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

NOMBOR DAN OPERASI
NUMBERS 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
RELATIONS

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

Average speed $= \dfrac{distance\ travelled}{time\ taken}$

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

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

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

6 $A^{-1} = \dfrac{1}{ad - bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

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*
$= (n-2) \times 180º$

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

4 Luas bulatan $= \pi j^2$
Area of circle $= \pi r^2$

5 $\dfrac{\text{Panjang lengkok}}{2\pi j} = \dfrac{\theta}{360°}$
$\dfrac{\text{Arc length}}{2\pi r} = \dfrac{\theta}{360°}$

6 $\dfrac{\text{Luas sektor}}{\pi j^2} = \dfrac{\theta}{360°}$
$\dfrac{Area\ of\ sector}{\pi r^2} = \dfrac{\theta}{360°}$

7 Luas lelayang $= \dfrac{1}{2} \times$ hasil darab panjang dua pepenjuru

Area of kite $= \dfrac{1}{2} \times product\ of\ two\ diagonals$

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

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

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 Isipadu prisma tegak = luas keratan rentas $\times$ tinggi
Volume of right prism = cross sectional area $\times$ height

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

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

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

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

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

16   Isipadu piramid tegak $= \frac{1}{3} \times$ luas tapak $\times$ tinggi

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

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

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

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*, $\bar{x} = \dfrac{\sum x}{N}$

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

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

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

5   Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\dfrac{\sum(x - \bar{x})^2}{N}} = \sqrt{\dfrac{\sum x^2}{N} - \bar{x}^2}$

6   Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\dfrac{\sum f(x - \bar{x})^2}{f}} = \sqrt{\dfrac{\sum fx^2}{f} - \bar{x}^2}$

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

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

1. Given linear equations $h - 9 = -21$. Determine value of h.
    Diberi persamaan linear $h - 9 = -21$. Tentukan nilai h.

    A -30
    B -12
    C 12
    D 30

2. The solution for $\frac{h}{4} - 1 \geq h + 5$ is
    Penyelesaian bagi $\frac{h}{4} - 1 \geq h + 5$ ialah

    A $h \geq -8$
    B $h \geq 8$
    C $h \leq -8$
    D $h \leq 8$

3. In Diagram 1, BG is a straight line.
   *Dalam Rajah 1, BG ialah suatu garis lurus.*
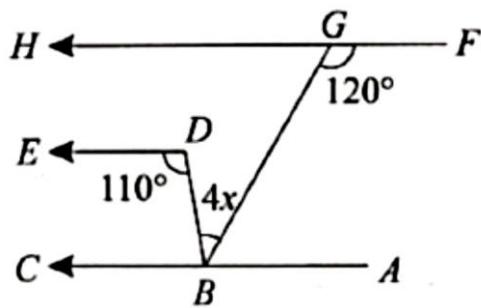
    Diagram 1 / *Rajah 1*

    Find the value of x.
    Cari nilai x.

    A   8.5
    B   10.5
    C   12.5
    D   14.5

4. Factorise completely $5x^2 - 80$.
    Faktorkan selengkapnya $5x^2 - 80$.

    A $5(x + 4)(x - 4)$
    B $5(x + 4)^2$
    C $5(x - 4)^2$
    D $(x + 4)(x - 4)$

5. $6(2t - 7) - (10 - 6t)^2 =$

    A $-142 + 132t - 36t^2$
    B $100 + 132t - 36t^2$
    C $-142 + 12t + 36t^2$
    D $100 + 12t + 36t^2$

6. Given that $m = \frac{3}{7} + \frac{n}{7}$, express n in terms of m.

   Diberi bahawa $m = \frac{3}{7} + \frac{n}{7}$, ungkapkan n dalam sebutan m.

   A $\quad n = \dfrac{49m - 3}{7}$

   B $\quad n = \dfrac{3 - 49m}{7}$

   C $\quad n = 3 - 7m$

   D $\quad n = 7m - 3$

7. In Diagram 2, $PQRSTU$ is a regular hexagon. RPW and RUV are straight lines.
   *Dalam Rajah 2, PQRSTU ialah heksagon sekata. RPW dan RUV ialah garis lurus.*
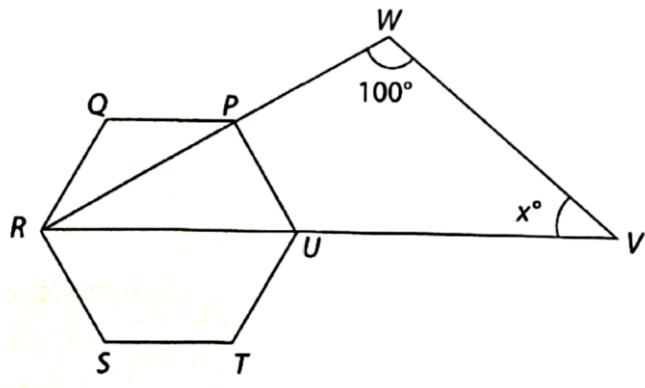
   Diagram 2 / *Rajah 2*

   Find the value of x.
   Cari nilai x.

   A 20
   B 30
   C 40
   D 50

8. Point M with coordinates (3 , 4) is the midpoint of the line AB and A has the point (−1 , 6). What is the point of B?
   Titik M dengan koordinat (3 , 4) adalah titik tengah bagi garis AB dan A mempunyai koordinat (-1 , 6). Apakah koordinat titik B?

   A (1 , 5)
   B (7 , 2)
   C (2 , 10)
   D (1 , 2)

9. Which set of ordered pairs is not a function?
   Antara berikut, set manakah bukan sebuah fungsi?

   A (1, 3), (2, 7), (3, 8), (4, 11)
   B (1, 2), (3, 5), (6, 9), (7, 11)
   C (2, 3), (4, 9), (3, 8), (4, 15)
   D (-9, 4), (-6, 3), (-2, 8), (0, 21)

6

10. Diagram 3 shows a straight line PQ with equation $y = 2x + 6$. QR is parallel to the x-axis and its distance is 9 unit.
Rajah 3 menunjukkan garis lurus PQ yang mempunyai persamaan $y = 2x + 6$. QR adalah selari dengan paksi-x dan jaraknya ialah 9 unit.
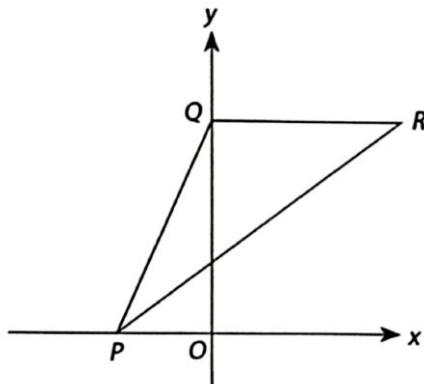

Diagram 3 / *Rajah 3*

Find the gradient of PR.
Cari kecerunan PR.

A $\dfrac{3}{4}$

B $\dfrac{4}{3}$

C $\dfrac{1}{2}$

D 2

11. Diagram 4 shows a triangle ABC drawn on a Cartesian plane.
Rajah 4 menunjukkan sebuah segi tiga ABC yang dilukis pada satah Cartes.
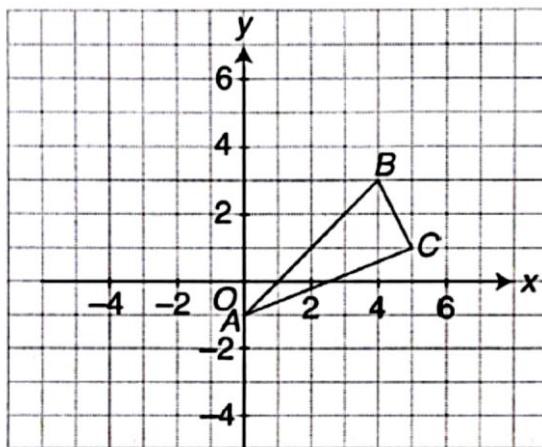
Diagram 4 / *Rajah 4*

Determine the coordinates of the image of point C under a reflection in the line AB.
Tentukan koordinat imej bagi titik C di bawah satu pantulan pada garis AB.

A (2 ,3)
B (2 ,4)
C (3 ,4)
D (1 ,5)

12. Table 1 is a cumulative frequency table which shows the mark of 30 pupils in a Mathematics quiz.
Jadual 1 ialah jadual kekerapan longgokan yang menunjukkan markah bagi 30 orang murid dalam suatu kuiz Matematik.

Markah *Marks*	0	1	2	3	4	5
Kekerapan longgokan *Cumulative frequency*	2	6	13	22	27	30

Table 1 / *Jadual 1*

Find the mode of the data.
Cari mod bagi data tersebut.

   A 6
   B 5
   C 4
   D 3

13. 40 coupons with serial numbers 11 to 50 are put in the box. One coupon is drawn at random. The probability of drawing a coupon with a number which is **not** a multiple of 5 is
*40 keping kupon dengan nombor siri 11 hingga 50 diletak dalam sebuah kotak. Sekeping kupon dicabut secara rawak. Kebarangkalian kupon yang dicabut dengan nombor siri **bukan** gandaan 5 ialah*

   A $\dfrac{1}{5}$

   B $\dfrac{4}{5}$

   C $\dfrac{7}{24}$

   D $\dfrac{9}{24}$

14. Simplify / *Ringkaskan* $2\left(m^{\frac{2}{3}}n^{-1}\right)^{-3} \times \dfrac{m^{-3}}{n^2}$

   A $\dfrac{2n}{m^5}$

   B $\dfrac{8n}{m^5}$

   C $\dfrac{2m^6}{n^6}$

   D $\dfrac{8m^6}{n^6}$

15. Round off 0.007105 correct to two significant figures.
Bundarkan 0.007105 betul kepada dua angka bererti.

   A 0.01
   B 0.0071
   C 0.00710
   D 0.00711

16. $1.6 \times 10^5 + 66\ 000 =$

   A 2.26×10^5
   B 2.26×10^9
   C 7.20×10^5
   D 7.20×10^9

17. The area of a rectangular land is 9.6 km². Its length is 4 000m. The width, in m, of the land is
   Luas sebuah tanah yang berbentuk segi empat tepat ialah 9.6 km². Panjang tanah itu 4 000m. Lebar, dalam m, tanah itu ialah

   A 2.4×10^3
   B 3.0×10^3
   C 4.8×10^3
   D 9.6×10^3

18. Bank Bumi offers an interest rate of 5 % per annum and is compounded every 3 months for savings in fixed deposit accounts. What is the minimum principal amount of money to be deposited at the beginning of the year in a fixed deposit account so that Miss Anis can earn more than RM10 000 of savings at the end of the fifth year?
   Bank Bumi menawarkan kadar faedah 5 % setahun dan dikompaunkan setiap 3 bulan sekali untuk simpanan dalam akaun simpanan tetap. Berapakah jumlah wang principal minimum yang perlu disimpan pada awal tahun dalam akaun simpanan tetap supaya Cik Anis boleh mendapat melebihi RM10 000 wang simpanan pada akhir tahun kelima?

   A RM7 000
   B RM7 601
   C RM7 800
   D RM7 801

19. Reuben bought 3 500 shares at RM1.78 a share and 5 500 shares at RM2.92 a share. Calculate the average cost for one unit of share.
   Reuben membeli 3 500 saham dengan harga RM1.78 sesaham dan 5 500 saham dengan harga RM2.92 sesaham. Hitung kos purata untuk satu unit saham.

   A RM5.48
   B RM4.48
   C RM3.48
   D RM2.48

20. Miss Lindrey has produced a scale drawing of the pool to be built. The actual dimensions of the pond are 2 m wide and 6 m long. When she measured the drawing on her plan, she saw that the measurements were 8 cm wide and 24 cm long. Determine the scale used by Miss Lindrey.
   Cik Lindrey telah menghasilkan lukisan skala kolam renang yang akan dibina. Dimensi sebenar bagi kolam adalah 2 m lebar dan 6 m panjang. Ketika dia mengukur lukisan pada pelannya, dia melihat bahawa ukuran adalah 8 cm lebar dan 24 cm panjang. Tentukan skala yang digunakan oleh Cik Lindrey.

   A 1 : 25
   B 25 : 1
   C 1 : 4
   D 4 : 1

9

21. Diagram 5 shows two triangles PQS and QRS.
Rajah 5 menunjukkan dua segi tiga PQS dan QRS.
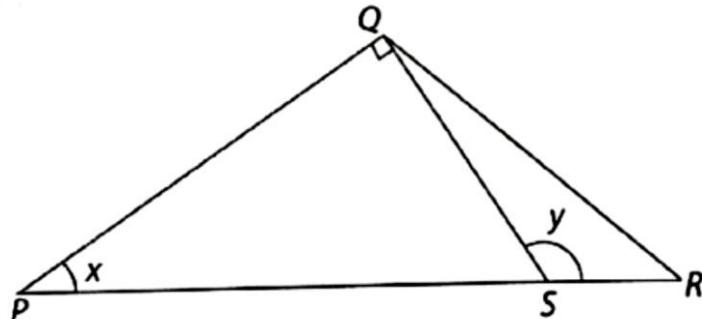
Diagram 5 / *Rajah 5*

Given $SR = 8$ cm, $PQ = 16$ cm and $5\ SR = 2\ PS$. Find the value of $\cos x + \tan y$.
Diberi $SR = 8$ cm, $PQ = 16$ cm dan $5\ SR = 2\ PS$. Cari nilai $\cos x + \tan y$.

A $\quad -\dfrac{32}{15}$

B $\quad \dfrac{32}{15}$

C $\quad -\dfrac{8}{15}$

D $\quad \dfrac{8}{15}$

22. Diagram 6 shows a circle with centre O. Given PR and QR are the tangents of the circle.
Rajah 6 menunjukkan sebuah bulatan yang berpusat O. Diberi PR dan QR ialah tangen bagi bulatan.
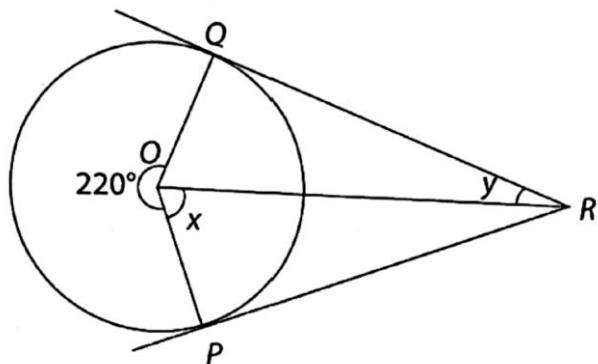
Diagram 6 / *Rajah 6*

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

A 90°
B 110°
C 180°
D 220°

23. In Diagram 7, OP is parallel to QR.
   *Dalam Rajah 7, OP selari dengan QR.*
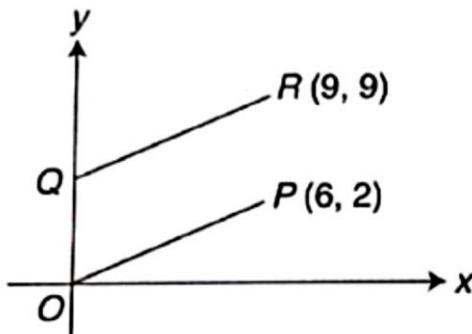
Diagram 7 / Rajah 7

Determine the y-intercept of line QR.
Tentukan pintasan-y bagi garis QR.

A 5
B 6
C 7
D 8

24. Which of the following graphs represents $y = 9 - 6x + x^2$?
    Antara yang berikut, yang manakah mewakili graf $y = 9 - 6x + x^2$?

A

C

B

D
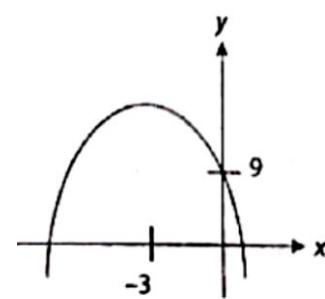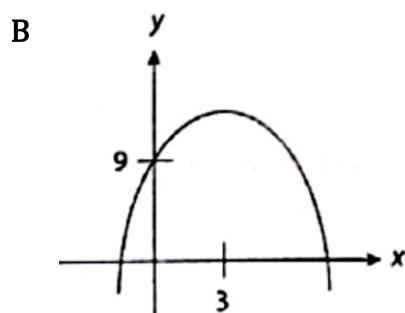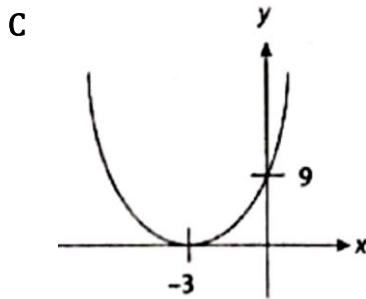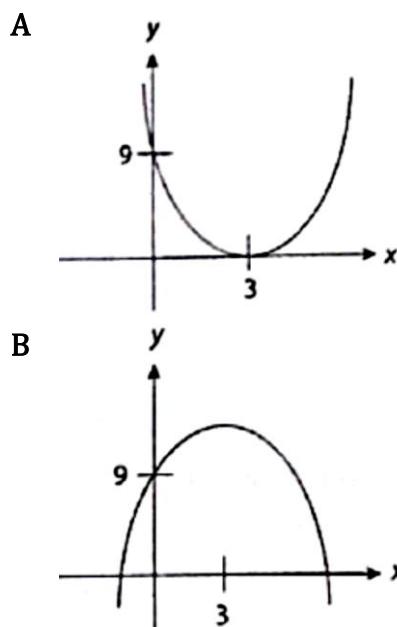
25. Given $542 = 10p6_8$, find the value of p.
    Diberi $542 = 10p6_8$, cari nilai bagi p.

A 1
B 2
C 3
D 4

26. $210_3 + 121_3 =$

   A 1011_3
   B 1101_3
   C 1110_3
   D 1111_3

27. The total numbers of visitors to Zoo Negara in January is 20202_5. What is the average number of visitors to Zoo Negara each day in January if it opens every day?
   Jumlah pengunjung yang melawat Zoo Negara pada bulan Januari adalah seramai 20202_5. Berapakah bilangan purata pengunjung yang melawat ke Zoo Negara setiap hari pada bulan Januari jika dibuka setiap hari?

   A 39
   B 40
   C 41
   D 42

28. Diagram 8 shows a Venn diagram with the universal set $\xi=\{$form five students in School Z$\}$, set $K = \{$students who registered for accounting$\}$ and set $L = \{$students who registered for additional mathematics$\}$.
   Rajah 8 menunjukkan gambar rajah Venn dengan set semesta, $\xi=\{$murid-murid tingkatan 5 di sekolah Z$\}$, set $K = \{$murid-murid yang mendaftar untuk subjek prinsip perakaunan$\}$ and set $L = \{$murid-murid yang mendaftar untuk subjek matematik tambahan$\}$.
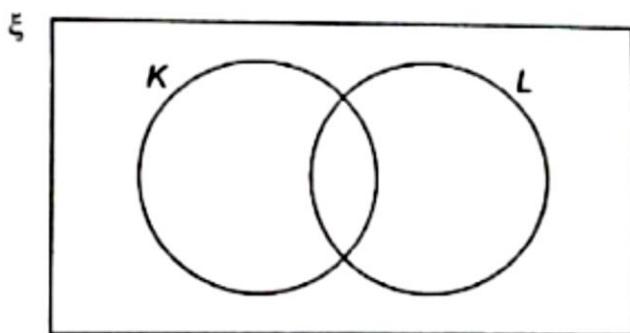

Diagram 8/ *Rajah 8*

   It is given that $n(K \cap L') = 22$. The number of students who registered for accounting is 57, the number of students who registered for additional mathematics is 94 and the number of students who did not register for both subjects is 32. Calculate the number of form 5 students in School Z.
   Diberi bahawa $n(K \cap L') = 22$. Bilangan murid yang mendaftar untuk subjek Perakaunan ialah 57 orang, bilangan murid yang mendaftar untuk subjek Matematik Tambahan ialah 94 orang dan bilangan murid yang tidak mendaftar untuk kedua-dua subjek ini ialah 32 orang. Hitung jumlah bilangan murid Tingkatan 5 di Sekolah Z.

   A 141
   B 143
   C 145
   D 148

29. Diagram 9 shows a graph.
   *Rajah 9 menunjukkan suatu graf.*
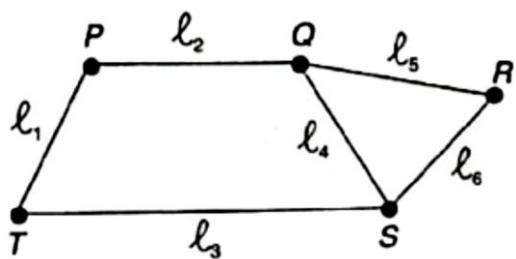
Diagram 9/ *Rajah 9*

Which of the following is **not** a subgraph of the graph?
*Antara berikut, yang manakah **bukan** satu subgraf bagi graf tersebut?*

A

C

B

D
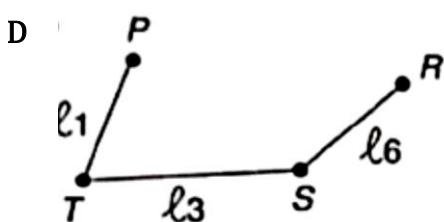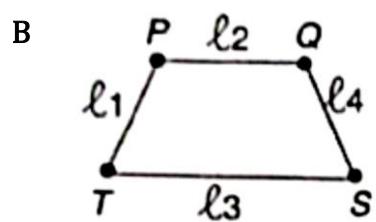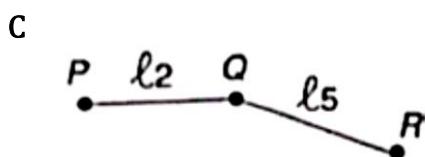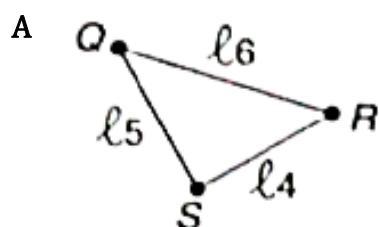
30. Which of the following shaded regions is represented by $x - y \geq 4$?
    Antara berikut, kawasan berlorek yang manakah diwakili oleh $x - y \geq 4$?

A

C

B

D

13
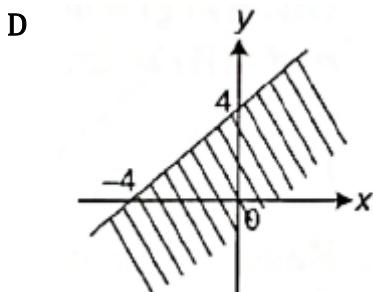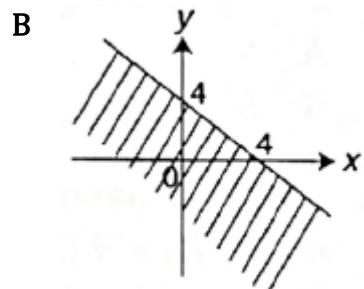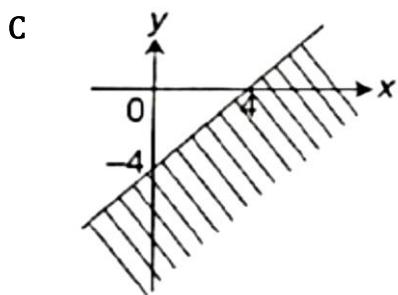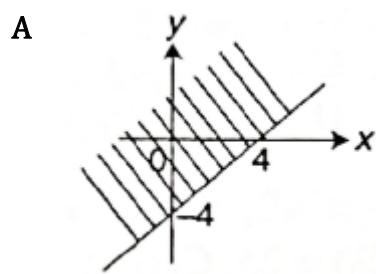
31. The following are long-term financial goals, **except**
    *Berikut merupakan matlamat kewangan jangka panjang, **kecuali***

    A Saving for retirement
       Simpanan untuk persaraan
    B Purchasing a new computer
       Membeli computer baru
    C Purchasing a house
       Membeli rumah
    D Saving for kid's education
       Simpanan untuk pendidikan anak

32. Given that p varies inversely as the square root of q and $p = 8$ when $q = 25$. Express p in term of q.
    Diberi bahawa p berubah secara songsang dengan punca kuasa dua q dan p = 8 apabila q = 25. Ungkapkan p dalm sebutan q.

    A $p = 40\sqrt{q}$

    B $p = \dfrac{8}{5\sqrt{q}}$

    C $p = \dfrac{40}{\sqrt{q}}$

    D $p = \dfrac{8}{5}\sqrt{q}$

33. Given p varies directly as m and inversely as cube of n, $m = 4$ and $n = 2$ when $p = 5$. Find the value of n when $m = 54$ and $p = 20$.
    Diberi p berubah secara langsung dengan m dan secara songsang dengan kuasa tiga n, m = 4 dan n = 2 apabila p = 5. Cari nilai n apabila m = 54 dan p = 20.

    A 3
    B 6
    C 9
    D 10

34. Given / *Diberi*:

$$2\begin{pmatrix} 4 & 5 \\ -3 & 8 \end{pmatrix} - \begin{pmatrix} -2 & 3 \\ -4 & 10 \end{pmatrix} =$$

    A $\begin{pmatrix} 10 & -2 \\ -2 & 6 \end{pmatrix}$

    B $\begin{pmatrix} 10 & 18 \\ 8 & -6 \end{pmatrix}$

    C $\begin{pmatrix} 8 & 18 \\ 8 & -6 \end{pmatrix}$

    D $\begin{pmatrix} 10 & 7 \\ -2 & 6 \end{pmatrix}$

35. Find the values of g and h, such that
    Cari nilai g dan h, jika

$$(4 \quad -2 \quad g)\begin{pmatrix} 1 & 4 \\ h & -2 \\ 7 & 8 \end{pmatrix} = (1 \quad 28)$$

    A $g = 1$, $h = -2$
    B $g = 2$, $h = 1$
    C $g = 5$, $h = 1$
    D $g = 1$, $h = 5$

36. William aged 35 years is quoted a rate of RM12.80 per RM1 000 assured per annum. He assures his life form RM120 000 but he wishes to pay the premium every month. The company states that for monthly payment, the premium is increased by 2 %. Calculate his monthly premium.
    William yang berumur 35 tahun diberikan sebut harga sebanyak RM12.80 bagi setiap insurans RM1 000 setiap tahun. Dia membeli insurans hayat sebanyak RM120 000 tetapi dia ingin membayar premiumnya secara bulanan. Syarikat menyatakan bagi pembayaran bulanan, premium ditambah sebanyak 2 %. Hitung premium bulanannya.
    A RM128.00
    B RM130.56
    C RM133.17
    D RM160.64

37. A tax levied on income earned by an individual or a company in Malaysia is
    Cukai yang dikenakan atas pendapatan yang diperoleh oleh seseorang individu atau sesebuah syarikat di Malaysia ialah
    A Door tax / *cukai pintu*
    B Income tax / *cukai pendapatan*
    C Sales and service tax / *cukai jualan dan perkhidmatan*
    D Road tax / *cukai jalan*

38. In Diagram 10, QRS is a straight line.
   *Dalam Rajah 10, QRS ialah garis lurus.*
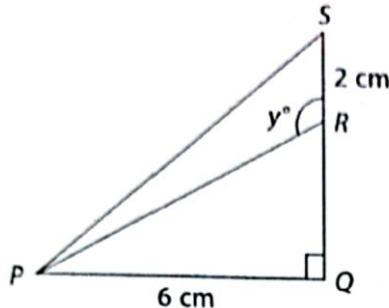
Diagram 10 / *Rajah 10*

    Given that tan $\angle SPQ = 1$, find the value of tan y°.
    Diberi bahawa tan $\angle SPQ = 1$, cari nilai tan y°.
    A $\dfrac{3}{2}$
    B $\dfrac{2}{3}$
    C $-\dfrac{3}{2}$
    D $-\dfrac{2}{3}$

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39. Which of the following represents the graph $y = 2\cos x$?
   Antara yang berikut, yang manakah mewakili graf $y = 2\cos x$?

   A

   C

   B

   D
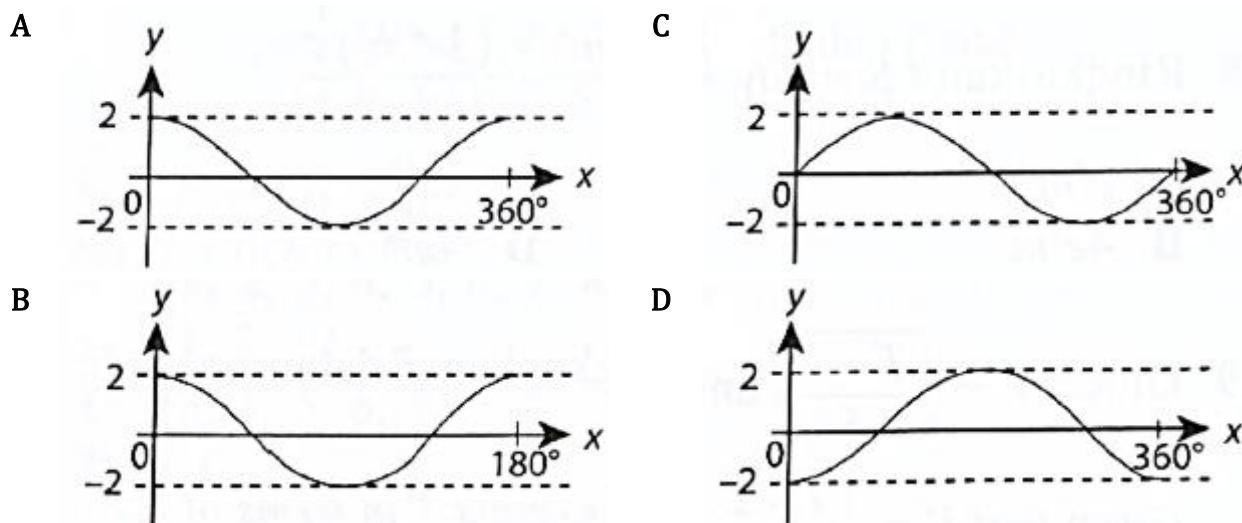
40. Diagram 11 shows the mathematical modeling process.
   Rajah 11 menunjukkan proses permodelan matematik.
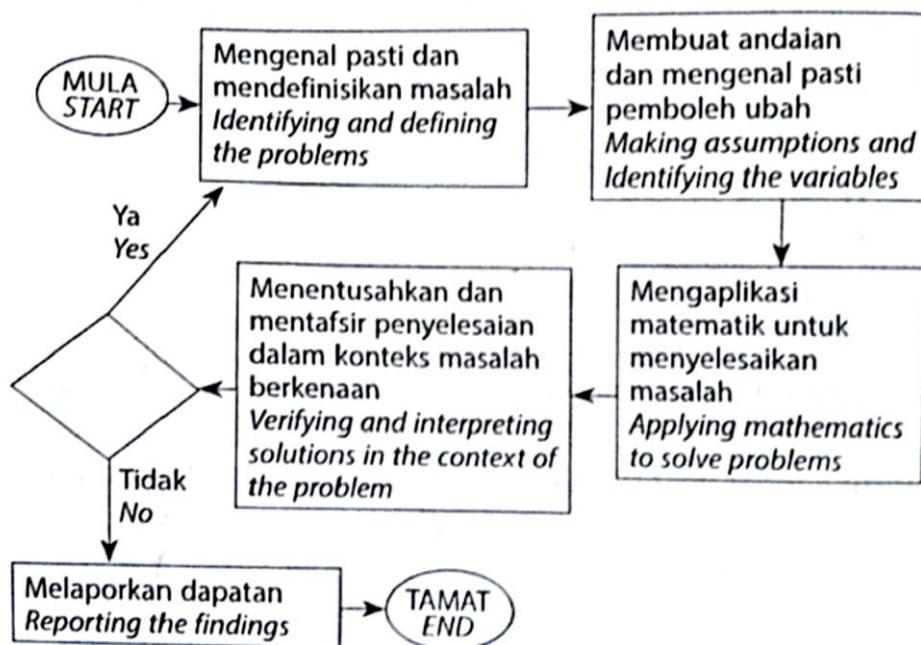

   Diagram 11 / *Rajah 11*

   The appropriate statement in the blank is:
   Penyataan yang sesuai di tempat kosong ialah:

   A Publish mathematical models
   Menerbitkan model matematik
   B Ask for expert opinion
   Meminta pandangan pakar
   C Need to refine the mathematical model?
   Perlu memurnikan model matematik?
   D Present a mathematical model
   Membentangkan model matematik

   END OF QUESTIONS