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 soalan. Simbol-simbol yang diberi adalah biasa digunakan.

RELATIONS
PERKAITAN

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 Distance / *jarak*

$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

6 Midpoint / *Titik tengah*

$(x, y) = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

7 $\text{Average speed} = \frac{\text{distance travelled}}{\text{time taken}}$

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

8 $\text{Mean} = \frac{\text{sum of data}}{\text{number of data}}$

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

9 $\text{Mean} = \frac{\text{Sum of (classmark} \times \text{frequency)}}{\text{sum of frequencies}}$

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

10 Pythagoras Theorem
Teorem Pithagoras
$c^2 = a^2 + b^2$

11 $P(A) = \frac{n(A)}{n(S)}$

12 $P(A') = 1 - P(A)$

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

14 $m = -\frac{y\text{-intercept}}{x\text{-intercept}}$

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

SHAPES AND SPACE

BENTUK DAN RUANG

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

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

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

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

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

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

6 Volume of right prism = cross sectional area × length
Isipadu prisma tegak = *luas keraain rentas* × *panjang*

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

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

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

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

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

10 Volume of right pyramid = $\frac{1}{3}$ × base area × height

Isipadu pyramid tegak = $\frac{1}{3}$ × *luas tapak* × *tinggi*

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

12 $$\frac{\text{arc length}}{\text{circumfere nce of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$$

$$\frac{panjang\ lengkuk}{lilitan\ bulatan} = \frac{sudut\ pusat}{360^\circ}$$

13 $$\frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$$

$$\frac{luas\ sektor}{luas\ bulatan} = \frac{sudut\ pusat}{360^\circ}$$

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

Factor skala, $k = \frac{PA'}{PA}$

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

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

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

1 Round off 69919 correct to three significant figures.

Bundarkan 69919 *betul kepada tiga angka bererti.*

A 700

B 7000

C 69900

D 69920

2 Express 0.0196 in standard form.

Ungkapkan 0.0196 *dalam bentuk piawai.*

A 1.96×10^{-3}

B 1.96×10^{-2}

C 1.96×10^{2}

D 1.96×10^{3}

3 $\dfrac{0.0015}{3+2\times10^{-1}} =$

A 4.6875×10^{4}

B 2.005×10^{-1}

C 4.6875×10^{-4}

D 3.0×10^{-5}

4 Given that x is a number in base 2 such that $31_8 < x < 11110_2$, the possible value of x is

Diberi bahawa x ialah nombor dalam asas 2 *dengan keadaan* $31_8 < x < 11110_2$, *nilai yang mungkin bagi x ialah*

A 10111_2

B 11000_2

C 11011_2

D 11111_2

5 Express $3 \times 5^3 + 2$ as a number in base five.

Ungkapkan $3 \times 5^3 + 2$ *sebagai nombor dalam asas lima.*

A 23_5

B 32_5

C 302_5

D 3002_5

6 In Diagram 1, *ABCD* is a quadrilateral and *AB* is parallel to *CE*.

Dalam Rajah 1, *ABCD ialah sebuah sisiempat dan AB adalah selari dengan CE.*

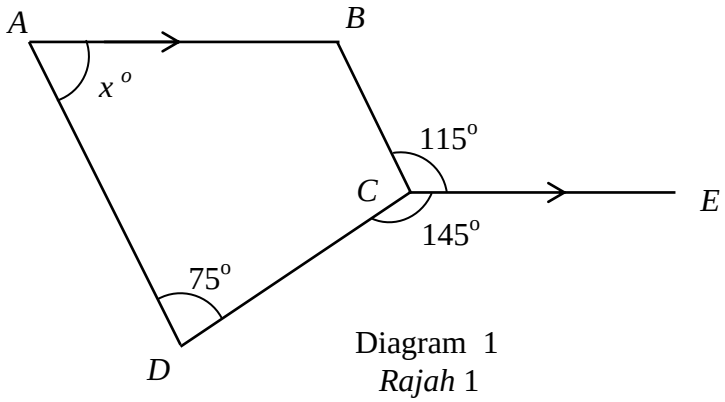


Diagram 1
Rajah 1

The value of *x* is

Nilai x ialah

A 65

B 70

C 80

D 120

7 In Diagram 2, *PQRS* is a rhombus.

Dalam Rajah 2, *PQRS adalah sebuah rombus.*

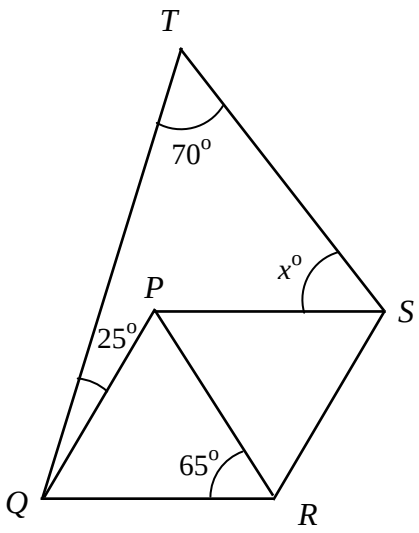


Diagram 2
Rajah 2

The value of x is

Nilai x ialah

A 15

B 20

C 25

D 35

8 In Diagram 3, *ABC* and *CDE* are tangents to the circle with centre *O*, at *B* and *D* respectively.

Dalam Rajah 3, *ABC dan CDE adalah tangen untuk bulatan berpusat O, masing-masing di titik B dan D.*

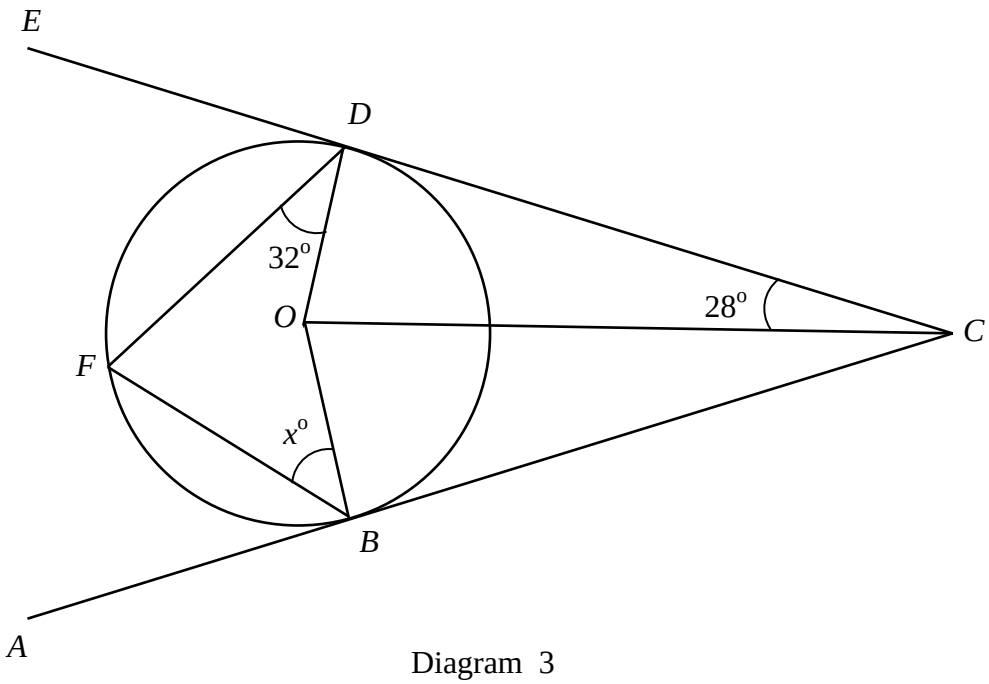


Diagram 3
Rajah 3

The value of x is

Nilai bagi x ialah

A 30

B 32

C 58

D 62

9 In Diagram 4, P' is the image of P under a certain translation. Q' is the image of Q under the same translation.

Dalam Rajah 4, P' *ialah imej bagi* P *di bawah satu translasi tertentu.* Q' *ialah imej bagi* Q *di bawah translasi yang sama.*

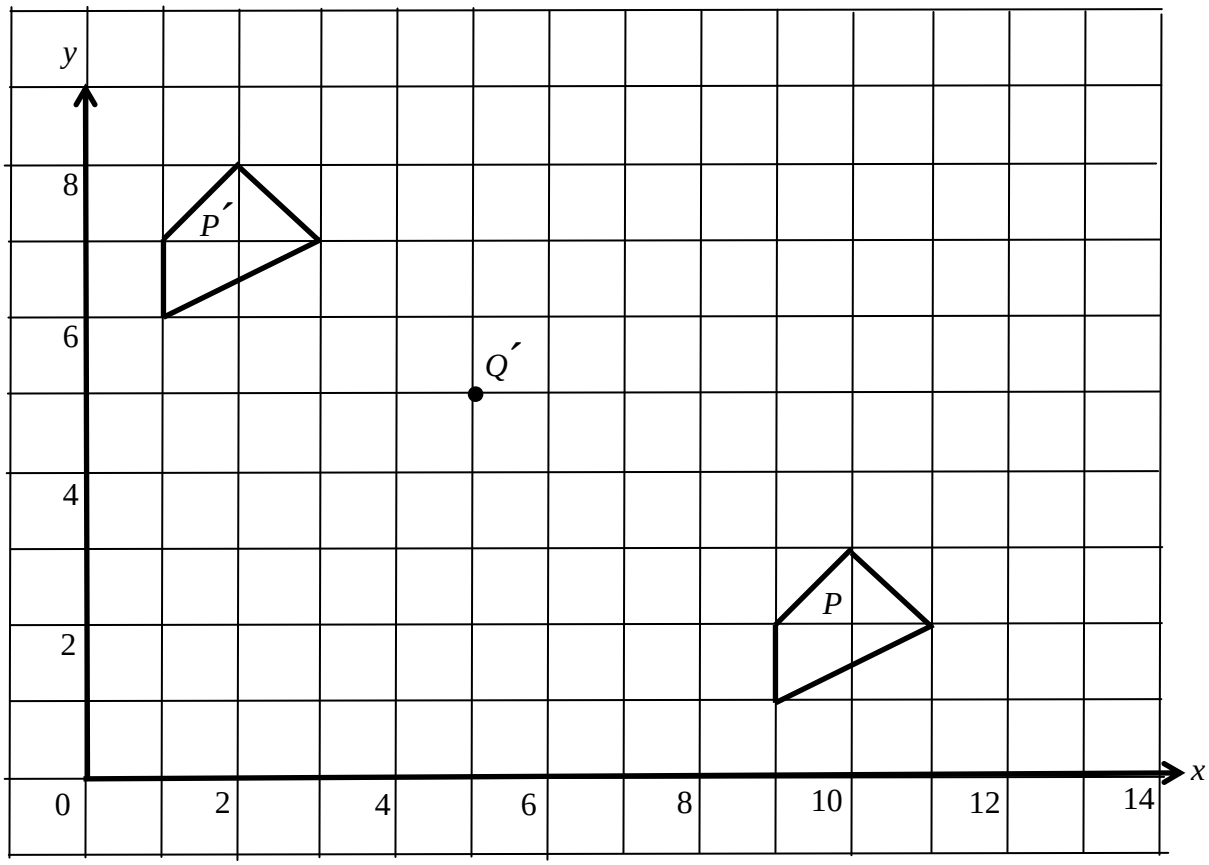


Diagram 4
Rajah 4

Find the coordinates of Q.

Carikan koordinat Q

A $(-3, 10)$

B $(13, 0)$

C $(-5, 12)$

D $(10, 13)$

10 Diagram 5 shows the point *X* which is the image of point *Y* under a reflection.

Rajah 5 *menunjukkan titik X adalah imej bagi titik Y di bawah satu pantulan.*

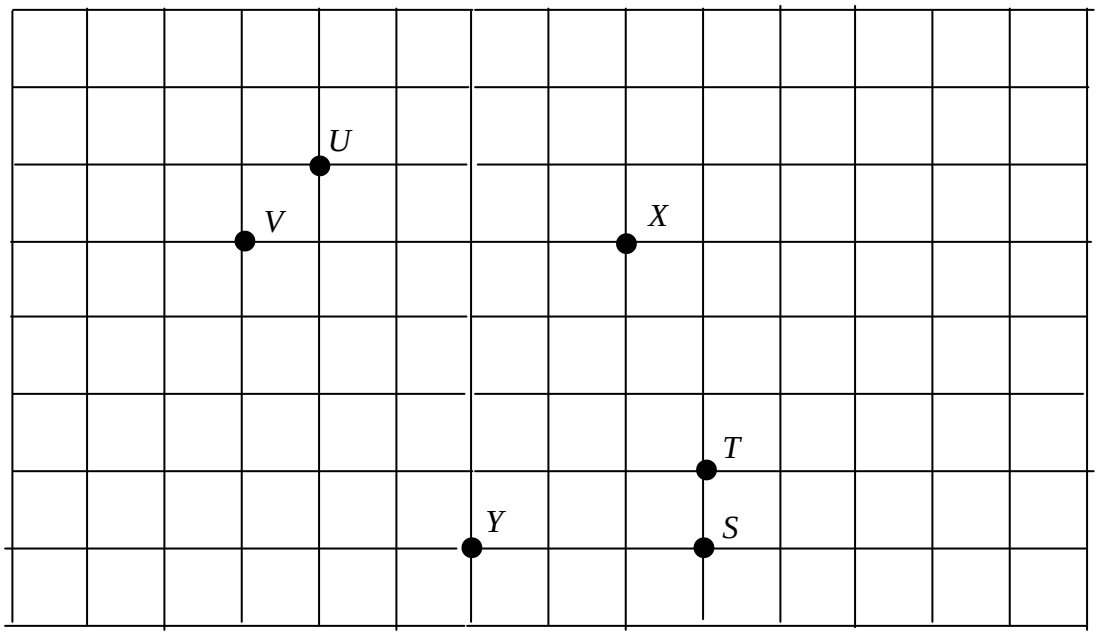


Diagram 5
Rajah 5

Determine the axis of the reflection.

Tentukan paksi pantulan tersebut.

A *TV*

B *SU*

C *SV*

D *TU*

11 In Diagram 6, pentagon *ABCDE* is the image of the pentagon *AFGHI* under an enlargement.

Dalam Rajah 6 *pentagon ABCDE adalah imej bagi pentagon AFGHI di bawah satu pembesaran.*

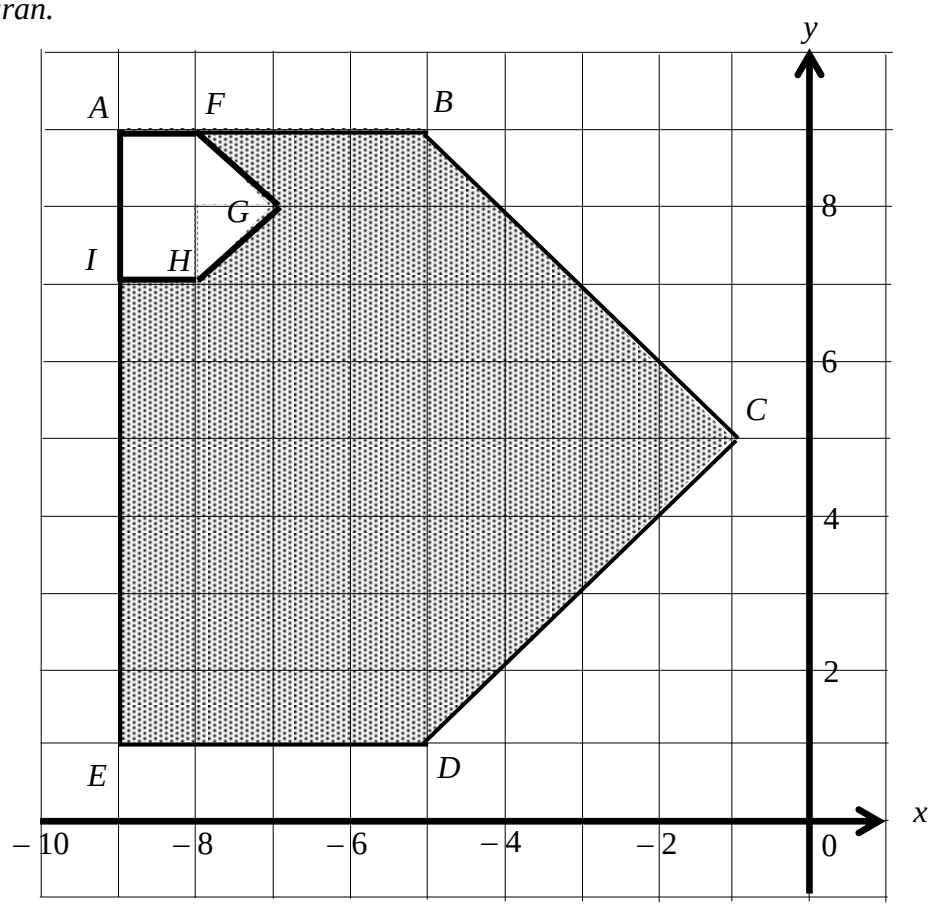


Diagram 6
Rajah 6

If the area of the shaded region is 360 cm^2, calculate the area, in cm^2, of pentagon *AFGHI.*

Jika luas kawasan berlorek ialah 360 cm^2*, hitungkan luas, dalam* cm^2*, bagi pentagon AFGHI.*

A 22.5

B 24

C 40

D 120

12 In Diagram 7, *PTR* is a straight line. Given that $\cos x^\circ = \frac{5}{13}$ and $\sin y^\circ = \frac{3}{5}$.

Dalam Rajah 7 , PTR ialah garis lurus. Diberi bahawa kos $x^\circ = \frac{5}{13}$ *dan* $\sin y^\circ = \frac{3}{5}$

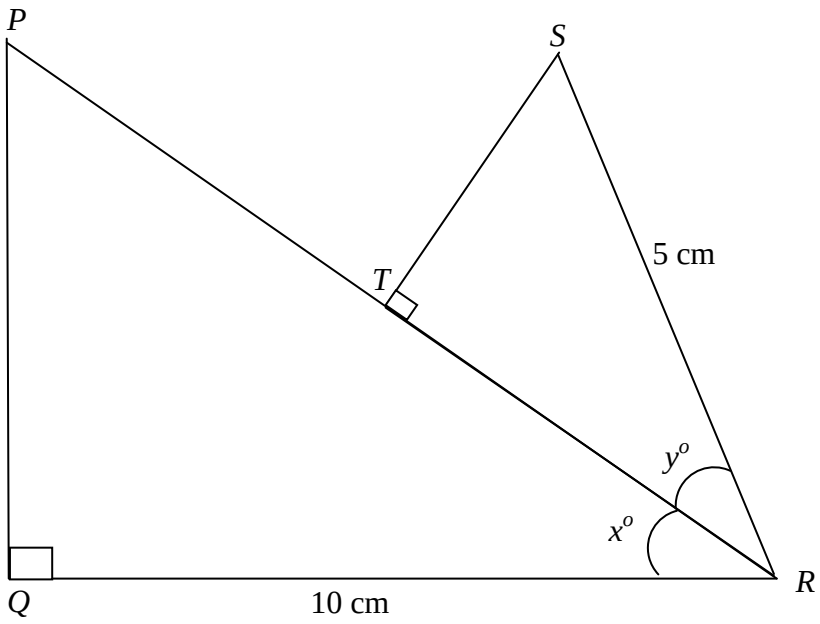


Diagram 7
Rajah 7

Find the length, in cm, of *PT*.

Carikan panjang , dalam cm , bagi PT.

A 10

B 22

C 23

D 26

13 Given that tan $x° = -\tan 60°$, where $0° \leq x° \leq 270°$, find the value x.

Diberi bahawa $\tan x° = -\tan 60°$, *di mana* $0° \leq x° \leq 270°$, *cari nilai* x.

A 60

B 120

C 240

D 300

14 Diagram 8 shows a right prism with a rectangular horizontal base *RSTU*. The prism has a uniform cross section in the form of trapezium *PQRS*.

Rajah 8 *menunjukkan sebuah prisma dengan tapak mengufuk yang berbentuk segiempat tepat RSTU. Prisma tersebut mempunyai keratan rentas seragam trapezium PQRS.*

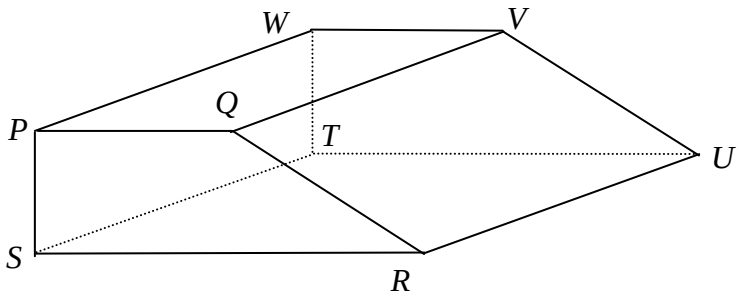


Diagram 8
Rajah 8

Name the angle between the plane *WSR* and the plane *RSTU*.

Namakan sudut di antara satah WSR dan satah RSTU.

A $\angle WRT$

B $\angle WRU$

C $\angle WSR$

D $\angle WST$

15 In Diagram 9, *MN* is a vertical television antenna on top of a building. Given that the angles of elevation of *M* and *N* from the point *Q* are 31.3° and 28.1° respectively.

Dalam Rajah 9, *MN ialah antena televisyen yang tegak di puncak sebuah bangunan. Diberi sudut dongakan M dan N dari titik Q masing-masing ialah* 31.3° *dan* 28.1° .

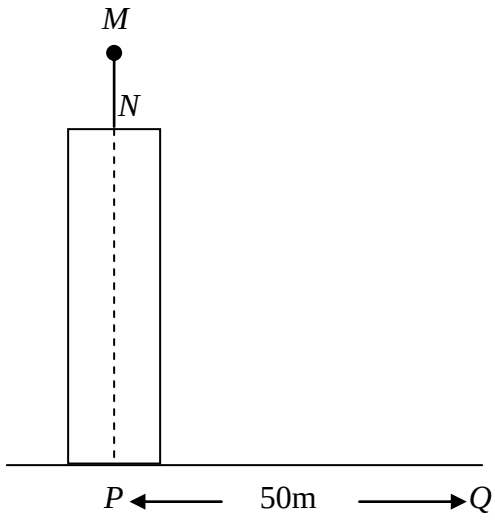


Diagram 9
Rajah 9

Calculate the height, in m, of the television antenna.

Hitungkan tinggi, dalam m , antena televisyen tersebut.

A 2.42

B 2.80

C 3.70

D 11.40

16 In Diagram 10, *P*, *Q* and *R* are three points on a horizontal plane.

Dalam Rajah 10, *P*, *Q dan R adalah tiga titik di atas suatu satah mengufuk.*

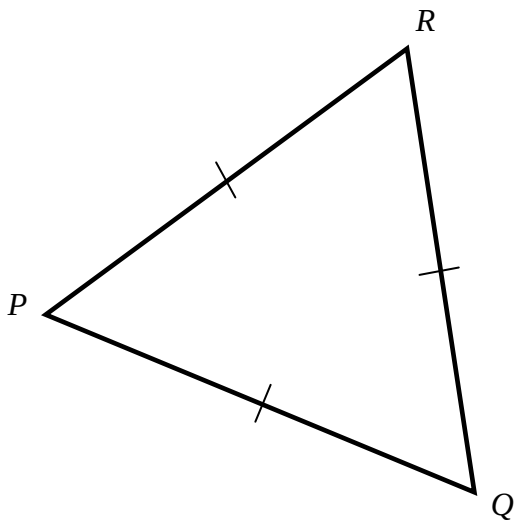


Diagram 10
Rajah 10

Given that *Q* is due east of *R*, find the bearing of *Q* from *P*.

Diberi bahawa Q berada di timur R, cari bearing Q dari P.

A 030^{o}

B 060^{o}

C 120^{o}

D 240^{o}

17 An aeroplane flew 1320 nautical miles from $P(80°N, 10°E)$ to Q via the North Pole. Find the position of Q.

Sebuah pesawat terbang 1320 *batu nautika dari* $P(80°U, 10°T)$ *ke* Q *melalui Kutub Utara. Cari kedudukan* Q .

A $(80°N, 10°E)$
$(80°U, 10°T)$

B $(80°N, 170°W)$
$(80°U, 170°B)$

C $(78°N, 30°E)$
$(78°U, 30°T)$

D $(78°N, 170°W)$
$(78°U, 170°B)$

18 In Diagram 11, *NOS* is the polar axis of the Earth. Given that $\angle PON = 50°$ and $\angle QOR = 120°$.

Dalam Rajah 11, *NOS ialah paksi bumi. Diberi* $\angle PON = 50°$ *dan* $\angle QOR = 120°$.

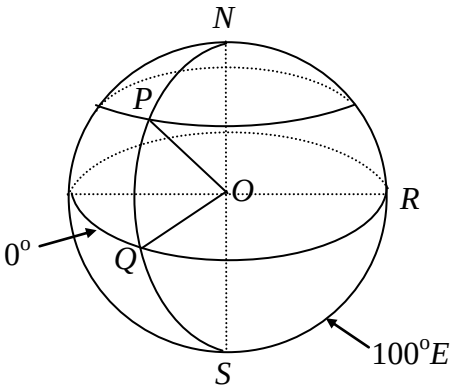


Diagram 11
Rajah 11

Find the position of *P*.

Carikan kedudukan P.

A (40°*N*, 20°*W*)
(40°*U*, 20°*B*)

B (40°*N*, 120°*W*)
(40°*U*, 120°*B*)

C (50°*N* , 20°*W*)
(50°*U* , 20°*B*)

D (50°*N* , 120°*W*)
(50°*U* , 120°*B*)

19 $\dfrac{-24pq+16q^2}{2q-3p} =$

A $-4q$

B $-8q$

C $4q$

D $8q$

20 Factorise completely $6mp - 12np - 4n + 2m$

Faktorkan selengkapnya $6mp - 12np - 4n + 2m$

A $(6p + 2)(m - 2n)$

B $2(3p - 1)(m + 2n)$

C $2(3p + 1)(m + 2n)$

D $2(3p + 1)(m - 2n)$

21 Given that $A = \dfrac{1}{2}\left(\sqrt[3]{\dfrac{B}{C}}\right)$, express B in terms of A and C.

Di beri bahawa $A = \dfrac{1}{2}\left(\sqrt[3]{\dfrac{B}{C}}\right)$, *ungkapkan B dalam sebutan A dan C.*

A $B = 2A^3C$

B $B = 6A^3C$

C $B = 8A^3C$

D $B = \dfrac{A^3}{8C}$

22 Given that $5(8 - m) = \frac{5m}{2} - 5$, find the value of m.

Diberi $5(8 - m) = \frac{5m}{2} - 5$, *carikan nilai* m.

A 3

B $5\frac{2}{3}$

C 6

D $8\frac{2}{3}$

23 Express $\frac{m-4}{4m} - \frac{2m-5}{m}$ as a single fraction in its simplest form.

Ungkapkan $\frac{m-4}{4m} - \frac{2m-5}{m}$ *sebagai satu pecahan tunggal dalam bentuk termudah.*

A $-\frac{7m+24}{4m}$

B $\frac{16-7m}{4m}$

C $\frac{1-m}{4m}$

D $\frac{7m-16}{4m}$

24 $\dfrac{(3mn^3)^2}{3mn \times m^2n^3}$ =

A $\dfrac{2n^2}{m^2}$

B $\dfrac{2n^2}{m}$

C $\dfrac{3n^5}{m}$

D $\dfrac{3n^2}{m}$

25 Given that $2^{3x} = 32(2^{-x})$, find the value of x.

Diberi $2^{3x} = 32(2^{-x})$, *cari nilai* x.

A $\dfrac{3}{4}$

B 1

C $\dfrac{5}{3}$

D $\dfrac{5}{4}$

26 Given that h is an integer, find all the values of h that satisfy both inequalities $\dfrac{h}{4} < 2$ and $28 - 7h \leq -3$.

Diberi h ialah integer, carikan semua nilai h yang memuaskan kedua-dua ketaksamaan $\dfrac{h}{4} < 2$ *dan* $28 - 7h \leq -3$.

A 5, 6, 7

B 4, 5, 6, 7

C 5, 6, 7, 8

D 4, 5, 6, 7, 8

27 Table 1 shows the distribution of marks for 50 students.

Jadual 1 *menunjukkan taburan markah bagi* 50 *orang pelajar.*

Marks *Markah*	Number of students *Bilangan pelajar*
6 - 10	7
11 - 15	11
16 - 20	8
21 - 25	12
26 - 30	9
31 - 35	3

Table 1
Jadual 1

Calculate the mean mark .

Hitungkan min markah.

A 17.4

B 19.4

C 21.4

D 37.6

28 Histogram in Diagram 12 shows the weight, in kg, of 30 students.

Histogram dalam Rajah 12 *menunjukkan berat, dalam kg, bagi* 30 *orang pelajar*.

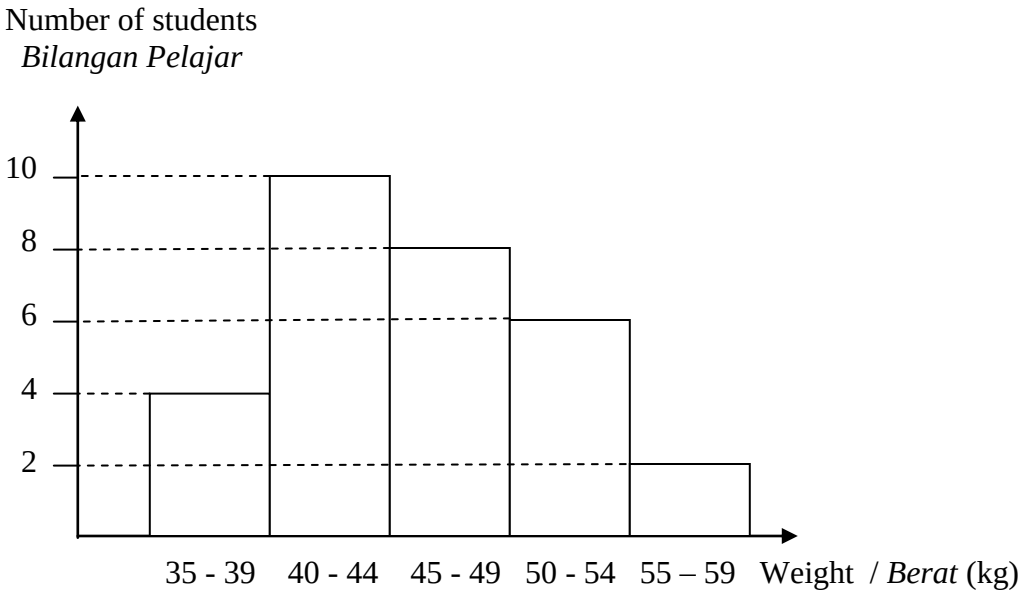


Diagram 12
Rajah 12

Calculate the percentage of students whose weight is more than 44 kg.

Hitungkan peratus pelajar yang mempunyai berat lebih daripada 44 *kg*.

A 26.67

B 33.33

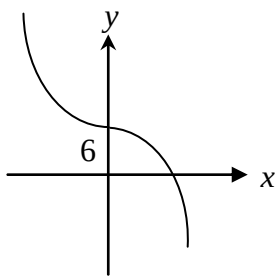
C 53.33

D 86.67

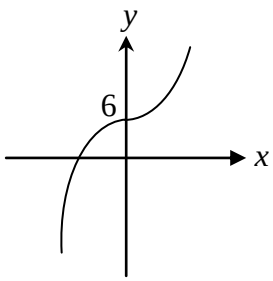
29 Which of the following represents the graph of $y = -\frac{1}{2}x^3 + 6$?

Antara yang berikut, yang manakah mewakili graf $y = -\frac{1}{2}x^3 + 6$ *?*

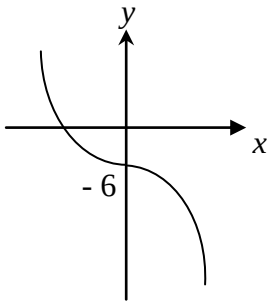
A



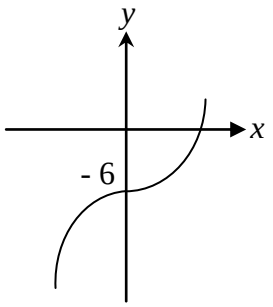
B



C



D



30 It is given that the universal set $\xi = \{x : 2 \leq x \leq 30, x \text{ is an integer}\}$,
set $H = \{x : x \text{ is a perfect square}\}$, and
set $N = \{x : x \text{ is a multiple of } 4\}$.

Diberi set semesta $\xi = \{x : 2 \leq x \leq 30, x \text{ ialah integer}\}$,
set $H = \{x : x \text{ ialah kuasa dua sempurna}\}$, *dan*
set $N = \{x : x \text{ ialah gandaan } 4\}$.

Find $n(H' \cap N)$.

Carikan $n(H' \cap N)$.

A 2

B 5

C 9

D 20

31 Diagram 13 is a Venn diagram with the universal set, $\xi = L \cup M \cup N$.

Rajah 13 *ialah sebuah gambarajah Venn yang menunjukkan set semesta* $\xi = L \cup M \cup N$.

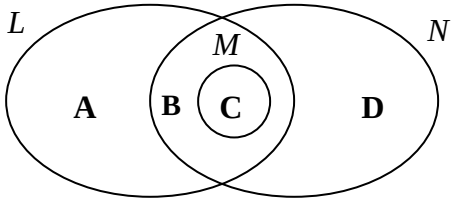


Diagram 13
Rajah 13

Which of the region, **A**, **B**, **C** or **D**, represents set $L \cap N \cap M'$?

Rantau yang manakah **A**, **B**, **C** *atau* **D**, *yang mewakili set* $L \cap N \cap M'$?

32 Diagram 14 is a Venn diagram showing set ξ, set R and set S.

Rajah 14 *ialah sebuah gambarajah Venn yang menunjukkan set* ξ, *set R dan set S.*

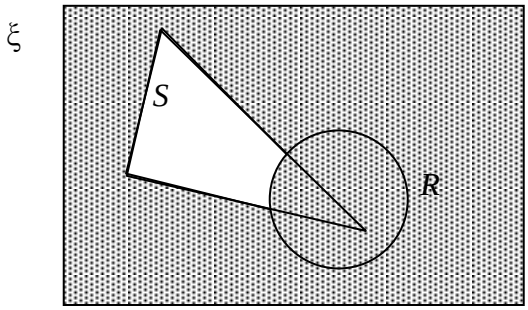


Diagram 14
Rajah 14

Which of the following represents the shaded region?

Yang manakah mewakili rantau yang berlorek?

A $R \cup S'$

B $R \cap S'$

C $S \cup R'$

D $S \cap R'$

33 In Diagram 15, *PQ* is parallel to *RS*. The equation of the straight line *RS* is $y = 2x - 7$. The point *F* lies on the *x*–axis.

Dalam Rajah 15, *PQ dan RS adalah selari. Persamaan bagi garis lurus RS ialah* $y = 2x - 7$. *Titik F berada di atas paksi–x.*

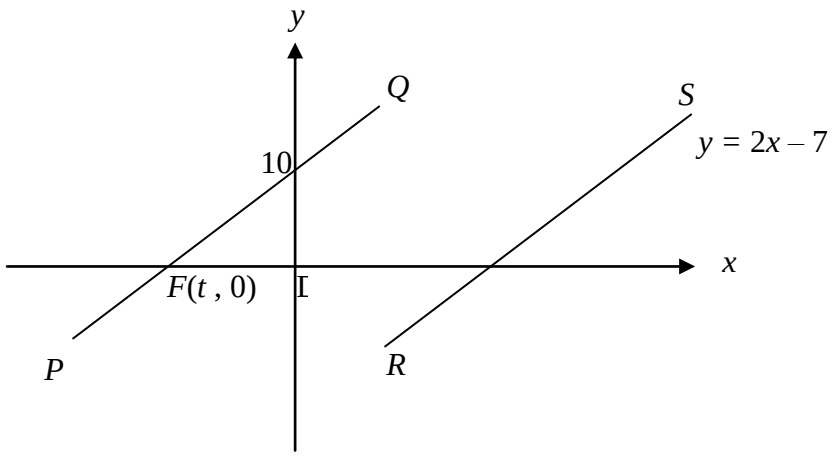


Diagram 15
Rajah 15

Find the value of *t*.

Cari nilai t.

A – 20

B – 10

C – 5

D – 2.5

34 Find the equation of the straight line with the *y*–intercept of 5 and passes through *P*(6 , –3).

Carikan persamaan garis lurus dengan pintasan–y ialah 5 *dan melalui P*(6 , –3).

A $y = -\frac{4}{3}x + 5$

B $y = \frac{4}{3}x + 5$

C $y = -\frac{3}{4}x + 5$

D $y = \frac{3}{4}x + 5$

35 Table 2 shows the number of stamps in an envelope. A stamp is taken out from the envelope randomly.

Jadual 2 *menunjukkan bilangan setem di dalam satu sampul surat. Sekeping setem dikeluarkan secara rawak daripada sampul surat itu.*

Stamp *Setem*	10 sen	20 sen	30 sen	50 sen
Number of stamps *Bilangan setem*	10	30	50	10

Table 2
Jadual 2

Find the probability that the selected stamp is less than 50 sen.

Carikan kebarangkalian bahawa setem yang dipilih itu kurang daripada 50 *sen.*

A $\frac{1}{10}$

B $\frac{2}{5}$

C $\frac{1}{2}$

D $\frac{9}{10}$

36 Zaid has a collection of coins from Britain, Indonesia and the Philippines.

He picks one coin at random. The probability of picking an Indonesian coin is $\frac{1}{3}$ and the probability of picking a Philippine coin is $\frac{4}{9}$. Zaid has 10 British coins.

Calculate the total number of coins in his collection.

Zaid mempunyai satu koleksi duit syiling dari negara Britain, Indonesia dan Filipina. Dia memilih sekeping duit syiling secara rawak. Kebarangkalian memilih duit syiling Indonesia ialah $\frac{1}{3}$ *dan kebarangkalian memilih duit syiling Filipina ialah* $\frac{4}{9}$*. Zaid mempunyai* 10 *duit syiling British. Hitungkan jumlah bilangan duit syilingnya.*

A 30

B 35

C 45

D 70

37 If t varies directly as the cube of s and $t = 6$ when $s = 2$, calculate the value of s when $t = 48$.

Jika t berubah secara langsung dengan kuasa tiga s dan $t = 6$ *apabila* $s = 2$*, hitungkan nilai s apabila* $t = 48$.

A $\frac{3}{4}$

B $\frac{4}{3}$

C 4

D 8

38 Table 3 shows the values of the variables u, v and w where u varies directly as the square of v and inversely as w.

Jadual 3 *menunjukkan nilai bagi pemboleh ubah* u, v *dan* w *dengan keadaan* u *berubah secara langsung dengan kuasa dua* v *dan berubah secara songsang dengan* w.

u	v	w
40	4	2
r	6	4

Table 3
Jadual 3

Calculate the value of r.

Hitungkan nilai bagi r.

A 12

B 30

C 45

D 180

39 Given $\begin{pmatrix}7\\2\end{pmatrix}+\begin{pmatrix}8\\5n\end{pmatrix}=-3\begin{pmatrix}-5\\1\end{pmatrix}$, find the value of *n*.

Diberi bahawa $\begin{pmatrix}7\\2\end{pmatrix}+\begin{pmatrix}8\\5n\end{pmatrix}=-3\begin{pmatrix}-5\\1\end{pmatrix}$, *cari nilai n.*

A -5

B -1

C $-\frac{1}{5}$

D $\frac{1}{5}$

40 Given $\begin{pmatrix}4 & m\\5 & -2\end{pmatrix}\begin{pmatrix}m\\-1\end{pmatrix}=\begin{pmatrix}-9\\-13\end{pmatrix}$, find the value of *m*.

Diberi $\begin{pmatrix}4 & m\\5 & -2\end{pmatrix}\begin{pmatrix}m\\-1\end{pmatrix}=\begin{pmatrix}-9\\-13\end{pmatrix}$, *cari nilai m.*

A -3

B $-\frac{9}{5}$

C $-\frac{1}{3}$

D $\frac{3}{2}$

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

