

Faculty of Fine Arts

Third year students

طلاب السنة الثالثة

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Digital Photography

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HISTORY OF PHOTOGRAPHY

INTRODUCTION

The word photography comes from the Greek and means "light writing" (photo = light, graphy = writing). We photographers are light artists. Drawing with light is very different than drawing with a pen. It requires light sensitive material, optics, dark enclosures and the ability to fix an image so that it does not fade. The history of how all this came to be is intertwined with our understanding of our place in the solar system and the universe.

THE DISCOVERY OF THE CAMERA

According to legend, the discovery of the camera may have begun thousands of years ago with desert nomads who saw scenes outside their tents projected upside down on the back wall when a tiny hole in their dark tent let in light during the bright day. This phenomena was known even to the ancient Greeks, such as Aristotle, and others.

In 1021 Arab scientist Alhazen (al Hasan Ibn al-Haytham) defined the basic nature of light and optics scientifically in his seven volume Book of Optics -- considered the most important book on the subject for the next 600 years. Alhazen was the first to use experimental methods and logical reasoning to define the essential aspects of light. that it emanated from an outside light source, that light traveled in rays, and that the rays traveled in straight lines. Although not the first to use a camera obscura, he was the first to describe how to construct one; in addition he described how to magnify an object with a lens and to make a sharper projected image with a pinhole by reducing the size of the pinhole.

In 1267 Friar Roger Bacon of England brought Alhazen's discoveries to the west in his book *Opus Majus*. Reading a translation from Arabic to Latin of Alhazen's Book of Optics, he was the first in the west to fully describe a magnifying glass. This led to the creation of eyeglasses in Italy around 1286. Roger Bacon also made major contributions to the science of optics, the camera obscura and "focussed on the spiritual quality of light as the fundamental unit of all creation.

PINHOLE IMAGERY AND THE CAMERA OBSCURA

During the Renaissance pinhole imagery and the camera obscura was discussed by:
Leonardo da Vinci in his Codex Atlanticus (1502) and others. During this time the camera obscura became widely used for both scientific and artistic purposes.

THE CAMERA BECOMES PORTABLE

In 1604 Kepler published the first modern western book on optics in The Optical Part of Astronomy (Astronomiae Pars Optica), designed the first portable camera obscura with a rotating lens and mirror to project the image onto a drawing board in 1620 and coined the term 'camera obscura' which has today evolved into the modern word 'camera'.

PHOTOGRAPHY IS BORN

The Discovery Of Light Sensitive Material

in 1727 Johann Heinrich Schulze noticed that silver nitrate turned dark when exposed to light. Silver halides became the basis for camera plates and film about 100 year later.

The Fixing Process

While Niepce and Louis Daguerre, another pioneering photographer who collaborated with Niepce and invented the daguerreotype, were able to 'fix' their photographs so that they did not fade -- it was not until 1839 that sodium thiosulfate, known to photographers as 'hypo', became the standard fixing chemical and has been used for that purpose ever since with film photography. Go to this site for a full history and description of photographic chemistry.

PHOTOGRAPHY BECOMES AVAILABLE TO THE GENERAL PUBLIC

Kodak And The Brownie Camera

Starting in 1878 George Eastman concentrated on making dry plates that were much easier to work with than the former wet plate process that required immediate exposure and development. In 1889 his company, Kodak, produced the first manufactured flexible transparent roll film. In 1900 the company mass produced the Brownie camera. It was easy to use due in part to the simplicity of roll film. Marketed as the everyman camera, it was a device that anyone could get decent snapshots with, as long as they followed Kodak's rather odd directions (see below). Photography then changed from the specialized craft it had been to an activity that was available to the general public.

35MM BECOMES THE STANDARD FORMAT

In 1949 Contax produced the first 35mm pentaprism SLR which allowed eye-level viewing. The small easily hand-holdable SLR design became the camera of choice for photographers for the next fifty years.

1995, Casio QV-10: This was first digital camera with a LCD monitor. It also served as the viewfinder. The monitor gave a real time viewing of a scene before the shot and then immediately showed the resulting photo. Even though it was relatively expensive compared to a film camera and had poor resolution, it became instantly popular.

2004: Ultra Deep Field digital photograph of distant galaxies taken by the Hubble space telescope: this shot of about 10 thousand galaxies more than 10 billion light years away was recorded using a 1 million second exposure, photographing the faintest light ever. Photography had now taken us to

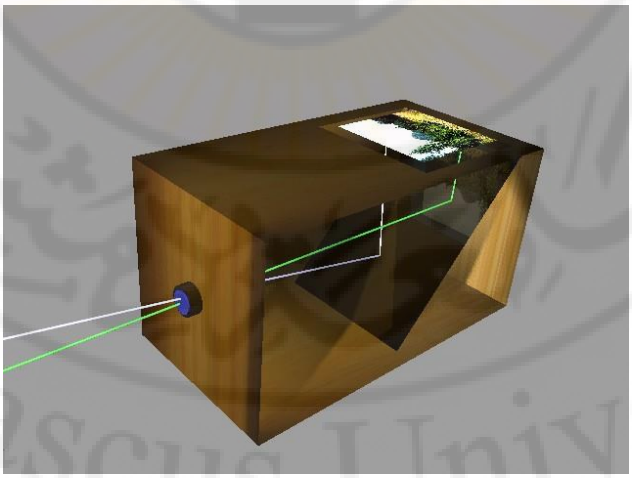
the edge of the universe in space and almost to the beginning of the formation of the universe, the Big Bang, in time.

THE FUTURE OF PHOTOGRAPHY

So Is Digital Photography The End Of Photography's Development?

Far from it -- photography has been changing from the very beginning. While there have been periods of relative stability such as 35mm and the single lens reflex, there have been other periods of rapid change. We are in one of those periods right now. A good example is the Lytro light-field camera that was just introduced this year -- using state of the art technology. Instead of taking a picture, it photographs 'light field data'. A photographer can go back later and decide where to put the focus. And while the advertised advantage of such a camera is today: "shoot now, focus later," I suspect that many other techniques will come about as a result of this technology.

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Digital Cameras:

There are two main types of Digital cameras are different in terms of abilities and sizes:

First: compact cameras:

This camera was made for the use by non-professional photographers. It is limited in capabilities and speed compared with reflective lens cameras.

Second: reflective lens cameras:

They are suitable for beginners and professionals. It also has a wide range of lenses that covers wide angles (up to 180 degrees with high speed shutter that might reach 1/8000. It can also freeze the fastest movement of objects

How a lens reflective camera works:

To capture the picture we press the shutter's button. Then, the shutter opens, the mirror is raised up, the light passes through to the sensor in time calculated by the photographer by determining the shutter's speed. The image's details are recorded on the sensor which in turn passes them to the processor which in turn converts it into a digital image that is then saved in the memory.

First: focus situation:

Making the subject in focus means that the subject is real in the focal point of the lens. We control the focus position by a key on the camera's body. There are two main focus modes in digital cameras:

1-(Manual Focus):

You can clarify the scene manually by turning the lens until the scene is clear for the photographer. We use this mode when it's difficult for the camera to auto focus or to make sure of the clarity of the subject in the picture .

2- (Auto Focus):

It is a position where the camera process to focus on the subject automatically by simply pressing the shutter button halfway, which includes three modes:

- **(ONE SHOOT or SINGL SHOOT):**

Where the focus is on the position for just one shot, and we use this position in the landscape and stable objects shooting.

- **(AL SERVO AF or Continuous Shooting):**

Make the camera continues focusing on the subject's movement. This position is used in the filming of moving objects .ALL FOCUS AF or Auto select): When the photographer chooses this position, the camera does all the work. It chooses to focus once (SINGLE SERVO).

- **ISO:** Light sensitivity plays an important and complementary role to the lens slot and shutter to adjust image exposure. The role of the key that adjusts sensitivity in the camera is to put sensor on the proper mode according to the available light.

The Image file type:

Modern digital cameras offers photographers the possibility of choosing the type of image file that they're shooting with. The most common types are (JPG) and (RAW) but the (RAW) is the most used.

The image file size:

In addition to select the image file type, digital cameras offer the possibility of choosing the proper image size

Image controls:

choose the sensitivity that is suitable for landscape lighting. Then choose the correct lighting for the frame.

Photographing modes:

- **Fully automatic exposure (AUTO):**

In this mode, the camera selects the aperture and shutter speed based on the specific scene's data and comparing the data with what has been programmed into the camera

Exposure programmer (PROGRAM):

Exposure mode is programmed to fit in emergency situations that don't allow to the photographer an opportunity to modify or choose the proper settings.

Field Depth is affected by three factors:

1-focal length of the lens
2- Lens aperture used.
3-The distance between the camera and the subject.

The higher the focal length of the lens the lower the depth of field and the clearer the isolation. If the photographer wanted the depth of the field to focus on the subject only he can:

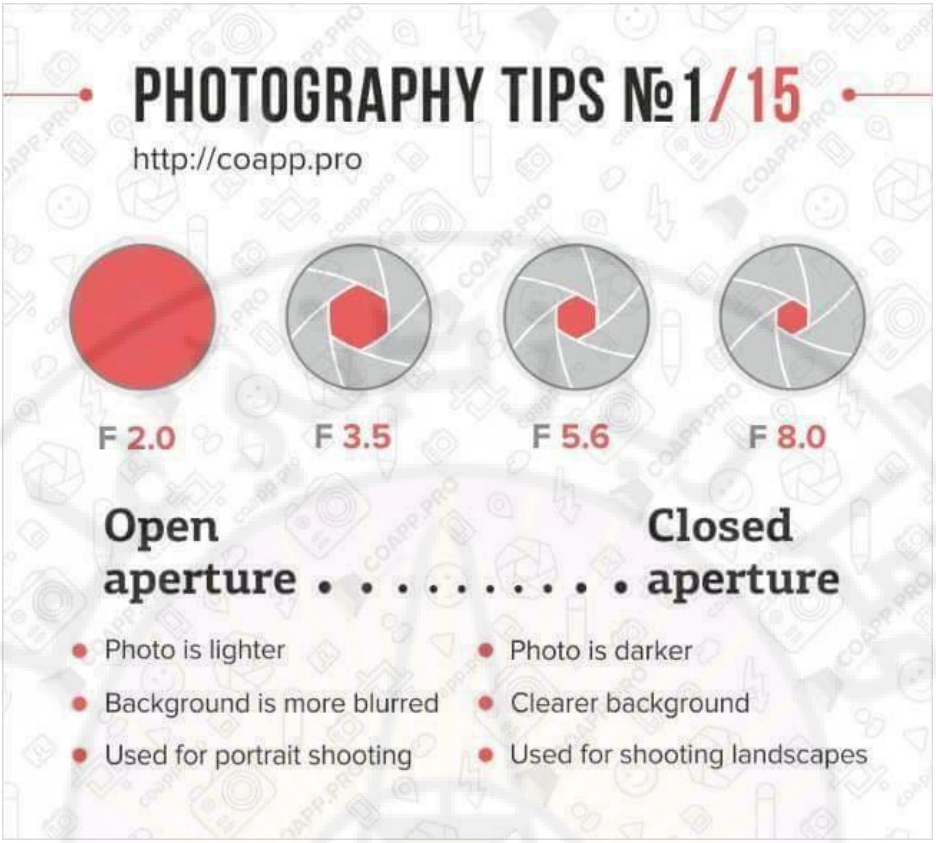
1- Choose a large aperture lens.
2- Use a lens with great focal length.
3- Get closer to the subject.

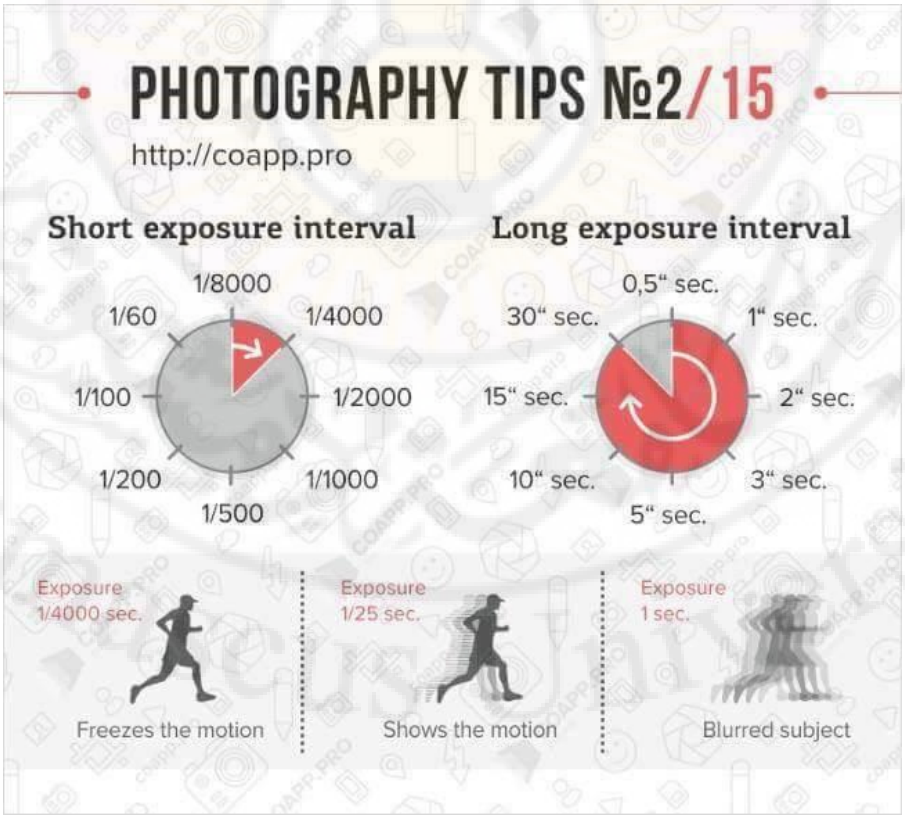
If the photographer desired a large depth in the field he could:

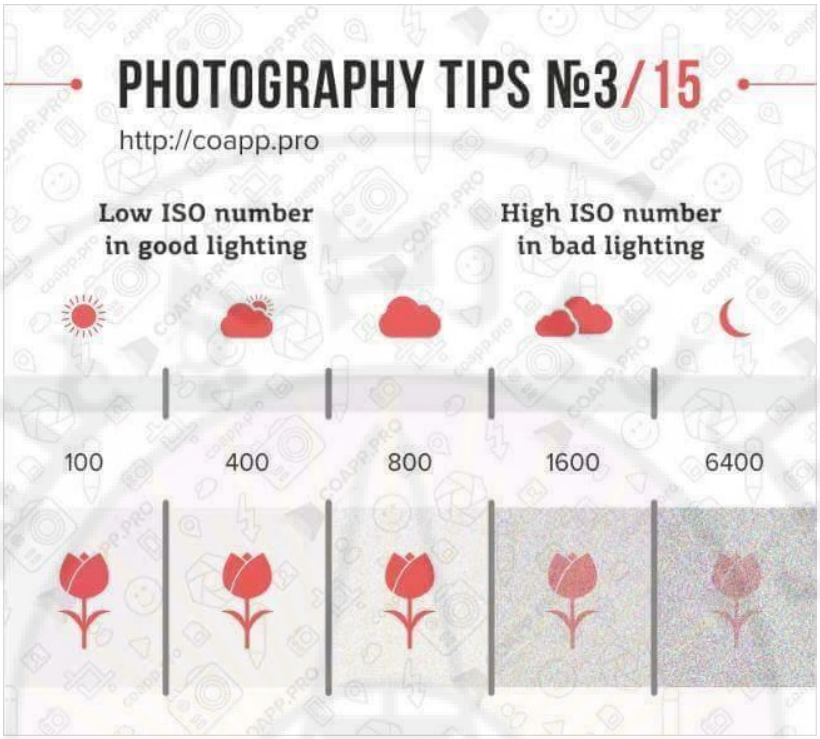
1- Use a small aperture lens.
2- Use a wide angle lens.
3- Move away from the subject.

Distance and depth of field will be divided into two parts:

1- A part that extends from the camera to the subject (the focus)
2- A part that extends behind the subject.


PHOTOGRAPHY TIPS №1/15
http://coapp.pro
F 2.0
F 3.5
F 5.6
F 8.0
Open aperture
Closed aperture
Photo is lighter
Background is more blurred
Used for portrait shooting
Photo is darker
Clearer background
Used for shooting landscapes


PHOTOGRAPHY TIPS №2/15
http://coapp.pro
Short exposure interval
Long exposure interval
1/8000
1/60
1/4000
1/100
1/2000
1/200
1/1000
1/500
0,5" sec.
30" sec.
1" sec.
15" sec.
2" sec.
10" sec.
3" sec.
5" sec.
Exposure 1/4000 sec.
Freezes the motion
Exposure 1/25 sec.
Shows the motion
Exposure 1 sec.
Blurred subject



Lenses:

A good lens gives you a good quality image, regardless the model of the camera. Choosing the right aperture helps in choosing the correct exposure of the image.

Standard Lenses:

It's a lens that is similar to the human eye in the field view at an angle of 46 degrees.

Wide-angle lenses:

Lenses covering a large area of the field view with more than 46 degrees. They have different focal dimensions such as (16 mm - 18 mm 20 mm - 24 mm 35 mm), and these lenses are often used in landscape photography, and photographing buildings.

Telephoto lenses:

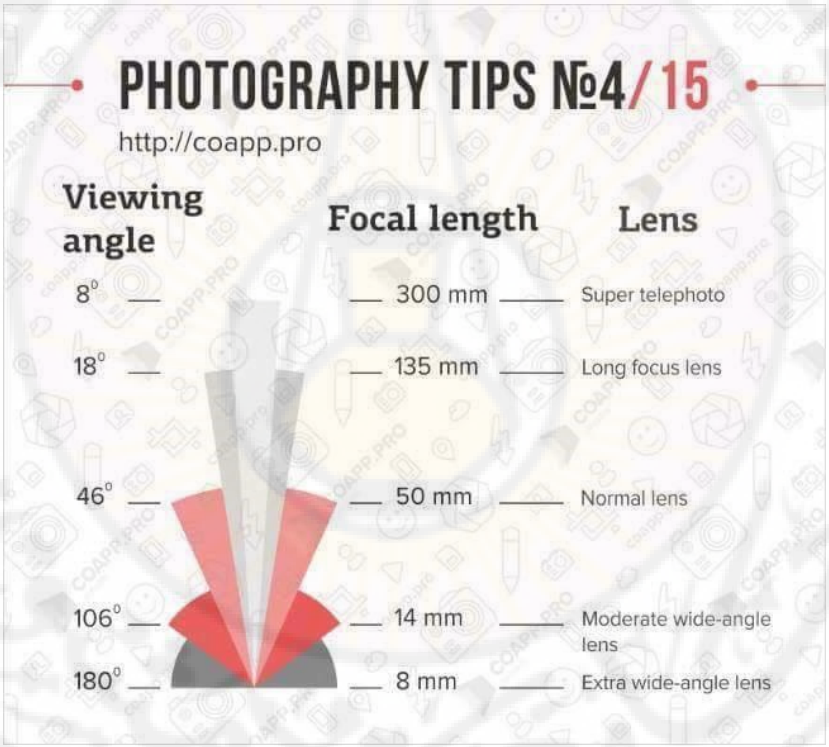
A telephoto lens view angles that are less than 46 degree. They are used in the filming of distant objects as a representation of birds and animals in addition to filming different sporting events.

Macro lenses:

They come in different focal lengths as (60 mm -90 mm -100 -180 mm ... mm) used in the filming of small objects such as insects to be magnified.

Zoom lens:

These lenses are flexible and they offer a broad range of focal length: (20-10), (55-17), (35-17), (105-24), (300-70). They are used for filming everyday life events, and photographing landscapes and buildings, birds and animals, according to its range.



(Land scape):

Here, the photographer focuses on three basic elements and shows the relationship between them. These elements are ground and what's on it of different topography, water in its different forms and the sky.

Photographing people (Portrait):

The focus is on the person's face, or on the faces of a group. Plus showing the overall situation surrounding them.

. **(Abstracts):**

The photographer looks for the beauty connection between the lines, spaces and colors in small parts of the scene. Abstract art is difficult because it depends on the photographer's

(Architecture):

The photographer focuses on showing the beauty of architecture, Photographers usually use zoom lenses and wide-angle to cover the area.

(SPORT):

Sports photography depends on catching opportunities to take unique shots, and this requires the use of high-speed shutter and zoom lenses with a long focal length.

(Studio Photography):

A picture is captured inside a studio with the use of artificial lighting, flashes, filters and reflectors.. It allows a great area for creativity for the photographer and it shows the topic in different ways.

(Panoramic):

Panorama capture is a shot consisting of several consecutive image picked up horizontal or vertical, and then collected to be one image. This method is often used in the filming cities and nature.

Light:

Lighting is the most important subject for a photographer to learn**.** We can split lighting into two main categories:

A- Direct lighting: It is the sunlight that falls directly on the objects to light it and to make it photographable.

B- The reflected light: It is a reflection of the direct rays of the sun lighting by different objects such as roofs and façades. In terms of the lighting angle, we can classify the lighting into the following sections:

1. **Front Lighting**:

Lighting is the main source behind the photographer and facing the subject, and this lighting makes the body appear in a flat way and does not have any dimensions.

2. Background lighting:

The main lighting source is behind any subject, and the light appears like a black shadow with specified features .

3. Side Lighting:

Here, the light source is to one side facing the photographer and the subject, and it can be divided into two parts:

1- lighting of 90 degrees angle:

Lighting is directed to one of the sides of the subject at an angle of 90 degrees lighting of 45 degrees angle**.**

2- Vertical lighting above the subject:

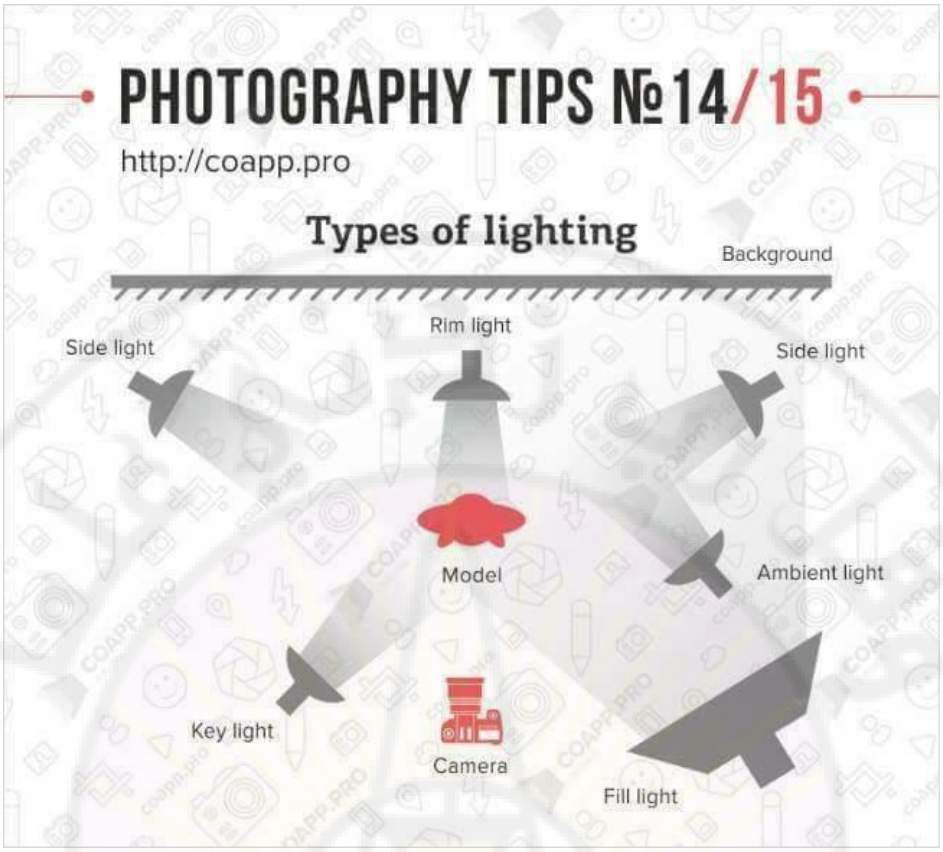
Here the light is completely on the subject like the sun in midday.

4- Bottom lighting under the topic:

This type is used for some purposes to give a specific lighting effect in photography as a representation for commercial products.

5- Scattered lighting:

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Where indirect lighting is dispersed because of the presence of dispersants to light like clouds. **.**

How digital cameras work when capturing the image:

1- At first the camera is directed to the required scene and we zoom in or out as needed.

2- A little pressure on the capture button, press halfway while keeping this situation that controls the shutter's opening.

3-The camera automatically adjusts the distance and compile information about the amount of light available.

4-The camera selects the appropriate capture and shutter speed required.

5- Keep pressure on the capture button.

6- For a period of time charges compile on all parts of the chip according to the amount of light that reached every part and the shutter opens to allow light to reach the electronic chip CCD.

7- It is translated into a numeric value.

8-The amount of charges formed on each part of the CCD is determined.

9-To form the image, the processor translates the digital data and its relation to their position on the CCD chip.

10- Image data is saved in a digital file after compressing it to reduce the file's size, according to the adjusted camera's settings. The file is saved on the camera's memory.

Terminology:

Pixel :A group of colorful tiny points deployed regularly. Every three dots are called (picture element) or pixels.

(Megapixel):A measure of the point density in a digital camera.

(RESOLUTION) :the number of discrete pixels that can be picked up by the camera.

(EFFECTIVE PIXELS): The real number of pixels recorded by the camera after the picture is taken.

(Memory Card): For storing images captured by a digital.

Assistance lenses: optional lenses for wide-angle photography or remote imaging.

(LCD viewfinder:) A small electronic screen located on the rear facade of the camera. It displays the things that you see using the lens.

(ISO): Short for International Standards Organization any International Organization for Standardization.

((Shutter Speed): It is period of time that allows light to enter through the lens to the film.

(Burst rate): Number of images that can be recorded in a row in the digital camera

(AF autofocus): The camera automatically adjusts the focus and it's not always 100% accurate.

(AF lock): Stops the auto-focus process, when the element or subject within the framework of clarity (focus).

(AE LOCK): Short for Auto Exposure Lock.

(WHITE BALANCE): Balancing colors to get natural colors and lighting.

(EXPOSURE VALUE): Exposure value EV time, a number that gives the amount of light given to any image.

(Focal Length): The distance between the lens and the image sensor.

(Zoom): Give us the ability to change the focal length by zooming in or out.

Optical zoom: Optical zoom lens, which works in zoom in or out with wide angle

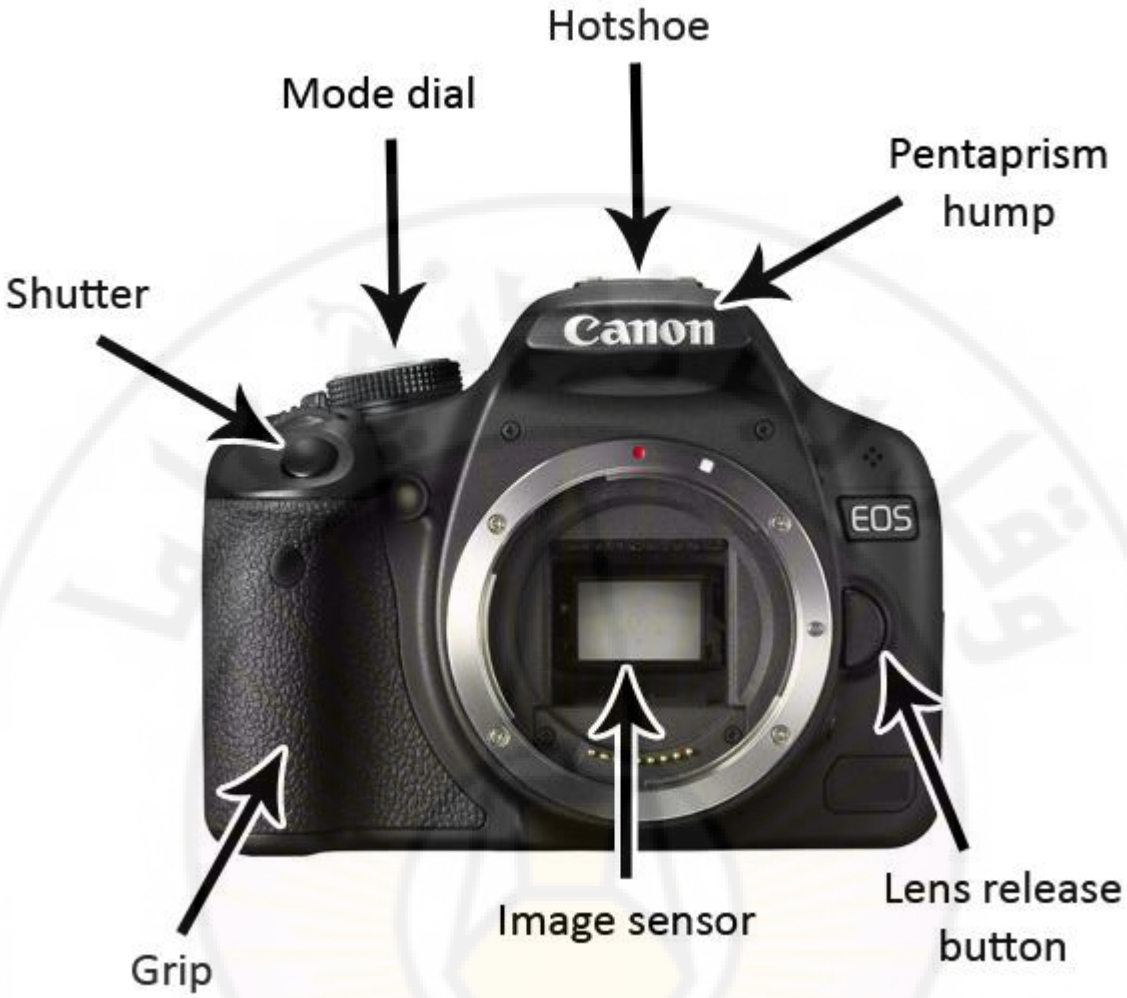
(DIGITAL ZOOM): Unreal zooming, works by zooming the recorded pixels and reduces the quality of the original image.

(image sensor) : Chip made of semiconductor within the digital camera and replace the normal film location.



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ISO Speed button
Drive Mode button
Shutter button
AF Mode Selection button
Main dial
Focus ring
EF-S 18-135mm f/3.5-5.6 IS kit lens
Zoom ring
Focus mode switch
Image Stabilizer switch
Built-in flash
Metering mode button
LCD illumination button
Mode dial
Power switch
Hot shoe
Top LCD panel
AF Selection Point
Live View/Movie
AE Lock
MENU
DISP.
Exposure Compensation
Quick Control
WB
White Balance
SET
AF
Canon
Drive Mode
Autofocus Mode
Playback
Erase
Picture Style



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Shutter Speed
Aperture
ISO
MENU
DISP.
1/125
F5.6
ISO400
P
WB
SET
AF
ONE SHOT
SET Q
90
Shooting Mode
Exposure Control


ISO Speed button
Drive Mode button
Shutter button
AF Mode Selection button
Main dial
Focus ring
EF-S 18-135mm f/3.5-5.6 IS kit lens
Zoom ring
Focus mode switch
Image Stabilizer switch
Built-in flash
Metering mode button
LCD illumination button
Mode dial
Power switch
Hot shoe
Top LCD panel