

## More Lights

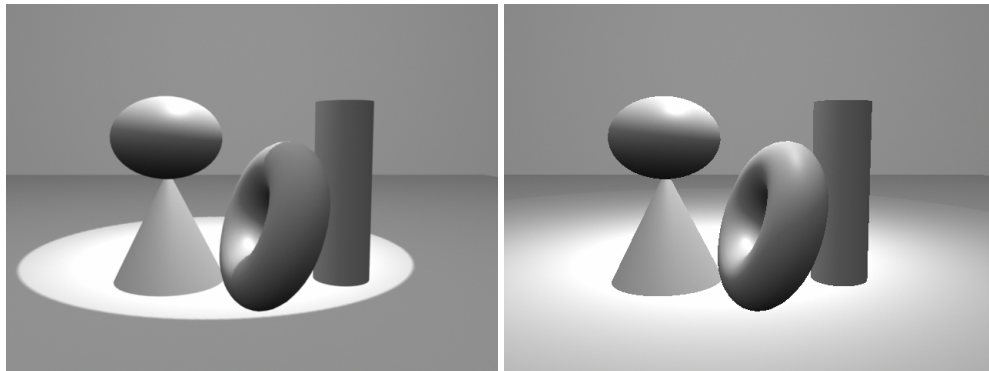
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*(This tutorial assumes you have already done the [Intro to Lights and Rendering](#) tutorial in this set.)*

### Set Up

- Retrieve your scene from the *Intro to Lights and Rendering* tutorial
- Or make a similar simple scene,
  - with a floor plane
  - and several objects on it

### Spot Lights



- A spot light emits a conical area of light in one direction
- >Create >Lights >Spot Light
- Translate the spot light up above the plane
  - (It will be at 0,0,0 initially)
- (It is helpful here to also use the IPR rendering for real-time updates)
- Select the spotlight
  - By default, your spotlight is shining
    - straight back along the  $-Z$  axis
  - Hit the **e** key for Rotate mode
  - Rotate the spot light so it aims at your objects
    - >Render >Render Current Frame to see your result
    - Or view the IPR real-time updated rendering

- **TIP:** the hardware rendering provides only a crude rendering
    - of a spotlight's light
- With the spotlight still selected:
  - Hit the **t** key to get the Manipulator icon
    - A line projects from the spotlight icon to a small box
      - This box is the *Aim Point* of the light
    - Click and drag the Aim Point to control where the light is pointing
      - Check your result in your rendering
        - Remember – hardware rendering is not useful here
        - You must use the software renderer
- You can also view the scene from the “point of view” of the spot light,
  - as another way of helping you orient the light
  - Select the spot light
  - In one of the modeling windows,
    - >Panels >Look Through Selected
      - You see the scene from the point of view of the light
  - Rotate the light a little
    - As the light rotates, the Look Through Selected view updates
  - Drag the Aim Point of the light
    - Same thing – the Look Through Selected view updates
  - This approach can be useful for getting a light to hit a certain portion of an object
    - For example, the edge of a box

### Spotlight Parameters

- Spotlights have many of the same parameters as a point light
  - Intensity, color, decay, etc.
- They also have several parameters specific to spot lights
- In the Attribute Editor for the spot light...
  - Change *Cone Angle*
    - Cone Angle = how wide the cone of light is
  - Change *Dropoff*
    - Dropoff = how quickly the light fades toward the edges of the cone

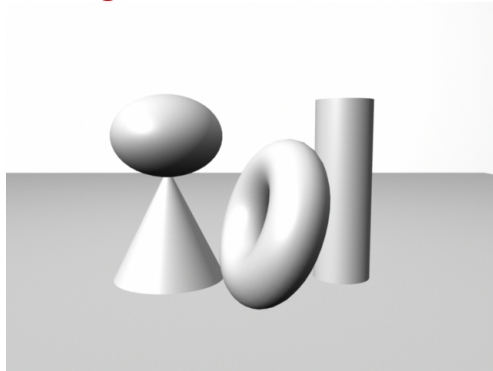
- Change *Penumbra Angle*
  - Penumbra Angle = how large the area of softness at the edge of cone
    - measured in degrees within the cone angle
    - For example, Penumbra Angle = 10 means a 10 degree area of softness on the inner rim of the cone of light
    - Penumbra Angle = -10 means a 10 degree area of softness on the outer rim of the cone of light

### Interactive Adjustment of Parameters

- Two methods for interactively changing parameter values in real time:
- **Real-time Cursor**
  - Open the Channel Box
  - Under SHAPES, click on spotLightShape1
    - click on the phrase *Cone Angle* to highlight it
  - In a modeling window,
    - drag with the middle-mouse button
      - The value of the *Cone Angle* parameter changes as you drag
    - Notice that the hardware-shaded rendering in your Persp window updates in real time
    - If you have rendered an IPR window,
      - the IPR region also updates with each drag
- **Manipulator icon**
  - **WARNING:** this interface can sometimes be confusing
  - Select the light
    - Hit the **t** key to get the Manipulator icon
      - (You can also use the little axis icon under the Translate, Rotate, Scale icons on the far left side of the screen)
    - A special icon appears on the light
      - The icon differs for each different type of object
        - (This is part of why it can be confusing)
    - The manipulator icon has several (sometimes many) functions
      - To change functions, double-click on the icon
      - Or select one of the sub-icons

- (another source of confusion)
- Click & drag different sub-icons to change different parameters
- **TIP:** for spotlights, it is often easiest to change the parameters by changing their values directly
  - and only use the manipulator icon for moving the Aim Point, as described above

## Directional Light



- Emits light in a single direction,
  - from a source infinitely far away
    - Therefore sometimes also called an “infinite” light
  - Since it is infinitely far away,
    - its location doesn’t matter
      - - only its direction matters
    - all the light rays from a directional light are parallel
  - Frequently used to simulate sunlight/outdoor light
- >Create >Lights >Directional Light
  - Parameters are similar to point and spot
- Hit the **t** key for the manipulator icon
  - Move the aim point to direct the light

## Ambient Lights

- Ambient light is equally present everywhere in the environment
  - Has no real-world equivalent
  - Useful for fine-tuning your lighting
    - to make things generally lighter or darker

- >Create >Lights >Ambient Light []
  - **WARNING:** By default, Maya makes an ambient light
    - That is partially ambient and partially point
      - (Groan!)
    - The ratio is controlled by the *Ambient Shade* parameter
      - Ambient Shade = 0 => 0% point light, 100% ambient
      - So...
  - **TIP:** to make a truly ambient light, set *Ambient Shade* = 0.0
    - If you also want a point light,
      - just make one
- Adjust *Intensity* of ambient light to increase/decrease overall brightness of scene

### **Cast Shadows**

- By default, CG lights do not cast shadows,
  - because shadow casting is computationally expensive
  - See the *Cast Shadows* tutorial in this set for details