আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম
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LAB - 8

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Course Title : Computer Graphics Lab

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1. Scaling a point about origin

```
#include <graphics.h>
#include <stdlib.h>

void scale_point(int x1, int y1, float sx, float sy, int *new_x, int *new_y)
{
   // Scale point
   *new_x = x1 * sx;
   *new_y = y1 * sy;
}

int main()
{
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");

   // Original point
   int x1 = 100, y1 = 100;
   circle(x1, y1, 3);

   // Scaling factors
   float sx = 2.0, sy = 3.0;
```

```
    // Scale point
    int new_x, new_y;
    scale_point(x1, y1, sx, sy, &new_x, &new_y);

    // Display scaled point
    circle(new_x, new_y, 3);

    getch();
    closegraph();

    return 0;
}
```

2. Scaling a triangle about origin.

```
#include <graphics.h>
#include <stdlib.h>

void scale_triangle(int x1, int y1, int x2, int y2, int x3, int y3, float sx,
float sy,
                    int *new_x1, int *new_y1, int *new_x2, int *new_y2, int
*new_x3, int *new_y3)
{
```

```
    // Scale points
    *new_x1 = x1 * sx;
    *new_y1 = y1 * sy;
    *new_x2 = x2 * sx;
    *new_y2 = y2 * sy;
    *new_x3 = x3 * sx;
    *new_y3 = y3 * sy;
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");

    // Original triangle
    int x1 = 100, y1 = 100, x2 = 200, y2 = 200, x3 = 150, y3 = 50;
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);

    // Scaling factors
    float sx = 2.0, sy = 2.0;
```

```
    // Scale triangle
    int new_x1, new_y1, new_x2, new_y2, new_x3, new_y3;
    scale_triangle(x1, y1, x2, y2, x3, y3, sx, sy, &new_x1, &new_y1,
&new_x2, &new_y2, &new_x3, &new_y3);

    // Display scaled triangle
    line(new_x1, new_y1, new_x2, new_y2);
    line(new_x2, new_y2, new_x3, new_y3);
    line(new_x3, new_y3, new_x1, new_y1);

    getch();
    closegraph();

    return 0;
}
```

3. Scaling a triangle about another point.

```
#include <graphics.h>
#include <stdlib.h>

void scale_triangle(int x1, int y1, int x2, int y2, int x3, int y3, int cx, int
cy, float sx, float sy,
```

```
                int *new_x1, int *new_y1, int *new_x2, int *new_y2, int
*new_x3, int *new_y3)
{
   // Translate points
   x1 -= cx;
   y1 -= cy;
   x2 -= cx;
   y2 -= cy;
   x3 -= cx;
   y3 -= cy;

   // Scale points
   x1 *= sx;
   y1 *= sy;
   x2 *= sx;
   y2 *= sy;
   x3 *= sx;
   y3 *= sy;

   // Translate points back to original position
   x1 += cx;
   y1 += cy;
```

```
    x2 += cx;
    y2 += cy;
    x3 += cx;
    y3 += cy;

    *new_x1 = x1;
    *new_y1 = y1;
    *new_x2 = x2;
    *new_y2 = y2;
    *new_x3 = x3;
    *new_y3 = y3;
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");

    // Original triangle
    int x1 = 100, y1 = 100, x2 = 200, y2 = 200, x3 = 150, y3 = 50;
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
```

```
    line(x3, y3, x1, y1);

    // Point to scale around
    int cx = 150, cy = 150;
    circle(cx, cy, 3);

    // Scaling factors
    float sx = 2.0, sy = 3.0;

    // Scale triangle
    int new_x1, new_y1, new_x2, new_y2, new_x3, new_y3;
    scale_triangle(x1, y1, x2, y2, x3, y3, cx, cy, sx, sy, &new_x1, &new_y1,
&new_x2, &new_y2, &new_x3, &new_y3);

    // Display scaled triangle
    line(new_x1, new_y1, new_x2, new_y2);
    line(new_x2, new_y2, new_x3, new_y3);
    line(new_x3, new_y3, new_x1, new_y1);

    getch();
    closegraph();
```

```
    return 0;
}
```