

Bengkel Teknik Menjawab SPM Matematik

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 yang biasa digunakan.

RELATIONS
PERKAITAN

- | | |
|--|--|
| <p>1 $a^m \times a^n = a^{m+n}$</p> <p>2 $a^m \div a^n = a^{m-n}$</p> <p>3 $(a^m)^n = a^{mn}$</p> <p>4 $A^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$</p> <p>5 Distance / jarak
 $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$</p> <p>6 Midpoint / Titik tengah
 $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$</p> <p>7 Average speed = $\frac{\text{distance travelled}}{\text{time taken}}$
 <i>Purata laju = $\frac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$</i></p> <p>8 Mean = $\frac{\text{sum of data}}{\text{number of data}}$
 <i>Min = $\frac{\text{hasil tambah nilai data}}{\text{bilangan data}}$</i></p> <p>9 Mean = $\frac{\text{sum of (midpoint} \times \text{frequency)}}{\text{sum of frequencies}}$
 <i>Min = $\frac{\text{hasil tambah (nilai titik tengah kelas} \times \text{kekerapan)}}{\text{hasil tambah kekerapan}}$</i></p> | <p>10 Pythagoras Theorem
 <i>Teorem Pithagoras</i>
 $c^2 = a^2 + b^2$</p> <p>11 $P(A) = \frac{n(A)}{n(S)}$</p> <p>12 $P(A') = 1 - P(A)$</p> <p>13 $m = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>14 $m = -\frac{y\text{-intercept}}{x\text{-intercept}}$
 $m = -\frac{\text{pintasan } y}{\text{pintasan } x}$</p> |
|--|--|

SHAPES AND SPACE
BENTUK DAN RUANG

- 1 Area of trapezium = $\frac{1}{2} \times \text{sum of parallel sides} \times \text{height}$
Luas trapezium = $\frac{1}{2} \times \text{hasil tambah dua sisi selari} \times \text{tinggi}$
- 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 \times length
Isi padu prisma tegak = *luas keratan rentas* \times *panjang*
- 7 Volume of cylinder = $\pi r^2 h$
Isi padu silinder = $\pi j^2 t$
- 8 Volume of cone = $\frac{1}{3} \pi r^2 h$
Isi padu kon = $\frac{1}{3} \pi j^2 t$
- 9 Volume of sphere = $\frac{4}{3} \pi r^3$
Isi padu sfera = $\frac{4}{3} \pi j^3$
- 10 Volume of right pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$
Isi padu piramid tegak = $\frac{1}{3} \times \text{luas tapak} \times \text{tinggi}$
- 11 Sum of interior angles of a polygon
Hasil tambah sudut pedalaman poligon
= $(n - 2) \times 180^\circ$

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

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

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

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

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

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

$$15 \quad \text{Area of image} = k^2 \times \text{area of object}$$

$$\text{Luas imej} = k^2 \times \text{luas objek}$$

CHAPTER 1 : STANDARD FORM

DIAGNOSTIC TEST

- Round off 0.0487 correct to two significant figures.
A 0.04
B 0.05
C 0.048
D 0.049

- $2.7 \times 10^5 + 77000 =$
A 1.04×10^5
B 1.04×10^9
C 3.47×10^5
D 3.47×10^9

- The area of a rectangular plot of land is 9.2 km^2 . Its width is 2300 m. Find the length, in m, of the plot of land.
A 4×10^3
B 4×10^4
C 6.9×10^3
D 6.9×10^4

- Express 0.0000405 in standard form.
A 4.05×10^{-5}
B 4.05×10^5
C 405×10^{-7}
D 405×10^7

- $\frac{9 \cdot 28 \times 10^{-2}}{(4 \times 10^{-3})^2} =$
A $2 \cdot 32 \times 10^3$
B $2 \cdot 32 \times 10^4$
C $5 \cdot 8 \times 10^3$
D $5 \cdot 8 \times 10^4$

CHAPTER 2 : QUADRATIC EXPRESSIONS AND EQUATIONS

DIAGNOSTIC TEST

1. $(2p + q)(q - 2p) =$

- A. $4p^2 - q^2$
- B. $q^2 - 4p^2$
- C. $4p^2 - 4pq - q^2$
- D. $4p^2 - 4pq + q^2$

2. $(3m - n)(2m - n) =$

- A. $6m^2 - mn + n^2$
- B. $6m^2 - 7mn - n^2$
- C. $6m^2 - 7mn + n^2$
- D. $6m^2 - 5mn + n^2$

3. $(x + 5y)^2 - 5xy =$

- A. $x^2 + 25y^2$
- B. $x^2 + 5xy + 25y^2$
- C. $x^2 - 5xy + 25y^2$
- D. $x^2 - 10xy + 25y^2$

4. $(x + y)^2 + (x^2 - y^2) =$

- A. $2x^2 + 2xy$
- B. $2x^2 - 2xy$
- C. $2x^2 + 2xy - 2y^2$
- D. $2x^2 - 2xy + 2y^2$

5. $(3h - 5)(2h + 4) =$

- A. $6h^2 + 2h + 20$
- B. $6h^2 + 2h - 20$
- C. $6h^2 + 12h - 20$
- D. $6h^2 - 10h + 20$

6. $m(m - 2) - 2m(m + 3) =$

- A. $-m^2 - 8m$
- B. $m^2 + 8m$
- C. $-m^2 + 4m$
- D. $m^2 - 6m$

CHAPTER 3: SETS

DIAGNOSTIC TEST

- 1 Diagram 1 is a Venn diagram which shows the elements of the sets P , Q and R .

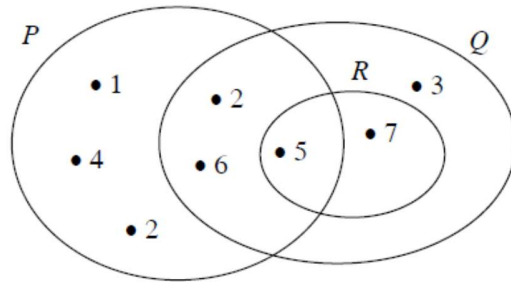


DIAGRAM 1

If the universal set, $\xi = P \cup Q \cup R$, then set $P' \cup R' \cap Q$ is

- A $\{5, 7\}$
B $\{2, 6\}$
C $\{2, 3, 6\}$
D $\{2, 3, 6, 7\}$
- 2 Diagram 2 represents a class of 40 pupils. Set $M = \{\text{Pupils who play tennis}\}$ and set $R = \{\text{Pupils who play badminton}\}$.

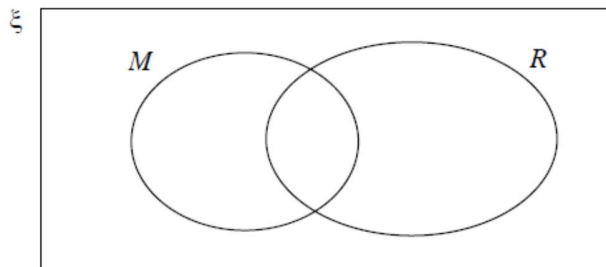
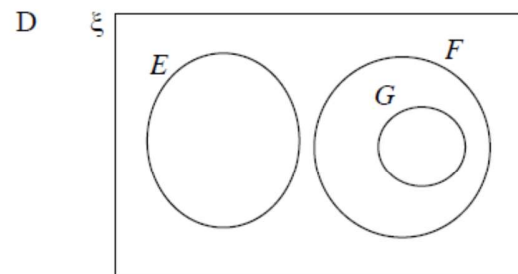
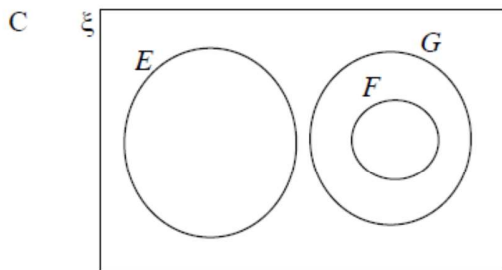
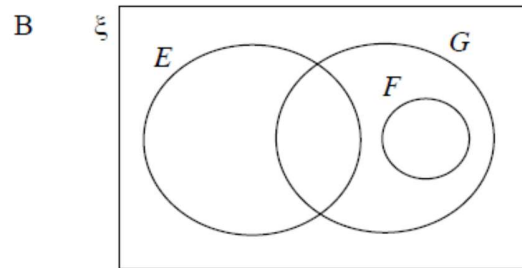
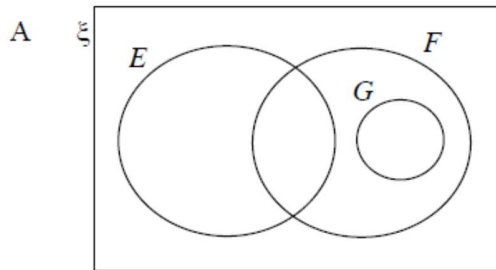


DIAGRAM 2

Given that $n(M) = 19$, $n(M \cap R) = 9$ and the number of pupils who do not play either game is 7, find the number of pupils who play badminton.

- A 10
B 14
C 23
D 25

- 3 Given that the universal set $\xi = E \cup F \cup G$, $G \subset F$ and $E \cap G \neq \emptyset$, the Venn diagram that represents these relationships is



- 4 Given that the universal set $\xi = \{x: 1 \leq x \leq 10, x \text{ is an integer}\}$, set $L = \{1, 3, 5, 9\}$, set $M = \{x: x \text{ is a perfect square}\}$ and set $N = \{x: x \text{ is a multiple of } 3\}$, $n(L \cup M \cap N')$ is
- A 0
B 2
C 3
D 8

- 5 Diagram 3 is a Venn diagram with the universal set $\xi = X \cup Y \cup Z$.

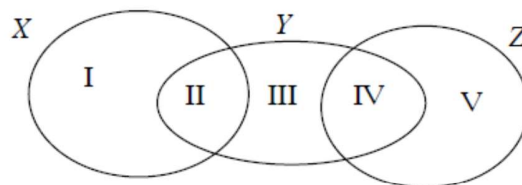


DIAGRAM 3

The set $X \cup (Y \cap Z)$ is represented by the regions

- A I, V
B I, II, IV
C I, III, V
D I, II, IV, V

CHAPTER 4: MATHEMATICAL REASONING

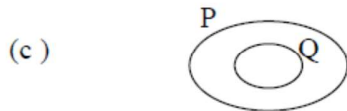
DIAGNOSTIC TEST

1.(a) Determine whether each of the following is a statement or a non statement.

- (i) $x + 3y$
- (ii) $4^2 = 8$

(b) Fill in the blank with the symbol $>$ or $<$ to form a false statement.

- (i) 2^3 3^2
- (ii) -6 -4



Based on the above Venn diagram, complete the following statement using an appropriate quantifier so that the statement is true.

‘ elements of set Q are elements of set P’

- (d) Write down the conclusion in the following argument.
Premise 1 : All prime numbers have only two factors.
Premise 2 : 5 is a prime number.
Conclusion :

[5 marks]

2. (a) Determine whether the following statement is true or false.

- (i) $3^2 = 6$ or $\frac{2}{5} = 0.4$
- (ii) $-3 \times -4 = 12$ and $-3 + -4 = 7$

(b) Write down two implications based on the following sentence.

$$mn = 0 \text{ if and only if } m = 0 \text{ or } n = 0$$

(c) Complete the following argument.

- Premise 1: If the radius of a circle is 5 cm, then its circumference is 10π
- Premise 2 :
- Conclusion: the radius of circle P is not 5 cm.

[5 marks]

3. (a) Based on the object and its given property, construct a **true** statement using an appropriate quantifier.

Object: odd numbers
Property: prime numbers

- (b) Combine the two statements below to form a true statement.

Statement 1: $3 + (-2) = 5$
Statement 2: 16 is a perfect square

- (c) Complete the following argument.

Premise 1:
Premise 2: The sum of interior angles of polygon Q is 540°
Conclusion: Q is a pentagon.

[5 marks]

4. (a) Identify the antecedent and consequent in the following implication.
' If a triangle has two equal sides, then it is an isosceles triangle.'
(b) State the converse of each of the following implication and determine if the converse is true or false.

- (i) If $x < 4$, then $x < 6$
(ii) If $A \cap B = A$, then $A \subset B$

- (c) Make a general conclusion by induction based on the numerical sequence below.

2, 9, 16, 23,

$2 = 2 + 7(0)$
 $9 = 2 + 7(1)$
 $16 = 2 + 7(2)$
 $23 = 2 + 7(3)$

.....

The numerical sequence can be represented by

- (d) Complete the following argument

Premise 1 :
Premise 2 : $M \cap N \neq M$
Conclusion: M is not a subset of N

[5 marks]

CHAPTER 5 : THE STRAIGHT LINE

DIAGNOSTIC TEST

1. In Diagram 1, MN is a straight line.

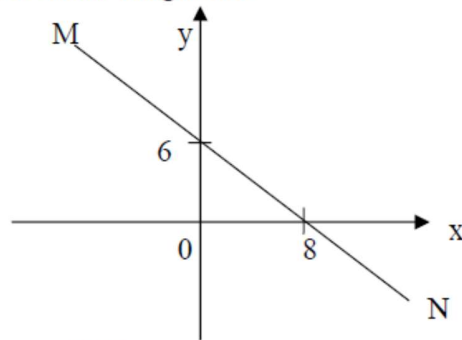


Diagram 1

Find the gradient of MN.

- A -2
 - B $\frac{3}{4}$
 - C $-\frac{3}{4}$
 - D 2
2. Given that the equation of a straight line is $x - 2y + 3 = 0$. Find the x-intercept of the straight line.
- A -1
 - B -2
 - C -3
 - D -4
3. In Diagram 2, the length of OC is 2 units.

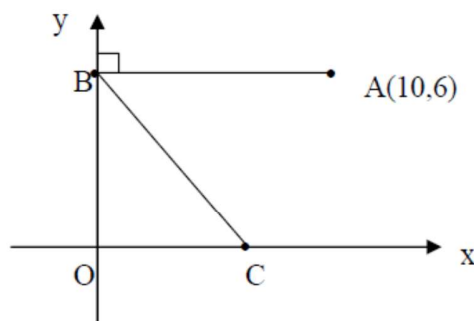
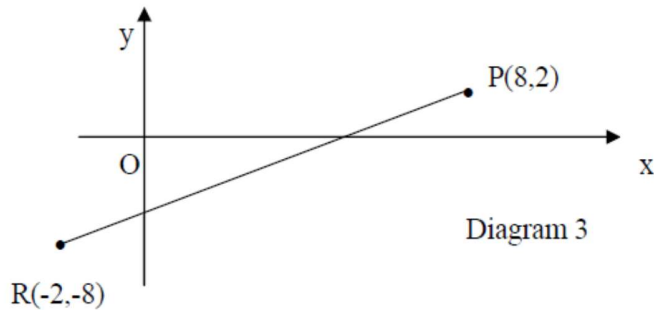


Diagram 2

The gradient of line BC is

- A 3
- B 4
- C -4

D -3

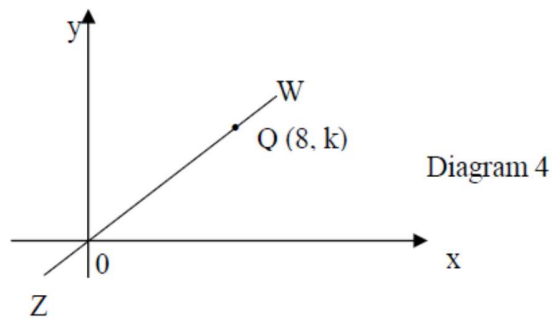


4. Based on Diagram 3, find the equation of line PR.

- A $y = -x - 6$
- B $y = -x + 6$
- C $y = x + 6$
- D $y = x - 6$

5. In Diagram 4, the equation of the line WZ is $y = \frac{3}{4}x$.

Q (8, k) is a point on the line WZ.



Find the value of k.

- A 6
- B 7
- C 8
- D 9

6. The equation of a straight line passing through the point $(-3, 8)$ and parallel to the line $y = \frac{2}{3}x + 5$ is

- A $y = \frac{2}{3}x + 8$
- B $3y = 2x + 10$
- C $3y = 2x + 30$
- D $y = \frac{2}{3}x - 3$

CHAPTER 6: STATISTICS

DIAGNOSTIC TEST

- A class interval has an upper limit of 15 and lower limit of 10. The lower boundary is
 - 9.5
 - 10.5
 - 14.5
 - 15.5

- The table 1 shows the frequency distribution of the scores of a group of players

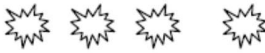
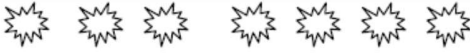

Score	1	2	3	4	5	6
Frequency	4	3	9	x	3	2

TABLE 1

If 3 is the modal score, the maximum value of x is

- 10
 - 9
 - 8
 - 7
- If the median of a set of integers, 3,8,9,x and 7 is x, the probable value of x is
 - 5
 - 6
 - 8
 - 9

- The diagram 1 is a pictograph showing the number of durians of different grades sold on a particular day. The information in the pictograph is represented by a pie chart.

Grade A durians	
Grade B durians	
Grade C durians	



Represents 50 durians

DIAGRAM 1

Calculate the angle of the sector which represents the number of grade C durians sold.

- 90°
- 112.5°
- 135°
- 157.5°

Questions 5 and 6 are based on table 2.

Table 2 shows the scores obtained by 12 students.

35	70	80	90
91	45	52	82
74	46	53	88

TABLE 2

5. Find the range of the score

- A 55
- B 56
- C 57
- D 5

6. If x mark is added to each student as a bonus and the mean is $70\frac{1}{6}$.

Find the value of x.

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

7. Which of the following class interval has a size of 5?

- A 1.1-1.5
- B 2.05-2.10
- C 5-9
- D 15-20

8 Find the mode for the following data

2, 2, 1, 3, 4, 1, 2

- A. 1
- B. 2
- C. 3
- D. 4

9

19, 18, 16, 15, 20, 15, 18, 16

The median for the above set of numbers is

- A.16
- B.17
- C 18
- D 20

CHAPTER 7 : PROBABILITY 1

DIAGNOSTIC TEST

1. In a group of 45 students, 35 are girls. A further 5 boys then join the group. If a student is chosen at random from the group, state the probability that the student is chosen is a boy

A $\frac{3}{10}$

B $\frac{1}{7}$

C $\frac{1}{10}$

D $\frac{1}{3}$

2. A jar contains 270 sweets of orange, lychee and coffee flavour. There are 48 orange flavoured sweets. If a sweet is picked at random from the jar, the probability of picking a lychee flavoured sweet is $\frac{1}{3}$. How many coffee flavoured sweets are there ?

A 90

B 132

C 106

D 16

3.

16	18	22	28	60	84
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DIAGRAM 1

The diagram 1 shows some number cards. If a card is picked randomly, find the probability that a multiple of 4 is picked.

A $\frac{2}{3}$

B $\frac{1}{2}$

C $\frac{1}{3}$

D $\frac{1}{6}$

4. During Christmas, Angela sent 6 greeting cards to her friends, 5 greeting cards to her relatives and 2 greeting cards to her brothers. If a greeting card sent by Angela is randomly selected, the probability that it was not sent to her brother is

- A $\frac{2}{13}$
- B $\frac{5}{13}$
- C $\frac{1}{6}$
- D $\frac{11}{13}$

5. A class has 18 boys and k girls. If a student is picked at random from the class, the probability that the student picked is a girl is $\frac{4}{7}$. Find the value of k .

- A 18
- B 24
- C 30
- D 42

6. The probability of Hafiz choosing a green coloured shirt is 15%. If Hafiz has 20 shirts, how many shirts are green?

- A 3
- B 4
- C 5
- D 6

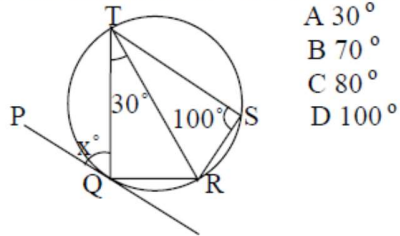
7. In a group of tourist, 15 of them wear watches. The probability of choosing at random a tourist from the group who wears a watch is $\frac{3}{5}$. If three tourists who wear watches leave the group, the probability of choosing at random a tourist who wears a watch is

- A $\frac{1}{22}$
- B $\frac{12}{25}$
- C $\frac{6}{11}$
- D $\frac{15}{25}$

CHAPTER 8 : CIRCLES III

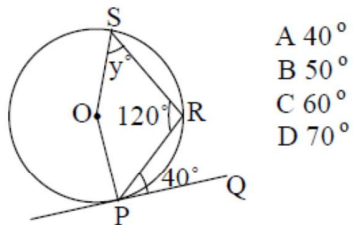
DIAGNOSTIC TEST

1. In the diagram, tangent PQ touches the circle at Q. Find the value of x.



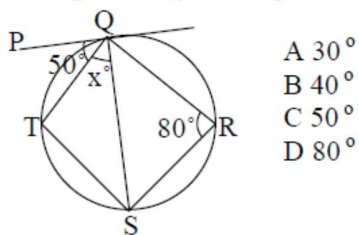
- A 30°
- B 70°
- C 80°
- D 100°

2. In the diagram, PQ is a tangent to the circle with centre O at P. Find the value of y.



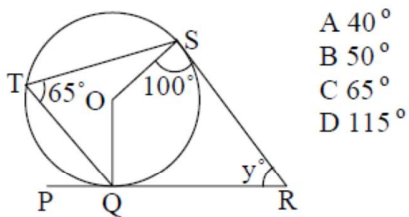
- A 40°
- B 50°
- C 60°
- D 70°

3. In the diagram, PQ is a tangent to the circle at Q. Find the value of x.



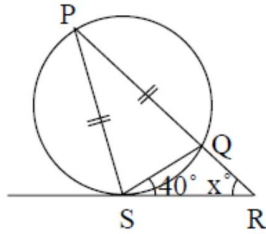
- A 30°
- B 40°
- C 50°
- D 80°

4. In the diagram, PQR is a tangent to the circle with centre O at Q. Find the value of y.



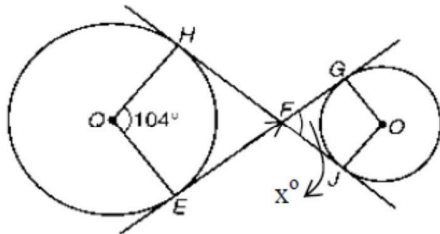
- A 40°
- B 50°
- C 65°
- D 115°

5. In the diagram, RS is a tangent to the circle at S and PQR is a straight line. Find the value of x.



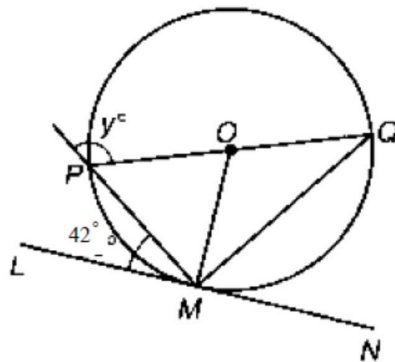
- A 20°
- B 25°
- C 30°
- D 40°

6. In the diagram below, EFG and HFJ are common tangents to the circles centre O and Q, at J, G, E and H respectively. Find the value of x.



- A. 76°
- B. 52°
- C. 104°
- D. 90°

7. In the diagram below, LMN is a tangent to the circle at M. POQ is the diameter of the circle. Find the value of y.



- A. 42°
- B. 132°
- C. 138°
- D. 48°

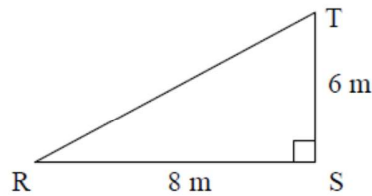
CHAPTER 10 : ANGLES OF ELEVATION AND DEPRESSION

DIAGNOSTIC TEST

1. The angle of depression from a river bank to a sampan is 25° . If the vertical distance from the bank to the sampan is 40m, calculate the horizontal distance between the sampan and the river bank.

- A. 18.65m
- B. 29.79m
- C. 47.67m
- D. 85.78m

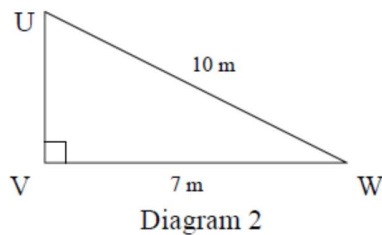
2.



In diagram 1, find the angle of elevation from R to T.

- A. $36^\circ 52'$
- B. $41^\circ 25'$
- C. $48^\circ 35'$
- D. $53^\circ 08'$

3.



In diagram 2, find the angle depression from U to W.

- A. 30°
- B. $44^\circ 36'$
- C. $45^\circ 34'$
- D. $135^\circ 34'$

4. A bird is at a distance of 50m horizontally from a helicopter. The bird is flying at a height of 60m vertically below the helicopter. Find the angle of depression of the helicopter to the bird.

- A. $33^{\circ} 33'$
- B. $39^{\circ} 48'$
- C. $50^{\circ} 12'$
- D. $56^{\circ} 27'$

5. A student is observing a ceiling fan. If the angle of elevation of the student to the fan is 20° and the horizontal distance between the two is 6m, calculate the height of the fan the floor (ignore the height of the student).

- A. 2.05m
- B. 2.18m
- C. 3.82m
- D. 5.63m

6. In the diagram 3, PQ and RS are two vertical pillars standing on horizontal ground. The angle of elevation of Q from S is 22° .

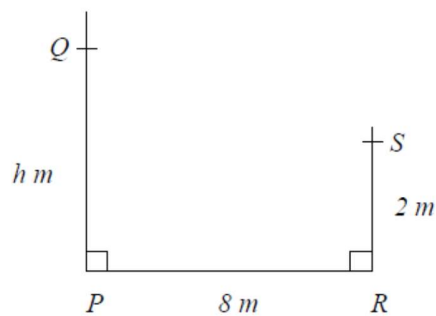


Diagram 3

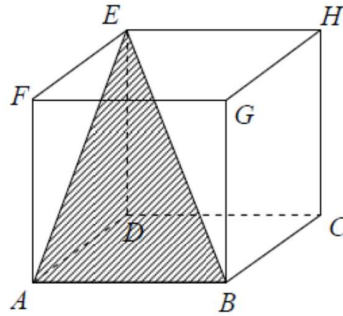
Calculate the value of h .

- A. 3.2
- B. 19.8
- C. 5.2
- D. 21.8

CHAPTER 11 : LINES AND PLANES IN 3-DIMENSION

DIAGNOSTIC TEST

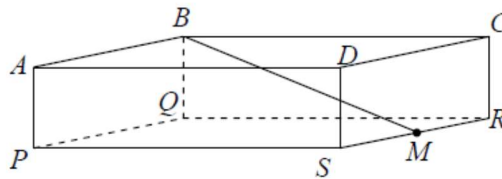
1. The diagram shows a cube with a horizontal base ABCD



Name the angle between line AF and the plane ABE

- A. $\angle EAB$
- B. $\angle EAF$
- C. $\angle EBA$
- D. $\angle EBF$

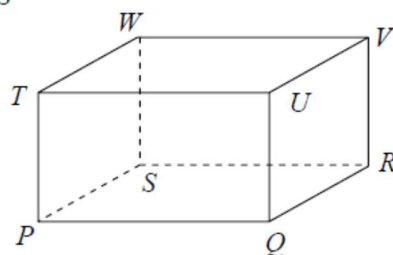
- 2.



The diagram shows a cuboid. Name the angle between line BM and the plane PRQS

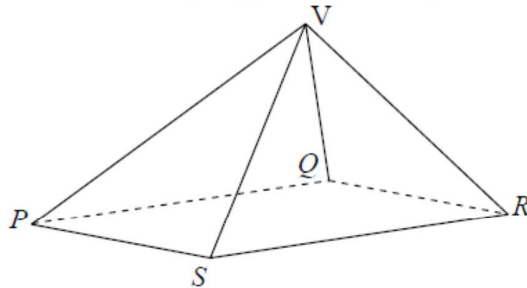
- A. $\angle BRQ$
- B. $\angle BMQ$
- C. $\angle BMR$
- D. $\angle BMS$

- 3.



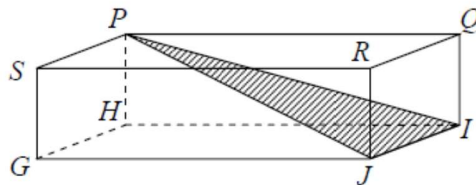
- The diagram shows a cuboid. The angle between line SU and plane PSWT is
- A. $\angle USP$
 - B. $\angle USQ$
 - C. $\angle UST$
 - D. $\angle USW$

4. The diagram shows a right pyramid with a quadrilateral base PQRS.



What is the angle between the line VQ and the base PQRS?

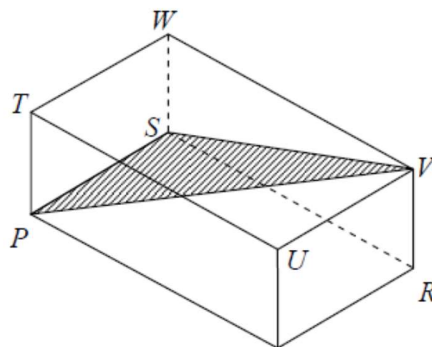
- A. $\angle VQR$
 - B. $\angle VQP$
 - C. $\angle VQS$
 - D. $\angle QVR$
5. The diagram shows a cuboid with a horizontal base GHIJ



Name the angle between line QI and the plane JPI

- A. $\angle QJP$
- B. $\angle QPI$
- C. $\angle QIH$
- D. $\angle QIP$

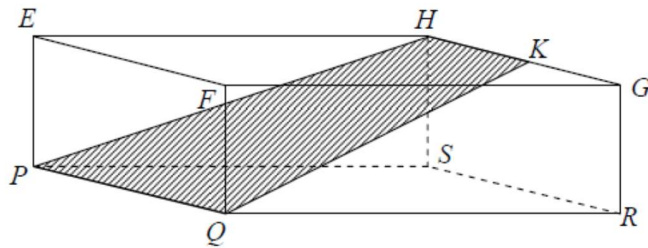
- 6.



The diagram shows a cuboid. Name the angle between the two planes PSTW and VSP

- A \angle VPW
- B \angle VSW
- C \angle VSP
- D \angle VPT

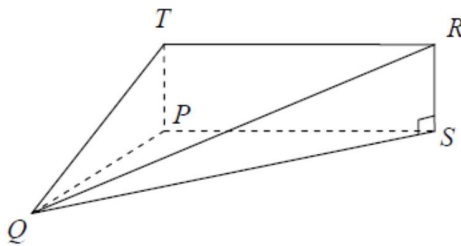
7.



The diagram shows a cuboid . The angle between the two planes PQKH and GHSR is

- A. \angle PHK
- B. \angle PHS
- C. \angle PHE
- D. \angle QKS

8



The diagram shows a pyramid with a horizontal triangular base PQR. RSTP is a vertical plane. The angle between the two planes TPQ and SRQ is

- A \angle PRQ
- B \angle SQR
- C \angle PQS
- D \angle TQS

TOPIC : GRAPHS OF FUNCTIONS
TIME : 2 HOURS

1. a) Complete Table 1 in the answer space for the equation $y = 2x^2 - 5x - 3$.
- b) For this part, use a graph paper.
By using a scale 2 cm to 1 unit on the x-axis and 2 cm to 5 units on the y-axis, draw the graph of $y = 2x^2 - 5x - 3$ for $-3 \leq x \leq 5$.
- c) From your graph, find
i) the value of y when $x = -2.4$,
ii) the value of x when $2x^2 - 5x - 3 = 0$.
- d) Draw a suitable straight line on your graph to find all the values of x which satisfy the equation $2x^2 - 8x = 7$ for $-3 \leq x \leq 5$.
State these values of x .

Answer:

a)

X	-3	-2	-1	0	0.5	1	2	3	4	5
Y	30		4	-3		-6	-5	0	9	22

Table 1

c) i) $y =$

ii) $x =$

d) $x =$

2. a) Complete Table 2 in the answer space for the equation $y = x^2 - 5x + 4$.
- b) For this part, use a graph paper.
By using a scale 2 cm to 1 unit on the x-axis and 2 cm to 5 units on the y-axis, draw the graph of $y = x^2 - 5x + 4$ for $0 \leq x \leq 8$.
- c) From your graph, find
a. the value of y when $x = 4.5$,
b. the value of x when $y = 21.75$
- d) Draw a suitable straight line on your graph to find all the values of x which satisfy the equation $x^2 - 7x + 3 = 0$ for $0 \leq x \leq 8$.
State these values of x.

Answer:

a)

X	0	1	2	2.5	3	4	5	6	7	8
Y	4	0	-2		-2		4	10	18	28

Table 2

c) i) $y =$

ii) $x =$

d) $x =$

TOPIC : TRANSFORMATIONS

TIME : 2 HOUR

1. (a) Diagram 1 shows two points, M and N , on a Cartesian plane.

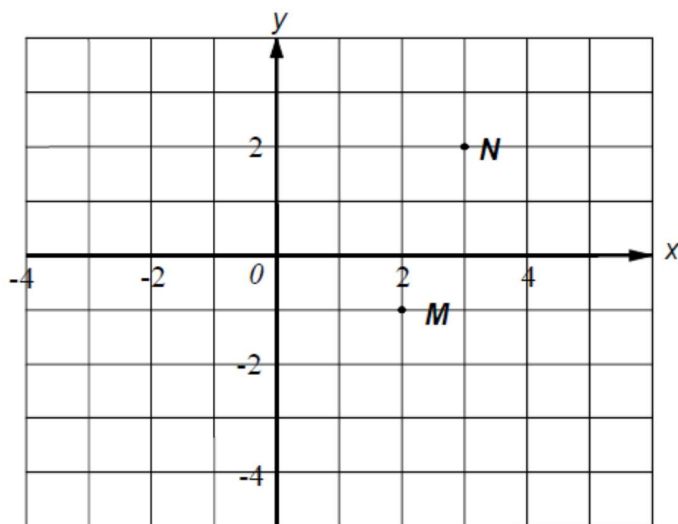


DIAGRAM 1

Transformation Y is a translation $\begin{pmatrix} -3 \\ -3 \end{pmatrix}$.

Transformation P is a reflection in the x -axis.

- (i) State the coordinates of the image of point N under transformation Y .
- (ii) State the coordinates of image of point M under the following transformation:

- (a) Y^2
(b) YP

[3 marks]

Answer:

(a) (i)

(ii) (a)

(b)

(b) Diagram 2 shows three trapezium $ABCD$, $EFGH$ and $PQRS$ on a Cartesian plane.

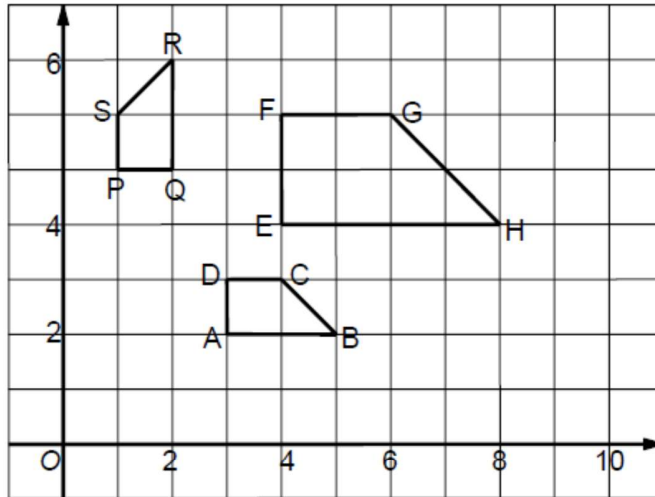


DIAGRAM 2

Trapezium $ABCD$ is the image of trapezium $PQRS$ under transformation M .
 Trapezium $EFGH$ is the image of trapezium $ABCD$ under transformation N .

(i) Describe in full transformation :

- (a) M
- (b) N

[6 marks]

(ii) Calculate the area of trapezium $EFGH$, if the area of trapezium $ABCD$ is 25 unit^2 .

[3 marks]

Answer:

(b) (i) (a)

(b)

(ii)

TOPIC : MATRICES
TIME : 2 HOURS

1. (a) The inverse matrix of $\begin{pmatrix} 3 & -2 \\ 5 & -4 \end{pmatrix}$ is $m \begin{pmatrix} -4 & n \\ -5 & 3 \end{pmatrix}$

Find the value of m and of n .

- (b) Hence, using matrices, solve the following simultaneous equations :

$$\begin{aligned} 3x - 2y &= 8 \\ 5x - 4y &= 13 \end{aligned}$$

2. (a) Given that $G = \begin{pmatrix} m & 3 \\ 2 & n \end{pmatrix}$ and the inverse matrix of G is $\frac{1}{14} \begin{pmatrix} 4 & -3 \\ -2 & m \end{pmatrix}$,
find the value of m and of n .

- (b) Hence, using matrices, calculate the value of p and of q that satisfies the following equation :

$$G \begin{pmatrix} p \\ q \end{pmatrix} = \begin{pmatrix} 1 \\ -8 \end{pmatrix}$$

TOPIC : GRADIENT AND AREA UNDER A GRAPH

MASA : 1 JAM

- 1 Diagram 1 shows the speed-time graph of a particle for a period of 15 s.

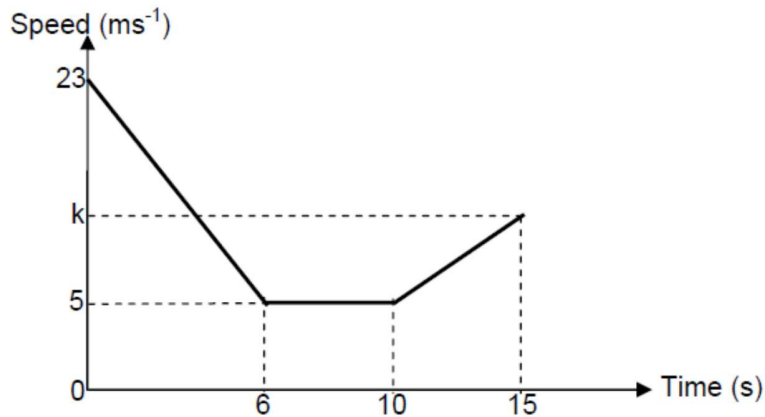


DIAGRAM 1

- (a) State the distance, in m, the particle moves with constant speed.
(b) Calculate the rate of change of speed, in ms^{-2} , in the first 6 s.
(c) Calculate the value of k , if the total distance travelled in the first 15 s is 139m.

[6 marks]

2. Diagram 2 shows the speed-time graph of two particles, α and β for a period of 8s.

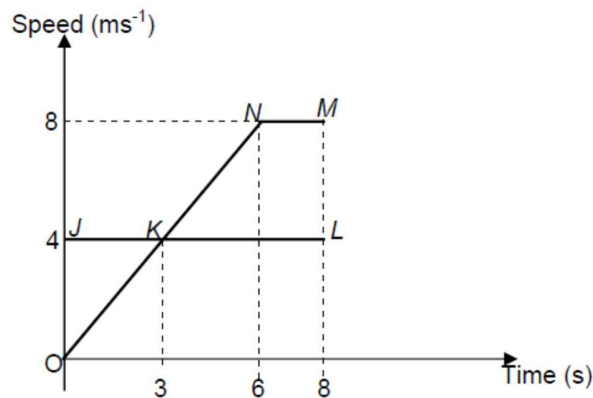


DIAGRAM 2

The graph $OKNM$ represents the movement of particle α and the graph JKL represents the movement of particle β . Both particles start moving at the same time.

- (a) State the length of time, in s, that particle α moves with uniform speed.
(b) Calculate the rate of change of speed, in ms^{-2} , of particle α in the first 6 s.
(c) Calculate the difference in distance, in m, of particle α and particle β for a period of 8 s.

[6 marks]

TOPIC : PROBABILITY
TIME : 2 HOURS

1. A box contains 5 green marbles, 4 blue marbles and 6 red marbles. A marble is picked at random.
Without replacing the first marble, another marble is taken from the box.
Calculate the probability that
- (a) the first marble green and the second marble red
 - (b) two marbles are the same colour.

Answer:

(a)

(b)

2. Table 1 shows the number of members of two sport societies, Rugby and Football, who are planning trips to Melaka and Pahang.

State to be visited	Number of members	
	Rugby	Football
Melaka	17	13
Pahang	9	15

Table 1

- (a) If two members are chosen at random from the Rugby, calculate the probability that both of them will be going to Melaka.
- (b) If two members are chosen at random from the group to Pahang, calculate the probability that both of them are from the same society.

Answer:

(a)

(b)

3. Table 2 shows the number of students of the class that leave at two residential areas.

Residential area	Number of students	
	Boy	Girl
Taman Desaru	7	3
Taman Penawar	5	4

Table 2

- (a) If two students are chosen at random from the Taman Penawar, calculate the probability that one of the students is girl and the other one is boy.
- (b) If two students are chosen at random from boy group, calculate the probability that both of the students are from the same residential area.

Answer:

(a)

(b)

4. In a quiz contest, there are three categories of questions consisting of 5 questions on Chemistry, 3 questions on Biology and 7 questions on Physics. Each question is placed inside an envelope. All of the envelopes are similar and put inside a box.

All the participants of the quiz contest are requested to pick at random two envelopes from the box.

Find the probability that the first participant picks

- (a) the first envelope with a Chemistry question and the second envelope with an Biology question.
- (b) two envelopes with question at the same category.

TOPIC : EARTH AS A SPHERE
TIME : 2 HOURS

1. $(50^{\circ}\text{S}, 70^{\circ}\text{E})$, G, H and K are four points on the earth's surface. F, G and H are on the same latitude such that FG is the diameter. The longitude of H is 45°W .
- (a) Find the longitude of G.
- (b) An aeroplane flew due west from F to H. It then flew 4800 nautical miles due north to K. Given that its average speed for the whole journey was 680 knots, calculate
- (i) the latitude of K,
- (ii) the distance, in nautical miles, from F to H,
- (iii) the time taken to complete the journey.

Answer:

(a)

(b) (i)

(ii)

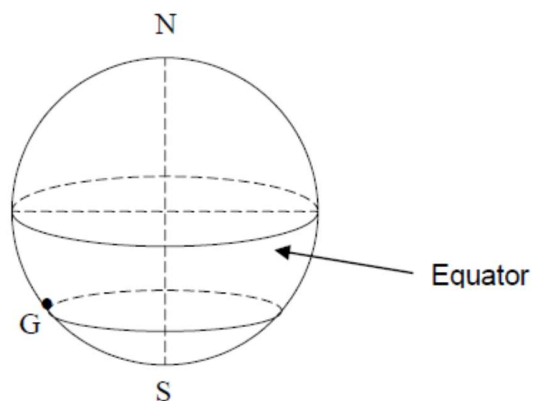
(iii)

2. G (60°S , 20°W) and H are two points on the surface of the earth where GH is a diameter of the common parallel of latitude.
- Find the latitude of H.
 - Given GL is a diameter of the earth. On the diagram in the answer space, mark the locations of H and L. Hence, state the location of L.
 - Calculate the shortest distance, in nautical miles, from H to the South Pole.
 - An aeroplane took off from G and flew due east along the common parallel of latitude at an average speed of 450 knots. The aeroplane took 8 hours to reach a point P. Calculate
 - the distance, in nautical miles, from G to P,
 - the longitude of P.

Answer:

(a)

(b)



(c)

(d)

TOPIC : PLAN AND ELEVATION
TIME : 2 HOUR

- 1 (a) Diagram 1(i) shows a solid right prism with the rectangular base QRXW lying on a horizontal plane.
 Pentagon PQRST is the uniform cross section of the prism.
 Rectangle STUY is a horizontal plane whereas rectangle PTUV is an Inclined plane.
 The sides PQ and SR are vertical.

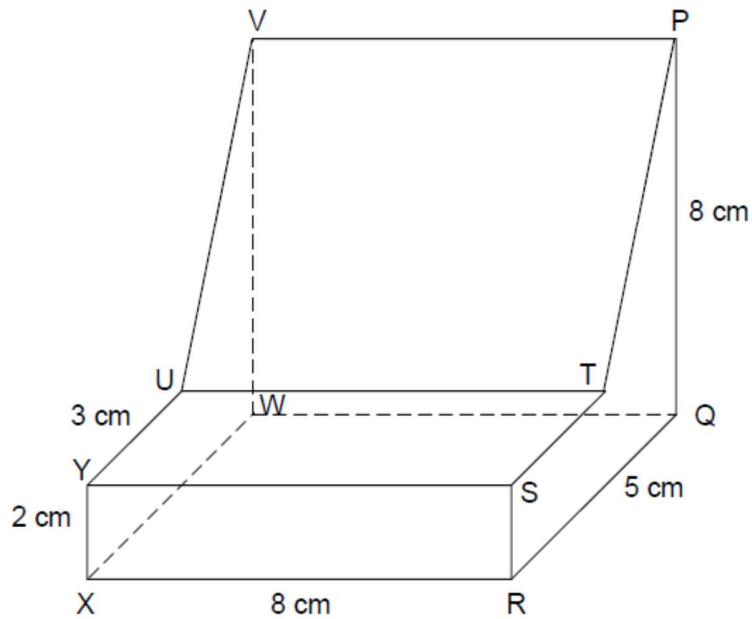
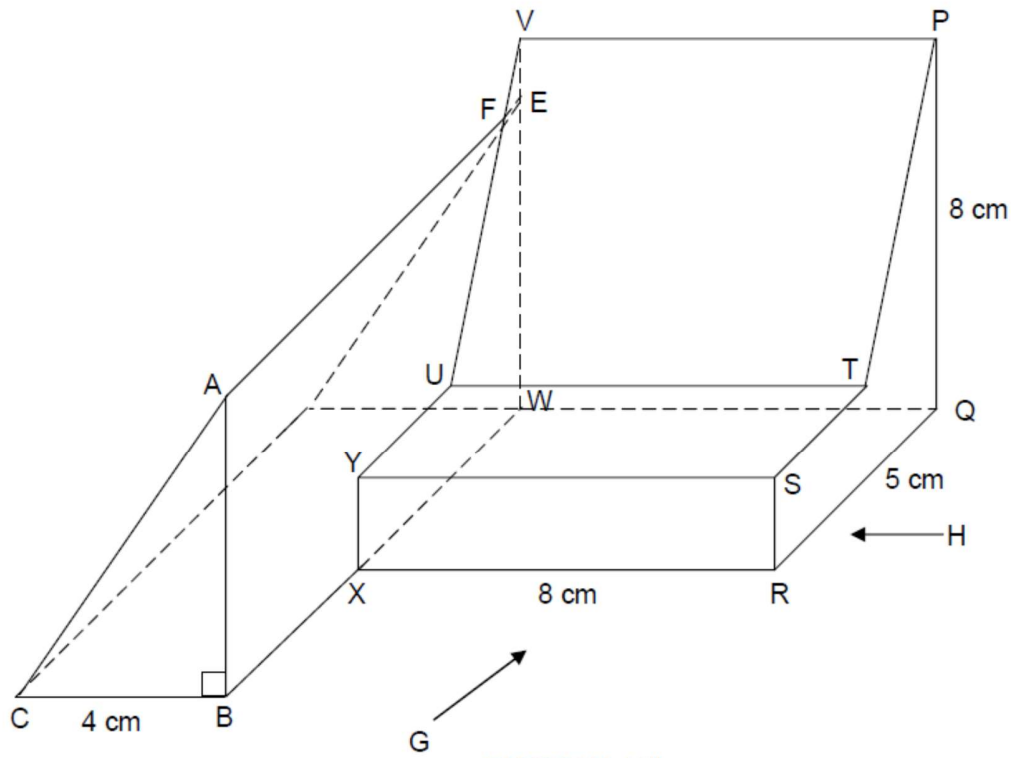


DIAGRAM 1(i)

Draw in full scale, the plan of the solid right prism.

- (b) Another solid prism with uniform cross section ABC is joined to the prism in Diagram 1(i) at the vertical plane EFUYXW to form a combined solid as shown in Diagram 1(ii).
It is given that $BX = 3\text{ cm}$ and $AB = 5\text{ cm}$.



Draw in full scale,

- (i) the elevation of the combined solid on a vertical plane parallel to XR as viewed from G.
- (ii) the elevation of the combined solid on a vertical plane parallel to RQ as viewed from H.

Answer space for Question Number 1:-

1. (a)

1. (b) (i)

1. (b) (ii)