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Light, Shadows and Our Sky





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Light, Shadows and Our Sky

The sky changes its appearance



THE IDEA

The same place can look different through a day. Sunlight changes the brightness and colour we see. Clouds can also change the view quickly.

Think of the same tree on a bright morning and under a dark cloud. The tree has not become a different tree.

CHECK YOUR THINKING

Does a darker picture prove it is night?

A Yes; dark pictures can only show night

B No; clouds and other conditions can affect brightness

B. Brightness alone is not enough to identify the time or cause.

A RELATED EXAMPLE

The Sun is a star

Our nearby star gives Earth light and heat. Other stars are much farther away. They are still in the sky during daytime, but the bright sky usually hides them from our eyes. Never look directly at the Sun. We use pictures and models to study it safely.

Light, Shadows and Our Sky

A shadow is blocked light



THE IDEA

Find the light, the object and the surface. An opaque object blocks light from reaching part of a surface. That darker region is a shadow.

In the picture, the torch is on the left and the shadow extends away to the right. The shadow is not a material leaking from the stick.

CHECK YOUR THINKING

Which side of the object receives the shadow?

A Always the left side

B The side away from the light

B. The object blocks light, so the shadow forms beyond it, away from the source.

A RELATED EXAMPLE

Why the Sun seems to move

Earth turns while we watch the sky. The Sun generally appears to cross the sky from east towards west because Earth rotates. Its exact path changes with place and season. It is not directly overhead at noon everywhere. This lesson uses a simplified day, not an exact local timetable.

Light, Shadows and Our Sky

Double the distance



THE IDEA

Consider a small light, a card and a screen. A 2 cm card is 10 cm from a small light. A screen is 60 cm from the light. The model gives a 12 cm shadow.

Move the card to 20 cm from the light: the shadow becomes 6 cm. Twice the distance gives half the shadow size in this fixed-screen model.

CHECK YOUR THINKING

What is the second shadow size in this model?

A 6 cm

B 24 cm

A. With this small source and fixed screen, doubling the card's distance halves the projected size.

A RELATED EXAMPLE

Closer to a small light, larger on the screen

Keep the screen and light fixed. Move an opaque card towards a small light source. The card blocks a wider spreading region, so its shadow on the screen grows. Move it towards the screen and the shadow gets smaller. This model is for a nearby small source, not the Sun's nearly parallel rays.

Light, Shadows and Our Sky

Change one thing



THE IDEA

Imagine moving the card. Keep the light and screen fixed. Start with the card near the screen, then move it halfway towards the light.

Say whether the shadow will grow or shrink and explain why. A card nearer the light blocks a wider part of the spreading beam.

CHECK YOUR THINKING

What is a fair comparison here?

A Move all three objects at once

B Move the card while fixing the light and screen

B. Changing only the card position makes the cause of the shadow-size change clearer.

A RELATED EXAMPLE

The Sun's angle changes shadows

A lower Sun often gives a longer shadow. For an upright stick on level ground, shadows are usually longer when the Sun is low. They are shorter when the Sun is higher. Near solar noon the shadow is usually shortest for that day. It does not have to vanish. A sundial uses a changing shadow to indicate time.

Light, Shadows and Our Sky

A cycle is not exactly four weeks



THE IDEA

One phase cycle takes about 29½ days. At new Moon, the sunlit half faces mostly away from us, so the Moon is usually not visible. It has not disappeared.

At full Moon, we see the sunlit side. “Quarter Moon” describes a position in the cycle even though about half the visible disc is bright.

CHECK YOUR THINKING

Is the Moon absent at new Moon?

A No; it is present but usually not visible

B Yes; a new Moon must form later

A. The Moon continues its orbit; our view of its lit side changes.

A RELATED EXAMPLE

Phases are changing views

The Moon keeps its round shape. As the Moon orbits Earth, we see different amounts of its sunlit half. These appearances are phases: crescent, quarter, gibbous and full, with smaller-looking lit portions between cycles. Ordinary phases are not Earth's shadow covering the Moon. That happens during a lunar eclipse.

ONE LAST CHALLENGE

Who actually explored the lunar surface?

Chandrayaan-3 landed on the Moon in 2023. The illustration shows the types of machines involved.



THE REVEAL

Vikram, the lander, and Pragyan, its rover.

These were robotic explorers. No astronauts travelled on the mission.

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