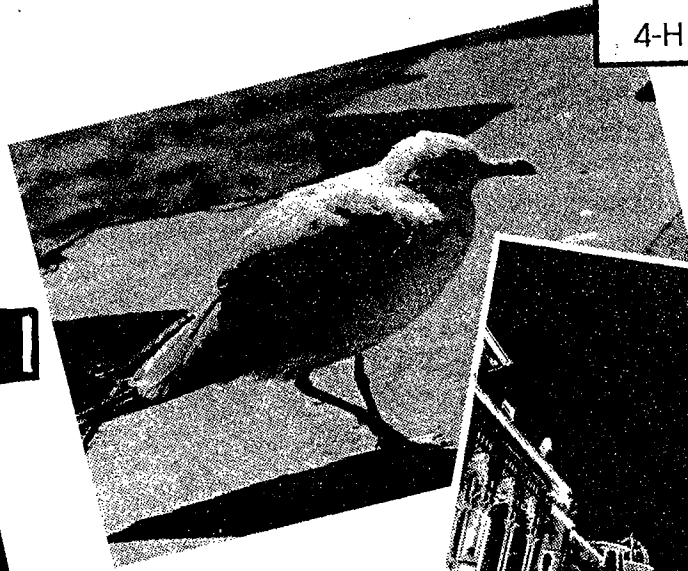


Adventures With Adjustable Cameras

MEMBER'S MANUAL



4-H PHOTOGRAPHY



4-H Photography Program

Unit 1: Adventures with Your Camera

Unit 2: Exploring Photography: Advanced Picture-Taking Techniques

Adventures with Adjustable Cameras

Darkroom Techniques

Action! Making Videos and Movies

Advanced Skill Guides (pamphlets on building a darkroom, experimenting with your enlarger, portraiture, publicity photos, and using photo skills in your career)

4-H Photography Awards

County

Four Gold Medals of Honor in Photography

State

Expense-paid trip to National 4-H Congress

National

Six educational scholarships of \$1500 each. A scholar incentive grant of \$500 is given to national winners whose grades rank in the upper half of their class during the semester they use the \$1500 scholarship.

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Introduction

The World As You See It

Every time you take a picture, you make choices. What will be in the picture? Will you take the picture standing up or kneeling down? Photography is fun because it opens your eyes to choices. It lets you show things as *you* see them.

An adjustable camera gives many *more* choices than simple or automatic cameras. These choices will lead to new adventures in photography. Here are a few examples.

IF YOU WANT TO:	YOU CAN CHANGE:
Show different views of the same subject, including extreme close-ups.	Lenses
Take natural looking pictures in dim light without flash.	Exposures
Control how much of the scene is sharp in the pictures.	Lens openings
Stop action or use blurred pictures to suggest motion.	Shutter speeds
Take full advantage of different film speeds, including high-speed films for pictures in dim light.	Films

1 Your Camera

You have a 35 mm camera and want to take clear, colorful, snappy pictures. That's easy. In addition to the camera, all you will need is the camera's instruction book, this guide, some film and ... practice.

Getting to Know Your Camera

Check your camera's instruction book to answer these questions.

1. Does the camera have a built-in light meter?
(It is sometimes called an exposure meter.)
2. Does the camera need a battery?
Most light meters require batteries to operate. Check on that in the camera instruction book. Also, be sure the battery is fresh. If the battery is dead, the meter won't work and the pictures won't be good. If the battery is weak, the meter may work incorrectly. Most batteries last only about one year.
3. Does the camera have settings for "manual" (non automatic) operation?
4. Does the camera have a setting for "automatic" operation?
The simplest way to take pictures is to use an automatic camera that makes all of the settings for you. If your camera is not automatic and you wish it were — no problem. Load the camera with a film which has a film speed of 200 (an ISO number marked on the box), set the shutter speed setting at 125, the lens opening at $f/16$, and the focus at 11 feet. Now you can pretend it is a simple snapshot camera and start taking pictures with no further adjustments — but only take pictures in sunlight from 5 1/2 feet and beyond. Don't try shaded areas, cloudy days, or after dark. Those pictures will not turn out well.

If you want to take pictures under all of these different kinds of conditions, you'll have to adjust the camera settings. That is what this guide is all about, so read on.

Question: Why is it called a "35 mm" camera?

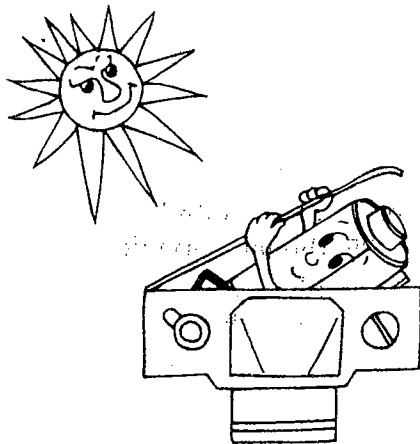
Answer: Because it uses 35 mm film. The "mm" stands for "millimeter."

Question: Why is it called "35 mm" film?

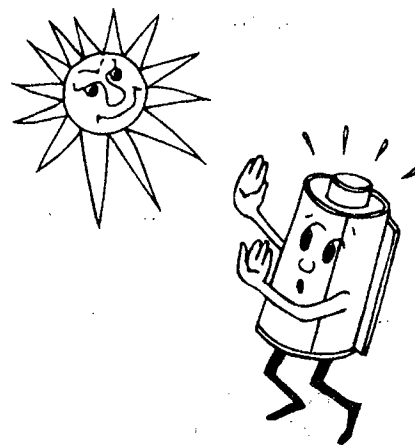
Answer: Because the area where each picture appears on the film is 35 millimeters wide.

2 Exposure

The most important part of taking a picture is the film. Film is very sensitive to light. When exposed to a tiny bit of light, film changes. It darkens at the spots where light touches it. That is why film comes in a metal container that keeps light away from the film until it is in your camera.



When you put film in your camera and close it, it is okay to start winding the film out of the metal container because the camera seals out light. When you take a picture, all you do is let just enough light in to record a nice, sharp picture on the film.



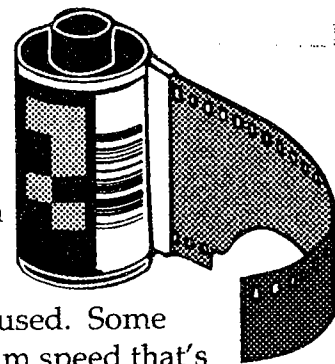
The amount of light you let in is called the "exposure." You have to set the camera properly to control the amount of light that gets into the camera.

All cameras have three basic settings that can change the exposure. They are:

- film speed
- lens opening
- shutter speed

Film Speed

How much light the film needs depends on its sensitivity to light or "film speed." High speed films need less light than slow speed films. The speed is indicated by an ISO number, which is usually included in the name of the film.



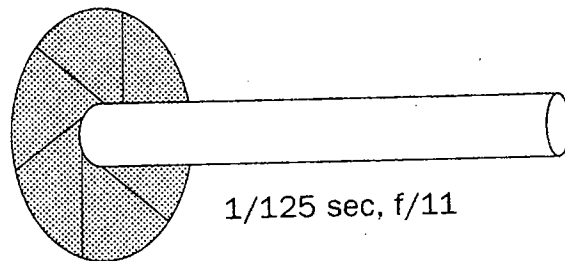
The light meter in your camera must know what kind of film is being used. Some cameras recognize films automatically. They read a special code for film speed that's printed on metal film containers. With other cameras, you must set the film speed before you start taking pictures. This setting is usually on the shutter speed dial.

Adjusting Exposure

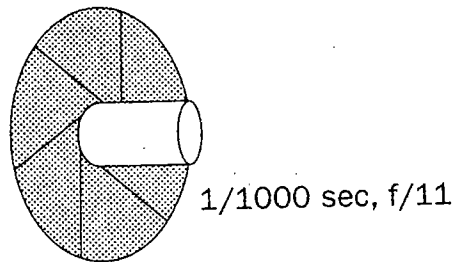
To get a good picture, you need to adjust the *shutter speed* and the *lens opening* settings to control the amount of light entering your camera.

The shutter speed controls the length of time the shutter will stay open to allow light to reach the film.

A slow shutter speed lets light in to expose the film for a long time.

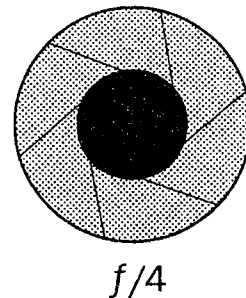


A fast shutter speed lets light in to expose the film for a short time.

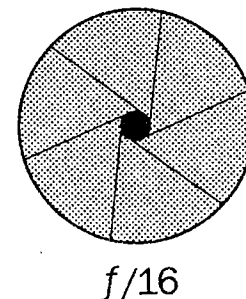


The lens opening controls how much light will enter the camera while the shutter is open.

A large lens opening lets in a lot of light.



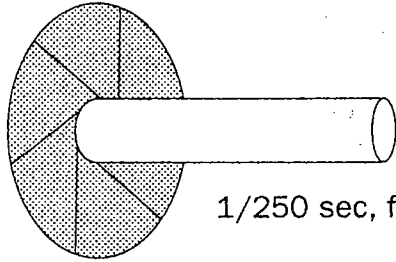
A small lens opening lets in a small amount of light.



Exposure

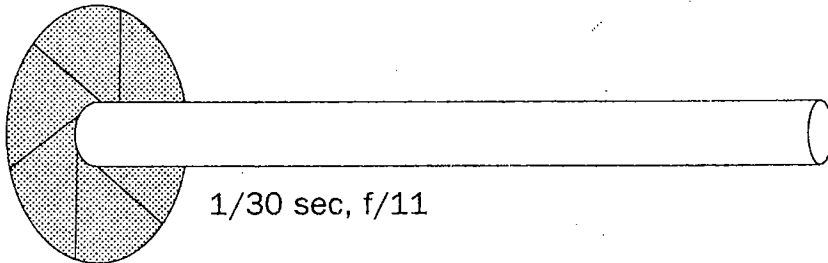
To get good pictures, the film in the camera needs to be exposed to the same quantity of light for every picture.

On a normal sunny day, you will use a fairly fast shutter speed and a medium lens opening so that the correct amount of light will reach the film and you will get a properly exposed picture.



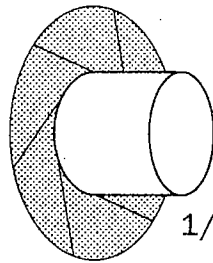
1/250 sec, f/11

On a cloudy day, the light isn't as bright and you need to either let light into the camera for a long time,



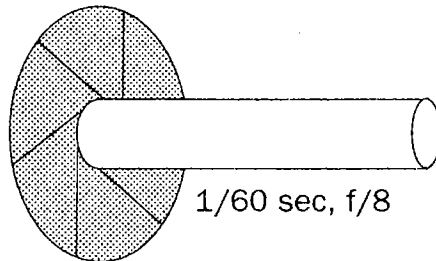
1/30 sec, f/11

or let in a lot of light for a shorter time.



1/500 sec, f/2.8

Or possibly both—a lot of light for a long time.

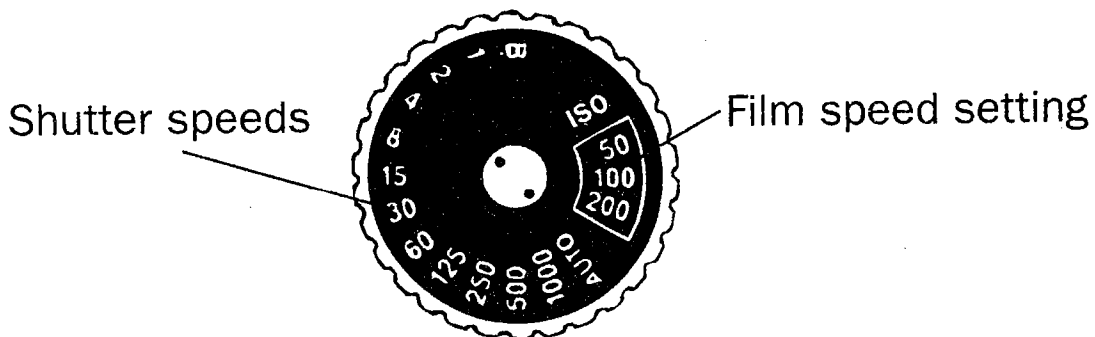
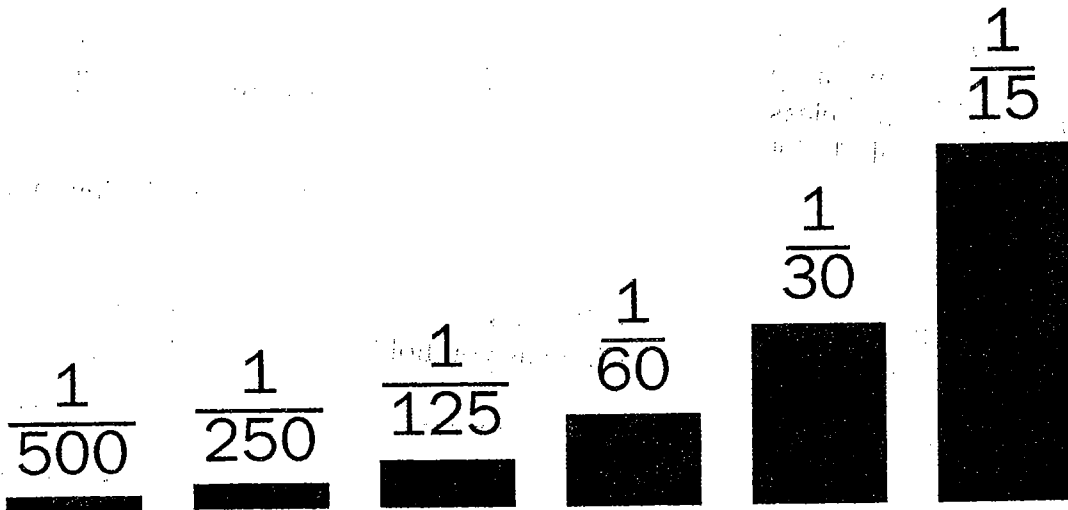


1/60 sec, f/8

Shutter Speeds

Find the shutter speed settings on the camera and learn how to change them. Shutter speed settings are usually numbered 30, 60, 125, 250, 500, 1000.

The numbers refer to fractions of a second. 250 means the shutter will be open for 1/250th of a second. Each slower speed (1/125, 1/60, 1/30, etc.) lets light in twice as long as the one before it.



Changing the Shutter Speed

Adventures

The fun starts here!

Adventures are sprinkled through this manual. These simple exercises will show you how much you can do with your camera — and *how* to do it.

Adventure

YOUR MISSION: Watch the shutter in action.

Set the lens opening at its largest opening. Set the shutter at 30.

Now open the camera back. Be careful not to touch the inside of the camera or the surface of the lens. Hold the camera up and look into the lens through the open back of the camera. Press the shutter release and see how long light is let through the lens. The shutter was open for only 1/30th of a second.

Now advance the camera once and set the shutter speed at 250. Look into the lens and watch how fast the shutter works.

Compare several different settings. Try the B or T setting, if your camera has one, to see how it works. It keeps the shutter open as long as you hold down the shutter release.

Let's start taking pictures. CHOOSE ONE OF THESE TWO ADVENTURES. Only an adjustable camera will give you these pictures!

If you'd like some tips about how to load your camera, turn to page 34 at the back of this Guide.

Adventure

YOUR MISSION: Take a picture at night without flash.

SCENE: Try a picture of your house after sunset with all the lights on. Or try a downtown street at night.

The built-in exposure meter won't help, because it will see too much darkness. See the instructions that come with your film, or use the chart on page 18 of this manual.

Remember to focus carefully. Hold the camera very steady.

Adventure (Alternate)

YOUR MISSION: Make a time exposure at night.

SPECIAL GEAR: You need a shutter setting of "B" on the camera for this exercise. When set on "B," the shutter stays open as long as you keep pressing the shutter release.

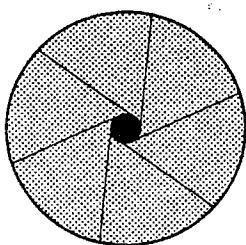
Put the camera on a tripod or set it on a solid surface so it doesn't move. Set the shutter at "B." Set the lens at its largest opening by turning the aperture ring to the last number on the right (it will be 4 or lower).

Have someone stand about 15 feet away and, with a flashlight pointing at the camera, make patterns in the air or write his or her initials or nickname (backwards) while you hold the button down.

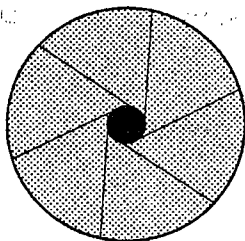
Lens Openings

The lens opening is also called the "aperture." A larger lens opening lets in more light. The size of the opening is changed by turning a ring on the lens. The numbers marked on this ring are called *f/numbers* or *f/stops*.

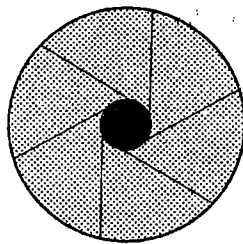
Just like the shutter settings, starting with the smallest lens opening (often *f/22* or *f/16*), each larger opening lets twice as much light into the camera as the setting before it.



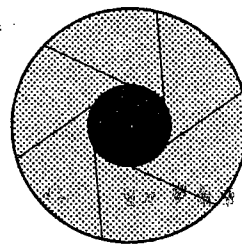
f/16



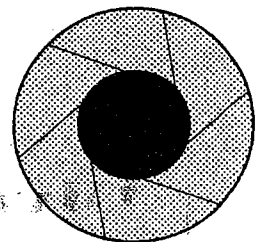
f/11



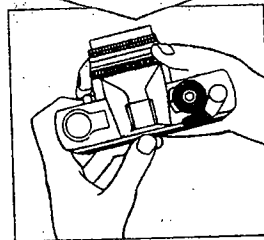
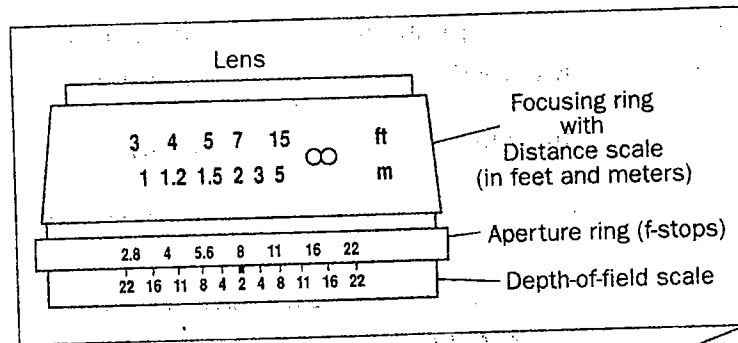
f/8



f/5.6



f/4



Changing the Lens Opening

Adventure

YOUR MISSION: Watch the aperture in action.

Set the shutter at 1/2 second. Set the lens opening at its largest opening.

Now open the camera back, as in the first Adventure, and look into the lens through the open back of the camera.

Press the shutter release and notice how big the opening is when light comes through the lens.

Now set the lens at the smallest opening, advance the camera once and repeat the exercise. Notice how small the opening is. Compare several different settings to see how each larger opening lets in twice as much light.

Why Change Settings?

Lens openings and shutter speeds affect your pictures in many ways. For example, you can choose:

- a fast shutter speed to stop action (sports subjects, for example) ... or
- a small lens opening to keep more of the scene in sharp focus, from near to faraway (a person near the camera and mountains in the distance, for example).

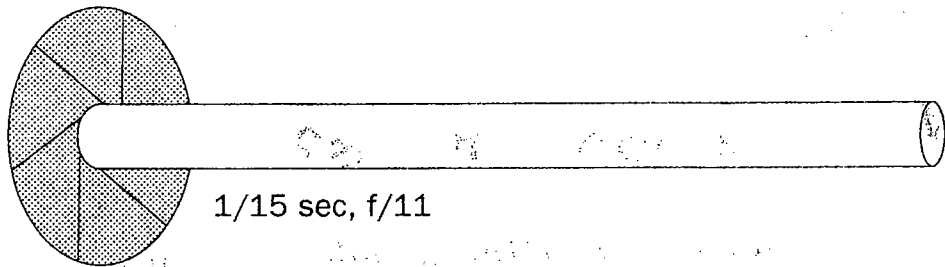
An adjustable camera lets you make those choices, then change your settings to keep the right exposure.

Keeping the Exposure Right

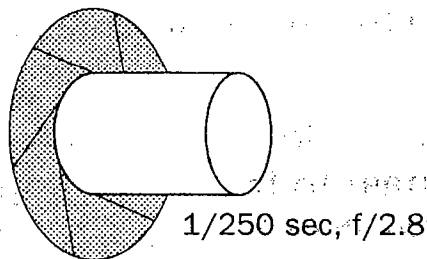
You can use several combinations of lens opening and shutter speed to get the right exposure.

The chart below shows numbers you will probably see on your camera. Each number is one step (or "stop") different from the one above or below. You can keep the same exposure by going up one column as you go down the other. Steps are equal on both sides.

LENS OPENING	SHUTTER SPEED
<i>f/16</i>	1/500
<i>f/11</i>	1/250
<i>f/8</i>	1/125
<i>f/5.6</i>	1/60
<i>f/4</i>	1/30
<i>f/2.8</i>	1/15
<i>f/2</i>	1/8



is the same exposure as



THIS ADVENTURE REQUIRES SLIDE FILM AND IS OPTIONAL.

Adventure

YOUR MISSION: Keep the same exposure with different settings.

SPECIAL GEAR: Use a roll of *slide* film for this adventure. Bad exposures show up more on slides than prints. Exposures that are slightly off are adjusted when prints are made, so print film won't work for this exercise.

Set your shutter speed at 125, and find a subject which needs a lens opening of about $f/8$ for proper exposure. On bright days, you may need to shoot in the shade.

Take 5 pictures of this subject at different settings.

1. At 125 and $f/8$.
2. Set the shutter speed to the fastest setting on your camera (1/500th to 1/1000th of a second). Adjust the lens opening to get the right exposure.
3. Set the shutter speed at 30. Adjust the lens opening to get the right exposure.
NOTE: 1/30th of a second is the slowest shutter speed you can use and still get sharp pictures while handholding the camera. Use a tripod for slower speeds.
4. Set the widest lens opening on your lens (usually $f/4$ to $f/2.8$). Adjust the shutter speed to get the right exposure.
5. Set the smallest lens opening on your lens (usually $f/16$ to $f/22$). Adjust the shutter speed to get the right exposure.

Compare your slides. You can lean them against a window if you don't have a projector or a light-box. They should all have the same exposure. If some slides are lighter or darker, then you need to practice making adjustments.

3 Controlling Sharpness

Focusing

Focus is a basic camera setting that makes the subject sharp in your pictures. Whenever you look through a lens (a magnifying glass, for instance) you have to move it back and forth until the subject looks sharp. The same is true of your camera lens.

As you turn the focus ring on your camera, the lens moves back and forth bringing the subject in focus. If you are taking a picture of something ten feet away, set the camera focus for ten feet and take the picture. If the subject is 25 feet away, set the focus for 25 feet. If you are taking a picture of a scene, or a building, or anything that is more than 25 feet away, set the camera on infinity " ∞ ." At this setting, everything in the distance is in focus.

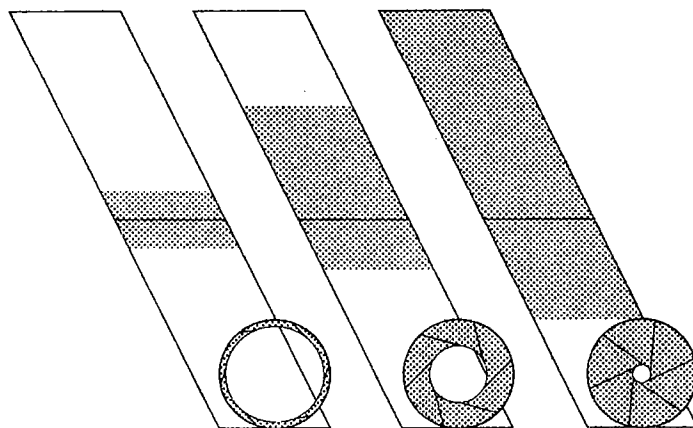
Lens Openings and Sharpness

We adjust the size of the lens opening to control how much light goes into the camera. The size of the lens opening also controls how much of the picture is sharp. A large lens opening makes a smaller portion of the space in the picture appear sharp.

Try the "Magic Pinhole Peeper" in the next *Adventure* (page 15) to see how lens openings change sharpness.

The camera works the same way. The smaller the lens opening, the more area of the picture that will be in focus.

This area of sharpness is called the "depth of field." With large lens openings, the depth of field is short. With small lens openings, the depth of field is long.



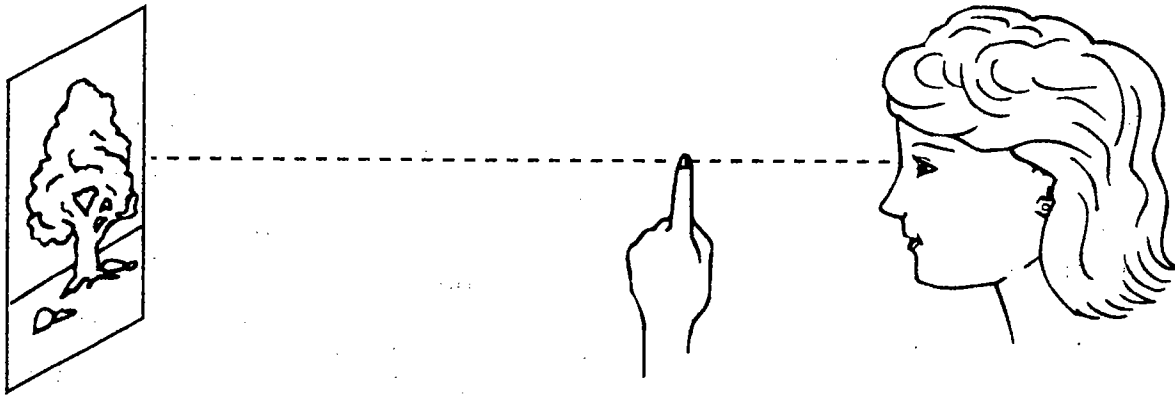
Adventure

Magic Pinhole Peeper →

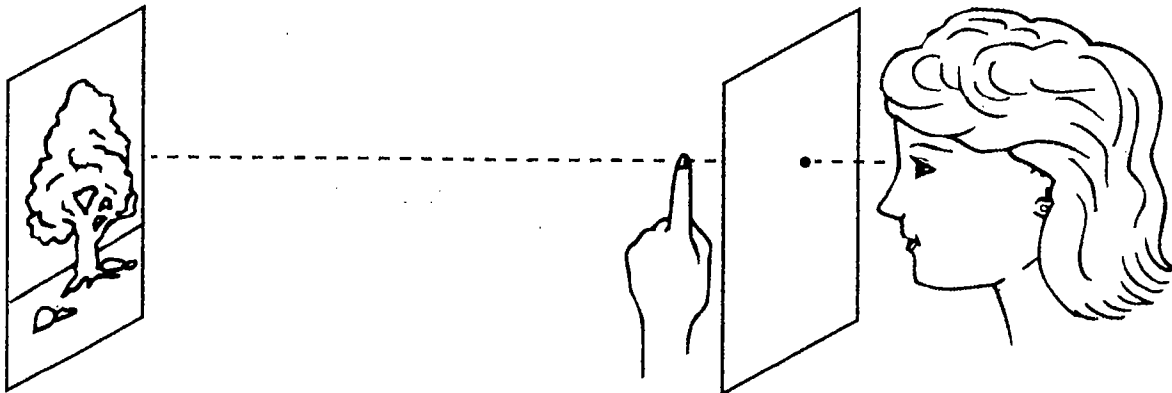
MISSION: To give your eye a greater area of sharpness using the magic pinhole peeper.

SPECIAL GEAR: Use a sharp pencil or other sharp object to punch a hole the size of the circle at the top of this page. You can punch the hole in this page or any piece of paper.

STEP #1: Look toward a picture or the wall across the room from you. Hold a finger up about a foot in front of you. Close one eye. With the open eye, try to focus on both the finger and the wall at the same time. You can't do this, because the lens opening of your eye is too large.



STEP #2: Now hold the pinhole peeper close to your eye so you can see through it. Look at your finger and the wall. Both are now in focus. The pinhole is smaller than the lens opening of your eye, which gives you a greater depth of field.



Controlling Sharpness

Using Depth of Field

When you understand depth of field, you can control which areas of the picture are sharp. You can keep the subject sharp and the background fuzzy. This calls attention to the subject. Distracting things in the background become blurred and people won't notice them.

You control depth of field by changing the size of the lens opening.

Adventure

MISSION: To control sharpness using lens openings.

THE SCENE: Select a daylight scene to photograph that has something near the camera as well as far away. Something near could be a tree branch or a person 5 or 6 feet away from the camera. Something far could be a house or a tree.

PICTURE #1: Set the lens at its largest opening ($f/2.8$ to $f/4$). Adjust the shutter speed to get the right exposure, or use the fastest shutter speed your camera has. Focus on the subject and take a picture.

PICTURE #2: Set the lens at its smallest opening ($f/16$ to $f/22$). Adjust the shutter speed to get the right exposure. Focus on the subject and take a picture.

RESULTS: The background should be out of focus in Picture #1 and sharp in Picture #2.

4 Natural Light

Shooting in Low Light

With a simple camera, only sunlight or flash will make good pictures. With your adjustable camera, you can take great pictures in all kinds of natural light, including "low light."

- You can show the colorful lights of the midway at the county fair after dark. Flash can't cover that distance. (Remember, the light from a flash is good for a distance that's about the length of a car.)
- You can show your Christmas tree lights at night. Flash will overpower the colored lights on the tree.

Many examples of "low light" are listed on the next page, along with recommended exposures. If you use a different film speed, you will have to change the exposure.

Low light scenes can fool your light meter and give you poor exposures. Use the suggestions on the next page, or check the camera's meter reading against these guidelines.

Indoor lights may color the scene differently from what your eye sees. For example, the light bulbs in your house have more orange-yellow color than bright sunlight. Your eyes get used to the light quickly and don't notice the difference, but the film will see it. If you don't like the color in your prints, the processing lab can change the color slightly by making new prints using color filters. Slide films are special. There is no chance to adjust the color in printing. That's why you can choose slide films labeled for "Daylight" or "Tungsten" light (from household light bulbs).

Natural Light

SUBJECTS/SETTINGS	SUGGESTED EXPOSURE (ISO 400 FILM)	
Fairs, amusement parks	1/30 sec.	f/2.8
Inside the house at night	1/30 sec.	f/2.8
Indoors with fluorescent lights	1/60 sec.	f/4
Christmas lights (houses outdoors and trees indoors)	1/15 sec.	f/2
Brightly lighted streets	1/60 sec.	f/2.8
Neon signs	1/125 sec.	f/4
Floodlighted buildings, monuments	1/15 sec.	f/2
Skyline — Distant view of lighted buildings	1 sec.	f/2.8
Skyline — 10 minutes after sunset (the ideal time!)	1/60 sec.	f/5.6
Campfires, bonfires	1/60 sec.	f/4
Night outdoor sports (football, baseball)	1/125 sec.	f/2.8
Night indoor sports (basketball, hockey)	1/125 sec.	f/2
Stage shows		
— Average	1/60 sec.	f/2.8
— Bright	1/125 sec.	f/4
Circuses, ice shows		
— Broad floodlights	1/60 sec.	f/2.8
— Bright spotlights	1/250 sec.	f/2.8

Night Photography

Can you use a camera outdoors at night without a flash? If it's an adjustable camera, you can!

Night photography is fun. Load your camera with high speed film, and you can photograph lighted buildings, houses, neon signs, or reflections on wet pavement. Everything looks different at night, so the exposure doesn't need to be exactly right to get interesting pictures.

