

Job No: 11**Duration:** 16H**Job Title:** Add Lighting**Objective:**

To insert different types lightings into suitable scenario.

Students should be able to understand the usage of the following:

- Type of lights
- Light properties
- Add target spotlight
- Add free spotlight
- Add target directional light
- Add free directional light
- Add Omni light

Introduction:

Lights are objects that simulate real lights such as household or office lamps, the light instruments used in stage and film work, and the sun itself. Different kinds of light objects cast light in different ways, emulating different kinds of real-world light sources.

When there are no lights in a scene, the scene is shaded or rendered with default lighting. You add lights to give the scene a more realistic appearance. Lighting enhances the clarity and three-dimensionality of a scene. In addition to general lighting effects, lights can be used to project images.

Light objects *replace* the default lighting. As soon as you create a light, the default lighting is turned off. If you delete all the lights in the scene, default lighting is turned back on. The default lighting consists of two invisible lights: one is above and to the left of the scene, and the other is below and to the right.

Types of lights:

3ds Max provides two types of lights: photometric and standard. All types are displayed in viewports as light objects. They share many of the same parameters, including shadow generators.

Photometric Lights

[Photometric lights](#) use [photometric](#) (light energy) values that enable you to more accurately define lights as they would be in the real world. You can set their distribution, intensity, color temperature, and other characteristics of real-world lights. You can also import specific photometric files available from lighting manufacturers to design lighting based on commercially available lights.



Airport Lounge

An architectural scene with realistic lighting created by photometric lights

Standard Lights:

[Standard lights](#) are computer-based objects that simulate lights such as household or office lamps, the light instruments used in stage and film work, and the sun itself. Different kinds of light objects cast light in different ways, simulating different kinds of light sources. Unlike photometric lights, Standard lights do not have physically-based intensity values.



A nighttime scene that uses standard lights for atmosphere rather than realism

Properties of light:

When you light a scene, it can be helpful to know how light naturally behaves.

When light rays strike a surface, the surface reflects them, or at least some of them, enabling us to see the surface. The appearance of a surface depends on the light that strikes it combined with the properties of the surface material, such as color, smoothness, and opacity.

Intensity

The intensity of light at its point of origin affects how brightly the light illuminates an object. A dim light cast on a brightly colored object shows only dim colors.



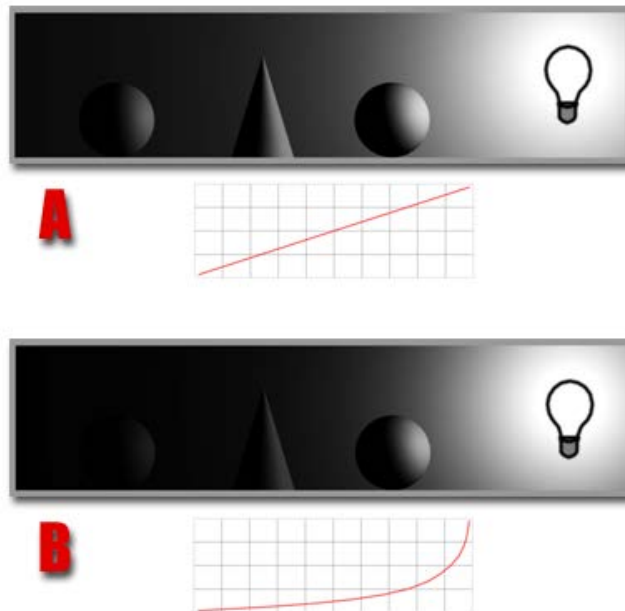
Left: A room lit by candles, which are a low-intensity source.

Right: The same room lit by a higher-intensity light bulb.

Attenuation

In the real world, light diminishes over distance. Objects far from the light source appear darker; objects near the source appear brighter. This effect is known as *attenuation*.

In nature, light attenuates at an inverse square rate. That is, its intensity diminishes in proportion to the square of the distance from the light source. It is common for attenuation to be even greater when light is dispersed by the atmosphere, especially when there are dust particles in the



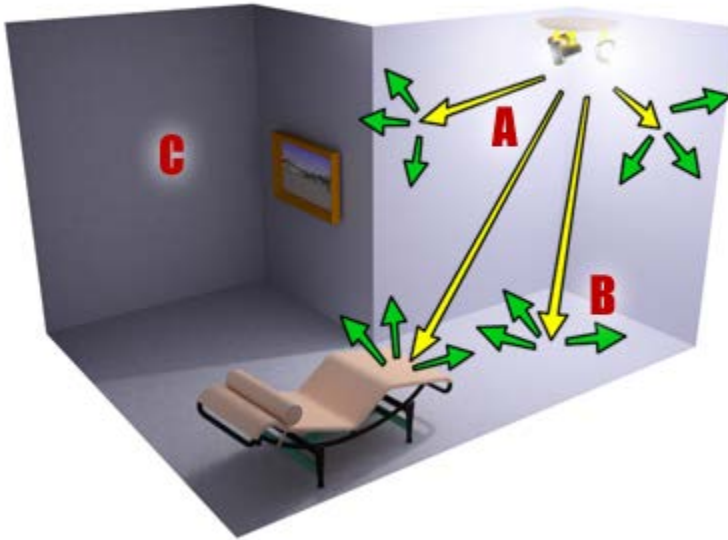
atmosphere, or fog or clouds.

A. Inverse decay; B. Inverse square decay; The graphs show the decay curves.

Reflected Light and Ambient Light

The light an object reflects can illuminate other objects. The more light a surface reflects, the more light it contributes to illuminating other objects in its environment.

Reflected light creates *ambient light*. Ambient light has a uniform intensity and is uniformly diffuse. It has no discernible source and no discernible direction.



A. Direct light

B. Reflected light

C. Resulting ambient light

Color and Light:

The color of light depends partly on the process that generates the light. For example, a tungsten lamp casts orange-yellow light, a mercury vapor lamp casts cold blue-white light, and sunlight is yellow-white. Light color also depends on the medium the light passes through. For example, clouds in the atmosphere tint daylight blue, and stained glass can tint light a highly saturated color.

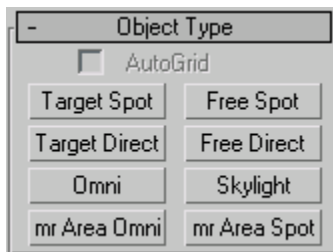
Light colors are *additive colors*; the primary light colors are red, green, and blue (RGB). As multiple colored lights mix together, the total light in the scene gets lighter and eventually turns white.



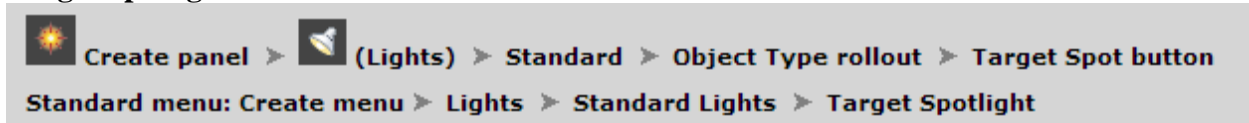
Additive mixing of colored lights

Standard Lights:

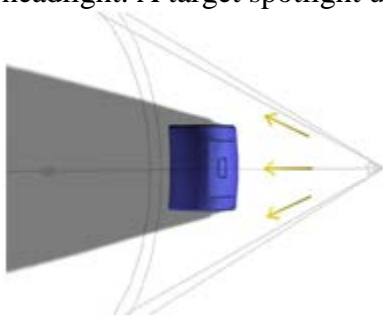
Standard lights are computer-based objects that simulate lights such as household or office lamps, the light instruments used in stage and film work, and the sun itself. Different kinds of light objects cast light in different ways, simulating different kinds of real-world light sources. Unlike [photometric lights](#), standard lights do not have physically-based intensity values.

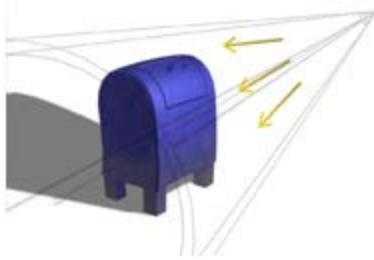


Target Spotlight:



A spotlight casts a focused beam of light like a flashlight, a follow spot in a theater, or a headlight. A target spotlight uses a movable target object to aim the light.







Top: Top view of a target spotlight


Bottom: Perspective view of the same light

Procedure for Target Spotlight:

To create a target spotlight:

1. On the  Create panel, click  (Lights).
2. Choose Standard from the drop-down list.
3. On the Object Type rollout, click Target Spot.
4. Drag in a viewport. The initial point of the drag is the location of the spotlight, and the point where you release the mouse is the location of the target.
The light is now part of the scene.
5. Set the creation parameters.

To adjust a target spotlight:

1. Select the light.
2. On the main toolbar, turn on  (Select And Move), or right-click the light and from the quad menu, choose Move. Move the light to adjust its aim.

Because the spotlight is always aimed at its target, you can't rotate it about its local X or Y axis. However, you can select and move the target object as well as the light itself. When you move either the light or the target, the light's orientation changes so it always points at the target.

Note The target's distance from the light does not affect the attenuation or brightness of the light.

To select the target:

The target, displayed as a small square, is often in the same area as objects that you want to illuminate. It can be difficult to select it by clicking.



1. Select the spotlight itself.
2. Right-click the light, and from the Tools 1 (upper-left) quadrant of the quad menu, choose Select Target.

Clicking the line that connects the light and its target selects both objects. However, region selection doesn't recognize the link line.

Another way to adjust a spotlight is to use a [Spotlight Parameters](#).

To change a viewport to a Light view:

1. Click or right-click the POV viewport label.

3ds Max opens the [Point-Of-View viewport label menu](#).

2. Choose Lights.

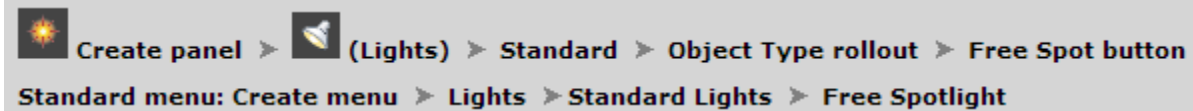
The Lights submenu shows the name of each spotlight or directional light in the scene.

3. Choose the name of the light you want.

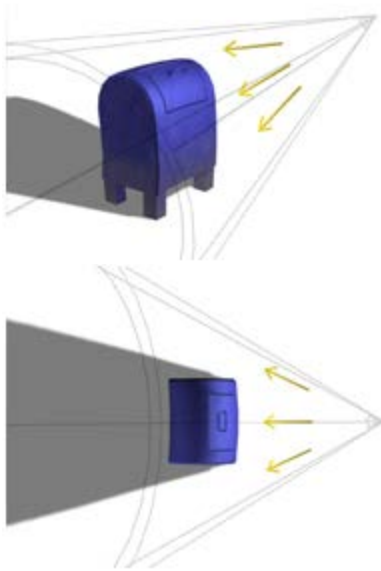
The viewport now shows the light's point of view. You can use the [Light viewport](#) to adjust the light.

The default keyboard shortcut for switching to a Light viewport is \$.

Free Spotlight:



A spotlight casts a focused beam of light like a flashlight, a follow spot in a theater, or a headlight. Unlike a targeted spotlight, a Free Spot has no target object. You can move and rotate the free spot to aim it in any direction.





Top: Perspective view of a free spotlight

Bottom: Top view of the same light

Procedure for Free Spotlight:

To create a free spotlight:

1. On the  Create panel, click  (Lights).
2. Choose Standard from the drop-down list.
3. On the Object Type rollout, click Free Spot.
4. Click the viewport location where you want the light to be.
The light is now part of the scene. It points away from you in the viewport you clicked.

You can adjust the light's direction with  (Move) and  (Rotate) or by using a [Light viewport](#).

5. Set the creation parameters.

To change a viewport to a Light view:

1. Click or right-click the POV viewport label.
3ds Max opens the [Point-Of- View viewport label menu](#).

2. Choose Lights.

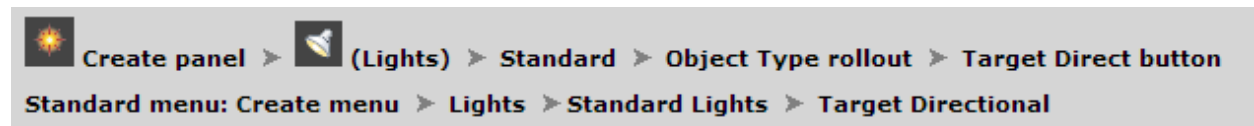
The Lights submenu shows the name of each spotlight or directional light in the scene.

3. Choose the name of the light you want.

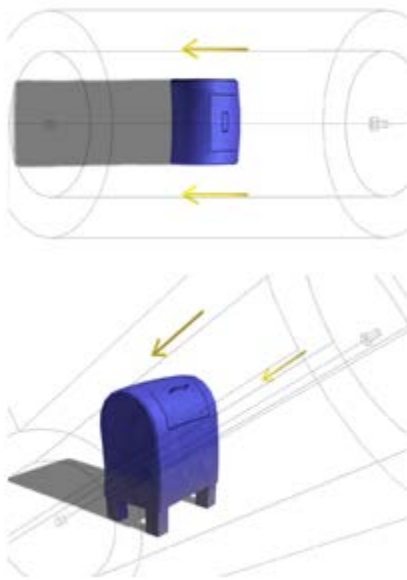
The viewport now shows the light's point of view. You can use the [Light Viewport Controls](#) to adjust the light.

The default keyboard shortcut for switching to a Light viewport is \$.

Target Directional Light:



Directional lights cast parallel light rays in a single direction, as the sun does (for all practical purposes) at the surface of the earth. Directional lights are primarily used to simulate sunlight. You can adjust the color of the light and position and rotate the light in 3D space.



Top: Top view of a target directional light



Bottom: Perspective view of the same light

A target directional light uses a target object to aim the light.

Because directional rays are parallel, directional lights have a beam in the shape of a circular or rectangular prism instead of a "cone."

Procedure for Target Directional Light:

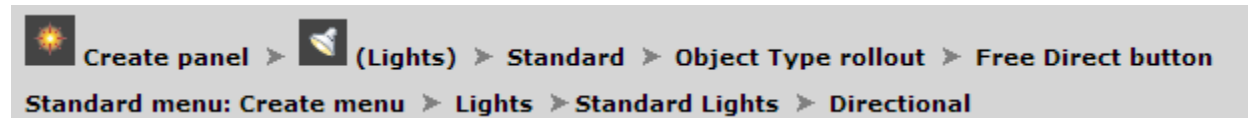
To create a target direct light:

1. On the  Create panel, click  (Lights).
2. Choose Standard from the drop-down list.
3. On the Object Type rollout, click Target Direct.
4. Drag in a viewport. The initial point of the drag is the location of the light, and the point where you release the mouse is the location of the target.
The light is now part of the scene.
5. Set the creation parameters.
To adjust the light's direction, move the target object.

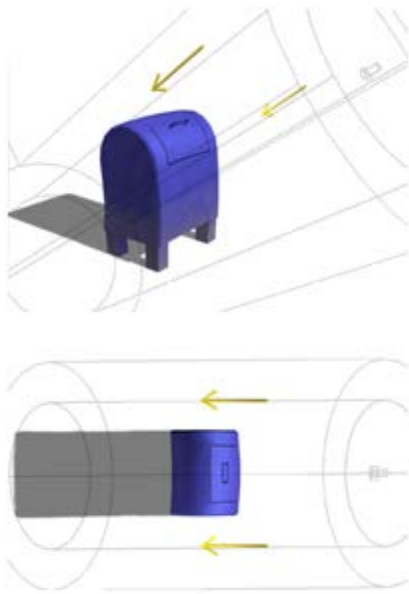
To change a viewport to a Light view:

1. Click or right-click the POV viewport label.
3ds Max opens the [Point-Of-View viewport label menu](#).
2. Choose Lights.
The Lights submenu shows the name of each spotlight or directional light in the scene.
3. Choose the name of the light you want.
The viewport now shows the light's point of view. You can use the [Light Viewport Controls](#) to adjust the light.
The default keyboard shortcut for switching to a Light viewport is \$.

Free Directional Light:



Directional lights cast parallel light rays in a single direction, as the sun does (for all practical purposes) at the surface of the earth. Directional lights are primarily used to simulate sunlight. You can adjust the color of the light and position and rotate the light in 3D space.



Top: Perspective view of a free directional light

Bottom: Top view of the same light



Unlike a targeted directional light, a Free Direct light has no target object. You can move and rotate the light object to aim it in any direction.

A Free Direct light is used when you select a Standard sun in your [Daylight system](#).

Because directional rays are parallel, directional lights have a beam in the shape of a circular or rectangular prism instead of a "cone."

Procedure for Free Directional Light:

To create a free direct light:

1. On the  Create panel, click  (Lights).
2. Choose Standard from the drop-down list.
3. On the Object Type rollout, click Free Direct.

4. Click a viewport.

The light is now part of the scene. It points away from you in the viewport you clicked.

5. Set the creation parameters.

To adjust the light's direction, you can rotate it as you would any object.

To change a viewport to a Light view:

1. Click or right-click the POV viewport label.

3ds Max opens the [Point-Of-View viewport label menu](#).

2. Choose Lights.

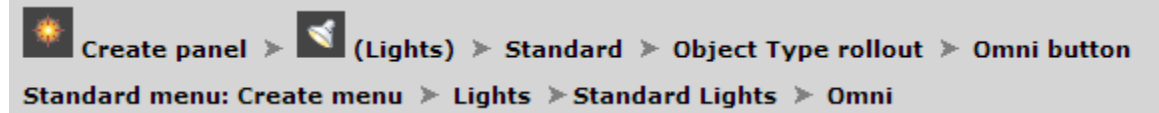
The Lights submenu shows the name of each spotlight or directional light in the scene.

3. Choose the name of the light you want.

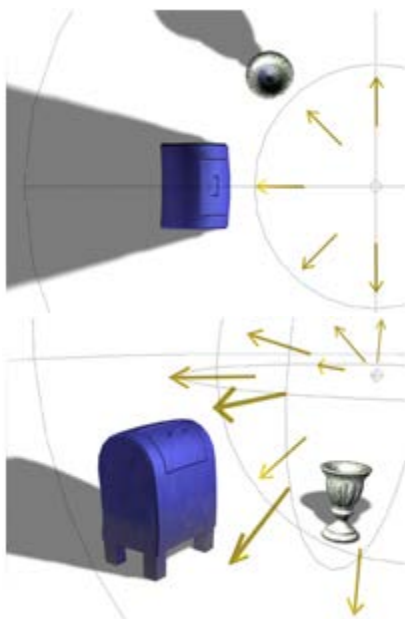
The viewport now shows the light's point of view. You can use the [Light Viewport Controls](#) to adjust the light.

The default keyboard shortcut for switching to a Light viewport is \$.

Omni Light:



An Omni light casts rays in all directions from a single source. Omni lights are useful for adding "fill lighting" to your scene, or simulating point source lights.



Top: Top view of an omni light



Bottom: Perspective view of the same light

Omni lights can cast shadows and projections. A single shadow-casting omni light is the equivalent of six shadow-casting spotlights, pointing outward from the center.

When you set a map projected by an Omni light to be projected using the Spherical, Cylindrical, or Shrink Wrap Environment coordinates, the map is projected in the same way as it would be mapped to the environment. When you use the Screen Environment coordinates or Explicit Map Channel Texture coordinates, six copies of the map are projected radially.

Procedure for Omni Light:

To create an omni light:

1. On the  Create panel, click  (Lights).
2. Choose Standard from the drop-down list.
3. On the Object Type rollout, click Omni.
4. Click the viewport location where you want the light to be. If you drag the mouse, you can move the light around before releasing the mouse to fix its position.

The light is now part of the scene.

5. Set the creation parameters.

To adjust the light's effect, you can move it as you would any object.