OpenGL: Defining a vertex

```
            2 f
glVertex 3 d v ( ... )
           i

float pt[2] = {0,0};

glVertex2i( 4, 3 );            // integer, x, y
glVertex2f( 1.0f, 2.0f );      // float,   x, y
glVertex3d( 0.5, 1.0, 2.0 );   // double,  x, y, z
glVertex2fv( &pt[0] );         // array of 2 float
```

OpenGL: Point and line geometry

```
glBegin( WHAT );
  glVertex*( ... );
  // more vertices ...
glEnd();
```

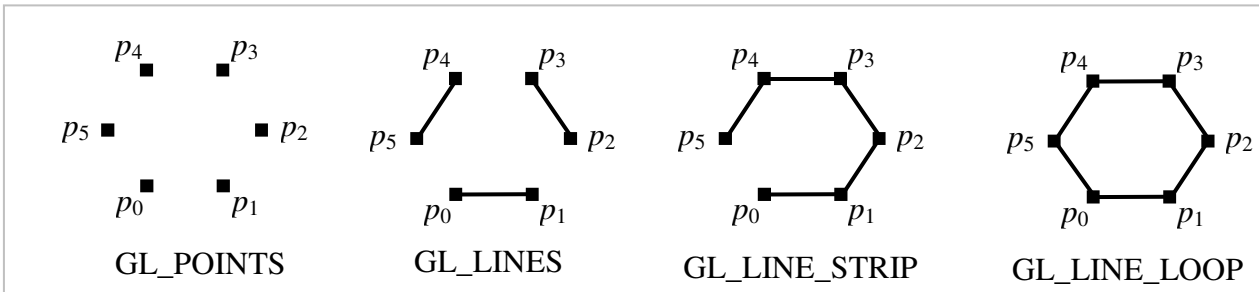
WHAT = GL_POINTS, GL_LINES, GL_LINE_STRIP, GL_LINE_LOOP

Examples:

```
glBegin( GL_POINTS );
  glVertex2i( 0,0 );
glEnd();

glBegin( GL_LINES );
  glVertex2i( 0,0 );
  glVertex2i( 0,1 );
glEnd();
```

```
glBegin( GL_* );
  glVertex*( ... ); // p0
  glVertex*( ... ); // p1
  glVertex*( ... ); // p2
  glVertex*( ... ); // p3
  glVertex*( ... ); // p4
  glVertex*( ... ); // p5
glEnd();
```



OpenGL point and line attributes

```
void glPointSize( GLfloat size );

void glLineWidth( GLfloat width );

void glLineStipple( GLint factor, GLushort pattern );
```

1 ≤ factor ≤ 256 pattern: 16 bit
repeat factor for each bit in pattern

```
glEnable( GL_LINE_STIPPLE );
```

Examples:

pattern = 0xf0f0 = 1111000011110000

pattern = 0xaaaa = 1010101010101010

glLineStipple(1, 0xf0f0);
1111000011110000111100001111 0000

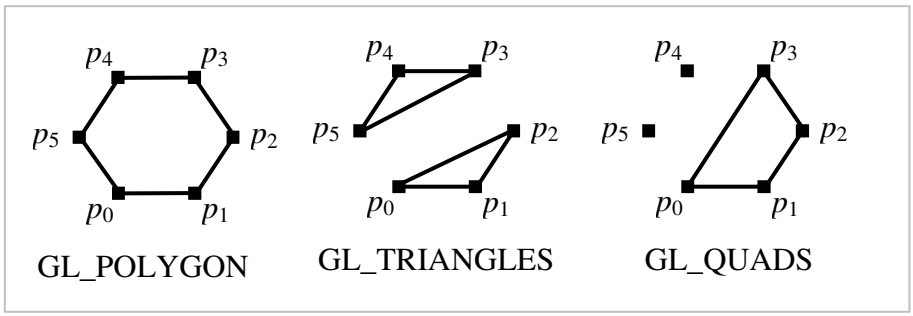
glLineStipple(2, 0xf0f0);
11111111000000001111111100000000

glLineStipple(1, 0xaaaa);
1010101010101010101010101010

OpenGL polygon geometry:

```
glBegin( GL_* );
  glVertex*( ... ); // p0
  glVertex*( ... ); // p1
  glVertex*( ... ); // p2
  glVertex*( ... ); // p3
  glVertex*( ... ); // p4
  glVertex*( ... ); // p5
glEnd();
```

`* = GL_POLYGON, GL_TRIANGLES, GL_QUADS`



OpenGL polygon attributes

Filled or unfilled: `glPolygonMode( face, mode );`

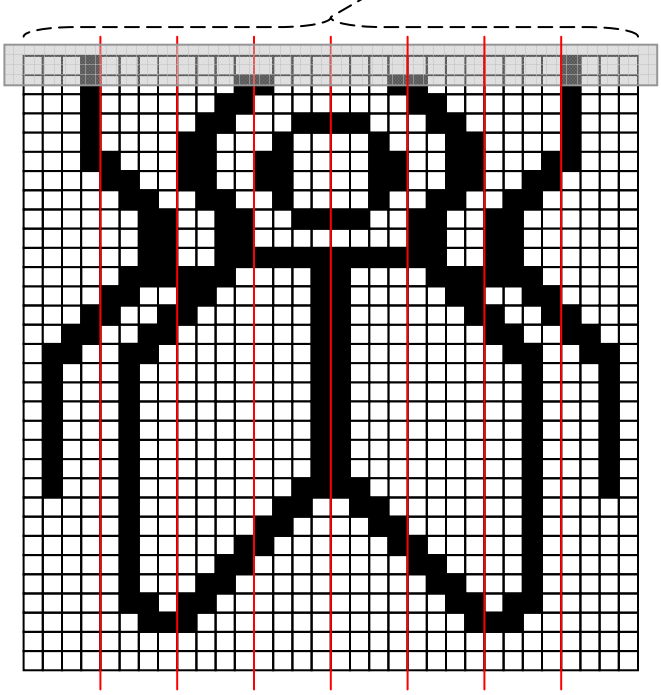
```
/* mode = GL_LINES, or GL_FILL */
/* face = GL_FRONT, or GL_BACK, or GL_FRONT_AND_BACK */
```

`face:` polygon's front, back, or both faces (sides facing the viewer)

Stippled:
```
glPolygonStipple( stipple_array_name )
glEnable( GL_POLYGON_STIPPLE )
```

`stipple_array_name:` array of `GLubyte` that logically defines a `32 bit x 32 bit` pattern .

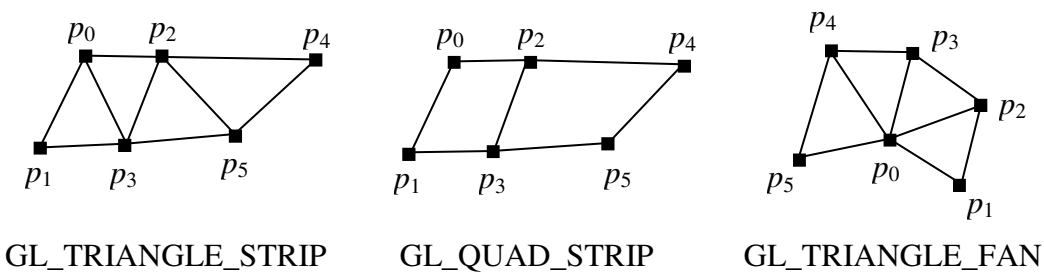
```
GLubyte fly[] =
{
    0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
    0x03, 0x80, 0x01, 0xC0, 0x06, 0xC0, 0x03, 0x60,
    0x04, 0x60, 0x06, 0x20, 0x04, 0x30, 0x0C, 0x20,
    0x04, 0x18, 0x18, 0x20, 0x04, 0x0C, 0x30, 0x20,
    0x04, 0x06, 0x60, 0x20, 0x44, 0x03, 0xC0, 0x22,
    0x44, 0x01, 0x80, 0x22, 0x44, 0x01, 0x80, 0x22,
    0x44, 0x01, 0x80, 0x22, 0x44, 0x01, 0x80, 0x22,
    0x44, 0x01, 0x80, 0x22, 0x44, 0x01, 0x80, 0x22,
    0x66, 0x01, 0x80, 0x66, 0x33, 0x01, 0x80, 0xCC,
    0x19, 0x81, 0x81, 0x98, 0x0C, 0xC1, 0x83, 0x30,
    0x07, 0xe1, 0x87, 0xe0, 0x03, 0x3f, 0xfc, 0xc0,
    0x03, 0x31, 0x8c, 0xc0, 0x03, 0x33, 0xcc, 0xc0,
    0x06, 0x64, 0x26, 0x60, 0x0c, 0xcc, 0x33, 0x30,
    0x18, 0xcc, 0x33, 0x18, 0x10, 0xc4, 0x23, 0x08,
    0x10, 0x63, 0xC6, 0x08, 0x10, 0x30, 0x0c, 0x08,
    0x10, 0x18, 0x18, 0x08, 0x10, 0x00, 0x00, 0x08
};
```

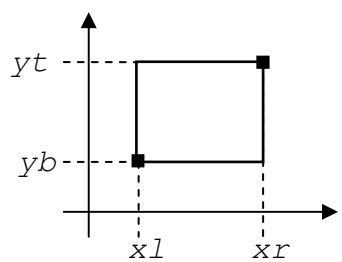


OpenGL polygon geometry:

```
glBegin( GL_* );
  glVertex*( ... ); // p0
  glVertex*( ... ); // p1
  glVertex*( ... ); // p2
  glVertex*( ... ); // p3
  glVertex*( ... ); // p4
  glVertex*( ... ); // p5
glEnd();
```

`* = GL_TRIANGLE_STRIP, GL_QUAD_STRIP, GL_TRIANGLE_FAN`



GL_TRIANGLE_STRIP GL_QUAD_STRIP GL_TRIANGLE_FAN

2D rectangles: **glRect**[**i f d**](xl, yb, xr, yt);