2 Shadows and silhouettes

We see things because rays of light reach our eyes. If no light reaches our eyes, we see nothing and call it darkness.

If you look around you, you will find that most objects are lit well enough for us to see them. But often an object blocks out the light. There are two words we use when an object blocks out some or all of the light – **SHADOW** and **SILHOUETTE**.

Shadows

Things that block the path of light completely are called **OPAQUE** objects.

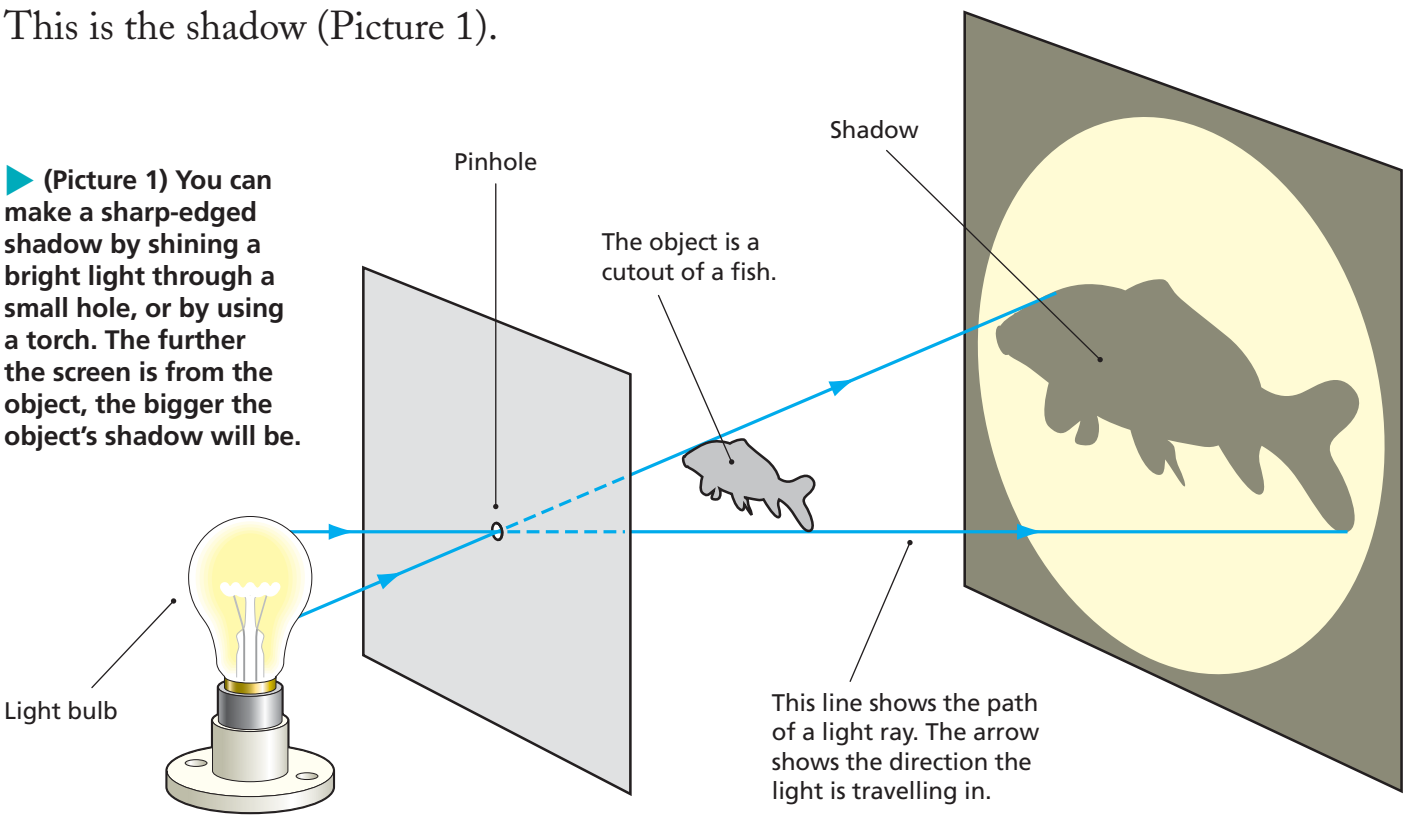
Because light travels in straight lines, it cannot curl round the sides of opaque objects that are in the way. The region behind the opaque object is then in darkness. The darkness is the same shape as the object that blocks out the light. This is the shadow (Picture 1).

Sharp and fuzzy shadows

Shadows are only sharp when there is just one small source of light. If the source of light is large, the shadow will have fuzzy edges and it will not be completely dark.

Shadow sizes

Shadows are not the same size as the object that makes them. Picture 1 shows you why. The size of the shadow depends on the distance between the source of light, the object making the shadow, and the surface on which the shadow is made.



(Picture 1) You can make a sharp-edged shadow by shining a bright light through a small hole, or by using a torch. The further the screen is from the object, the bigger the object's shadow will be.

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To help you see why this is so, the path of light is drawn as two straight lines coming from the light bulb. Each ray of light passes through the small hole (called a **PINHOLE**) and then grazes the sides of the object.

Because light travels in straight lines, the further the screen is behind the object, the bigger the shadow will be. In Pictures 2 and 3 the object and screen have each been moved to show you what effect this has.

Silhouette

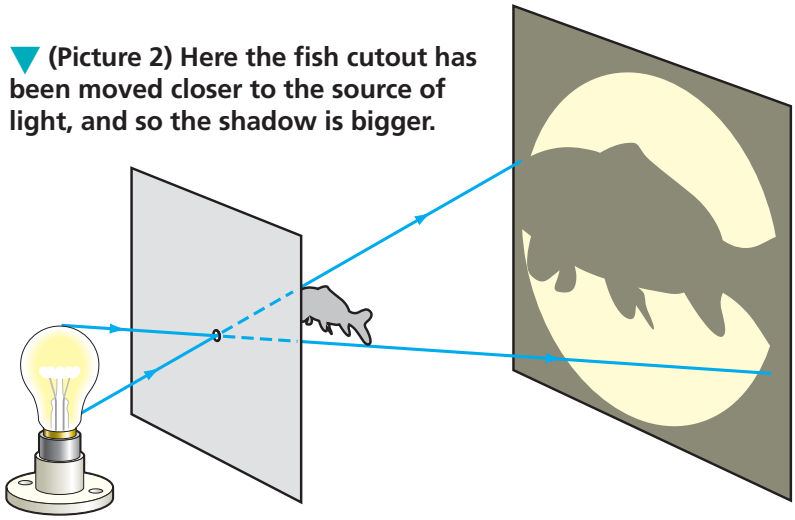
So far, we have looked at the shadow cast by an object. But if you were standing in the shadow of an object, you would see the object as black, with a bright light around it. This is called a silhouette (Picture 4). During an **ECLIPSE** of the Sun, for example, the Moon's shadow is cast on the Earth, but we see the Moon in silhouette against the sunlit sky.

▲ **(Picture 4) When you look at a bright light and see the outline of an object, the object appears black. This is called a silhouette.**

Summary

- **When light is blocked it produces shadows and silhouettes.**
- **The size of a shadow changes depending on the distance between the source of light, the object and the surface the shadow falls on.**
- **To get sharp shadows, there must be a single, small source of light.**

▼ **(Picture 2) Here the fish cutout has been moved closer to the source of light, and so the shadow is bigger.**



▶ **(Picture 3) Here the screen has been moved closer to the fish cutout, and so the shadow is smaller.**