



# Models & Hierarchies

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CSE167: Computer Graphics  
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# Normals

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- The concept of normals is essential to lighting
  - Intuitively, we might think of a flat triangle as having a constant normal across the front face
  - However, in computer graphics, it is most common to specify normals and perform lighting at the vertices
  - This gives us a method of modeling smooth surfaces as a mesh of triangles with 'shared' normals at the vertices
  - We will talk about lighting in the next lecture, but for today, we will still think of our vertex as containing a normal
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# Models

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- We will extend our concept of a Model to include normals
- We can do this by simply extending our vertex class:

```
class Vertex {
    Vector3 Position;
    Vector3 Color;
    Vector3 Normal;
public:
    void Draw() {
        glColor3f(Color.x, Color.y, Color.z);
        glNormal3f(Normal.x, Normal.y, Normal.z);
        glVertex3f(Position.x, Position.y, Position.z);    // This has to be last
    }
}
```

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