkan h dalam sebutan g .

- | | | | |
|---|-----------------------------|---|-----------------------------|
| A | $h = \frac{2g + 4}{1 + g}$ | B | $h = \frac{2g + 4}{g - 1}$ |
| C | $h = \frac{6g + 4}{1 + 3g}$ | D | $h = \frac{6g - 4}{3g - 1}$ |

- 22 Diagram 13 shows the entry ticket price for a Rainbow Theme Park.
Rajah 13 menunjukkan harga tiket masuk bagi Rainbow Theme Park.



Diagram 13 / *Rajah 13*

The ticket price for 3 adults and 2 children is RM64. Write an equation for the ticket price of an adult in terms of the ticket price of a child.

Harga tiket untuk 3 orang dewasa dan 2 orang kanak-kanak ialah RM64. Tulis satu persamaan bagi harga tiket untuk seorang dewasa dalam sebutan harga tiket untuk seorang kanak-kanak.

- | | |
|---|---|
| <p>A $b = \frac{64-3a}{2}$</p> <p>C $a = \frac{64-2b}{3}$</p> | <p>B $b = \frac{64-2a}{3}$</p> <p>D $a = \frac{64-3b}{2}$</p> |
|---|---|
- 23 $y^{-5} \times 2y^3 =$
- | | |
|--|--|
| <p>A $\frac{2}{y^2}$</p> <p>C $2y^2$</p> | <p>B $\frac{1}{2}y^2$</p> <p>D $\frac{1}{2}y^{-2}$</p> |
|--|--|
- 24 Simplify / *Ringkaskan* $\left(3 \times 8^{\frac{1}{3}}\right)^3 \div \left(27^{\frac{2}{3}} \times 32^{\frac{1}{5}}\right)$
- | | |
|------------------------|------------------------|
| <p>A 2</p> <p>C 12</p> | <p>B 3</p> <p>D 24</p> |
|------------------------|------------------------|

- 25 The solution for $x \leq 2x - \frac{1}{4}$

Penyelesaian bagi $x \leq 2x - \frac{1}{4}$

A $x \geq \frac{1}{4}$

B $x \leq \frac{1}{4}$

C $x \geq \frac{1}{2}$

D $x \leq \frac{1}{2}$

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

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

A $-2, -1, 0, 1$

B $-3, -2, -1, 0$

C $-2, -1, 0, 1, 2$

D $-3, -2, -1, 0, 1$

- 27 Diagram 14 shows an incomplete line graph representing the number of cars sold in the first six months of the year. The profit gained in March is RM7000.

Rajah 14 menunjukkan graf garis yang tidak lengkap yang mewakili bilangan kereta yang dijual bagi 6 bulan pertama bagi suatu tahun. Keuntungan diperolehi dalam bulan Mac ialah RM7000.

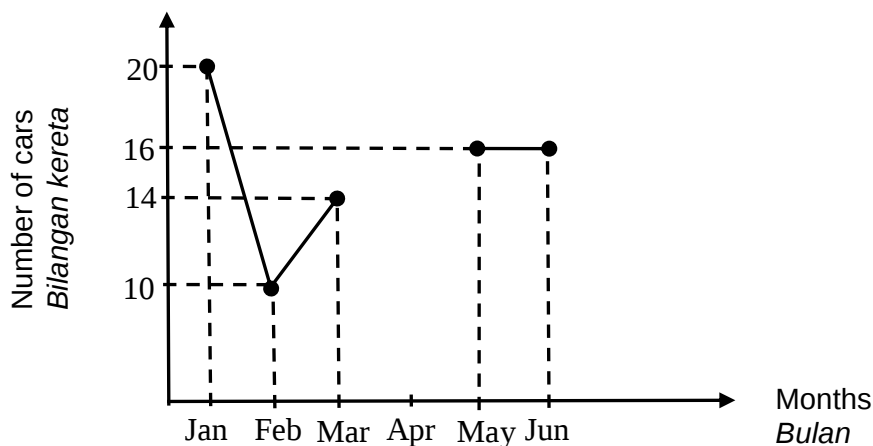


Diagram 14 / Rajah 14

If the total profit for the first six months is RM45 500, find the total number of cars sold in April.

Jika keuntungan bagi enam bulan pertama ialah RM45 500, cari jumlah kereta yang dijual dalam bulan April.

A 14

B 15

C 16

D 17

- Jadual 1 menunjukkan bilangan buku yang dibeli oleh sekumpulan pelajar dalam satu sekolah.

Number of books <i>Bilangan buku</i>	1	2	3	4	5
Frequency <i>Kekerapan</i>	4	6	6	9	10

Table 1 / *Jadual 1*

Beza antara mod dan median bagi data tersebut di atas ialah

- | | | | |
|---|---|---|---|
| A | 0 | B | 1 |
| C | 2 | D | 3 |

- Jadual 2 menunjukkan hasil darab kekerapan dan skor bagi setiap skor dalam satu kuiz.

Score <i>Skor</i>	Frequency $\times$ Score <i>Kekerapan $\times$ Skor</i>
1	7
2	16
3	<i>P</i>
4	16
5	30

Table 2 / *Jadual 2*

Diberi terdapat 30 skor dalam kuiz itu, cari min skor.

- A** 2.5
B 2.6
C 2.7
D 2.8

30. Diagram 15 shows a graph on a Cartesian plane

Rajah 15 menunjukkan suatu graf pada satah Cartes.

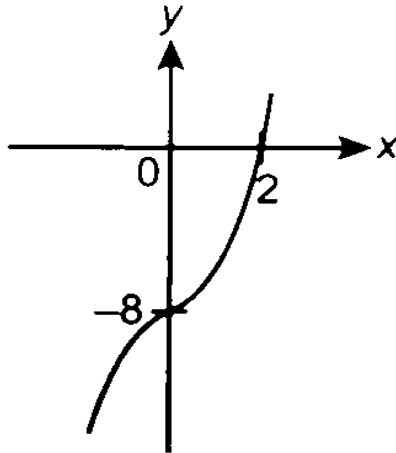


Diagram 15 / Rajah 15

Which of the following is the equation of the graph.

Antara yang berikut , yang manakah adalah persamaan bagi graf itu.

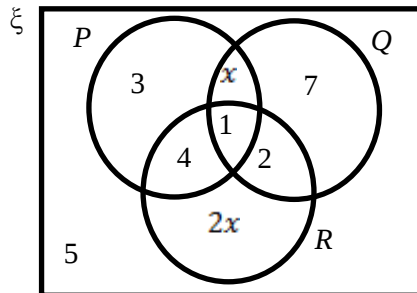
- | | |
|------------------|-------------------|
| A $y = -x^3 - 8$ | B $y = -2x^3 - 8$ |
| C $y = x^3 - 8$ | D $y = 2x^3 - 8$ |

31. List all the subset of set $M = \{2, 3, 5\}$

Senaraikan semua subset bagi set $M = \{2, 3, 5\}$

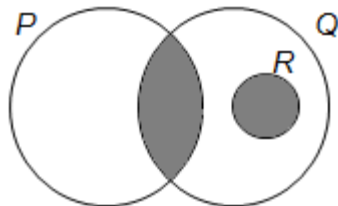
- A $\{2\}, \{3\}, \{5\}, \{2, 3\}, \{2, 5\}, \{3, 5\}, \{2, 3, 5\}, \{ \}$
- B $\{2\}, \{3\}, \{5\}, \{2, 3\}, \{2, 5\}, \{3, 5\}, \{2, 3, 5\}$
- C $\{2\}, \{3\}, \{5\}, \{2, 3, 5\}$
- D $\{2\}, \{3\}, \{5\}$

- Rajah 16 ialah gambar rajah Venn yang menunjukkan bilangan unsur dalam set semesta, ξ , set P , set Q dan set R .



D 7

- Rajah 17 menunjukkan gambarajah Venn dengan keadaan set semesta, $\xi = P \cup Q \cup R$.



D $(P \cup Q) \cap R$

- 34 In Diagram 18 , GH is a straight line on a Cartesian plane.

Dalam Rajah 18 , GH ialah garis lurus pada suatu satah Cartesian.

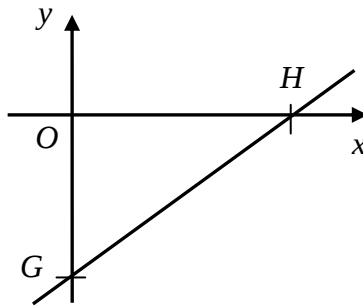


Diagram 18 / Rajah 18

It is given that $OG : OH = 3 : 4$. Find the gradient of the straight line GH .

Diberi bahawa $OG : OH = 3 : 4$. Cari kecerunan bagi garis lurus GH .

- | | | | |
|---|----------------|---|----------------|
| A | $\frac{3}{4}$ | B | $\frac{4}{3}$ |
| C | $-\frac{3}{4}$ | D | $-\frac{4}{3}$ |

- 35 The straight line PQ has a gradient of $-\frac{1}{2}$. The coordinates of point Q is $(0, -6)$.

Find the x-intercept of the straight line PQ .

Garis lurus PQ mempunyai kecerunan $-\frac{1}{2}$. Koordinat titik Q ialah $(0, -6)$.

Cari pintasan-x bagi garis lurus PQ .

- | | | | |
|---|----|---|-----|
| A | 12 | B | 3 |
| C | -3 | D | -12 |

- 36 Sofea tossed a coin 300 times .The number of times she obtained heads is 180.

Calculate the number of times she is expected to get tails if she tossed the coin 500 times.

Sofea melambung sekeping syiling 300 kali.Bilangan kali dia mendapat kepala ialah 180.

Kira berapa kali sofea dijangka mendapat ekor jika dia melambung syiling sebanyak 500 kali.

- | | | | |
|---|-----|---|-----|
| A | 120 | B | 180 |
| C | 200 | D | 300 |

- 37 Given set $P = \{T, R, A, N, S, F, O, R, M, A, T, I, O, N\}$. If a letter is chosen at random from the set P , find the probability that the letter A is **not** chosen.

Diberi bahawa set $P = \{T, R, A, N, S, F, O, R, M, A, T, I, O, N\}$

Jika satu huruf dipilih secara rawak dari set P , cari kebarangkalian huruf A **tidak** dipilih.

- | | | | |
|----------|---------------|----------|---------------|
| A | $\frac{1}{7}$ | B | $\frac{2}{7}$ |
| C | $\frac{5}{7}$ | D | $\frac{6}{7}$ |

- 38 The relation between p , m and n is given as $p \propto \frac{\sqrt[3]{m}}{n}$
It is given that $p = 4$ when $m = 8$ and $n = 6$. Find the value of p when $m = 64$ and $n = 3$.

Hubungan di antara p , m dan n diberi sebagai $p \propto \frac{\sqrt[3]{m}}{n}$

Diberi $p = 4$ bila $m = 8$ dan $n = 6$. Cari nilai p bila $m = 64$ dan $n = 3$.

- | | | | |
|----------|----|----------|----|
| A | 16 | B | 24 |
| C | 32 | D | 48 |

- 39 P varies inversely as the square root of M . By using k as a constant, express k in terms of P and M .

P berubah secara songsang dengan punca kuasa dua M . Dengan menggunakan k sebagai pemalar, ungkapkan k dalam sebutan P dan M .

- | | | | |
|----------|------------------------|----------|---------------------------------|
| A | $k = PM^{\frac{1}{2}}$ | B | $k = \frac{P}{M^{\frac{1}{2}}}$ |
| C | $k = PM^2$ | D | $k = \frac{P}{M^2}$ |

- 40 Given matrix $P = \begin{pmatrix} 5 & -1 \end{pmatrix}$ and matrix $Q = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$, then PQ is

Diberi matrik $P = \begin{pmatrix} 5 & -1 \end{pmatrix}$ dan matrik $Q = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$, maka PQ ialah

- | | | | |
|----------|---|----------|--|
| A | $\begin{pmatrix} 17 \end{pmatrix}$ | B | $\begin{pmatrix} 20 \\ -3 \end{pmatrix}$ |
| C | $\begin{pmatrix} 20 & -3 \end{pmatrix}$ | D | $\begin{pmatrix} 20 & -4 \\ 15 & -3 \end{pmatrix}$ |

END OF QUESTION PAPER