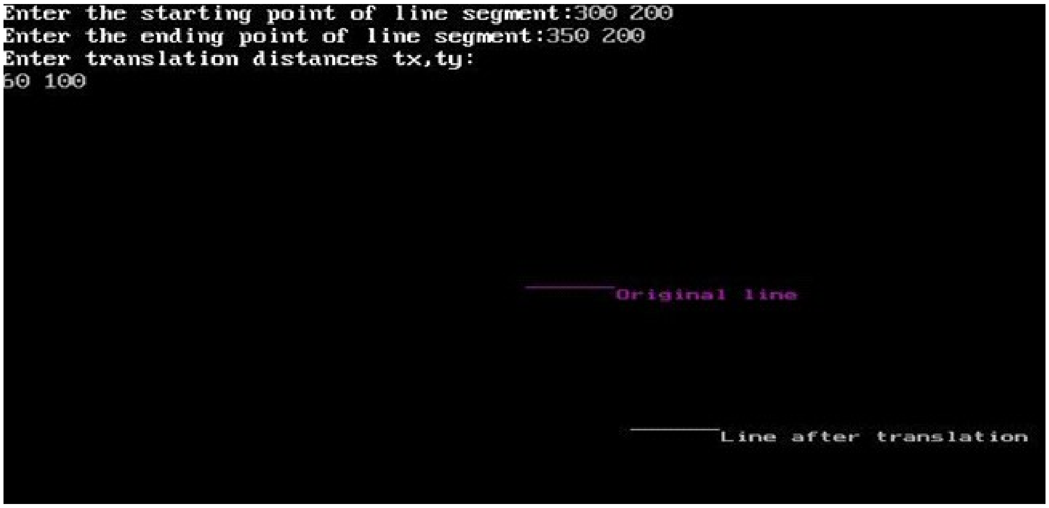
1. Program for Translation

```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
#include <math.h>
void main()
{
    int gd = DETECT, gm;
    int x1, y1, x2, y2, tx, ty, x3, y3, x4, y4;
    initgraph(&gd, &gm, "C:\\TurboC3\\BGI");
    printf("Enter the starting point of line segment:");
    scanf("%d %d", &x1, &y1);
    printf("Enter the ending point of line segment:");
    scanf("%d %d", &x2, &y2);
    printf("Enter translation distances tx,ty:\n");
    scanf("%d%d", &tx, &ty);
    setcolor(5);
    line(x1, y1, x2, y2);
    outtextxy(x2 + 2, y2 + 2, "Original line");
    x3 = x1 + tx;
    y3 = y1 + ty;
    x4 = x2 + tx;
    y4 = y2 + ty;
    setcolor(7);
    line(x3, y3, x4, y4);
    outtextxy(x4 + 2, y4 + 2, "Line after translation");
    getch();
}
```

Output:

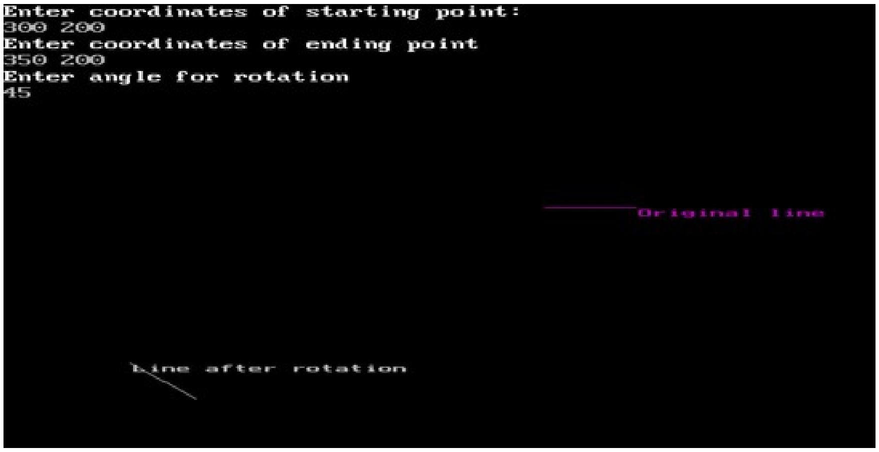


```
Enter the starting point of line segment:300 200
Enter the ending point of line segment:350 200
Enter translation distances tx,ty:
60 100
```

2. Program for Rotation

```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
#include <math.h>
void main()
{
    int gd = DETECT, gm;
    float x1, y1, x2, y2, x3, y3, x4, y4, a, t;
    initgraph(&gd, &gm, "C:\\TurboC3\\BGI");
    printf("Enter coordinates of starting point:\n");
    scanf("%f%f", &x1, &y1);
    printf("Enter coordinates of ending point\n");
    scanf("%f%f", &x2, &y2);
    printf("Enter angle for rotation\n");
    scanf("%f", &a);
    setcolor(5);
    line(x1, y1, x2, y2);
    outtextxy(x2 + 2, y2 + 2, "Original line");
    t = a * (3.14 / 180);
    x3 = (x1 * cos(t)) - (y1 * sin(t));
    y3 = (x1 * sin(t)) + (y1 * cos(t));
    x4 = (x2 * cos(t)) - (y2 * sin(t));
    y4 = (x2 * sin(t)) + (y2 * cos(t));
    setcolor(7);
    line(x3, y3, x4, y4);
    outtextxy(x3 + 2, y3 + 2, "Line after rotation");
    getch();
}
```

Output:

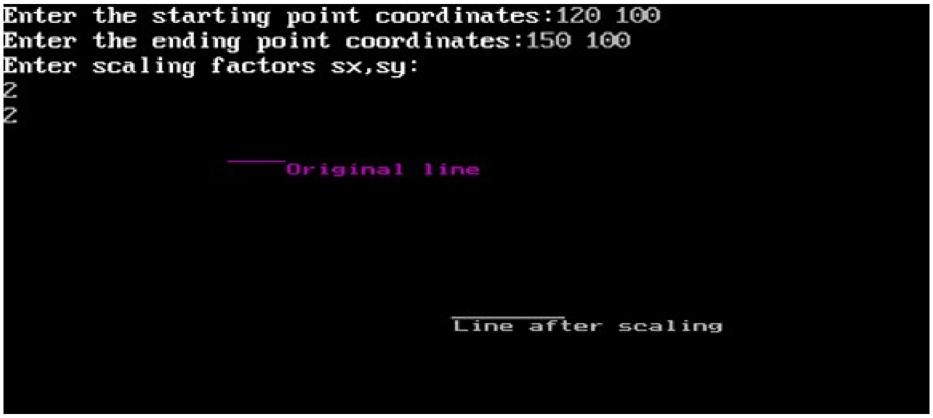


```
Enter coordinates of starting point:
300 200
Enter coordinates of ending point
350 200
Enter angle for rotation
45
```

3. Program for Scaling

```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
#include <math.h>
void main()
{
    int gd = DETECT, gm;
    float x1, y1, x2, y2, sx, sy, x3, y3, x4, y4;
    initgraph(&gd, &gm, "C:\\TurboC3\\BGI");
    printf("Enter the starting point coordinates:");
    scanf("%f %f", &x1, &y1);
    printf("Enter the ending point coordinates:");
    scanf("%f %f", &x2, &y2);
    printf("Enter scaling factors sx,sy:\n");
    scanf("%f%f", &sx, &sy);
    setcolor(5);
    line(x1, y1, x2, y2);
    outtextxy(x2 + 2, y2 + 2, "Original line");
    x3 = x1 * sx;
    y3 = y1 * sy;
    x4 = x2 * sx;
    y4 = y2 * sy;
    setcolor(7);
    line(x3, y3, x4, y4);
    outtextxy(x3 + 2, y3 + 2, "Line after scaling");
    getch();
}
```

Output:



```
Enter the starting point coordinates:120 100
Enter the ending point coordinates:150 100
Enter scaling factors sx,sy:
2
2

                    Original line


                                        Line after scaling
```

4. Program for Reflection

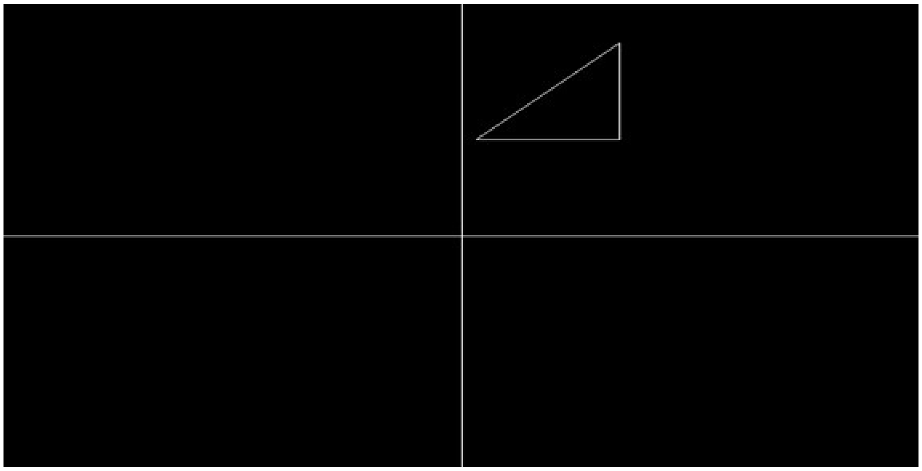
(i)About X-axis

```
#include <stdio.h>

#include <conio.h>

#include <graphics.h>

#include <math.h>

char IncFlag;

int PolygonPoints[3][2] = {{10, 100}, {110, 100}, {110, 200}};

void PolyLine()

{

   int iCnt;

   cleardevice();

   line(0, 240, 640, 240);

   line(320, 0, 320, 480);

   for (iCnt = 0; iCnt < 3; iCnt++)

   {

      line(PolygonPoints[iCnt][0], PolygonPoints[iCnt][1],
            PolygonPoints[(iCnt + 1) % 3][0], PolygonPoints[(iCnt + 1) % 3][1]);
    }
}
void Reflect()
{
    float Angle;
    int iCnt;
    int Tx, Ty;
    printf("endl");
    ;
    for (iCnt = 0; iCnt < 3; iCnt++)
        PolygonPoints[iCnt][1] = (480 - PolygonPoints[iCnt][1]);
}
void main()
{
    int gDriver = DETECT, gMode;
    int iCnt;
    initgraph(&gDriver, &gMode, "C:\\TurboC3\\BGI");
    for (iCnt = 0; iCnt < 3; iCnt++)
    {
        PolygonPoints[iCnt][0] += 320;
        PolygonPoints[iCnt][1] = 240 - PolygonPoints[iCnt][1];
    }
    PolyLine();
    getch();
    Reflect();
```

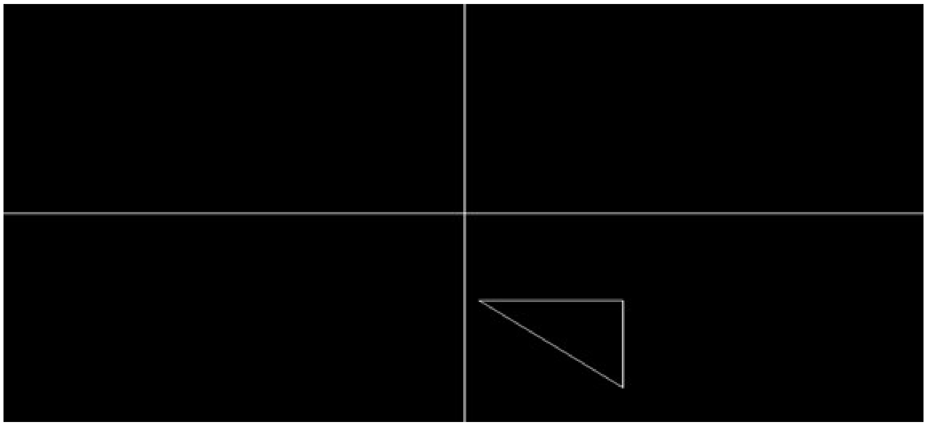
```
   PolyLine();

   getch();

}
```

Output:

Object before Reflection about the X-axis:



Object after Reflection about the X-axis:

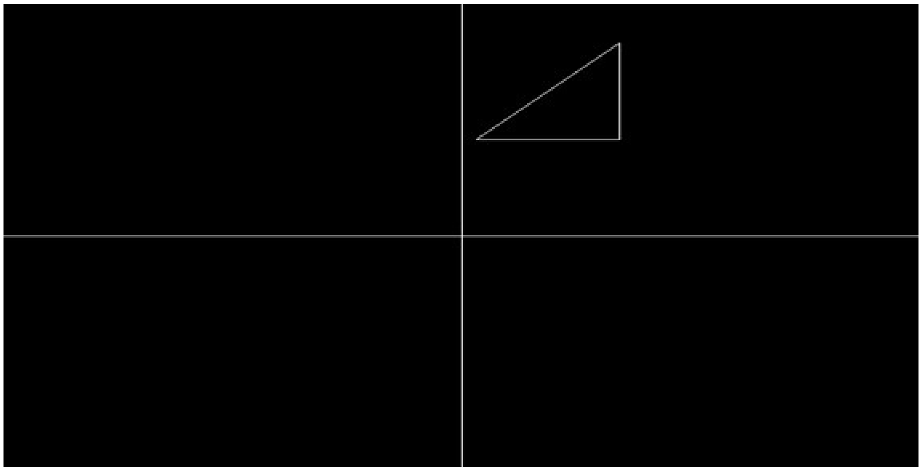


(ii)About Y-axis

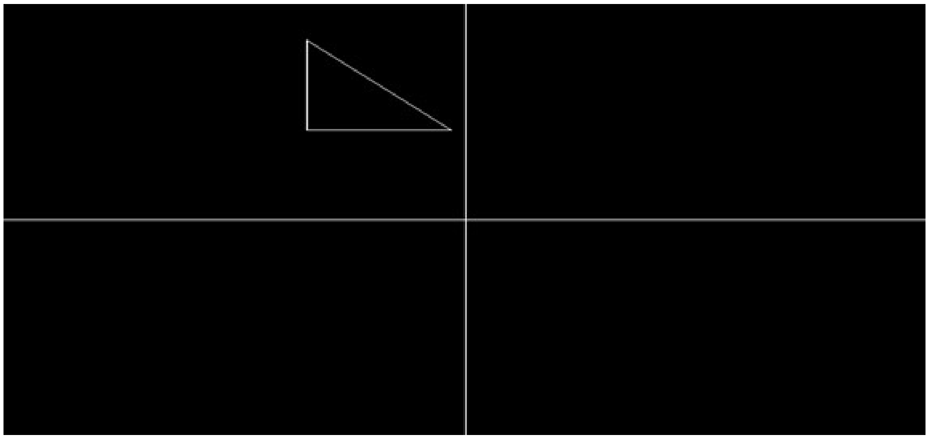
```
#include <stdio.h>

#include <conio.h>

#include <graphics.h>

#include <math.h>
```

```
char IncFlag;
int PolygonPoints[3][2] =
    {{10, 100}, {110, 100}, {110, 200}};
void PolyLine()
{
    int iCnt;
    cleardevice();
    line(0, 240, 640, 240);
    line(320, 0, 320, 480);
    for (iCnt = 0; iCnt < 3; iCnt++)
    {
        line(PolygonPoints[iCnt][0], PolygonPoints[iCnt][1],
             PolygonPoints[(iCnt + 1) % 3][0], PolygonPoints[(iCnt + 1) % 3][1]);
    }
}
void Reflect()
{
    float Angle;
    int iCnt;
    int Tx, Ty;
    for (iCnt = 0; iCnt < 3; iCnt++)
        PolygonPoints[iCnt][0] = (640 - PolygonPoints[iCnt][0]);
}
void main()
{
    int gd = DETECT, gm;
    int iCnt;

    initgraph(&gd, &gm, "C:\\TurboC3\\BGI");

    for (iCnt = 0; iCnt < 3; iCnt++)

    {

        PolygonPoints[iCnt][0] += 320;

        PolygonPoints[iCnt][1] = 240 - PolygonPoints[iCnt][1];

    }

    PolyLine();

    getch();

    Reflect();

    PolyLine();

    getch();

}
```

Object before Reflection about the Y-axis:



Object after reflection about Y-axis:



5. Program for Shearing

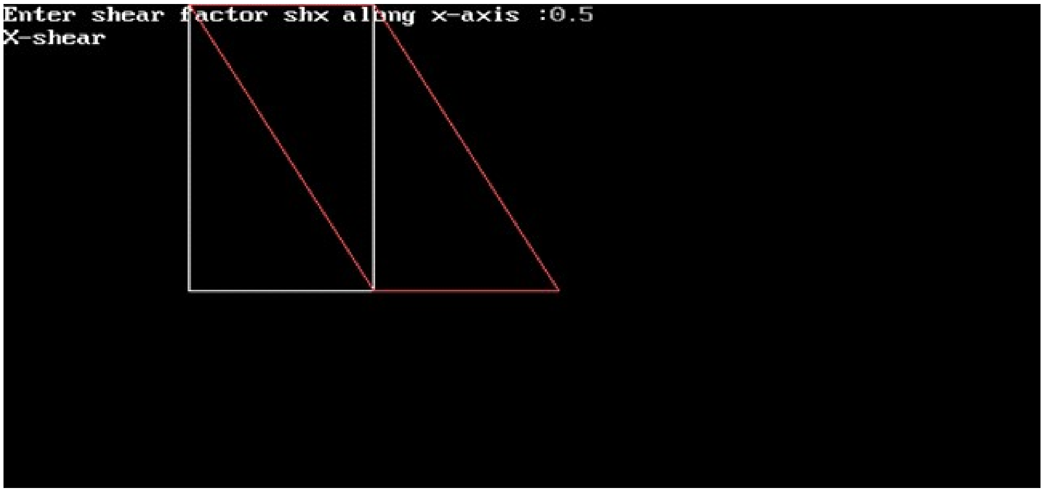
(i)X-Shear

```
#include <stdio.h>

#include <conio.h>

#include <dos.h>

#include <graphics.h>

void main()

{

   int gd = DETECT, gm;

   float shx, shy;

   initgraph(&gd, &gm, "C:\\TurboC3\\BGI");

   printf("Enter shear factor shx along x-axis :");

   scanf("%f", &shx);

   line(100, 0, 200, 0);

   line(200, 0, 200, 200);

   line(200, 200, 100, 200);

   line(100, 200, 100, 0);

   printf("X-shear");

   setcolor(12);
```

```
    line((100 + (0 * shx)), 0, (200 + (0 * shx)), 0);

    line((200 + (0 * shx)), 0, (200 + (200 * shx)), 200);

    line((200 + (200 * shx)), 200, (100 + (200 * shx)), 200);

    line((100 + (200 * shx)), 200, (100 + (0 * shx)), 0);

    getch();

}
```

Output:

Red lined rectangle shows object after X-Shear transformation



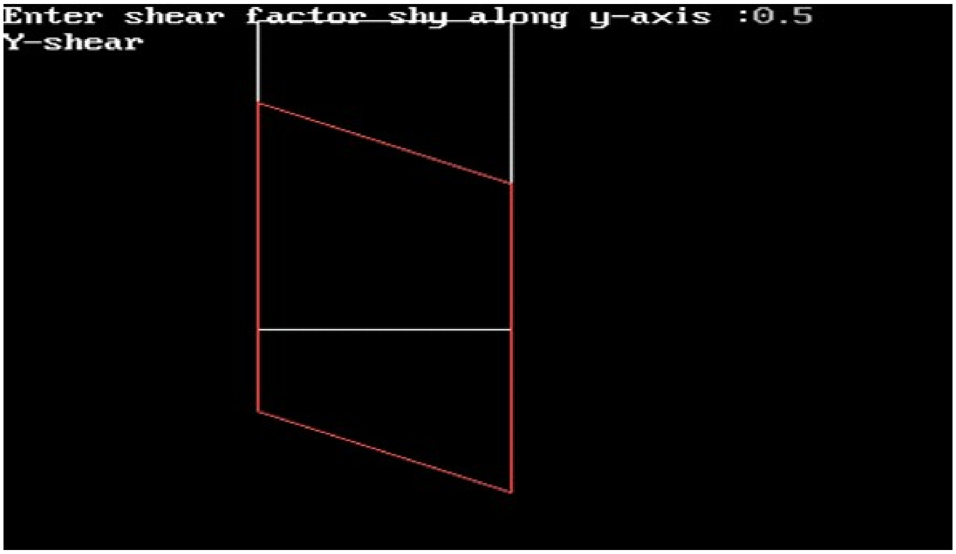
```
Enter shear factor shx along x-axis :0.5
X-shear
```

(ii)Y-Shear

```
#include <stdio.h>

#include <conio.h>

#include <dos.h>

#include <graphics.h>

void main()

{

    int gd = DETECT, gm;

    float shx, shy;

    initgraph(&gd, &gm, "C:\\TurboC3\\BGI");
    printf("Enter shear factor shy along y-axis :");
    scanf("%f", &shy);
    line(100, 10, 200, 10);
    line(200, 10, 200, 200);
    line(200, 200, 100, 200);
    line(100, 200, 100, 10);
    printf("Y-shear");
    setcolor(12);
    line(100, 10 + (shy * 100), 200, 10 + (shy * 200));
    line(200, 10 + (shy * 200), 200, 200 + (shy * 200));
    line(200, 200 + (shy * 200), 100, 200 + (shy * 100));
    line(100, 200 + (shy * 100), 100, 10 + (shy * 100));
    getch();
    closegraph();
}
```

Output:

Red lined rectangle shows object after Y-Shear transformation



```
Enter shear factor shy along y-axis :0.5
Y-shear
```