MODUL 11
SKIM TIUSYEN FELDA (STF) MATEMATIK SPM "ENRICHMENT"
TOPIC : TRANSFORMATIONS
TIME   : 2 HOUR

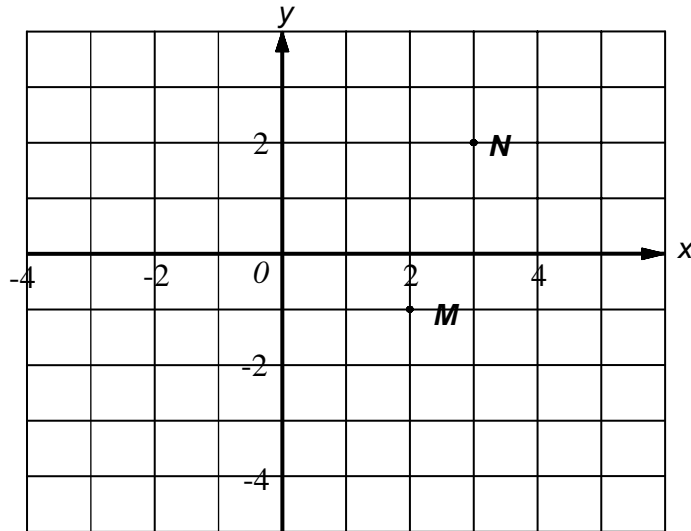1. (a) Diagram 1 shows two points, *M* and *N*, on a Cartesian plane.

DIAGRAM 1

Transformation **Y** is a translation $\begin{pmatrix} -3 \\ -3 \end{pmatrix}$.

Transformation **P** is a reflection in the x-axis.

(i) State the coordinates of the image of point *N* under transformation **Y**.

(ii) State the coordinates of image of point *M* under the following transformation:

(a) **Y²**
(b) **YP**   [3 *marks*]

Answer:

(a) (i)

    (ii) (a)

        (b)

(b) Diagram 2 shows three trapezium *ABCD, EFGH* and *PQRS* on a Cartesian plane.
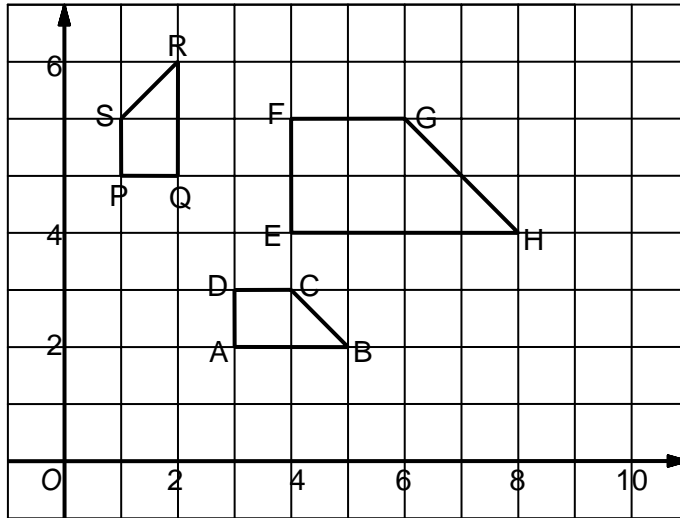

DIAGRAM 2

Trapezium *ABCD is* the image of trapezium *PQRS* under transformation **M**.
Trapezium *EFGH is* the image of trapezium *ABCD* under transformation **N**.

(i) Describe in full transformation :

   (a) **M**
   (b) **N**   [6 *marks*]

(ii) Calculate the area of trapezium *EFGH*, if the area of trapezium *ABCD* is 25 unit^2.   [3 *marks*]

Answer:

(b) (i) (a)

   (b)

(ii)

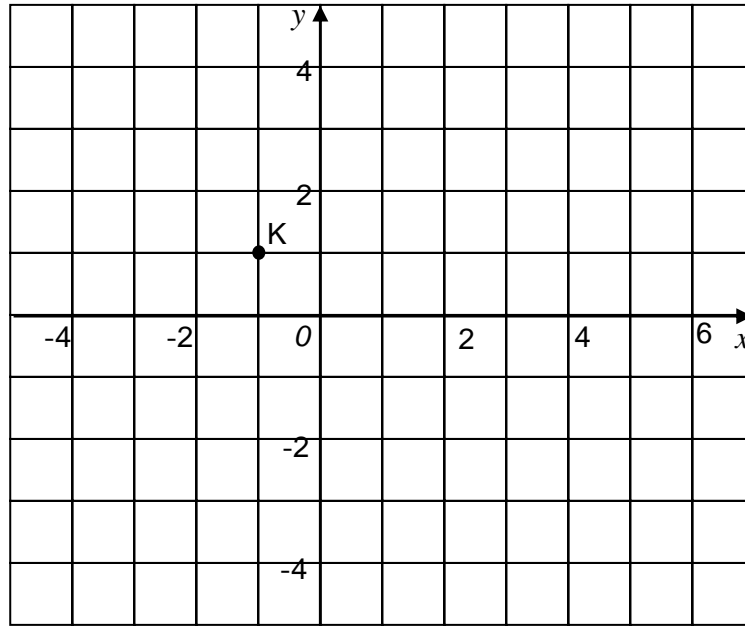2. (a) Diagram 3 shows the point **K** on a Cartesian plane.

DIAGRAM 3

The transformation **R** represents a 90^0 anticlockwise rotation about the center (3, 2). The transformation **T** represents a translation $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$. State the coordinates of the image of the point **K** under the following transformations.

(i) **R**

(ii) **RT**   [3 *marks*]

Answer:

(a) (i)

(ii)

(b) Diagram 4 shows three quadrilateral *EFGH, ABCD* and *OFJK* on a Cartesian plane. *EFGH* is the image of *ABCD* under the transformation **U** and *OFJK* is the image of *EFGH* under the transformation **V** .

DIAGRAM 4

(i) Describe completely the transformation,

(a) **U**,
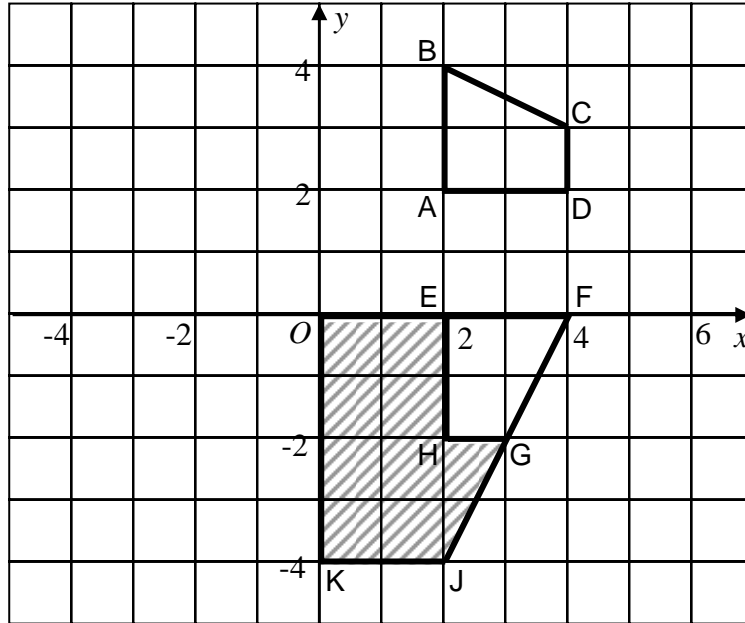(b) **V**.   [6 *marks*]

(ii) Given that the shaded area is 120 unit^2 , find the area of *ABCD*.
                                                                          [3 *marks*]

Answer:

(b) (i) (a)

(b)

(ii)

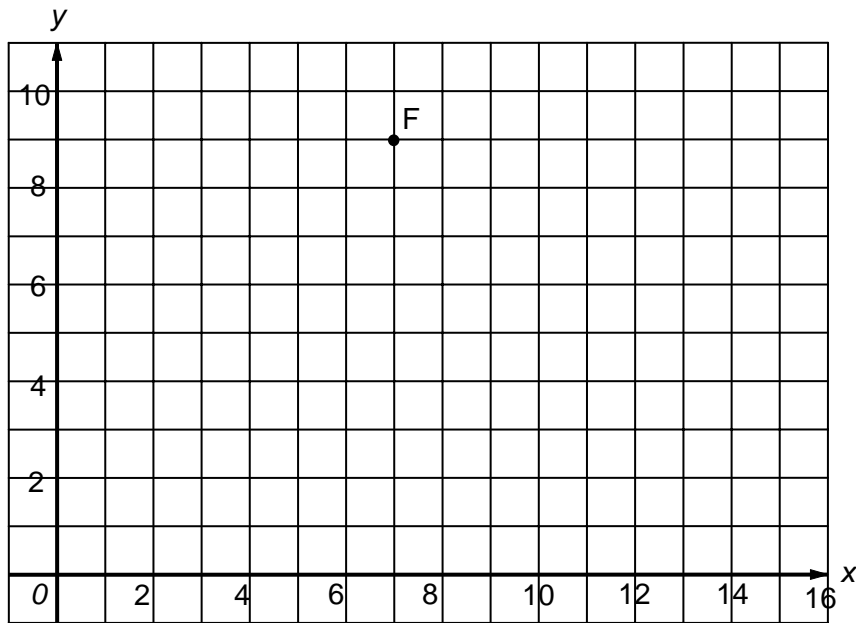3. (a) Diagram 5 shows the point **K** on a Cartesian plane.

DIAGRAM 5

Transformation **S** is a translation $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$.

Transformation **T** is a reflection in the x = 9.

(i) State the coordinates of the image of point **F** under transformation **S**.

(ii) State the coordinates of image of point **F** under transformation **TS**. [3 *marks*]

Answer:

(a) (i)

(ii)

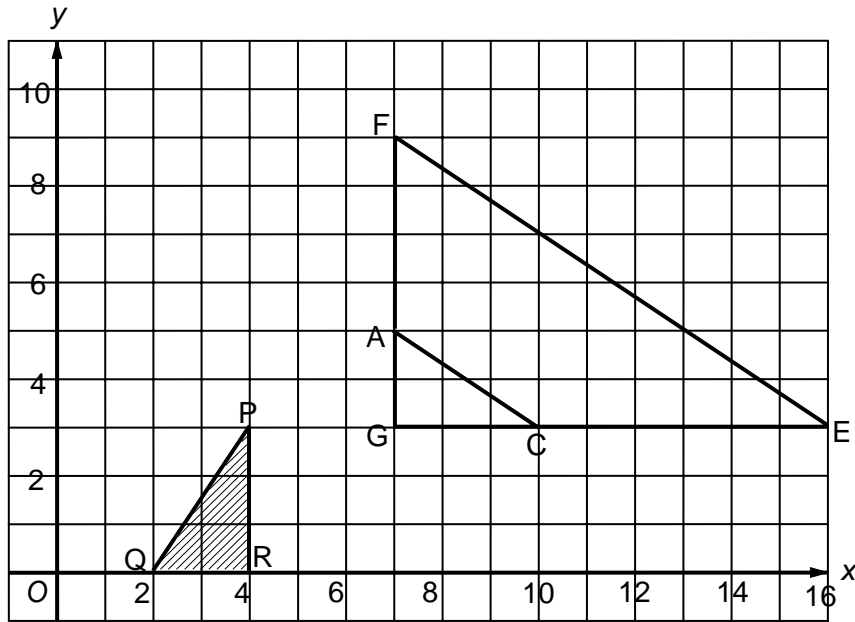(b) Diagram 6 shows three triangle *PQR, ACG* and *EFG* on a Cartesian plane.

DIAGRAM 2

Triangle *ACG is* the image of triangle *PQR* under transformation **V**.
Trapezium *EFG is* the image of triangle *ACG* under transformation **W**.

(i) Describe in full transformation :

(a) **V**
(b) **W**   [3 *marks*]

(ii) Given that the area of triangle *EFG* represents a region of area 72 unit^2.
Calculate the area, in unit^2, of the region represented by triangle *PQR*.
[6 *marks*]

[
Answer:

(b) (i) (a)

(b)

(ii)

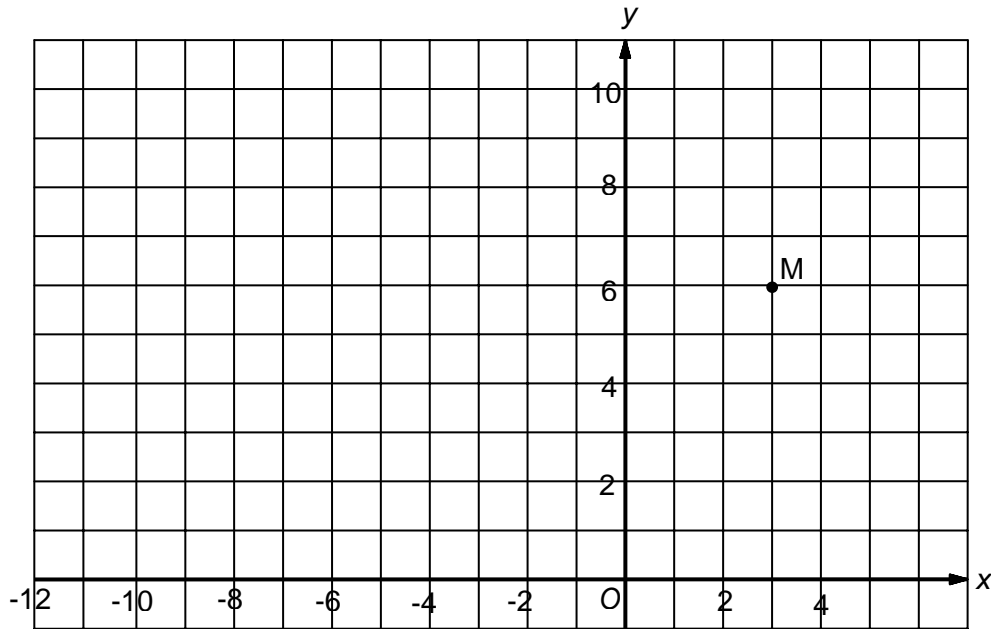4. (a) Diagram 7 shows the point **M** on a Cartesian plane.

DIAGRAM 7

Transformation **P** is a reflection in the line x= -3.
Transformation **R** is a rotation of 90° clockwise about the origin.

State the coordinates of the image of point **M** under the following transformation:

(i) **P**

(ii) **RP**   [3 *marks*]

Answer:

(a) (i)

(ii)

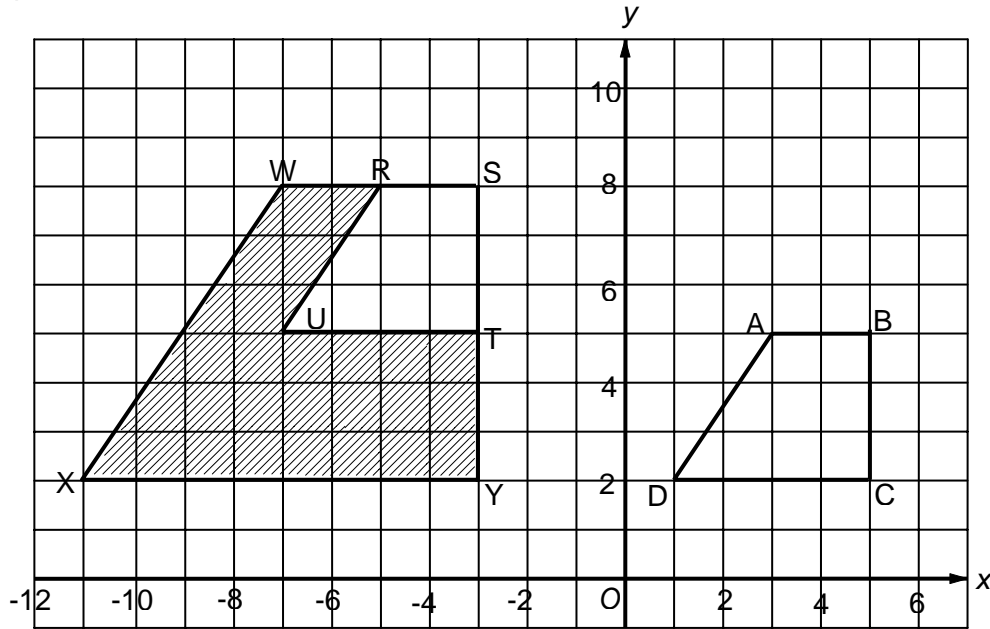(b) Diagram 8 shows three trapezium *ABCD, RSTU* and *WSYX* on a Cartesian plane.

DIAGRAM 8

WSYX is the image of *ABCD* under combined transformation **UV**.

(i) Describe in full transformation :

(a) **U**
(b) **V**   [5 *marks*]

(ii) Given that the area of shaded region *WXYTUR* represents a region of area 150 cm^2. Calculate the area, in cm^2, of the region represented by *RSTU.*
                                                                          [4 *marks*]

Answer:

(b) (i) (a)

(b)

(ii)

5. (a) Transformation **R** is a 90° clockwise rotation at centre (2, 2).

Transformation **T** is a translation $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$.

State the coordinate of the image for coordinate (6 , 4) under the following transformations:

(i) **R²**.

(ii) **TR**. [4 *marks*]

Answer:

(a) (i)

(ii)

(b) Diagram 9 shows quadrilateral , *ABCD*, *PQRS* and *EFGH*, drawn on a Cartesian plane.
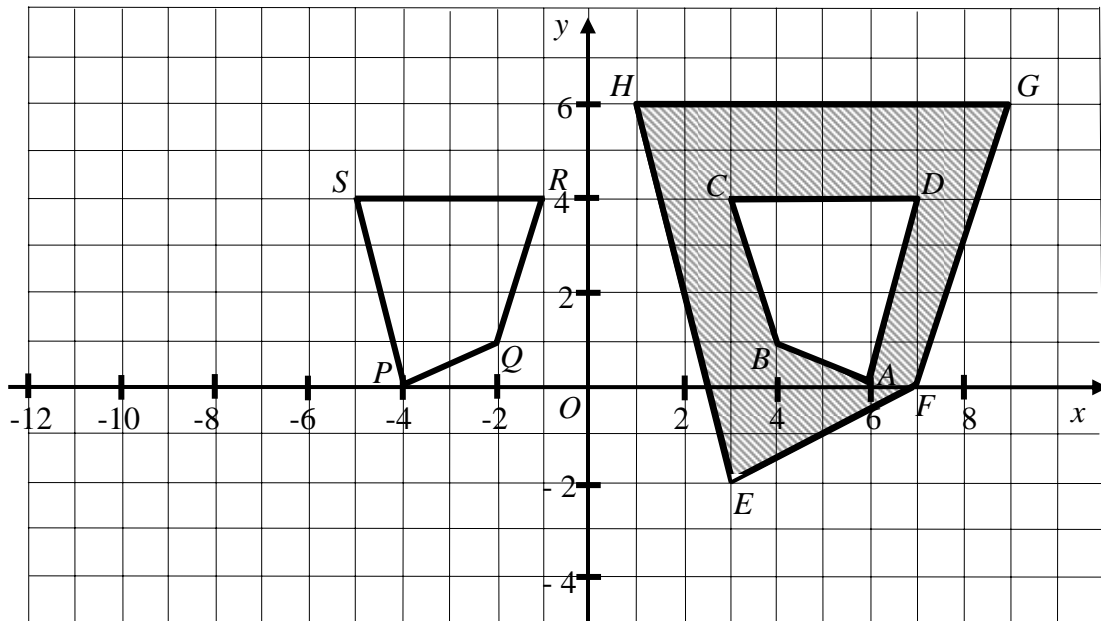

DIAGRAM 9

PQRS is the image of *ABCD* under transformation **S** and *EFGH* is the image of *PQRS* under transformation **Q**.

(i) Describe in full transformation :

(a)Transformation **S**

(b)Transformation **Q** [5 *marks*]

(ii) Given the area of *ABCD* is 64 unit², calculate the area of shaded region.

[3 *marks*]

Answer:

(b) (i) (a)

(b)

(ii)

JAWPAN MODUL11
TOPIC : TRANSFORMATIONS

1	(a) (i)	(0, -1)	1
	(ii)(a)	(-3, -4)	1
	(b)	(-1, -2)	1
	(b)(i)(a)	M is a rotation of 90° clockwise about point (1,3)	3
	(b)	N is an enlargement with centre at (2,0) and a scale factor of 2	3
	(ii)	Area EFGH = k^2(Area ABCD)	
		= 2^2(25)	3
		= 100 unit^2	

2	(a)(i)	(4, -2)	1
	(ii)	(1, 0)	2
	(b)(i)(a)	U is a rotation of 90° clockwise about the point (1, 1)	3
	(b)	V is an enlargement with centre at (4, 0) and scale factor of 2	3
	(ii)	Area OFJK = k^2(Area ABCD)	
		120 + Area ABCD = 2^2(Area ABCD)	3
		Area ABCD = 40 unit^2	

3	(a)(i)	(12, 7)	1
	(ii)	(6, 7)	2
	(b)(i)(a)	V is a rotation of 90° clockwise about point (7, 0)	3
	(b)	W is an enlargement with centre at (7, 3) and scale factor of 3	3
	(ii)	Area EFG = k^2(Area PQR)	
		72 = 3^2(Area PQR)	3
		Area PQR = 8 unit^2	

4	(a)(i)	(-3, 6)	1
	(ii)	(6, 11)	2
	(b)(i)(a)	U is a translation $\begin{pmatrix} -8 \\ 3 \end{pmatrix}$	1
	(b)	V is an enlargement with centre at (-3, 8) and scale factor of 2.	3
	(ii)	Area WXYS = k^2(Area RSTU)	
		150 + RSTU = 2^2(Area RSTU)	4
		Area RSTU = 50 cm^2	

5	(a)(i)	(-3, 0)	2
	(ii)	(4, 4)	2
	(b)(i)(a)	S is a reflection in the line x =1	2
		Q is an enlargement with centre at (-11, 2) and scale factor of 2.	3
	(ii)	Area ABCD + Area of shaded region= k^2(Area ABCD)	
		64 + Area of shaded region = 2^2(64)	3
		Area of shaded region = (256 – 64) cm^2	
		Area of the shaded region = 192 cm^2	