

1. Using the data below find the interquartile range (3mks).

$$1\frac{3}{2} = 6.5$$

23, 56, 45, 34, 23, 67, 89, 34, 24, 67, 56, 78, 34

23, 23, 24, 34, 34, 34, 45, 56, 56, 67, 67, 79, 89

$$\left(\frac{24 + 34}{2} \right) = 29$$

$$\frac{67 + 67}{2} = 67$$

$$67 - 29 = 38$$

2. The masses of four students were obtained and recorded as shown 78, 67, 76, 98, 94, 68, 69, 87, 76, 56, 78, 71, 56. Using an assumed mean of 76, find the actual mean of the data (4mks)

N	No (d)	t = d - A
56 87	56	-20
56 94	56	-20
67 98	67	-9
67	67	-9
68	68	-8
69	69	-7
76 78	76	0
76 78	76	0
	78	2
	78	2
	87	11
	94	18
	98	22
	Et	-18

$$\bar{X} = \frac{\sum fd}{\sum f} + A.M.$$

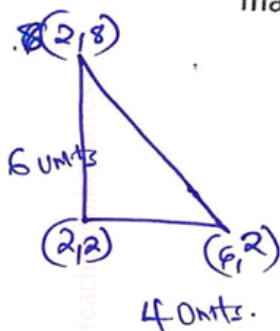
$$\frac{-18}{13} + 76 = 74.62$$

Maths exam

midterm

one

3. A triangle with vertices A(2,2), B(6,2) and C(2,8) is transformed by matrix $T \begin{pmatrix} 2 & 1 \\ 2 & 3 \end{pmatrix}$. Find the area of the image (3mks).



Area of the object.

$$= \frac{1}{2} \times 4 \times 6 = 12 \text{ square units.}$$

$$\text{Detor} = 6 - 2 = 4$$

$$\text{Image} = 4 \times 12 = 48 \text{ square units}$$

4. The vertices of a triangle A(2,3), B(4,2) and C(3,5) are mapped into A'(7,13), B'(10,12) and C(a,b). find the matrix of transformation and find the co-ordinates of C' (4mks)

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 7 \\ 13 \end{pmatrix}$$

$$\begin{aligned} 2a + 3b &= 7 \\ 2c + 3d &= 13 \\ 4a + 2b &= 10 \\ 4c + 2d &= 12 \end{aligned}$$

$$\begin{aligned} 2a + 3b &= 7 \\ 4a + 2b &= 10 \\ 4a + 6b &= 14 \\ 4a + 2d &= 10 \\ \hline 4b &= 4 \\ b &= 1 \end{aligned}$$

$$\begin{aligned} 2a &= 4 \\ a &= 2 \end{aligned}$$

$$\begin{aligned} 2c + 3d &= 13 \\ 4c + 2d &= 12 \\ 4c + 6d &= 24 \\ 4c + 2d &= 12 \\ \hline 4d &= 12 \\ d &= 3 \\ c &= 2 \end{aligned}$$

$$\begin{pmatrix} 2 & 1 \\ 2 & 3 \end{pmatrix} \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 7 \\ 13 \end{pmatrix}$$

5. Using the table below find the 6th decile and 4th percentile by calculation (4mks).

Classes	frequency	cf
0-9	2	2
10-19	4	6
20-29	8	14
30-39	6	20
40-49	5	25

6th decile

$$\begin{aligned} \frac{6}{10} \times 25 &= 15 \\ 29.5 + \frac{(15-14)}{6} \times 10 &= 31.67 \end{aligned}$$

4th percentile

$$\begin{aligned} \frac{14}{100} \times 25 &= 3.5 \\ 9.5 + \frac{(3.5-2)}{4} \times 10 &= 13.25 \end{aligned}$$

6. Point A(2,5) is translated by vector $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$ find the co-ordinates of A' (2mks)

$$A \begin{pmatrix} 2 \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ 4 \end{pmatrix} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$$

$$A' = (4, 9)$$

7. A quadrilateral ABCD has vertices A (4, -4), B(2, -4), C(6, -6) and D (4, -2)

a. On the grid provided draw the quadrilateral ABCD. (2mks)

b. A'B'C'D' is the image of ABCD under positive quarter turn about the origin. On the same grid draw the image A'B'C'D' (3mks)

c. A''B''C''D'' is the image of A' B' C' D' under the transformation given by the matrix

$$\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} A & B & C & D \\ 4 & 2 & 6 & 4 \\ -4 & -4 & -6 & -2 \end{pmatrix} = \begin{pmatrix} A' & B' & C' & D' \\ -4 & 4 & -6 & -6 \\ 4 & 2 & 6 & 4 \end{pmatrix}$$

(i) determine the co-ordinates of A'' B'' C'' D'' (2mks)

(ii) On the same grid draw the quadrilateral A'' B'' C'' D'' (1mk)

d. Determine a single matrix that maps ABCD onto A'' B'' C'' D. (2mks)

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} A & B \\ 4 & 2 \\ -4 & -4 \end{pmatrix} = \begin{pmatrix} A'' & B'' \\ -4 & 4 \\ 4 & 2 \end{pmatrix}$$

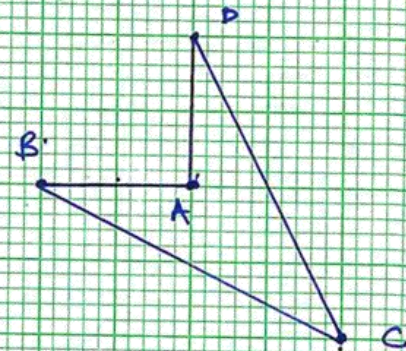
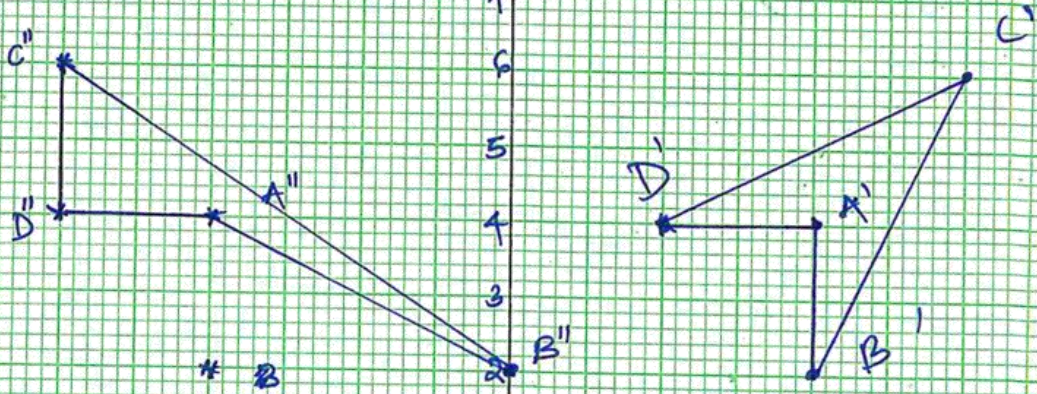
$$\begin{aligned} 4a + -4b &= -4 \\ 4c - 4d &= 4 \\ 2a - 4b &= 0 \\ 2c - 4d &= 2 \end{aligned}$$

$$\begin{aligned} 4a - 4b &= -4 \\ 2a - 4b &= 0 \\ \hline 2a &= -4 \\ \frac{2a}{2} &= \frac{-4}{2} \\ a &= -2 \\ -8 - 4b &= -4 \\ -4b &= 4 \\ b &= -1 \end{aligned}$$

$$\begin{aligned} 4c - 4d &= 4 \\ 2c - 4d &= 2 \\ \hline 2c &= 2 \\ c &= 1 \\ 2 - 4d &= 2 \\ -4d &= 0 \\ d &= 0 \end{aligned}$$

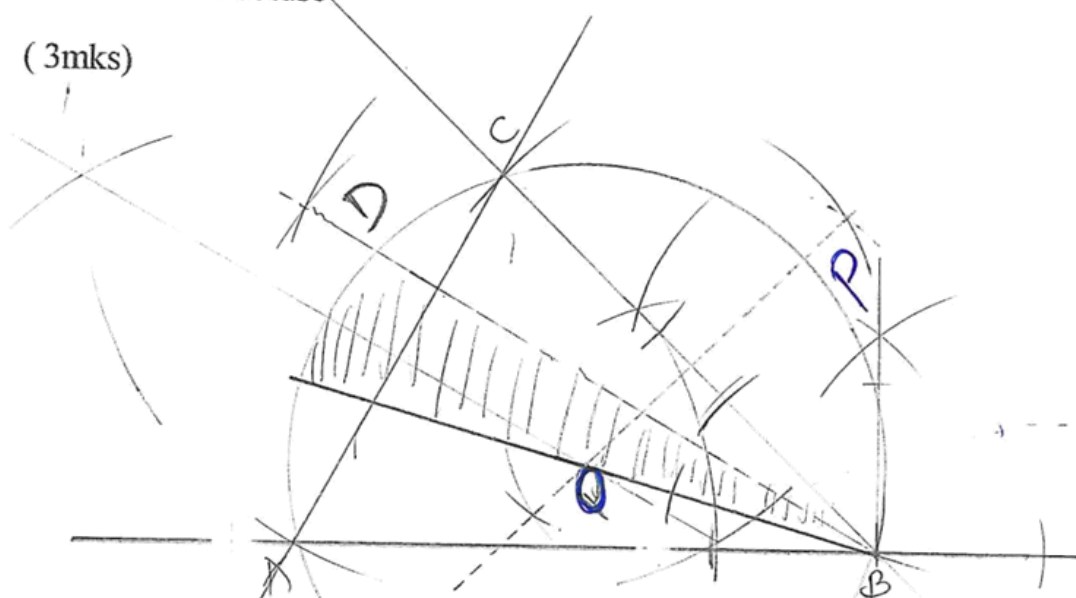
$$\begin{pmatrix} -2 & -1 \\ 1 & 0 \end{pmatrix} \text{ Matrix of transformation}$$

$$\begin{aligned} A' &= (4, 4) \\ B' &= (4, 2) \\ C' &= (6, 6) \\ D' &= (2, 4) \end{aligned}$$



8. (a) Using a ruler and a pair of compasses complete the construction of a triangle ABC in which $\angle ABC = 45^\circ$. $BC = 7\text{cm}$, $AC = 5.6\text{ cm}$ and angle BAC is obtuse

(3mks)



- b) Draw the locus of point P such that P is equidistant from a point O and Passes through the vertices of triangle. (3mks)

- (b) Locate point D on the locus of P equidistant from lines BC and BO. Q lies in the region enclosed by lines BD, BO extended and the locus of P. Shade the locus of Q. (4mks)

9. The data below shows the masses in grams of 50 potatoes

Mass (g)	25- 34	35-44	45 - 54	55- 64	65 - 74	75-84	85-94
No of potatoes	3	6	16	12	8	4	1
	3	9	25	37	45	49	50

- (a) On the grid provide, draw a cumulative frequency curve for the data (4mks)
- (b) Use the graph in (a) above to determine



$$\textcircled{i} \frac{60\pi}{100} = 48.50$$

$$\textcircled{ii} 40 - 24 = 16$$

$$\frac{16}{50} \times 100 = 32\%$$