ALGEBRA AND TRIGONOMETRY

(1) Complete:

1) If A = (3 , 5) , B (2 , 1) , C = (-2 , 4) then the surface area of ΔABC equals …… square unit.

2) If A = $\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix}$ the A^2 = ……

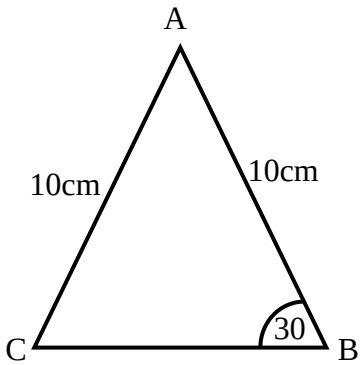
3) (sec x – tan x) (Sec x + tan x) = ……

4) $(\sin\theta - \cos\theta)^2 + 2\sin\theta\cos\theta$ = ……

5) The S.S of the inequality 2x – 7 > 5x in R is ……..

6) The area of the circular sector whose arc length is 6cm and the radius length of its circle is 4cm. equals ……. cm^2.

7) in the opposite figure



i) BC = ……..cm

ii) The surface area of Δ ABC = ……cm^2

8) if A^{-1} = $\begin{pmatrix} 5 & -2 \\ -7 & 3 \end{pmatrix}$ then A = ……

9) if $\begin{vmatrix} 2x & 2 \\ 4 & 3 \end{vmatrix}$ = 10 the x = …….

10) $\sin^2 x + \tan^2 x + \cos^2 x$ = ……

11) The general solution of the equation $\sin\theta = \frac{1}{2}$ is …….

12) if tan A + cot A = 3 then $\tan^2 A + \cot^2 A$ = …….

2- Prove that :

1) $\frac{Cot\ C}{1+cot^2 C}$ = sin C Cos C

2) Sec A – sin A = Cos A Cot A

3) $Sec^2A + Cosec^2 A = Sec^2A\ Cosec^2A$

4) $Cot^2A – Cos^2A = Cot^2A\ Cos^2A$

5) $\frac{Cos^2 A}{1-sinA}$ =1 + sin A

6) $\frac{1-tan^2 A}{1+tan^2 A} = 2Cos^2A – 1$

7) $\frac{1}{sin^2(90-\theta)}$ - $\tan^2 \theta = 1$

8) $(\sin A - Cos)^2 + (\sin A + Cos\ A)^2 = 2$

9) $\frac{1}{1+Cot\ A} = \frac{\tan A}{1+\tan A}$

10)$(Sec\ A – \tan A)^2 = \frac{1-Sin\ A}{1+\sin A}$

11) if sec x – tan x = 6 the sec x + tan x = …….

12) if sin A + Cos A = $\frac{7}{5}$ the sin A Cos A = …….

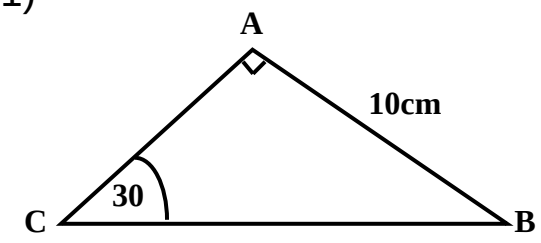
13) the general solution of the equation sin θ = Cos θ is …….

14) if tan(-θ) = $\sqrt{3}$ = 0 where θ ∈] $\frac{\pi}{2}$, $\frac{3\pi}{2}$[the θ = …… or ……

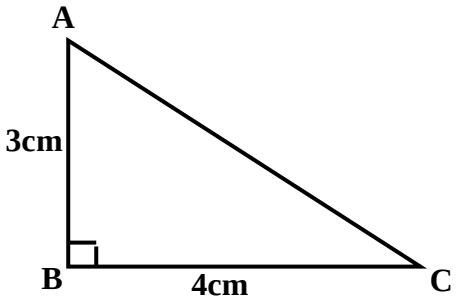
15) if 2 sin θ + $\sqrt{3}$ = 0 , θ ∈] $\frac{\pi}{2}$, $\frac{3\pi}{2}$[then θ = ……

3- Solve each of the following triangles:

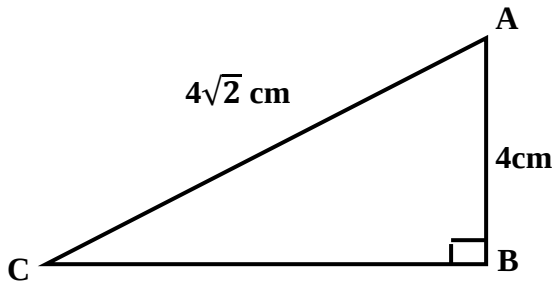
1)



2)



3)



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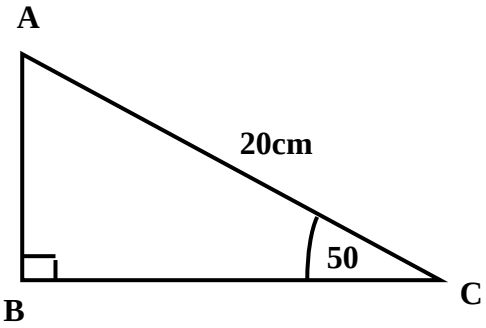
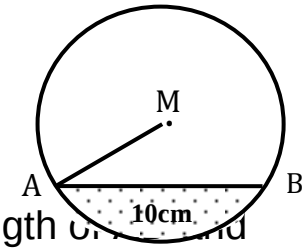
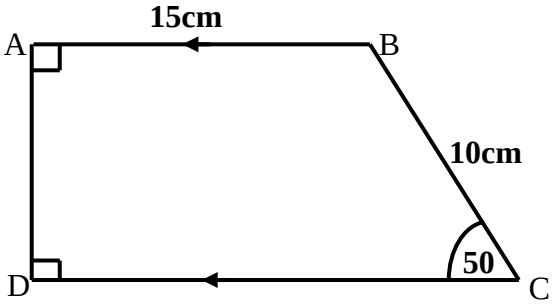


4- In the opposite figure find the length of the radius of the circle.
and the surface area of the shaded part.



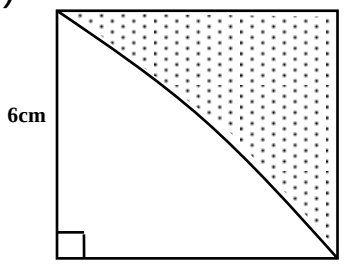
5- In the opposite figure ABCD is a trapezium find the length of AB and DC.



6- Find the area of a circular sector in which the length of its arc is16cm , and the length of its radius is 6cm.

7- Find the area of the shaded part in each of the following.

1)



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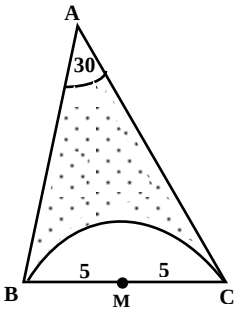
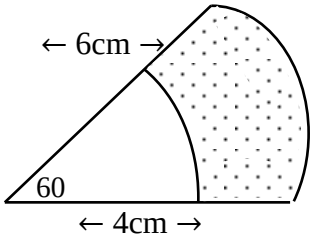
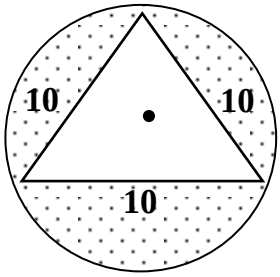


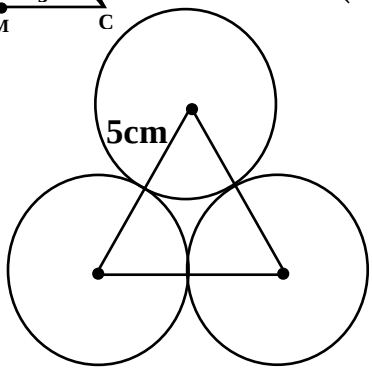
3)



4)



5)



8- if A = $\begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$, B = $\begin{pmatrix} -2 & 1 \\ 4 & -2 \end{pmatrix}$ find AB , BA , (A + B) A

9- if A = (1 2 3) , B = $\begin{pmatrix} 4 \\ 5 \\ 1 \end{pmatrix}$ find if possible AB , BA .

10- if A = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $(A + B)^T$ = $\begin{pmatrix} 2 & 0 \\ 1 & -1 \end{pmatrix}$ find A^TB^T

11- if A = $\begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$ and $A^2 - XA + yI = 0$ find X , y where x , y $\in$ R

12- if A = (a_{ij}) is a matrix of order 3 x 2 and $a_{ij} = i + 2j$ find A and A^T

13- if A = $\begin{pmatrix} 1 & 4 & x^2 + 1 \\ 4 & 2 & 3 \\ 5 & 3 & 6 \end{pmatrix}$ is Symmetric matrix find the value of x.

14- Find the area of regular octagon whose side length 8cm. " two nearest to cm ".

15- From the top of a tower of height 60m. the measure of the angle of depression of a car in the same horizontal with its base is 28° 36' Find the distance between this car and the base of the tower to the nearest metre.

16- Find the area of regular pentagon whose side length is 16 cm.

17- Find the S.S by cramer's method.

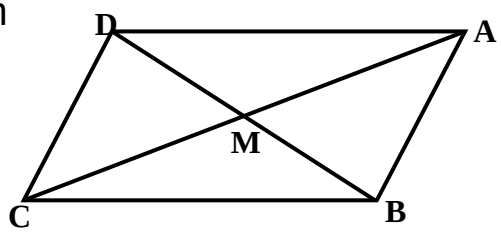
$$X + 2y - 3Z = 6 \ , \ 2X - y - 4Z = 2 \ , \ 4X + 3y - 2Z = 14$$

18- From the top of a hilli of height 2.56 km, the measure of angle of depression is 63° find the distance between the point and the man to the nearest metre.

19- A man found that the measure of the angle of elevation of plane its height 1000 metre, he found its measure is 25° 17' find the distance of the man and plane.

Geometry

1) In the opposite figure ABCD is a parallelogram

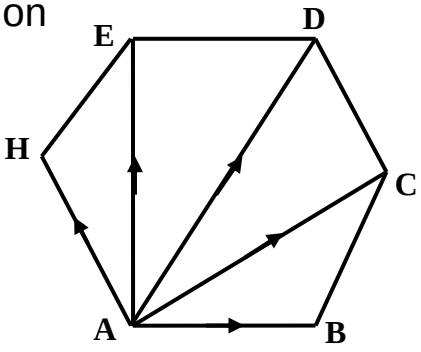


Complete :

1) $\overrightarrow{CM}$ = $\overrightarrow{\ldots\ldots}$ 2) $\overrightarrow{DA}$ = $\overrightarrow{\ldots\ldots}$ 3) -$\overrightarrow{AB}$ = $\overrightarrow{\ldots\ldots}$

4) $\overrightarrow{BM}$ = $\overrightarrow{\ldots\ldots}$ 5) $\overrightarrow{AC}$ = $\overrightarrow{2\ \ldots\ldots}$ 6) $\overrightarrow{MD}$ = - $\frac{1}{2}$ $\overrightarrow{\ldots\ldots}$

2) In the opposite figure ABCDEH is a regular hexagon

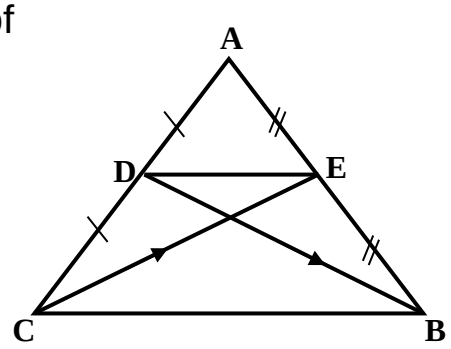


Prove that :

$\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AH} = 3\overrightarrow{AD}$

3) In the opposite figure E , D are the mid-points of $\overline{AB}$ and $\overline{AC}$ respectively .

Prove that $\overrightarrow{CE} + \overrightarrow{DB} = \frac{1}{2}\overrightarrow{CB}$



4) if A =(3 , -2) , B (6 , 2) , C (1 , 3) and D(4 , 7) find $||\vec{A} - 3\vec{B}||$,

$||\overrightarrow{AB}||$, $||\overrightarrow{CD}||$

5) if A = (5 , $5\sqrt{3}$)write the polar form of $\vec{A}$

6) if A = (10 , 120˚) write the Cartesian form of $\vec{A}$

7) if A = (4 , 300˚) write $\vec{A}$ in terms of $\vec{i}$, $\vec{j}$

8) if A = (2 , -3) , $\vec{B}$ = (-6 , m) find m if

i) $\vec{A}$ // $\vec{B}$ ii) $\vec{A} \perp \vec{B}$

9) if ABCD is a parallelogram , A(2 , -2) , B(4 ,-2) , C(2 , 3) find the coordinates of the point D and the point of intersection of its two diagonals.

10) if A = (-3 , -7) , B (4 , 0) find the point C which divides $\overrightarrow{AB}$ internally by the ratio 5 : 2

11) if A = (3 , 5) , B (7 , -10) find the point C in which.

1- C $\in \overrightarrow{AB}$, $\frac{CA}{CB} = \frac{2}{3}$

2- C $\in \overrightarrow{AB}$, $\frac{CA}{CB} = \frac{3}{2}$

3- C $\in \overrightarrow{AB}$, $\frac{CA}{AB} = \frac{1}{4}$

12) if A = (3 , -2) , B = (-2 , 3) find the ratio by which

1- C (8 , -7) divides $\overleftrightarrow{AB}$

2- the x-axis divides $\overleftrightarrow{AB}$

3- the y-axis divides $\overleftrightarrow{AB}$

and determine the type of division in each case.

13) ABC is a triangle where A(1 , 2) , B(3 , -1) , C(5 , 5) find the coordinate of the point of intersection of the three medians.

14) if the equation of the straight line L is (2k – 1) x + (3 – k) y – x k + 6 = 0 , find the value of k in each of the following cases.

1) (1 , 2) ∈ L

2) L is parallel to the st. line x + y = 2

3) L is parallel to the x-axis

4) L is parallel to y-axis

15) write the equation of the st. line passes through the point (4 , 3) and

1- the point (1 , 4)

2- parallel to the st. line 2x + y – 10 = 0

3- perpendicular to the st. line $\frac{x}{2} + \frac{y}{3} = 1$

4- make on angle of measure 135° with the positive direction of x-axis.

5- cut equal parts from the positive direction of $\overrightarrow{ox}$, $\overrightarrow{oy}$

16) find the surface area of the triangle formed by the st. line 2x + 3y = 12 and the two axis.

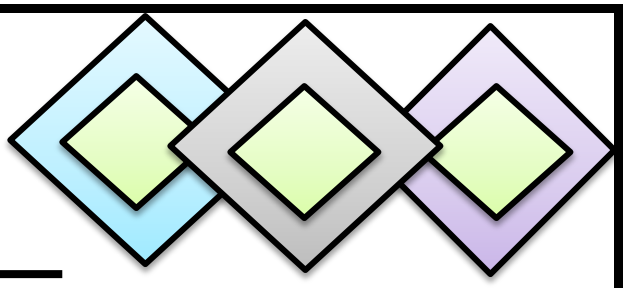
17) In Δ ABC , A(3 , 5) , B (7 , 4) , C (-4 , 0) If E is the mid-point of $\overline{BC}$. Write the equation of the st. line $\overleftrightarrow{AE}$.

18) if A=(5 , -6) , B(3 , 4) find the equation of the axis of symmetry of $\overline{AB}$

19) In Δ ABC , A= (0 , 2) , B = (3 , 1) , C = (-2 , -1) find m ($\hat{A}$)

20) In Δ ABC , A(2 , 3) , B(5 , 7) , C= (1 , 4) find y if m ($\hat{B}$)= 90° then find the measure of the other two angles.

21) find the distance between the point (1, 5) and the line passes through the two points (2 , -3) and (2 , -1)



22) Complete:

1- the length of the perpendicular from the point (-3 ,5) and the y-axis is …….

2- the length of the perpendicular from the point (1 ,-4) and the x-axis is …….

3- the length of the perpendicular from the point (0 ,-4) and the st. line is ……

23) Find the equation of the straight line which passes through the point of the intersection of the two straight

Lines 3x + 2y = 10 , 5x – 3y – 4 = 0 and its perpendicular to the straight line 2x + 7y – 4 = 0

24) If the two forces F1= $2\vec{i} + 3\vec{j}$, F2 = a $\vec{i}$ + j , F3 = $5\vec{i}$ + b $\vec{j}$ act at point find the value of a , b if the resultant of those forces R.

a) $\overrightarrow{R} = 5\vec{i} - 2\vec{j}$ **b)** $\overrightarrow{R} = \overrightarrow{0}$

25) The two force F1 , F2 act at one point find the value and the direction of their. Resultant if

F1 = $34\vec{e}$ in the north east direction

F2 = $34\vec{e}$ in the south west direction.

26) Two forces of magnitudes F1 = $2\vec{i} - 3\vec{i}$, F2 = $4\vec{i} + 7\vec{i}$, F3 = $3\vec{i} - \vec{j}$ act at point. Find the resultant and its direction.

27) Find the equation of the straight line which passes through the point (3,1) and the point of intersection of two straight lines 3x + 2y – 7 = 0 , x + 3y = 7

28) If $\overrightarrow{V_a} = 120\,\hat{k}$, $\overrightarrow{V_b} = 80\,\hat{k}$ find $\overrightarrow{V_{ba}}$, $\overrightarrow{V_{ab}}$

29) Find the equation of the straight line which passes through the point of intersection of intersection of $\vec{r}$ = k(-3 , 2) , $3\vec{x} - 2y = 13$ and parallel to y – axis .

30) Find the equation of the straight line which passes through the point of intersection of the two straight lines 2x + 3y -2 = 0 , 3x – y – 14 = 0 and makes with the positive direction of X axis positive angle its measure 135°

Answers

Algebra and trigonometry

Q1:

1) $9\frac{1}{2}$ cm^2

2) $\begin{pmatrix} 13 & 9 \\ 12 & 16 \end{pmatrix}$

3) 1

4) 1

5) $]-\infty, \frac{-7}{3}[$

6) 12 cm^2

7) $10\sqrt{3}$ cm , $25\sqrt{3}$ cm^2

8) $\begin{pmatrix} 3 & 2 \\ 7 & 5 \end{pmatrix}$

9) 3

10) Sec^2x

11) $\theta = \pm 30 + 2n\pi$

12) 1

Q2:

from 1→ 10 prove

11) $\frac{1}{6}$

12) $\frac{1}{5}$

13) θ = 45 + 180n

14) θ = 240

15) $\frac{15}{8}$

Q3:

from 1 → 4

Solve : find the value of each element in Δ by sin , Cos , Tan.

Q4:

r = $\frac{10}{3}\sqrt{3}$ cm

area = 20.5 cm^2

Q5:

AD = 7.7 cm

DC = 21.4 cm

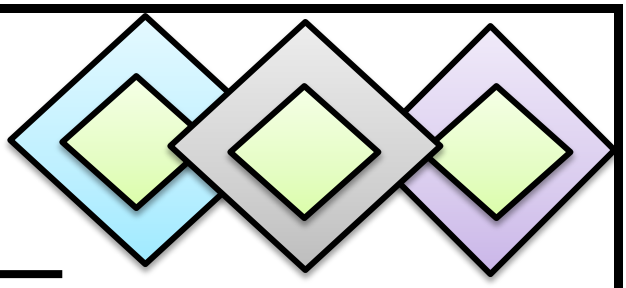
Q6: 72 cm^2

Q7: Solve by yourself.

Q8: $\begin{pmatrix}-2 & 1\\ -2 & 1\end{pmatrix}$, $\begin{pmatrix}-1 & 0\\ 2 & 1\end{pmatrix}$, $\begin{pmatrix}15 & 5\\ 27 & 9\end{pmatrix}$

Q9: (17) , $\begin{pmatrix}4 & 8 & 12\\ 5 & 10 & 15\\ 1 & 2 & 3\end{pmatrix}$

Q10: $\begin{pmatrix}-2 & -18\\ -2 & -26\end{pmatrix}$



Q11: x = 4 , y = 3

Q12: , A = $\begin{pmatrix} 3 & 5 \\ 4 & 6 \\ 5 & 7 \end{pmatrix}$, A^T = $\begin{pmatrix} 3 & 4 & 5 \\ 5 & 6 & 7 \end{pmatrix}$

Q13: x = ± 2

Q14: 309 cm2

Q15: 110m

Q16: 440cm2

Q17: X = 2 , y = 2 , Z = 0

Q18: Answer by Yourself

Q19: Answer by Yourself

Geometry

1) $\overrightarrow{MA}$, $\overrightarrow{CB}$, $\overrightarrow{CD}$, $\overrightarrow{3D}$, $\overrightarrow{AM}$, $\overrightarrow{DB}$

2) Prove

3) Prove

4) 5 , 5 , $\sqrt{306}$

5) , **(6** , **(7** Try to solve

8) m = 9 , m = -4

9) D (0 , 3) , (2 , $\frac{1}{2}$)

10) (2 , -2)

11)

1- ($\frac{23}{5}$, 3) 2 , 3 Try to Solve.

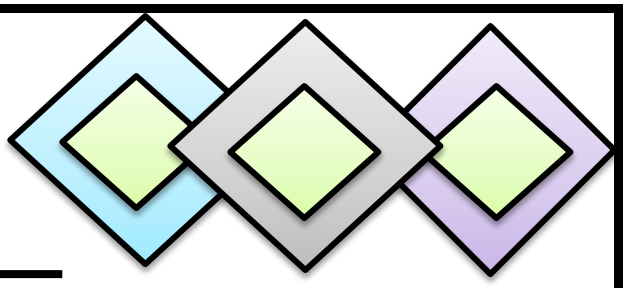
12)

1- 1 : 2 ext.

2- 2 : 3 inter

3- 3 : 2 ext.

13) (3 , 2)



14)

1- $k = \frac{11}{7}$

2- $k = \frac{4}{3}$

3- $k = \frac{1}{2}$

4- $k = 3$

15)

1- $x + 3y - 13 = 0$

2- $y + 2x - 11 = 0$

3- $3y - 2x - 1 = 0$

4- $y + x - 6 = 0$

5- $y + x - 6 = 0$

16) 12 sq. units

17) $4y - 3x - 11 = 0$

18) $5y - x + 9 = 0$

19) $m(\angle A) = 74^\circ\ 44'\ 41'$

20) $y = 10$, $55^\circ\ 47'\ 3''$, $34^\circ\ 12'\ 56''$

21) 1 unit

22) Complete

3 units , 4 units , 3 units .

23) $3X + 2y - 10 + K(5X - 3y - 4) = 0$ (1)

The slope of $2X + 7y - 4 = 0$

Is $\frac{-2}{7}$

$\therefore$ The slope of the required straight line is $\frac{7}{2}$

From 1

$\therefore 3X + 2y + 10 + 5KX - 3KY - 4K = 0$

$\therefore X(3 + 5K) + y(2 - 3K) - 10 - 4K = 0$

$\therefore X(3 + 5K) + y(2 - 3K) - 10 - 4K = 0$

$\therefore$ Slope $= \frac{3+5K}{2-3K} = \frac{7}{2}$

$K = \frac{20}{11}$ The equation $7X - 2y - 10 = 0$

24) -2 , -6 , -7 , -4

25) $\vec{F} = 34\vec{e} - 34\vec{e} = \vec{0}$

$\therefore$ The body is in equilibrium

26) 15 force unit, 53° 7' 48"

27) $\vec{r} = (3, 1) + k(2, -1)$

28) $-40\vec{e}$ $40\vec{e}$

29) $\vec{r} = (3, -2) + k(0, 1)$

30) $y + x = 2$