## ST. VIVEKANAND PUBLIC SCHOOL, SADABAD

## WORKSHEET

## Class 12 - Mathematics

## Section A

1. Find values of $k$ if area of triangle is 35 square units having vertices as (2, -6 ), ( 5,4 ), ( $k, 4$ ).
2. If $A=\left[\begin{array}{rr}\cos \theta & \sin \theta \\ -\sin \theta & \cos \theta\end{array}\right]$ then for any natural number, find the value of $\operatorname{Det}\left(A^{n}\right)$.
3. Solve the system of linear equation, using matrix method $4 x-3 y=3 ; 3 x-5 y=7$
4. Using determinant show that the $(5,5),(-5,1)$ and $(10,7)$ points are collinear.
5. In the determinant $\left|\begin{array}{ccc}2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7\end{array}\right|$. Verify that $\mathrm{a}_{11} \mathrm{~A}_{31}+\mathrm{a}_{12} \mathrm{~A}_{32}+\mathrm{a}_{13} \mathrm{~A}_{33}=0$

## Section B

6. If $\mathrm{A}=\left[\begin{array}{rrr}1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1\end{array}\right]$, find $\mathrm{A}^{-1}$ and hence solve the system of linear equations
$x+2 y+z=4$,
$-x+y+z=0$,
$x-3 y+z=2$.
7. Find $A^{-1}$ if $A=\left|\begin{array}{lll}0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0\end{array}\right|$ and show that $A^{-1}=\frac{A^{2}-3 I}{2}$
8. Using matrix method, solve the system of equations
$\mathrm{x}+\mathrm{y}-\mathrm{z}=1$;
$3 \mathrm{x}+\mathrm{y}-2 \mathrm{z}=3$;
$\mathrm{x}-\mathrm{y}-\mathrm{z}=-1$.

## Section C

9. Read the text carefully and answer the questions:

Two farmers Ankit and Girish cultivate only three varieties of pulses namely Urad, Massor and Mung. The sale (in ₹) of these varieties of pulses by both the farmers in the month of September and October are given by the following matrices A and B .


September sales (in ₹):
$\mathrm{A}=\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000\end{array}\right)$ Ankit
October sales (in ₹):
A $=\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 5000 & 10000 & 6000 \\ 20000 & 30000 & 10000\end{array}\right) \begin{gathered}\text { Ankit } \\ \text { Girish }\end{gathered}$
(i) The combined sales of Masoor in September and October, for farmer Girish is:
a) ₹ 80000
b) ₹ 135000
c) ₹ 40000
d) ₹ 90000
(ii) The combined sales of Urad in September and October, for farmer Ankit is:
a) ₹ 20000
b) ₹ 36000
c) ₹ 30000
d) ₹ 15000
(iii) Find decrease in sales of Mung from September to October, for the farmer Ankit.
a) ₹ 10000
b) No Change
c) ₹ 30000
d) ₹ 24000
(iv) If both the farmers receive $2 \%$ profit on gross sales, then compute the profit for each farmer and for each variety sold in October.
a) $\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 150 & 200 & 220 \\ 400 & 200 & 280\end{array}\right){ }_{\text {Ankit }}$
b) $\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 100 & 200 & 120 \\ 250 & 200 & 220\end{array}\right)$ Ankit
c) $\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 100 & 200 & 120 \\ 400 & 200 & 200\end{array}\right) \begin{gathered}\text { Ankit } \\ \text { Girish }\end{gathered}$
d) $\left(\begin{array}{ccc}\text { Urad } & \text { Masoor } & \text { Mung } \\ 100 & 200 & 220 \\ 400 & 300 & 200\end{array}\right) \begin{gathered}\text { Ankit } \\ \text { Girish }\end{gathered}$
(v) Which variety of pulses has the highest selling value in the month of September for the farmer Girish?
a) Mung
b) Masoor
c) Urad
d) All of these have same price
10. Read the text carefully and answer the questions:

Three schools A, B and C organized a mela for collecting funds for helping the rehabilitation of flood victims. They sold handmade fans, mats, and plates from recycled material at a cost of ₹ 25 , ₹ 100 and ₹ 50 each. The number of articles sold by school A, B, C are given below.

(i) If P be a $3 \times 3$ matrix represent the sale of handmade fans, mats and plates by three schools $\mathrm{A}, \mathrm{B}$ and C , then
a)

$\mathrm{P}=$| Fans |
| :---: |
| $A$ |
| $B$ |
| $C$ |\(\left[\begin{array}{lll}25 \& 35 \& 40 <br>

40 \& 40 \& 50 <br>
20 \& 30 \& 20\end{array}\right]\)
c) $\mathrm{P}=\begin{aligned} & \text { Fans } \\ & A \\ & B \\ & C\end{aligned}\left[\begin{array}{lll}40 & 50 & 20 \\ 25 & 40 & 30 \\ 35 & 50 & 40\end{array}\right]$
b) Fans Mats Plates
$\mathrm{P}=\begin{aligned} & A \\ & B \\ & C\end{aligned}\left[\begin{array}{lll}40 & 25 & 35 \\ 50 & 40 & 50 \\ 20 & 30 & 40\end{array}\right]$
d) $\begin{array}{r}\text { Pans }\end{array} \begin{aligned} & \text { Mats } \\ & A \\ & B \\ & C\end{aligned}\left[\begin{array}{lll}25 & 40 & 20 \\ 35 & 40 & 30 \\ 40 & 50 & 20\end{array}\right]$
(ii) If Q be a $3 \times 1$ matrix represent the sale prices (in ₹) of given products per unit, then
a) $\mathrm{Q}=\begin{array}{ccc}\text { Fans } & \text { Mats } & \text { Plates } \\ {\left[\begin{array}{ccc}25 & 50 & 100\end{array}\right]}\end{array}$
b) $\mathrm{Q}=\left[\begin{array}{c}25 \\ 100 \\ 50\end{array}\right] \begin{gathered}\text { Fans } \\ \text { Mats } \\ \text { Plates }\end{gathered}$
c) $\left.\mathrm{Q}=\begin{array}{ccc}\text { Fans } & \text { Mats } & \text { Plates } \\ {[25} & 100 & 50\end{array}\right]$
d) $\mathrm{Q}=\left[\begin{array}{c}25 \\ 50 \\ 100\end{array}\right] \begin{gathered}\text { Fans } \\ \text { Mats } \\ \text { Plates }\end{gathered}$
(iii) The funds collected by school A by selling the given articles is
a) ₹ 7875
b) ₹ 6125
c) ₹ 8000
d) ₹ 7000
(iv) The funds collected by school B by selling the given articles is
a) ₹ 8125
b) ₹ 7125
c) ₹ 5125
d) ₹ 6125
(v) The total funds collected for the required purpose is
a) ₹ 20000
b) ₹ 30000
c) ₹ 21000
d) ₹ 35000

## 11. Read the text carefully and answer the questions:

Two schools A and B want to award their selected students on the values of Honesty, Hard work and Punctuality. School A wants to award ₹x each, ₹y each and ₹z each for the three respective values to its 3,2 and 1 students respectively with a total award money of ₹ 2200 . School B wants to spend ₹ 3100 to award its 4,1 and 3 students on the respective values (by giving the same award money to the three values as school A). The total amount of award for one prize on each value is $₹ 1200$.

(i) What is the award money for Honesty?
a) ₹ 350
b) ₹300
c) ₹ 400
d) ₹500
(ii) What is the award money for Punctuality?
a) ₹ 300
b) ₹500
c) ₹ 280
d) ₹ 450
(iii) What is the award money for Hard work?
a) ₹550
b) ₹500
c) ₹ 400
d) ₹ 300
(iv) If a matrix P is both symmetric and skew-symmetric, then $|\mathrm{P}|$ is equal to
a) 0
b) none of these
c) 1
d) -1
(v) If P and Q are two matrices such that $\mathrm{PQ}=\mathrm{Q}$ and $\mathrm{QP}=\mathrm{P}$, then $\left|\mathrm{Q}^{2}\right|$ is equal to
a) 1
b) $|\mathrm{P}|$
c) $|\mathrm{Q}|$
d) 0
12. Express the matrix $B=\left[\begin{array}{ccc}2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3\end{array}\right]$ as the sum of a symmetric and a skew symmetric matrix.
13. If $P(x)=\left[\begin{array}{cc}\cos x & \sin x \\ -\sin x & \cos x\end{array}\right]$ then show that $\mathrm{P}(\mathrm{x}) \cdot \mathrm{P}(\mathrm{y})=\mathrm{P}(\mathrm{x}+\mathrm{y})=\mathrm{P}(\mathrm{y}) \cdot \mathrm{P}(\mathrm{x})$.
14. Express the matrix $B=\left[\begin{array}{ccc}2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3\end{array}\right]$ as the sum of a symmetric and a skew-symmetric matrix.
15. Obtain the inverse of the following matrix:
$A=\left[\begin{array}{lll}0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1\end{array}\right]$
16. Find the value of x , if $\left[\begin{array}{lll}1 & x & 1\end{array}\right]\left[\begin{array}{ccc}1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2\end{array}\right]\left[\begin{array}{c}1 \\ 2 \\ x\end{array}\right]=0$
17. Two schools P and Q want to award their selected students on the values of Tolerance, Kindness, and

Leadership. The school P wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3,
2 and 1 students respectively with total award money of Rs2200.
School Q wants to spend Rs 3100 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as school P). If the total amount of award for one prize on each value is Rs1200, using matrices, find the award money for each value.
18. For the matrix $A=\left[\begin{array}{ll}3 & 2 \\ 1 & 1\end{array}\right]$, find the numbers a and b such that $\mathrm{A}^{2}+\mathrm{aA}+\mathrm{bI}=0$.
19. Find adjoint of the matrix $\left|\begin{array}{ccc}1 & -1 & 2 \\ 2 & 3 & 5 \\ -2 & 0 & 1\end{array}\right|$
20. Show that the matrix, $A=\left[\begin{array}{ccc}1 & 0 & -2 \\ -2 & -1 & 2 \\ 3 & 4 & 1\end{array}\right]$ satisfies the equation, $\mathrm{A}^{3}-\mathrm{A}^{2}-3 \mathrm{~A}-\mathrm{I}_{3}=\mathrm{O}$. Hence, find $\mathrm{A}^{-1}$
21. Solve the system of the following equations: (Using matrices):

$$
\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4 ; \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1 ; \frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2
$$

