## 2. *Matrices*

| | | | |
|---|---|---|---|
| **1** | $C = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$<br>Let $\begin{pmatrix} 11 & 3 \\ 4 & 1 \end{pmatrix}\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$<br>$(11a + 3c = 2)\times 1 \qquad (11b + 3d = 4)\times 1$<br>$(4a + c = 3)\times 3 \qquad (4b + d = 6)\times 3$<br>$11a + 3c = 2 \qquad 11b + 3d = 4$<br>$12a + 3c = 9 \qquad 12b + 3d = 18$<br>$a = 7 \qquad b = 14$<br>$c = -25 \qquad d = -50$<br>$\therefore C = \begin{pmatrix} 7 & 14 \\ -25 & -50 \end{pmatrix}$ | $M_1$<br><br>$M_1$<br><br>$A_1$<br><br>3 | Alternative<br>$C = B^{-1}A$<br>✔equations $B^{-1}$<br>$\begin{pmatrix} -1 & 3 \\ 4 & -11 \end{pmatrix}$ allow any two<br>✔solving of equations<br>$\begin{pmatrix} -1 & 3 \\ 4 & -11 \end{pmatrix}\ \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$<br>or equivalent |
| **2.** | $\begin{pmatrix} 2 & 3 \\ -3 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ 0 \end{pmatrix}$<br>$Det\ 4 - {}^{-}\ 9 = 13$<br>$\frac{1}{13}\begin{pmatrix} 2 & -3 \\ 3 & 2 \end{pmatrix}\begin{pmatrix} 2 & 3 \\ -3 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{13}\begin{pmatrix} 2 & -3 \\ 3 & 2 \end{pmatrix}\begin{pmatrix} 13 \\ 0 \end{pmatrix}$<br>$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$<br>$x = 2,\ y = 3$ | M1<br><br>M1<br><br>A1 | |
| | | 03 | |

*1.*

$$\begin{pmatrix} & \end{pmatrix}\begin{pmatrix} \ \end{pmatrix} = \begin{pmatrix} \ \end{pmatrix}$$

$$\begin{pmatrix} & \end{pmatrix}\begin{pmatrix} & \end{pmatrix}\begin{pmatrix} \ \end{pmatrix} = \begin{pmatrix} & \end{pmatrix}\begin{pmatrix} \ \end{pmatrix}$$

***Premultiplication by the inverse.***

***Simplification.***

***C.A.O***

$$\begin{pmatrix} & \end{pmatrix}\begin{pmatrix} & \\ & \end{pmatrix} = \begin{pmatrix} & \\ & \end{pmatrix}$$

$$\begin{pmatrix} & \\ & \end{pmatrix} = \begin{pmatrix} & \\ & \end{pmatrix}$$

$a = 2$ ✓ *and* $b = 3$ ✓

2. $(x-3) - (2x) = 0$
$x-3-2x = 0$
$-2x + x - 3 = 0$
$-x - 3 = 0$
$x = 3$

3. $\begin{pmatrix} & \\ & \end{pmatrix} \begin{pmatrix} & \\ & \end{pmatrix} = \begin{pmatrix} & \\ & \end{pmatrix}$

*Determinant* $= +65 - 49 = 16$

$C^{-1} = 1 \quad -5 \quad 7$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

4. $3 \quad 2 \quad \begin{pmatrix} & \\ & \end{pmatrix} = \begin{pmatrix} & \\ & \end{pmatrix}$
$2 \quad 2$

$$\begin{pmatrix} & \\ & \end{pmatrix} = 9$$
$$= 2$$

$a = 7$
$c = -6$
$3b + 2d = -3$
$2b + 2d = 1$
$b = -4$
$d = 4.5$
$A = \begin{pmatrix} & \\ & \end{pmatrix}$

5. $20x\ (-3 - {}^{-}8)$
$100$ *area of* $1^{st}$ *image.*
$100 \times (4 - {}^{-}3)$
$700$ *area of* $2^{nd}$ *image*

6. *Det.* $9 + 2 = 11$

$$A^{1} = \frac{1}{11} \begin{pmatrix} & \\ & \end{pmatrix}$$

$$\begin{pmatrix} & \\ & \end{pmatrix}\begin{pmatrix} & \\ & \end{pmatrix} = \begin{pmatrix} & \\ & \end{pmatrix}$$

3 -1 y 4

$$\begin{pmatrix} \\ \end{pmatrix} = \frac{1}{11}\begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \frac{1}{11}\begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}$$

*P (2, 2)*

7 $PQ = \begin{pmatrix} \\ \end{pmatrix}$

$$\begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}$$

*x =1 y= -2*

8. *½ x – ¼ y = 2*

*$^{2}/_{5} + {}^{1}/_{6} = 6$*

*2x _ y = 8*

*12x + 5y = 180*

*10x – 5y = 40 +*

*22x = 220*

*x = 10*

*¼ y = ½ (10) $^{-2}$*

*¼ y = 5-2 = 3*

*Y = 12*

9. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

$$\begin{pmatrix} \\ \end{pmatrix}9$$

$$\begin{pmatrix} \\ \end{pmatrix}\begin{pmatrix} X^1 & Y^1 & Z^1 \\ -1 & -2 & -6 \\ 1 & 4 & 9 \end{pmatrix}$$

=

$$\begin{pmatrix} \\ \end{pmatrix}$$

=

| | | |
|---|---|---|
| 1 | 4 | 9 |
| -1 | -2 | -6 |

*Final image* $X^{11}\ Y^{11}Z^{11}$

$X^{11}(1, -1)\ Y^{11}(4, -2),\ Z^{11}(9, -6)$

*10.* *P Q R* *A B C*

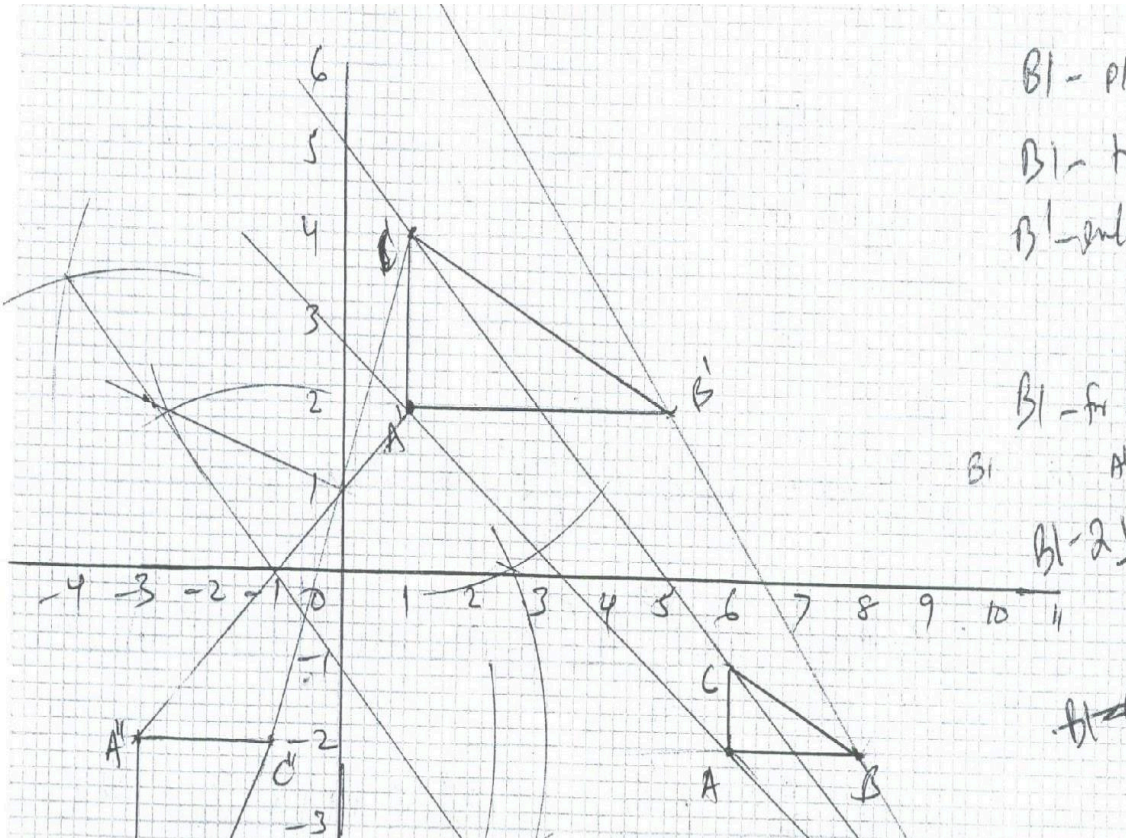
*a/:* [ ] [ ] = [ ]

*(c) Centre (-3,2)*

*Angle + 90°*

*A B C*

*a)* [ ] [ ] = [ ]



11. Det $\begin{vmatrix} 2 & -3 \\ - & - \end{vmatrix} = 5$

Area of $A^1B^1C^1 = 5 \times 15$

$= 75\ cm^2$

12. $A.S.F = \frac{110}{10} = 11$

$5X(X) - -6 = 11$

$5X^2 + 6 = 11$

$5x^2 = 5$

$X^2 = 1$

$X = \pm 1$

13. Area of the image = Area of the object x Det.

Det. ($\Delta$) = 15 – 18 = -3

$54\ cm^2 = A \times -3$

$\frac{54}{3}\ cm^2 = A$

Area of $\Delta ABC = 18\ cm^2$

14. Det. $9 + 2 = 11$

$$A^1 = \frac{1}{11}\begin{pmatrix} & \\ & \end{pmatrix}$$

$$\begin{pmatrix} & \\ & \end{pmatrix}\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \frac{1}{11}\begin{pmatrix} & \\ & \end{pmatrix}\begin{pmatrix} & \\ & \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \frac{1}{11}\begin{pmatrix} \\ \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix} = \begin{pmatrix} \\ \end{pmatrix}$$

P (2, 2)