NATIONAL GEOGRAPHIC

10+
80-20104
EN

DISCOVERY SET

40 MM TABLE TOP TELESCOPE & 900X MICROSCOPE

INSTRUCTION MANUAL

⚠ WARNING:
SUN HAZARD – Never look directly at the sun with this device.

⚠ WARNING:
CHOKING HAZARD – Small parts.
Not for children under 3 years.

⚠ WARNING:
The lens contains lead that may be harmful.
Wash hands after touching.

⚠ WARNING:
FUNCTIONAL SHARP POINT – Not for children under 3 years.

⚠ WARNING:
This product can expose you to chemicals including lead, which is known to the State of California to cause cancer.
For more information go to www.P65Warnings.ca.gov.

AA 1.5V x2 NOT INCLUDED

Do not mix old and new batteries.
Do not mix alkaline, standard (carbon-zinc), or rechargeable (ni-cad, ni-mh, etc.) batteries.
Non-rechargeable batteries are not to be recharged.
Please recycle batteries responsibly.

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IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW THE INSTRUCTIONS BEFORE USE.
KEEP THESE INSTRUCTIONS FOR LATER USE.

• SUN WARNING: WARNING: NEVER ATTEMPT TO OBSERVE THE SUN WITH THIS DEVICE! OBSERVING THE SUN – EVEN FOR A MOMENT – WILL CAUSE INSTANT AND IRREVERSIBLE DAMAGE TO YOUR EYE OR EVEN BLINDNESS. EYE DAMAGE IS OFTEN PAINLESS, SO THERE IS NO WARNING TO THE OBSERVER THAT THE DAMAGE HAS OCCURRED UNTIL IT IS TOO LATE. DO NOT POINT THE DEVICE AT OR NEAR THE SUN. DO NOT LOOK THROUGH THE DEVICE AS IT IS MOVING. CHILDREN SHOULD ALWAYS HAVE ADULT SUPERVISION WHILE OBSERVING.

• RESPECT PRIVACY: WHEN USING THIS DEVICE, RESPECT THE PRIVACY OF OTHER PEOPLE. FOR EXAMPLE, DO NOT USE IT TO LOOK INTO PEOPLE'S HOMES.

• CHOKING HAZARD: CHILDREN SHOULD ONLY USE DEVICE UNDER ADULT SUPERVISION. KEEP PACKAGING MATERIALS LIKE PLASTIC BAGS AND RUBBER BANDS OUT OF THE REACH OF CHILDREN AS THESE MATERIALS POSE A CHOKING HAZARD.

• RISK OF BLINDNESS: NEVER USE THIS DEVICE TO LOOK DIRECTLY AT THE SUN OR IN THE DIRECT PROXIMITY OF THE SUN. DOING SO MAY RESULT IN A PERMANENT LOSS OF VISION.

• RISK OF FIRE: DO NOT PLACE DEVICE, PARTICULARLY THE LENSES, IN DIRECT SUNLIGHT. THE CONCENTRATION OF LIGHT RAYS COULD CAUSE A FIRE.

• DO NOT DISASSEMBLE THIS DEVICE: IN THE EVENT OF A DEFECT, PLEASE CONTACT YOUR DEALER. THE DEALER WILL CONTACT THE CUSTOMER SERVICE DEPARTMENT AND CAN SEND THE DEVICE IN TO BE REPAIRED IF NECESSARY.

• DO NOT SUBJECT THE DEVICE TO TEMPERATURES EXCEEDING 60 °C (140 °F).

• DISPOSAL: KEEP PACKAGING MATERIALS, LIKE PLASTIC BAGS AND RUBBER BANDS, AWAY FROM CHILDREN AS THEY POSE A RISK OF SUFFOCATION. DISPOSE OF PACKAGING MATERIALS AS LEGALLY REQUIRED. CONSULT THE LOCAL AUTHORITY ON THE MATTER IF NECESSARY AND RECYCLE MATERIALS WHEN POSSIBLE.

• THE WEEE SYMBOL IF PRESENT INDICATES THAT THIS ITEM CONTAINS ELECTRICAL OR ELECTRONIC COMPONENTS WHICH MUST BE COLLECTED AND DISPOSED OF SEPARATELY.

• NEVER DISPOSE OF ELECTRICAL OR ELECTRONIC WASTE IN GENERAL MUNICIPAL WASTE. COLLECT AND DISPOSE OF SUCH WASTE SEPARATELY.

• MAKE USE OF THE RETURN AND COLLECTION SYSTEMS AVAILABLE TO YOU, OR YOUR LOCAL RECYCLING PROGRAM. CONTACT YOUR LOCAL AUTHORITY OR PLACE OF PURCHASE TO FIND OUT WHAT SCHEMES ARE AVAILABLE.

• ELECTRICAL AND ELECTRONIC EQUIPMENT CONTAINS HAZARDOUS SUBSTANCES WHICH, WHEN DISPOSED OF INCORRECTLY, MAY LEAK INTO THE GROUND. THIS CAN CONTRIBUTE TO SOIL AND WATER POLLUTION WHICH IS HAZARDOUS TO HUMAN HEALTH, AND ENDANGER WILDLIFE.

• IT IS ESSENTIAL THAT CONSUMERS LOOK TO RE-USE OR RECYCLE ELECTRICAL OR ELECTRONIC WASTE TO AVOID IT GOING TO LANDFILL SITES OR INCINERATION WITHOUT TREATMENT.

Customer Service: Call 1-866-252-3811

Parts Overview

1. 40 mm Objective Lens
2. Tabletop Tripod
3. Optical Tube Assembly (OTA) with Dew Shield
4. Tripod Head
5. Focus Wheel
6. Diagonal
7. Eyepieces (H6 mm and H20 mm)
8. Compass

Available Downloads Visit:
www.esmanuals.com

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How To Set Up
Note: We recommend assembling your telescope for the first time in the daylight or in a lit room so that you can familiarize yourself with assembly steps and all components.

- Find a stable surface, like a table. Set the tripod on the table and open it until the tripod spreaders are fully extended.
- Snap the telescope tube into the U-shaped clamp on the top of the tripod head.
- Insert the diagonal into the focuser and secure it by tightening the thumbscrews.
- Place your chosen eyepiece into the diagonal. We recommend starting with the 20 mm because it will provide the widest field of view.

Using Your Telescope:
Now you are ready to start observing! Put the 20 mm eyepiece into the diagonal to get the widest field of view. This wider field of view will make it easier to locate and track objects. To move the scope up, down and side to side, grip the telescope near where the tube meets the focuser and steadily move the tube until your target comes into view in the eyepiece. It is important to remember that the rotation of the Earth means objects will move out of your eyepiece fairly quickly. Once you have found and focused on your desired target, you will have to track the object as it journeys across the night sky. For a closer look at an object, you can insert the 6mm eyepiece. The magnification will increase from 20x to 67x.

Focal Length	Eyepiece	Magnification
400 mm	**20 mm**	20x
400 mm	**6 mm**	67x

Cleaning:
Your telescope is a precision optical device and keeping the optics free of dust and dirt is crucial for optimal performance. To clean the lenses (objective and eyepiece) use only a photo-grade soft brush or a lint-free cloth, like a microfiber cloth. Do not press down too hard while cleaning, as this might scratch the lens. If necessary, the cleaning cloth can be moistened with an optical glass cleaning fluid and the lens wiped clean using very little pressure. **The eyepiece is NOT waterproof so do not spray fluids directly onto the glass or dip it in water. Never use harsh detergents! After you have finished cleaning an eyepiece, allow it to fully dry before storing.**

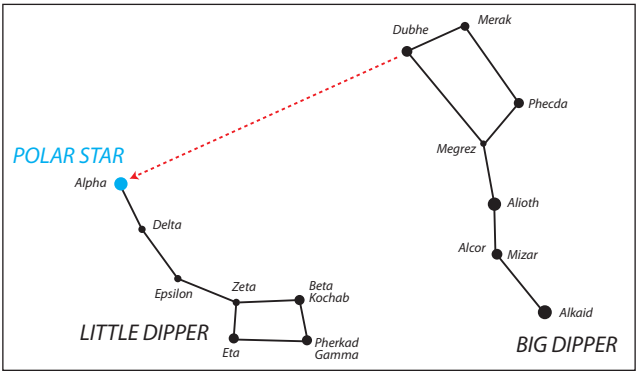
Make sure your telescope is always protected against dust and dirt.
After use, leave it in a warm room to dry off before storing.

Troubleshooting Guide:

Problem	Solution
No picture	Remove dust protection cap and sun-shield from the objective opening.
Blurred picture	Adjust focus using focus ring.
No focus possible	Wait for temperature to balance out.
Bad quality	Never observe through a glass surface such as a window.

Observing Tips:
Star hopping
Star hopping is a technique used by amateur astronomers to navigate the night sky. By using easily recognizable constellations and asterisms as a guide, an observer can locate stars and other objects.

For example, Polaris, which is commonly referred to as The North Star, can be located quickly using star hopping. First, find the Big Dipper asterism in the Ursa Major constellation. The popular pattern is defined by seven stars, and the two stars on the front edge of the Big Dipper's "bowl" are Merak and Dubhe. Next, draw an imaginary line from the bottom star (Merak) on this front edge through the top star (Dubhe) on the front edge. Follow the line to the first bright star you see. That should be Polaris. Finally, to verify your finding, locate the Little Dipper asterism. Polaris is the anchor star at the end of the Little Dipper's "handle."



Simulated images

Possible Objects For Observation:
Terrestrial Objects

To view terrestrial objects, install the diagonal into the focuser, insert the H20mm eyepiece into the diagonal and turn the focuser until the image is clear. After mastering the H20mm eyepiece, switch to the H12.5mm eyepiece and practice scanning and focusing. Choose several terrestrial objects to practice focusing on — such as the ones pictured on the right. As you are exploring, NEVER point your telescope at or near the Sun due to serious risk of blindness.

Terrestrial Images

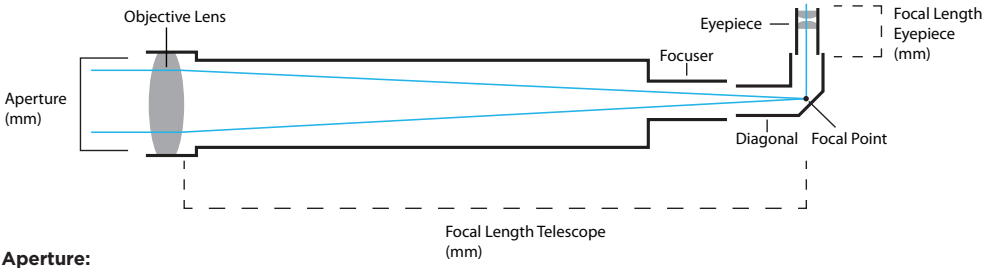
H20mm H12.5mm

The Moon
Diameter: 3,476 km
Distance: Approximately 384,401 km
The Moon is the Earth's only natural satellite, and it is the second brightest object in the sky (after the Sun). Although it is our closest neighbor, a lot of people have never really taken a good long like at the Moon. With your telescope, you should be able to see several interesting lunar features. These include lunar maria, which appear as vast plains, and some of the larger craters. The best views will be found along the terminator, which is the edge where the visible and shadowed portions of the Moon meet.

The Moon

H20mm H12.5mm

Telescope Terms to Know:

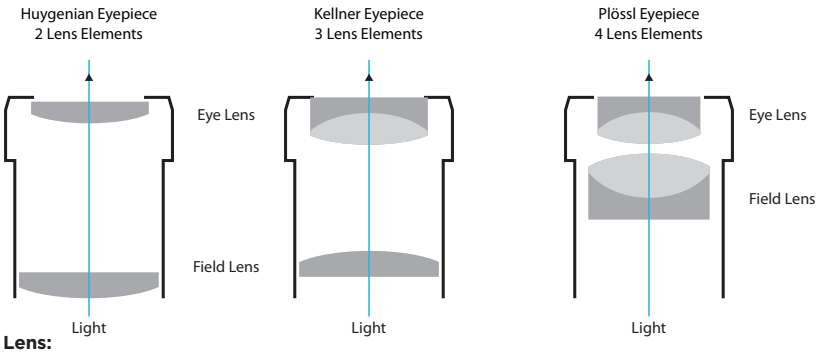


Aperture:
This figure, which is usually expressed in millimeters, is the diameter of a telescope's light-gathering surface (objective lens in a refractor or primary mirror in a reflector). Aperture is the key factor in determining the brightness and sharpness of the image.

Objective Lens:
The objective lens is the main light-gathering component of a refractor telescope. It is actually composed of several lens elements.

Diagonal:
This accessory houses a mirror that deflects the ray of light 90 degrees. With a horizontal telescope tube, this device deflects the light upwards so that you can comfortably observe by looking downwards into the eyepiece. The image in a standard diagonal mirror appears upright, but rotated around its vertical axis (mirror image). To get an image without this rotation, you will need to use a special diagonal with an erect image prism.

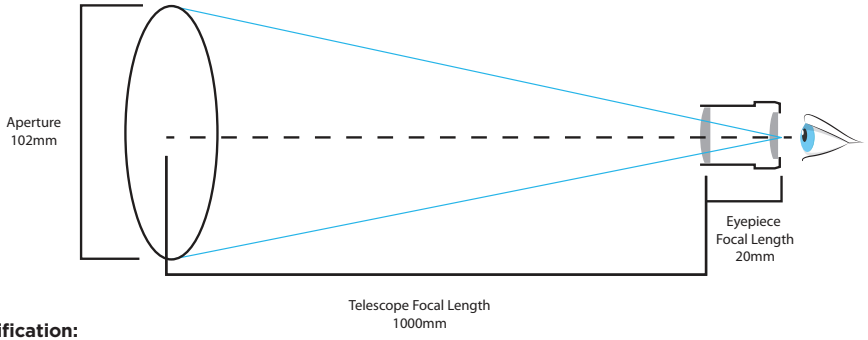
Eyepiece:
An eyepiece is an optical accessory comprised of several lens elements. It determines the magnification of a particular observing setup.



Barlow Lens:
A Barlow lens effectively increases the focal length of a telescope. It is inserted between the eyepiece and the focuser/diagonal (depending on the optical setup) and multiplies the magnification power of the eyepiece.
For example, a 2x Barlow will double the magnification of a particular eyepiece.

Focal length (Telescope):
The focal length is the distance in millimeters between the objective lens or primary mirror and the point at which entering light rays converge — otherwise known as the focal point. The focal lengths of the telescope tube and the eyepiece are used to determine magnification.

Focal length (Eyepiece):
The focal length is the distance in millimeters between the center of the first lens element in an eyepiece and the focal point. The focal lengths of the telescope tube and the eyepiece are used to determine magnification. Short eyepiece focal lengths produce higher magnifications than long eyepiece focal lengths.



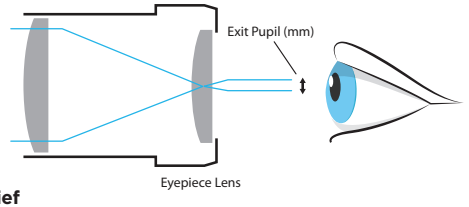
Magnification:
The magnification corresponds to the difference between observation with the naked eye and observation through a magnifying device like a telescope. If a telescope configuration has a magnification of 30x, then an object viewed through the telescope will appear 30 times larger than it would with the naked eye. To calculate the magnification of your telescope setup, divide the focal length of the telescope tube by the focal length of the eyepiece. For example, a 20mm eyepiece in a telescope with a 1000mm focal length will result in 50x power, which will make the object appear 50 times larger. If you change the eyepiece, the power goes up or down accordingly.

$$\text{Magnification} = \frac{\text{Telescope Focal Length}}{\text{Eyepiece Focal Length}}$$

Focal ratio
The focal ratio of a telescope is determined by dividing the telescope's focal length by its aperture (usually expressed in millimeters). It plays a key role in determining a telescope's field of view and significantly impacts imaging time in astrophotography. For example, a telescope with a focal length of 1000mm and a 100mm clear aperture has a focal ratio of f/10.

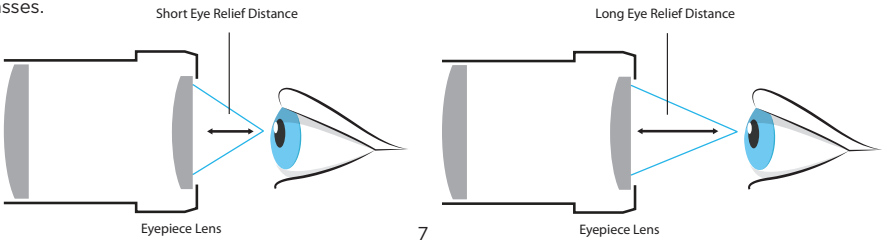
$$\text{Focal Ratio} = \frac{\text{Telescope Focal Length}}{\text{Telescope Aperture}}$$

Exit Pupil
The exit pupil is the diameter of the beam of light coming out of the eyepiece. To calculate exit pupil, divide the focal length of your eyepiece by your telescope's focal ratio. For example, if you use a 20mm eyepiece with an f/5 telescope, the exit pupil would be 4mm.

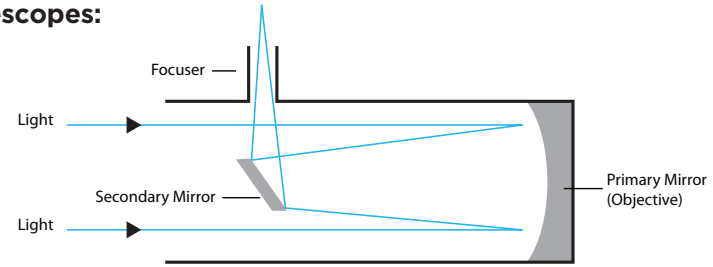


$$\text{Exit Pupil} = \frac{\text{Eyepiece Focal Length}}{\text{Telescope Focal Ratio}}$$

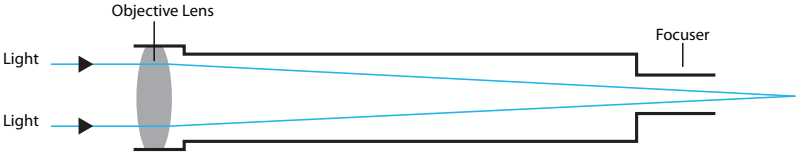
Eye Relief
Eye relief is all about a comfortable viewing experience because it is the distance at which you need to position your eye from the eyepiece's outermost surface to enjoy the full field of view. This characteristic is of special concern to observers who wear glasses to correct an astigmatism, because a long enough eye relief is necessary to allow room
for glasses.



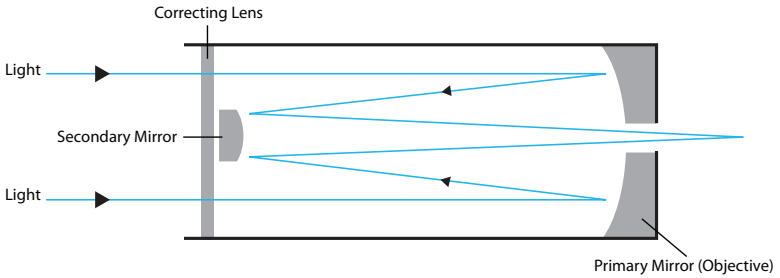
Types Of Telescopes:



Reflector
A reflector telescope uses mirrors to gather and focus light. Light enters the telescope through its open front end and travels to the concave primary mirror at the back. From there the light is reflected back up the tube to a flat secondary mirror, which sits at a 45° angle in relation to the eyepiece. Light bounces off of this secondary mirror and out through the eyepiece. A reflector's views will be upside down therefore it should only be used for astronomical observing because "up" and "down" are irrelevant in space.



Refractor:
A refracting telescope uses a collection of lenses to gather and focus light. A refractor's views will be upside down if a diagonal is not in use. A standard diagonal will generate a "right side up" image, however, it will rotate the image on the vertical axis (mirror image). To get the "right side up" image without the rotation, you will need to use a special diagonal with an erect image prism.



Catadioptric:
A catadioptric telescope uses a combination of mirrors and lenses to gather and focus light. Popular catadioptric designs include the Maksutov-Cassegrain and Schmidt-Cassegrain.

IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW THE INSTRUCTIONS BEFORE USE.
KEEP THESE INSTRUCTIONS FOR LATER USE.

• **THIS MICROSCOPE SET IS INTENDED FOR CHILDREN OLDER THAN AGE 9.** CHILDREN SHOULD ONLY USE THIS DEVICE UNDER ADULT SUPERVISION. NEVER LEAVE A CHILD UNSUPERVISED WITH THIS DEVICE. ACCESSORIES IN THE EXPERIMENT KIT MAY HAVE SHARP EDGES AND TIPS. PLEASE STORE THE DEVICE AND ALL OF ITS ACCESSORIES AND AIDS OUT OF THE REACH OF YOUNG CHILDREN WHEN NOT BEING USED DUE TO A RISK OF INJURY.

• **CHEMICALS:** ANY CHEMICALS AND LIQUIDS USED IN CONJUNCTION WITH THE DEVICE SHOULD BE KEPT OUT OF REACH OF CHILDREN. DO NOT DRINK ANY OF THE CHEMICALS CONTAINED IN THIS SET. HANDS SHOULD BE WASHED THOROUGHLY UNDER RUNNING WATER AFTER WORKING WITH THESE CHEMICALS. IN CASE OF ACCIDENTAL CONTACT WITH EYES OR MOUTH, RINSE THE AFFECTED AREA WITH WATER. SEEK MEDICAL TREATMENT FOR AILMENTS ARISING FROM CONTACT WITH THE CHEMICAL SUBSTANCE, AND TAKE THE CHEMICALS WITH YOU TO THE DOCTOR.

• **CHOKING HAZARD:** CHILDREN SHOULD ONLY USE DEVICE UNDER ADULT SUPERVISION. KEEP PACKAGING MATERIALS LIKE PLASTIC BAGS AND RUBBER BANDS OUT OF THE REACH OF CHILDREN AS THESE MATERIALS POSE A CHOKING HAZARD.

• ⚠ **BATTERY GUIDELINES:** THIS DEVICE CONTAINS ELECTRONIC COMPONENTS THAT ARE POWERED BY BATTERIES. BATTERIES SHOULD BE KEPT OUT OF CHILDREN'S REACH. WHEN INSERTING BATTERIES, PLEASE ENSURE THE POLARITY IS CORRECT. INSERT THE BATTERIES ACCORDING TO THE DISPLAYED +/- INFORMATION. NEVER MIX OLD AND NEW BATTERIES. REPLACE ALL BATTERIES AT THE SAME TIME. NEVER MIX ALKALINE, STANDARD CARBON-ZINC AND RECHARGEABLE NICKEL-CADMIUM BATTERIES. NEVER SHORT CIRCUIT THE DEVICE OR BATTERIES OR THROW EITHER INTO A FIRE. LEAKING OR DAMAGED BATTERIES CAN CAUSE INJURY IF THEY COME INTO CONTACT WITH THE SKIN. IF YOU NEED TO HANDLE SUCH BATTERIES, PLEASE WEAR SUITABLE SAFETY GLOVES. REMOVE BATTERIES FROM THE PRODUCT BEFORE EXTENDED STORAGE TO PREVENT LEAKING. DO NOT IMMERSE THE BATTERY COMPARTMENT IN WATER. NON-RECHARGEABLE BATTERIES ARE NOT TO BE RECHARGED.
RECHARGEABLE BATTERIES ARE TO BE REMOVED FROM THE TOY BEFORE BEING CHARGED. RECHARGEABLE BATTERIES ARE ONLY TO BE CHARGED UNDER ADULT SUPERVISION. EXHAUSTED BATTERIES ARE TO BE REMOVED FROM TOY. THE SUPPLY TERMINALS ARE NOT TO BE SHORT-CIRCUITED. PLEASE RECYCLE BATTERIES RESPONSIBLY.

• **RISK OF FIRE:** DO NOT PLACE DEVICE, PARTICULARLY THE LENSES, IN DIRECT SUNLIGHT. THE CONCENTRATION OF LIGHT RAYS COULD CAUSE A FIRE.

• **DO NOT DISASSEMBLE THIS DEVICE.** IN THE EVENT OF A DEFECT, PLEASE CONTACT YOUR DEALER. THE DEALER WILL CONTACT THE CUSTOMER SERVICE DEPARTMENT AND CAN SEND THE DEVICE IN TO BE REPAIRED IF NECESSARY.

• **DO NOT SUBJECT THE DEVICE TO TEMPERATURES EXCEEDING 60 °C (140 °F).**

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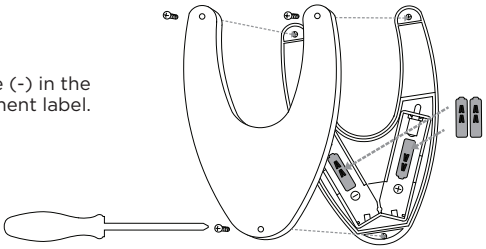
Parts Overview

1. 20x Eyepiece
2. Focus Knob
3. Stage
4. Stage Clips
5. Objective Turret (5x, 20x, 45x)
6. Illumination ON/OFF Switch and Mirror
7. Base and Battery Case
8. Microscope Arm
9. (3) Prepared Slides and (3) Blank Slides with Slide Case
10. (3) Slide Covers & Labels
11. (3) Collection Vials
12. Spatula, Scalpel, Tweezers, Stirring Rod, Pipette
13. Petri Dish

Observe, Investigate, Discover!
When you want to take your investigations to the cellular level, the 900x Microscope is ready to reveal the hidden details of the world around you. Everyday things like sand, onion skin, hair and pollen will show their extraordinary sides when viewed at magnifications ranging from 100x to 900x. To jump start your observations, the set comes with prepared specimens, collection tools and an experiment guide.

Install Batteries
1. Remove button screws and cover.
2. Install batteries with the positive (+) and negative (-) in the correct direction indicated by the battery compartment label.
3. Replace the cover and screws.
Please recycle batteries responsibly.



How Do I Use My Microscope
Before you use your microscope, make sure that the table, desk or surface that you place it on is stable and is not subject to vibration. If the microscope needs to be moved, hold it by the arm and base while carefully transferring it. Once the microscope is in a suitable location and the batteries are installed, check the light source to make sure that it illuminates. Use a microfiber cleaning cloth to gently wipe the lenses off. If the stage is dirty with dust or oil, carefully clean it off. Make sure that you only raise and lower the stage using the focus adjustment knob.

How Do I Operate The Illumination?
Locate the mirror/light on the base of the microscope. Flip the mirror/light to the "on" position (with the light facing up) and the light will illuminate. This microscope is equipped with an incandescent light that illuminates the specimen from below.

How Do I Adjust My Microscope Correctly?
Place the microscope in a suitable location as described above, and sit in a comfortable viewing position. Always start each observation with the lowest magnification. Adjust the distance of the microscope stage so that the stage is in the lowest position — farthest away from the turret head. Turn the objective turret until it clicks into place at the lowest magnification (Objective: 5x/Magnification: 100x). Note: Before you change the objective setting, always make sure the microscope stage is farthest away from the turret by rotating the focus knob. Separating the stage and turret by rotating the focus knob will avoid causing damage to the specimen slide or microscope. When starting an observation, always start with the 5x objective in the rotating head.

How Do I Observe The Specimen?
Sitting in your location with adequate illumination, the following basic rules should be observed. Start with a simple observation at the lowest magnification. Position the object or specimen in the middle of the stage under the stage clips, center over the lower light. Focus the image by rotating the focus knob until a clear image appears in the eyepiece.

Place the prepared slide directly under the objective on the microscope stage and secure it with the stage clips. The prepared slide should be located directly over the lower illumination. Look through the eyepiece and carefully turn the focus knob until the image appears clear and sharp. Now you can select a higher magnification by rotating to the objective turret. Higher levels of magnification can be achieved by turning the objective turret to a higher setting (400x or 900x). Following this procedure creates a steady increase of magnification without overpowering the view of the object. The following magnification order should be used: 100x, 400x then 900x. Each time the magnification changes (due to the objective change), the image sharpness must be readjusted with the focus knob. When doing this, be careful because if you move the microscope stage too quickly, the objective and the slide could come into contact and cause damage to the slide or microscope.

For transparent objects (e.g. sea salt), light is projected by the lower light traveling from below the stage, through the objective and eyepiece, and finally into your eye. This process of light transmission is known as microscopy. Many micro-organisms found in water, plant components and the smallest animal parts are transparent in nature. Opaque specimens, on the other hand, will need to be prepared for viewing. Opaque specimens can be made transparent by a process of treatment and penetration with the correct materials (media), or by slicing. You can read more about creating specimens in the enclosed microscope experiments booklet.

Magnification Guide:

Eyepiece	Objective	Power
20x	5x	100x
20x	20x	400x
20x	45x	900x

Note:
The highest magnification is not always the best for every specimen!

Troubleshooting Guide:

Problem	Solution
No recognizable image	Turn on light, Readjust focus, Start with the lowest power objective (5x)
No image	Center object on slide under lowest power objective
No light	Replace batteries, Check on/off position

History of the Microscope:
The optical microscope uses light moved through a lens or lenses to produce magnified views of the smallest of subjects. Over the centuries, these devices have become staples in classrooms, laboratories, jewelry stores and more.

However, like other observing aids such as the telescope, the exact origins of the optical microscope are difficult to trace to just one inventor.

The following are some of the milestones in the development of the optical microscope:

1590s —Dutch spectacle makers create an early version of the compound microscope. Exactly which Dutch spectacle makers should get credit for the invention is a long-standing matter of debate. The candidates include Zacharias Janssen or Hans Lippershey, who are also linked to the invention of the telescope.

1665 — English polymath Robert Hooke publishes Micrographia, a groundbreaking book filled with descriptions and illustrations of observations he made with a telescope. In this publication, Hooke coined the term “cell” when describing the microscopic structures that he had observed in a sliver of cork.

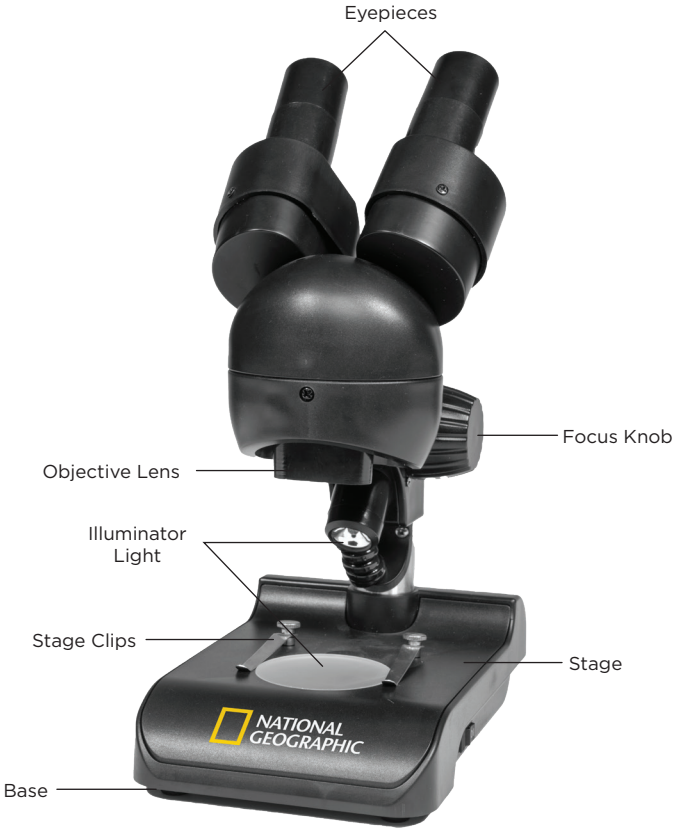
1670s – Dutch merchant, civil servant and science enthusiast Antonie van Leeuwenhoek makes the first observations of bacteria and protozoa using single lens microscopes that he made himself. His microscopes reached unprecedented magnification levels up to 270x. He eventually became known as “the father of microbiology”.

Microscope Types:
Optical microscopes work by guiding light that passes through a specimen or bounces off a specimen through a series of lenses to bring enlarged views of the specimen to the observer’s eyes. The most common configurations of optical microscopes are:

Simple Microscope
A simple microscope has a single magnifying lens, which allows objects to be viewed at one set magnification power. A common example of a simple microscope would be a jeweler’s loupe or a magnifying glass.

Compound Microscope
A compound microscope has two sets of magnifying lenses that are used in tandem to view specimens at a range of magnifications. The total magnification power of a particular lens combination is determined by multiplying the magnification of the eyepiece lens and the magnification of the objective lens. Due to the combination of lenses, compound microscopes have higher magnification ranges that are ideal for viewing microorganisms.

Stereo Microscope
A stereo microscope has two objective lenses and two eyepieces and moves light from the specimen along two optical paths, one directed toward the right eye and one to the left. This results in a three-dimensional view. This type of microscope has a low magnification range that is geared toward observing larger solid objects like minerals and insects. Stereo microscopes are often used in dissection.



Microscope Terms:
Eyepiece:
The eyepiece is the lens that an observer looks through. Some microscopes have interchangeable eyepieces for more magnification options.

Field of view:
The field of view is the diameter of the circle of light seen through the microscope's eyepiece.

Filter:
A filter, which is made of colored transparent plastic, can be placed between the illuminator source and the specimen to help observers better recognized components of colorless or transparent objects. Many microscopes have a color filter wheel with a range of filters located in the middle of the stage.

Illuminator:
The illuminator is a light source used to direct light through or off a specimen. Illuminators can be positioned below the stage, above the stage or both.

Interpupillary Distance:
On a binocular microscope, which has two eyepieces, this is the distance between the two eyepieces. The positioning of the eyepieces can usually be adjusted.

Magnification:
Magnification power corresponds to the difference between observation with the naked eye and observation through a magnifying device like a microscope. In a compound microscope, magnification is determined by multiplying the magnifying power of the eyepiece and the magnifying power of the objective lens. For example, a 10x eyepiece with an objective lens set at 40x will equal to magnification power of 400x.

$$\textbf{Magnification} = \text{Eyepiece Magnifying Power} \times \text{Objective Lens Magnifying Power}$$

Mirror:
A mirror positioned below the stage can be used to direct ambient light up through an opening in the stage to light a specimen.

Objective lens:
The objective lens is the lens closest to the specimen and is the first to receive light that passes through or off the specimen.

Stage:
The stage is the flat platform that a specimen sits on for observing. Many are equipped with metal or plastic clips to secure slides in place.

Turret
The turret, which is also known as a revolving nosepiece, is a revolving set of objective lenses.

Observing tips:
• When using a microscope with multiple magnification options, always start each observation with the lowest magnification.

• Before you change the objective setting, always make sure the microscope stage is farthest away from the turret by rotating the focus knob. Separating the stage and turret by rotating the focus knob will avoid causing damage to the specimen slide or microscope.

• Remember, the highest magnification is not always the best for every specimen.

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