

# Incandescent Light Filaments

**Goal** • Complete this worksheet to extend your knowledge of light sources.

## Introduction

The first source of human-made light was simply a burning branch. These led to torches, which were long sticks made with oil- or wax-soaked material at one end. Torches have been found in some of the earliest sites of human communities.

Lamps were invented around 70 000 B.C.E., during the Stone Age. At first, they were no more than hollow shells or rocks containing a wick soaked with some flammable material, such as oil, but eventually they were made of pottery or metal.

The first electric light was invented in 1878. It was a bright arc of light that jumped between two carbon rods when electricity was passed through them. The arc burned out in about 30 hours, so it was not very practical for homes. Thomas Alva Edison tried to correct this shortcoming by inventing the incandescent light bulb, but even this did not become part of everyone's household until

another inventor, Lewis Latimer, had perfected it.

The filament inside an incandescent bulb produces light because it resists the flow of electric current. In order to do this, the filament has to be a substance that is very resistant to electric current and very thin. In fact, a substance must be heated to over 500°C before it gives off visible light. At that temperature, it glows a dull red. To give off bright, white light, the substance must have a temperature of many thousand degrees.

Edison's first electric light bulbs contained bamboo or paper filaments. These burned to ashes too easily. Latimer was aware that carbon has an extremely high melting point. It is also highly resistant to the flow of an electric current. Using this knowledge, Lewis Latimer created a filament made entirely of carbon. It glowed brightly and the bulb lasted much longer.

## What to Do

- After reading through the introduction above, conduct research at the library or on the Internet to answer the following questions.

## Questions

1. What material are filaments made of in today's incandescent light bulbs? Why is this substance better than carbon?

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## When Light Strikes

**Goal** • Classify various materials as transparent, opaque, or translucent, and describe the behaviour of light when it strikes different materials.

### What to Do

- In the space below, or on a separate page, answer the following questions.

1. What do sharp shadows tell us about the way light travels?

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2. Define the following words:

(a) transparent \_\_\_\_\_

(b) opaque \_\_\_\_\_

(c) translucent \_\_\_\_\_

3. Why is frosted glass often used for bathroom windows instead of clear glass or a solid wall?

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- Complete the chart below. In the second column, classify each material as transparent, opaque, or translucent. In the third column, use the words absorbed, reflected, transmitted, or scattered to describe what happens to light when it strikes the material listed in column one. Suggest examples of materials for numbers 11 and 12.

Materials	Classification	Behaviour of Light
1. glass		
2. white clouds		
3. stained glass window		
4. aluminum foil		
5. fog		
6. cellophane		
7. cardboard		
8. wax paper		
9. black board		
10. mirror		
11.	transparent	
12.		scattered

