TERM - 1 MATHS
CLASS: XII
CHAPTER 3: MATRICES

WORKSHEET 3

1. A matrix is an ordered rectangular array of numbers or functions.
2. A matrix having m rows and n columns is called a matrix of order m X n
3. $[a_{ij}]_{m \times 1}$ is a column matrix.
4. $[a_{ij}]_{1 \times n}$ is a row matrix .
5. An m X n matrix is a square matrix if m = n
6. $A = [a_{ij}]_{m \times m}$ is a diagonal matrix if $a_{ij} = 0$ when $i \neq j$
7. $A = [a_{ij}]_{m \times m}$ is a scalar matrix if $a_{ij} = 0$ when $i \neq j$, $a_{ij} = k$ (k is some constant),When i=j
8. $A = [a_{ij}]_{m \times m}$ is an identity matrix if $a_{ij} = 1$ when i=j , $a_{ij} = 0$ when $i \neq j$
9. $A = [a_{ij}] = [b_{ij}]$ = B if (i) A and B are of same order , (ii) $a_{ij} = b_{ij}$ For all possible values of i and j
10. K A = $k [a_{ij}]_{m \times n} = [k a_{ij}]_{m \times n}$
11. –A = (-1) A
12. A – B = A + (-B)
13. A + B = B + A where A and B are of same order
14. (A + B) + C = A + (B + c) where A , B and C are of same order.
15. K (A + B) = k A + k B where A and B are of same order , k is constant.
16. (k + m) A = k A + m A where ka dn m are constant.
17. (i) A (BC) = (AB) C (ii) A (B+C) = AB + AC (iii) (A +B) C = AC +BC
18. If $A = [a_{ij}]_{m \times n}$ then $A' = [a_{ji}]_{n \times m}$
19. (i) $(A')' = A$ (ii) $(kA)' = k A'$ (iii) $(A + B)' = A' + B'$

    (iv) $(AB)' = B' A'$

20. A is symmetric matrix if $A' = A$
21. A is skew symmetric matrix if $A' = -A$
22. Any square matrix A can be represented as the sum of a symmetric $\frac{1}{2} (A + A)'$ and a skew symmetric matrix $\frac{1}{2} (A - A)'$.
23. If A and B are two square matrix such that AB = BA = I , then B is the inverse of A and is denoted by A^{-1} and A is inverse of B.
24. If A and B are invertible matrices of same order , $(AB)^{-1} = B A^{-1}$
25. Inverse of a square matrix , if it exists , is unique.

Praadis Education

MCQ

Q1	If $A = [\,2\ \ -3\ \ 4\,]$, $B = \begin{bmatrix}3\\2\\2\end{bmatrix}$ $X = [\,1\ 2\ 3\,]$, $Y = \begin{bmatrix}2\\3\\4\end{bmatrix}$ AB + XY equals to (a) [28] (b) [24] (c) [12] (d) [-28]
Q2	The number of all possible matrices of order 3 X 3 will each entry 0 or 1 is (a) 27 (b) 18 (c) 81 (d) 512.
Q3	If matrix A is both symmetric and skew symmetric , then (a) A is diagonal matrix (b) A is square and zero matrix (c) A is square matrix (d) None of these
Q 4	If A = $\begin{bmatrix}\alpha & 0\\1 & 1\end{bmatrix}$ and B = $\begin{bmatrix}1 & 0\\5 & 1\end{bmatrix}$, then the value of α for which A^2 = B is (a) 1 (b) -1 (c) 4 (d) Not possible to find
Q 5	C is a skew symmetric matrix of order n , X is a column matrix of order n X 1 then X' C X is a (a) square matrix (b) identity matrix (c) zero marix (d) None of these
Q 6	A is a 3 X 4 matrix . A matrix B is such that A' B and B A' are defined .Then the order of B is (a) 3 X 4 (b) 3 X 3 (c) 4 X 4 (d) 4 X 3
Q 7	. If A = $\begin{bmatrix}a & b\\b & a\end{bmatrix}$ $A^2 = \begin{bmatrix}x & y\\y & x\end{bmatrix}$ then value of x and y are (a) x = $a^2 + b^2$ y = $a^2 - b^2$ (b) x = 2 a b y = $a^2 + b^2$

Praadis Education

	(c) x = a^2 + b^2 y = ab (d) x = a^2 + b^2 y = 2 a b
Q 8	If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ and A^2 – k A – 5 I = 0 then the value of k is (a) 3 (b) 7 (c) 5 (d) 9
Q 9	If A $\begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix} = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$ then A is (a) $\begin{bmatrix} 2 & -1 & 1 \\ 0 & -3 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & -2 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}$ (d) $\begin{bmatrix} -1 & 1 & 0 \\ 2 & -3 & 4 \end{bmatrix}$
Q10	If A = $\begin{bmatrix} 1 & -2 & 2 \\ 4 & -3 & 0 \\ 5 & -1 & 6 \end{bmatrix}$ B = $\begin{bmatrix} 1 & 2 & 3 \\ -4 & -5 & -6 \\ 7 & -8 & 9 \end{bmatrix}$ then the element of second column and third row of AB is (a) 1 (b) -44 (c) 30 (d) -33
Q11	The diagonal elements of a skew symmetric matrix are (a) all zeros (b) are all equal to some scalar k not equal to zero (c) can be any number (d) None of these
Q 12	If A = $\begin{bmatrix} 3 & x+1 \\ 2x+3 & x+2 \end{bmatrix}$ is a symmetric matrix , then x is (a) 4 (b) 2 (c) -4 (d) -2
Q 13	Choose the correct statement: (a) Every identity matrix is a scalar matrix . (b) Every scalar matrix is a identity matrix. (c) Each diagonal matrix is a identity matrix. (d) A square matrix with all the elements 1 is an identity matrix.
Q14	If A is square matrix such that A^2 = A , then $(I + A)^2$ - 3 A is (a) I (b) 2 A (c) 3 I (d) A

Praadis Education

Q15	The values of x , y and z , if $\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$ are (a) x = 2 y = 3 z = 4 (b) x = 2 y = 4 z = 3 (c) x = 3 y = 4 z = 2 (d) x = 3 y = 2 z = 4
Q16	If matrix $A = \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$ is the square root of the 2 X 2 identity matrix , then the relation a between a, b and c is (a) $a^2 + bc - 1 = 0$ (b) $a^2 - bc - 1 = 0$ (c) $a^2 + bc + 1 = 0$ (d) $-a^2 + bc - 1 = 0$
Q 17	Suppose 3 X 3 matrix A = $[aij]$, whose elements are given by $a_{ij} = i^2 - j^2$ Then a_{32} is equal to (a) 5 (b) 1 (c) 2 (d) 3
Q 18	If $\begin{bmatrix} 1 & 2 \\ -2 & -b \end{bmatrix} + \begin{bmatrix} a & 4 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 0 \end{bmatrix}$, then $a^2 + b^2$ is equal to (a) 20 (b) 22 (c) 12 (d) 10
Q 19	$X\begin{bmatrix} 2 \\ 3 \end{bmatrix} + y\begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$ then the value of x is (a) 0 (b) 3 (c) 7 (d) 10
Q 20	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$ then A^2 is equal to (a) 0 (b) - A (c) I (d) 2 A
Q 21	If $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = O$ then the value of x is (a) $5\sqrt{5}$ (b) $\pm 4\sqrt{3}$ (c)$\pm\ 3\sqrt{5}$ (d) $\pm 6\sqrt{5}$
Q 22	If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then the value of k so that $A^2 = 8A + kI$ is (a) 4 (b) 5 (c) 6 (d) – 7

Pradis Education

Q 23	If X = $\begin{bmatrix}3 & -4\\1 & -1\end{bmatrix}$, B = $\begin{bmatrix}5 & 2\\-2 & 1\end{bmatrix}$ and A = $\begin{bmatrix}p & q\\r & s\end{bmatrix}$ satisfy the equation AX = B Then the matrix A is equal to (a) $\begin{bmatrix}-7 & 26\\1 & -5\end{bmatrix}$ (b) $\begin{bmatrix}7 & 26\\4 & 17\end{bmatrix}$ (c) $\begin{bmatrix}-7 & -4\\26 & 13\end{bmatrix}$ (d) $\begin{bmatrix}-7 & 26\\-6 & 23\end{bmatrix}$
Q 24	If A = $[a_{ij}]_{m \times n}$, then A' is equal to (a) $[a_{ji}]_{n \times m}$ (b) $[a_{ij}]_{m \times n}$ (c) $[a_{ji}]_{m \times n}$ (d) $[a_{ij}]_{n \times m}$
Q 25	If A and B are symmetric matrices of same order , then AB – BA is a (a) Skew symmetric matrix (b) Symmetric matrix (c) Zero matrix (d) Identity matrix
Q 26	If A = $\begin{bmatrix}0 & c & -b\\-c & 0 & a\\b & -a & 0\end{bmatrix}$ and B = $\begin{bmatrix}a^2 & ab & ac\\ab & b^2 & bc\\ac & bc & c^2\end{bmatrix}$, then AB is (a) B (b) A (c) O (d) I
Q 27	A square matrix A = $[a_{ij}]_{n \times n}$ is called a diagonal matrix if $a_{ij} = 0$ for (a) i=j (b) i<j (c) i>j (d) i≠j
Q 28	If A = $\begin{bmatrix}4 & 1 & 0\\1 & -2 & 2\end{bmatrix}$, B = $\begin{bmatrix}2 & 0 & -1\\3 & 1 & x\end{bmatrix}$, C = $\begin{bmatrix}1\\2\\1\end{bmatrix}$ and D = $\begin{bmatrix}15+x\\1\end{bmatrix}$ such that (2 A – 3 B) C = D , then x = (a) 3 (b) -4 (c) -6 (d) 6
Q 29	If A = $\begin{bmatrix}1 & 2 & 2\\2 & 1 & -2\\a & 2 & b\end{bmatrix}$ is a matrix satisfying A A^T = 9 I_3 , then the values of a and b respectively are (a) 1, 2 (b) -2 , -1 (c) -1 , 2 (d) -2 , 1

Praads Education

Q 30	If $\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ is sum of a symmetric matrix B and a skew symmetric matrix C, then C is (a) $\begin{bmatrix} 1 & -5/2 \\ 5/2 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & -5/2 \\ 5/2 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -5/2 \\ 5/2 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & -3/2 \\ 5/2 & 1 \end{bmatrix}$
Q 31	If A = $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then A^{16} is equal to : (a) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Q 32	If A = $\begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and k A = $\begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k , a and b are respectively (a) -6,-12,-18 (b) -6,4,9 (c) -6,-4,-9 (d) -6,12,18
	CASE STUDY : 1 Two farmers Ram Kishan and Gurcharan Singh cultivate only three varities of rice namely X , Y and Z . The sale (in ₹) of these varities of rice by both the farmers in the month of September and October are given by the following matrices A and B September sales (in ₹) X Y Z A = $\begin{bmatrix} 10{,}000 & 20{,}000 & 30{,}000 \\ 50{,}000 & 30{,}000 & 10{,}000 \end{bmatrix}$ $RAM\ KISHAN$ $GURCHARAN\ SINGH$

Praadis Education

	October sales (in ₹) $B = \begin{matrix} X & Y & Z \\ \end{matrix}$ $\begin{bmatrix} 5{,}000 & 10{,}000 & 6{,}000 \\ 20{,}000 & 10{,}000 & 10{,}000 \end{bmatrix} \begin{matrix} RAMKISHAN \\ GURCHARAN\ SINGH \end{matrix}$ Based on the above information answer the following question:
Q 1	The combined sales in September and October for each farmer in each variety is (a) $\begin{bmatrix} 5{,}000 & 10{,}000 & 24{,}000 \\ 30{,}000 & 20{,}000 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 15{,}000 & 30{,}000 & 36{,}000 \\ 70{,}000 & 40{,}000 & 20{,}000 \end{bmatrix}$ (c) $\begin{bmatrix} 15{,}000 & 30{,}000 & 36{,}000 \\ 30{,}000 & 20{,}000 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 5{,}000 & 10{,}000 & 24{,}000 \\ 70{,}000 & 40{,}000 & 20{,}000 \end{bmatrix}$
Q 2	The change in sales from September to October is (a) $\begin{bmatrix} 5{,}000 & 10{,}000 & 24{,}000 \\ 30{,}000 & 20{,}000 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 15{,}000 & 30{,}000 & 36{,}000 \\ 70{,}000 & 40{,}000 & 20{,}000 \end{bmatrix}$ (c) $\begin{bmatrix} 15{,}000 & 30{,}000 & 36{,}000 \\ 30{,}000 & 20{,}000 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 5{,}000 & 10{,}000 & 24{,}000 \\ 70{,}000 & 40{,}000 & 20{,}000 \end{bmatrix}$
Q 3	If Ram Kishan receive 2 percent profit on gross rupees sales, the profit of Ram Kishan for each variety sold in October is (a) [200 200 120] (b) [100 100 120] (c) [100 200 220] (d) [100 200 120]
Q 4	If Gurcharan receive 3 percent profit on gross rupees sales , the profit of Gurcharan Singh for each variety sold in October is (a) [600 600 300] (b) [600 600 600] (c) [600 300 300] (d) [300 300 300]
	CASE STUDY : 2 Three schools DPS , CVC and KVS decided to organize a fair for collecting money for helping the food victims They sold handmade fans , mats and plates from recycled material at a cost of ₹ 25 , ₹ 100 and ₹ 50 each respectively. The numbers of articles sold are given as

Praatis Education

School / Article	DPS	CVC	KVS
Handmade fans	40	25	35
Mats	50	40	50
Plates	20	30	40

Based on the information given above , answer the following questions.

Q 1 What is the total money (in ₹) collected by the school DPS?

(a) 700 (b) 7000 (c) 6125 (d) 7875

Q 2 What is the total amount of money (in ₹) collected by schools CVC and KVS?

(a) 14000 (b) 15725 (c) 21000 (d) 13125

Q 3 What is the total amount of money (in ₹) collected by all three schools DPS , CVC and KVS ?

(a) 15775 (b) 14000 (c) 21000 (d) 17125

Q 4 If the number of handmade fans and plates are interchanged for all the schools , then what is the total money (in ₹) collected by all the schools?

(a) 18000 (b) 6750 (c) 5000 (d) 21250

Q 5 How many articles (in total) are sold by three schools ?

(a) 230 (b) 130 (c) 430 (d) 330

CASE STUDY : 3

On her birthday , Seema decided to donate some money to children of an orphanage home.

Pradhi Education

	 If there were 8 children less , everyone would have got Rs 10 more.However , if there were 16 children more,everyone would have got Rs 10 less.Let the number of children be x and the amount distributed by Seema for one child be y (in ₹) Based on the information given above , answer the following questions.
Q 1	The equations in terms are (a) 5x - 4y = 40 , 5x – 8y = - 80 (b) 5x - 4y = 40 , 5x + 8y = 80 (c) 5x - 4y = 40 , 5x + 8y = - 80 (d) 5x + 4y = 40 , 5x – 8y = - 80
Q 2	Which of following matrix equations represent the information given above? (a) $\begin{bmatrix}5 & 4\\5 & 8\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix} = \begin{bmatrix}40\\-80\end{bmatrix}$ (b) $\begin{bmatrix}5 & -4\\5 & -8\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix} = \begin{bmatrix}40\\80\end{bmatrix}$ (c) $\begin{bmatrix}5 & -4\\5 & -8\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix} = \begin{bmatrix}40\\-80\end{bmatrix}$ (d) $\begin{bmatrix}5 & 4\\5 & -8\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix} = \begin{bmatrix}40\\-80\end{bmatrix}$
Q 3	The number of children who were given some money by Seema, is (a) 30 (b) 40 (c) 23 (d) 32
Q 4	How much amount (in ₹) is given to each child by Seema ? (a) 32 (b) 30 (c) 62 (d) 26
Q 5	How much amount Seema spends in distributing the money to all the students of the Orphanage?

Pragati Education

	(a) ₹609	(b) ₹ 960	(c) ₹906	(d) ₹ 690

ANSWERS

Q 1	A	Q 2	D	Q 3	B	Q 4	d
Q 5	C	Q 6	A	Q 7	D	Q 8	c
Q 9	C	Q 10	D	Q 11	A	Q 12	d
Q 13	a	Q 14	A	Q 15	b	Q 16	a
Q 17	a	Q 18	A	Q 19	b	Q 20	c
Q 21	b	Q 22	D	Q 23	a	Q 24	a
Q 25	a	Q 26	C	Q 27	d	Q 28	c
Q 29	b	Q 30	C	Q 31	d	Q 32	c

Case study 1:

1 – b 2 – a 3 – d 4 – c

Case study 2:

1 – b 2 – a 3 – c 4 – d 5 – d

Case study 3 :

1 – a 2 – c 3 – d 4 – b 5 – b

Praadis Education