

Multigenerational Programming Kit



This kit is one of four solar science kits available for use by New Mexico public libraries. Libraries can use these kits and the associated training to develop engaging space science programs before and after the eclipse that capitalize on increased public interest in solar science.





INVENTORY OF TRUNK



StarNet: Multigenerational Programming Kit

IN

OUT

Sun Viewing Tools

- | | | |
|--------------------------|--------------------------|-------------------------------------|
| ☐ | ☐ | 1 Coronado Personal Solar Telescope |
| ☐ | ☐ | 1 telescope case |
| ☐ | ☐ | 1 telescope mount |
| ☐ | ☐ | 2 large sunoculars |

Guides/Handouts

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | Telescope manual |
| ☐ | ☐ | Telescope cleaning instructions |
| ☐ | ☐ | SEAL activity guide |
| ☐ | ☐ | Big Sun, Little Moon (Handout Only) (Spanish version) |
| ☐ | ☐ | Activity guide |
| ☐ | ☐ | Instruction sheet |

Book

- | | | |
|--------------------------|--------------------------|-------------------------------|
| ☐ | ☐ | "When the Sun Goes Dark" book |
|--------------------------|--------------------------|-------------------------------|

To Be Provided by Borrowing Library

- | | | |
|--------------------------|--------------------------|--------------------------------|
| ☐ | ☐ | Large coin (such as a quarter) |
| ☐ | ☐ | Large round dinner plate |

(Or any two round, stiff objects of different size will work.)

Checked by _____

Date _____

Checked by _____

Date _____

DIY

SUN SCIENCE

Big Sun, Small Moon

Why do the Sun and Moon look like they're the same size in the sky?

Description

If you've seen a Solar eclipse, you may have noticed that the Moon comes very close to covering the entire Sun. Use a coin and a plate to investigate why the Sun and Moon look like they're the same size.

Age Level: 7 and up



Materials

- Large coin, such as a quarter
- Large round dinner plate

Any two round, stiff objects of different size will work. Instead of a plate and coin, you can create your own Sun and Moon out of construction paper. You will need a partner to help you with this activity.



Time

Preparation: 5 minutes
Activity: 5 minutes
Cleanup: 2 minutes

Safety

Never look directly at the Sun!

Step 1

Hold both the coin and the plate at arm's length. The plate will look much larger than the coin.



Step 2

While you hold the coin at arm's length, have your friend hold the plate and walk backwards away from you four steps. When your friend stops, close one of your eyes and look at both the coin and the plate as though they're next to each other. Does the plate look smaller than before, compared to the coin?



Step 3

First, predict how far away your partner will have to walk until the coin and plate appear the same size to you. Then have your partner walk backwards away from you until the coin and plate look the same size. How far away did your partner have to walk? Was your prediction correct?



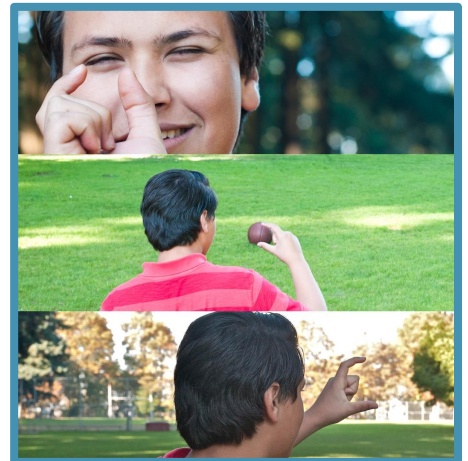
What's Going On?

If you've ever seen a picture of a Solar eclipse, you may have noticed that the Moon comes very close to covering the entire Sun. However, the Sun is 400 times larger than the Moon! So how can these objects appear to be the same size? Objects that are further away always look smaller, but a small object and a big object can look the same size if they are the right distance away from you. In fact, the Sun is about 400 times further away from Earth than the Moon!



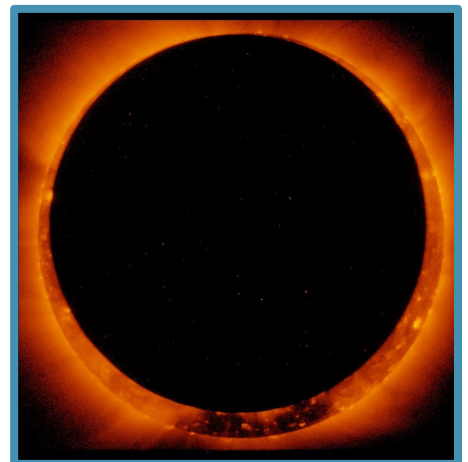
Measuring things far away

Close one eye and look at an object far away. Use your fingertips to frame the object you see. Note how far apart your fingertips are. Now look at an object that looks bigger and again move your fingertips until you frame the object. Your fingertips should be further apart. Astronomers do something very similar to this to measure the size of stars, planets, and other bodies appear to us. They call this term “angular diameter” (or “angular size”) for the angle that's formed by the apparent size of an object you observe from Earth.



Size of the Moon & Sun

The Sun and Moon have roughly the same angular diameter. In fact, sometimes the Moon appears slightly larger than the Sun, and sometimes the Sun appears slightly larger than the Moon. This is because the Moon's noncircular orbit around Earth sometimes brings it closer and sometimes further away from Earth. It's just a coincidence that the Sun and Moon appear to be the same size when viewed from Earth. If you were on another planet, its “moons” could have a very different angular size compared with the Sun!

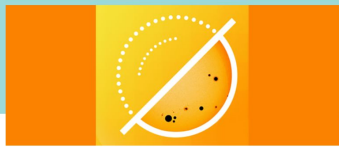


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Visitors Educators Partners Play Shop Support

DIY Sun Science



Sunny Day Activity Printouts



For more info and other activities, visit:

LawrenceHalofScience.org/do_science_now/diy_sun_science

Credits

**The
Lawrence**
Hall of
Science

UNIVERSITY OF CALIFORNIA, BERKELEY

The DIY Sun Science app allows families and educators to investigate and learn about the Sun at home, at school, or anywhere you go! The app provides 15 hands-on investigations, images, and videos.

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Activity inspired by “Eclipse: How can the little Moon hide the giant Sun?” NASA/Sun-Earth Day. Slide 6, NASA. Slide 8, NASA/Hinode/XRT.



Partner

This work was supported by NASA under award number NNX10AE05G and 80NSSC21M0082. Any opinions, findings, conclusions, or recommendations expressed in these programs are those of the author and do not reflect the views of NASA.

M.A.L.T.A.™ Mount Manual ALTitude Azimuth

Coronado has built a small, rugged, and portable Alt-azimuth mount, M.A.L.T.A.™, to be used with the P.S.T.™. The threads on the bottom of the P.S.T.™ will accept any standard 1/4 20 pitch photographic or astronomy mounting accessories. To use the M.A.L.T.A.™ attach it to the P.S.T.™ using the two screws included with the M.A.L.T.A.™. Then secure the mount head to the base using the tension screw going through the top down into the base. The individual legs then thread into their holes. By loosening the tension screw one can adjust the azimuth or horizontal axis, retighten the tension screw to freeze that axis. The silver tension screw on the mount head will adjust the altitude or vertical axis when loosened and hold the P.S.T.™ firm when tightened down. See the section on Sol Ranger™ for precise alignment.



Sol Ranger™

The P.S.T.™ has been designed with an internal Sol Ranger™ Sun spotting device. There is a small pinhole on the front face of the P.S.T.™ body and a small opaque window on the top, near the eyepiece holder. When properly aligned on the Sun the pinhole will let in light that will be projected onto the opaque glass in the form of a small harmless ball. It is NOT necessary to put your eye up to the opaque glass. Best alignment will be found when this ball of light is near center but it is not always dead center. Adding a SM40/T-Max™ will obstruct the Sol Ranger™.

Cleaning

Cleaning the P.S.T.™ should be done with a fine camel hair brush to remove any dirt from the objective. High quality lens cleaner and a soft cloth can also be used on the objective and the body itself. Take care of the P.S.T.™ as you would any high quality optical instrument and the views will last a lifetime.

What You Will See With The Coronado Personal Solar Telescope™.

The narrowband filter within the P.S.T.™ isolates a specific bandwidth of light called Hydrogen Alpha. This allows one to view the Sun's Chromosphere. The image of the Sun will be a deep red across the entire disk. Be aware that it can take time to 'train' one's eye for H-Alpha viewing. This instrument was designed for single eyepiece visual use only. Coronado will not guarantee the performance of aftermarket products, including eyepieces, other than those built by Coronado for the P.S.T.™.

Prominences – H-Alpha emissions projecting beyond the limb of the Sun, consisting of complex clouds or streamers of gas above or in the chromosphere.

Filaments – Prominences seen against the face of the Sun, appearing as long narrow dark streamers or diffuse complex dark areas in H-Alpha light. Filaments often mark areas of magnetic shearing

Active Region - A localized, transient volume of the solar atmosphere in which plages, Sunspots, and flares may be observed. Active regions are the result of enhanced magnetic fields and appear darker than the surrounding areas with a roughly circular shape.

Plage – patchy H-Alpha brightening on the solar disk, usually found in or near active regions, which can last for several days. Plage is irregular in shape and variable in brightness, marking areas of nearly vertical emerging or reconnecting magnetic field lines.

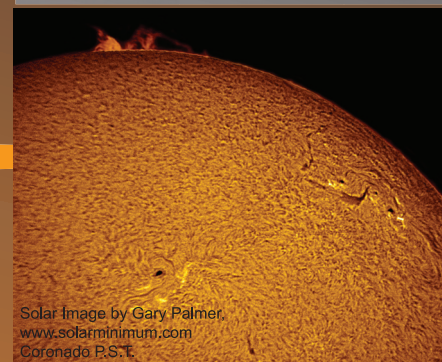
Sunspots – Moderate to large spots usually consisting of a darker central region (umbra) and a lighter halo consisting of many short fine fibrils (penumbra).

Flares - A sudden eruption of energy in the solar atmosphere lasting minutes to hours, from which radiation and particles are emitted.

CORONADO™

P.S.T.™ Personal Solar Telescope™

Instruction Manual



Solar Image by Gary Palmer,
www.solarminimum.com/
Coronado P.S.T.

Coronado Instruments Inc.™

27 Hubble

Irvine, CA, 92618

Tel: (949) 451-1450

Toll Free in USA: 1-800-626-3233

www.coronadofilters.com

Coronado Safety Warnings

As with all of our solar viewing products the P.S.T.™ has been built with safety as the top priority. This instrument was tested and sealed at our facilities as a complete, safe, and working unit. Do not attempt to disassemble the P.S.T.™. Doing so will void your warranty and may compromise your safety.

Coronado is obsessed with safety and you should be too.

Details of our safety specifications can be found at www.coronadofilters.com. Never use a solar filter unless the manufacturer is able to provide such information. Before each use make sure the P.S.T.™ does not appear damaged in any way – if you have any questions please contact

Coronado or your dealer.

U.S. Patent No. 7,054,518.

How To Adjust The Tuning And Focus On The P.S.T.

The Coronado P.S.T.[™] is equipped with a tuning mechanism which allows the user to adjust performance of the solar filter. The purpose of this adjustment is to compensate for possible detuning of the filter due to the change in operating conditions (such as barometric pressure that can change with elevation changes.) The adjustable tuner is located right at the end of the optical tube assembly where it merges to the rectangular body of the P.S.T.[™], and is easily recognized by the knurled rubber ring (see Fig. 1). The minute spectral adjustment of the etalon filter is accomplished by simply rotating this knurled ring in either direction. In most instances the filter adjustment will not be required – the P.S.T.[™] is delivered properly tuned by Coronado engineers. The judgment about occasional adjustment is made based on overall image quality and the ability to see the image details with a satisfactory contrast. NOTE: The maximum possible extent of a (relatively tight) rotation of the adjustable tuner is approximately 130°. No excessive force should be applied in an attempt to rotate the knurled ring further than mechanically allowed. The best achievable contrast of the image will be found within the limits of adjustment, and, once such image is obtained, no further improvement of the image quality can be gained by forcing the tuner. In search for a better solar image, the astronomer should first find the “sweet spot” by appropriately focusing the telescope using the focusing knob (see fig 1). Once the P.S.T.[™] is appropriately focused, the edge of the solar disk will appear sharp. However, if, for example, the prominences are not seen after the telescope has been focused, the filter adjustment may be of help. In this case the knurled ring of the adjustable tuner should be appropriately turned until the sought contrast of the Sun’s chromosphere is apparent.



We would like to mention one more convenient operational feature provided by the adjustable tuner of the P.S.T.[™]. Should the user decide to double-stack their P.S.T.[™] with a SolarMax40[™], there will be no need to send the P.S.T.[™] back to Coronado for spectral matching of the filters. The user will be able to properly spectrally match almost any SolarMax 40[™] to the filter of the P.S.T.[™] by using the adjustable tuner of the P.S.T.[™] once the telescope has been double-stacked.



The advantage of double stacking is the resulting bandpass of <0.6Å. This will dramatically increase the amount of surface detail that one can see with the P.S.T.[™]. This module does not change any other performance specs other than the bandpass. Because the T-Max[™] blocks the input for the Sol Ranger[™] Coronado recommends aligning the P.S.T.[™] before attaching the SolarMax 40[™] unit.

Product Specifications

Aperture – 40mm
Focal Length – 400mm
F/ Ratio – F/10
Bandwidth – <1.0Å
Thermal Stability – 0.005Å/C
Blocking – Full blocking >10⁻⁵ from EUV to far IR

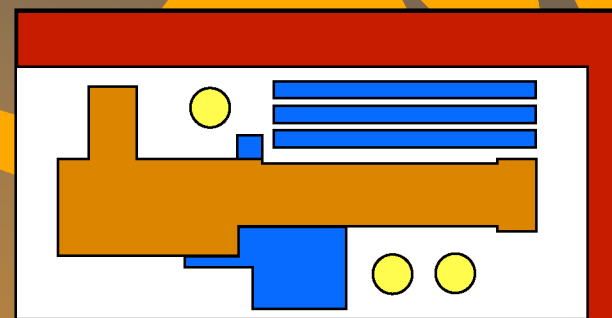
Storage

If you have not purchased the optional travel case for the Coronado P.S.T.[™] you may skip this section. Coronado has designed the packaging for your P.S.T.[™] to fit directly into the optional carrying case. Simply remove the telescope and accessories and lift out the foam, a section from the top and right hand side will have to be removed as shown in figure 2 on the following page.

Slide the foam into the travel case with the cutouts facing up and replace the P.S.T.[™] and accessories. Follow the color key and diagram.

Figure 2

-  P.S.T.[™] storage
-  Remove for use with optional hard case.
-  Remove for storing MALTA[™] mount
-  Eyepiece storage.



Please visit our website for a look at our image gallery, useful observing and imaging tips in ‘Solar Chat’, and our complete product catalog. As you become more involved in solar viewing we have several accessories you can purchase to enhance your enjoyment. Pictures and pricing can be found at www.coronadofilters.com or call us 800-626-3233

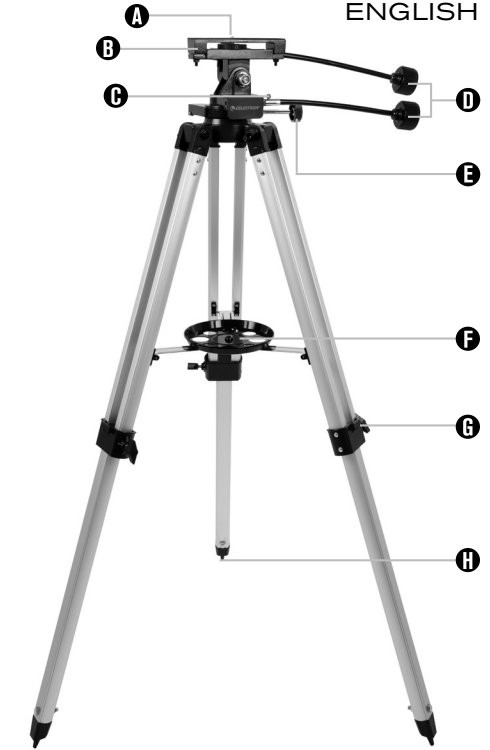
- CEMAX[™] Eyepieces & Barlow – Optically enhanced with fully multi-coated lenses to have their peak transmittance at H α . Better contrast with less scattered light.
- Ultimate Solar Observers Hat – Made of a UV reflective material to keep you cool while observing. Also serves as a dark cloth for reducing incidental light.

CELESTRON®

Heavy-Duty Alt-Azimuth Tripod

Quick Setup Guide

ITEM #93607
ENGLISH



- A.** Mounting bolt
- B.** Mounting head and position controls
- C.** D-shaped gear shaft
- D.** Slow motion control dials
- E.** Azimuth control tension dial
- F.** Eyepiece accessory tray
- G.** Leg position locks
- H.** Spiked feet



Unpack your tripod and verify that all parts are present. Your Heavy-Duty Alt-Azimuth Tripod includes: the tripod with alt-azimuth adjustable head, two azimuth slow motion control dials, an azimuth control tension dial, and an eyepiece accessory tray.



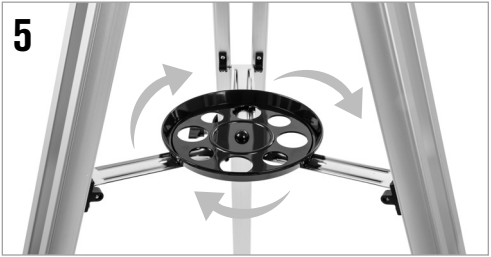
To set up the tripod, spread the legs outward until they are fully extended and push down the center leg brace.



Extend the center portion of each of the three tripod legs down about 6 to 12 inches. Use the tightening screw on each leg to secure the extended leg in place.

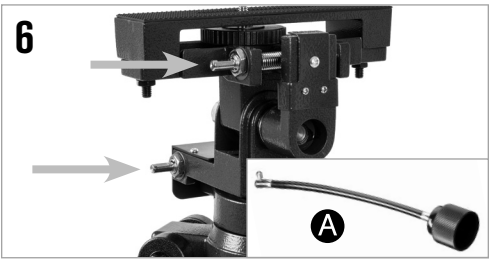


Check to ensure that all three legs are the same height once extended to provide a level platform for the telescope.

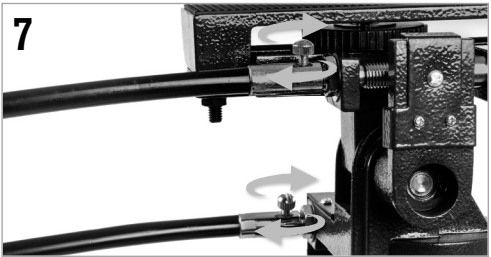


Place the eyepiece accessory tray on top of the tripod's center leg brace. Thread the tray into the threaded hole in the center of the leg brace until it is fully seated.

NOTE: If necessary, rotate the accessory tray counterclockwise until the accessory holes are not covered by the leg brace arms as shown here.



Attach the slow motion control dials **A** to your mount, Although these have two different length arms, it is your preference which to attach to which control point.



Place the slow motion control dials over the D-shaped gear shaft and push inward to make sure they are fully seated. Use your fingers to tighten the setscrews onto the gear shaft. Further tighten the setscrew using a flat blade screwdriver if desired.



Attach the azimuth control tension dial.



Attach your telescope, spotting scope, or binocular tripod mount to the mounting bolt.

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REMARQUE: Si nécessaire, faites tourner le plateau à accessoires dans le sens anti-horaire, de manière que les logements des accessoires ne soient pas couverts par les entretoises illustrées ici.

6. Attachez les molettes de mouvement ralenti **A** à votre monture. Bien que ces derniers aient des bras de longueur différente, vous pouvez choisir le point d'attache qui vous convient le mieux.

7. Placez les molettes de contrôle de mouvement ralenti sur le moyeu d'engrenage en D et poussez vers l'intérieur pour vous assurer qu'ils sont bien installés. Sans outils, serrez les vis sur le moyeux d'engrenage. Serrez encore les vis à main à l'aide d'un tournevis à tête plate si désiré.

8. Attachez la molette de contrôle de la tension azimuthale.

9. Attachez votre télescope, votre longue vue ou votre monture de jumelles pour trépied à l'aide de l'écrou de monture.

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Hochbelastbares Altazimut-Stativ

Kurzanleitung zur Einrichtung

ARTIKELNR. 93607

DEUTSCH

- A.** Befestigungsschraube
- B.** Montagekopf und Positionssteuerungen
- C.** D-förmige Getriebewelle
- D.** Zeitlupen-Einstellrädchen
- E.** Einstellrad für die Azimut-Spannung
- F.** Okular-Zubehörablage
- G.** Beinpositionsverriegelungen
- H.** Füße mit Spikes

1. Packen Sie Ihr Stativ aus und überprüfen die Vollständigkeit aller Teile. Ihr Hochbelastbares Altazimut-Stativ umfasst: das Stativ mit dem verstellbaren Altazimut-Kopf, zwei Azimut-Zeitlupen-Einstellrädchen, ein Einstellrad für Azimut-Spannung und eine Okular-Zubehörablage.

2. Zum Aufbau des Stativs die Beine nach außen ziehen, bis sie vollständig ausgezogen sind. Drücken Sie die mittlere Beinstrebe nach unten.

3. Den mittleren Teil jeder der drei Beinstreben ca. 15 bis 30 cm nach unten ausfahren. Die ausgezogenen Beine mit den drei Feststellschrauben unten an jedem Bein sichern.

4. Achten Sie darauf, dass alle drei Beine nach dem Ausziehen die gleiche Höhe haben, um eine waagerechte Plattform für das Teleskop zu bilden.

5. Platzieren Sie die Zubehörablage oben auf der mittleren Stativstützstrebe. Drehen Sie die Ablage in die Gewindeöffnung in der Mitte der Beinstrebe, bis sie fest sitzt.

HINWEIS: Drehen Sie ggf. die Zubehörablage gegen den Uhrzeigersinn, bis die Zubehörlöcher nicht durch die Arme der Beinstrebe verdeckt sind, wie hier dargestellt.

6. Bringen Sie die Zeitlupen-Einstellrädchen **A** an Ihrer Montierung an. Obwohl diese zwei unterschiedlich lange Arme haben, ist es Ihnen überlassen, welches Sie an welchem Kontrollpunkt anbringen.

7. Setzen Sie die Zeitlupen-Einstellrädchen auf die D-förmige Getriebewelle und drücken Sie sie nach innen, um sicherzustellen, dass sie richtig

sitzen. Ziehen Sie die Stellschrauben an der Getriebewelle mit Ihren Fingern fest. Ziehen Sie die Stellschrauben bei Bedarf mit einem Schlitzschraubendreher stärker fest.

8. Bringen Sie das Einstellrad für die Azimut-Spannung an.

9. Bingen Sie Ihr Teleskop, Spektiv oder Ihre Fernglasstativhalterung an der Befestigungsschraube an.

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Robusto treppiede altazimutale

Guida rapida

ARTICOLO N. 93607

ITALIANO

- A.** Bullone di montaggio
- B.** Testa di montaggio e comandi di posizione
- C.** Asta a forma di D
- D.** Ghiera comandi movimento lento
- E.** Ghiera tensionamento controllo azimut
- F.** Vassoio porta accessori oculare
- G.** Blocchi posizione gambe
- H.** Piedini appuntiti

1. Disimballare il treppiede e verificare che siano presenti tutti i componenti. Questo robusto treppiede altazimutale include: il treppiede con testa altazimutale regolabile, due ghiera di controllo del movimento lento dell'azimut, una ghiera di tensionamento del controllo dell'azimut e un vassoio porta accessori dell'oculare.

2. Per configurare il treppiede, allargare le gambe verso l'esterno fino a quando non saranno completamente estese e spingere verso il basso il supporto centrale delle gambe.

3. Allungare la parte centrale di ciascuna delle tre gambe del treppiede verso il basso di 15-30 cm. Usare la vite di fissaggio situata su ciascuna gamba per fissare la gamba allungata in posizione.

4. Assicurarsi che tutte e tre le gambe siano alla stessa altezza una volta estese per fornire una piattaforma a livello per il telescopio.

5. Sistemare il vassoio porta accessori dell'oculare sul supporto centrale delle gambe del treppiede. Avvitare il vassoio nel foro filettato al centro del supporto delle gambe fino a quando non è completamente posizionato.

NOTA: Se necessario, ruotare il vassoio porta accessori in senso antiorario fino a quando i fori non sono coperti dai bracci del supporto delle gambe come mostrato qui.

6. Fissare le ghiera di controllo del movimento lento **A** alla montatura. Sebbene queste abbiano due bracci con diverse lunghezze, l'utente può scegliere quale asta fissare a ciascun punto di controllo.

7. Sistemare le ghiera di controllo del movimento lento sull'asta a forma di D e spingere verso l'interno per garantire che siano posizionate correttamente. Serrare manualmente le viti sull'asta. Serrare ulteriormente la vite con un cacciavite a taglio se necessario.

8. Fissare la ghiera di tensionamento del controllo

dell'azimut.

9. Fissare il telescopio, il cannocchiale o i binocoli alla montatura mediante il bullone di montaggio.

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Trípode altazimut resistente

Guía de instalación rápida

PRODUCTO# 93607

ESPAÑOL

- A.** Perno de montaje
- B.** Cabezal de montaje y controles de posición
- C.** Eje de engranaje en formato D
- D.** Diales de control de movimiento lento
- E.** Dial de tensión de control de azimut
- F.** Bandeja de accesorios de oculares
- G.** Cierres de posición de patas
- H.** Patas con púa

1. Desembale el trípode y compruebe que estén presentes todas las piezas. Su trípode altazimut resistente incluye: el trípode con cabezal altazimut ajustable, dos diales de control de movimiento lento en azimut, un dial de tensión de control de azimut, y una bandeja de accesorios de oculares.

2. Para instalar el trípode, separe las patas hacia fuera hasta que estén totalmente extendidas y empuje el soporte de las patas central.

3. Extienda la sección central de cada una de las tres patas del trípode hacia abajo entre 6 y 12 pulgadas (15 y 30 cm). Use el tornillo de fijación en cada pata para asegurar la pata extendida en posición.

4. Asegúrese de que las tres patas tengan la misma altura extendidas para ofrecer una plataforma nivelada para el telescopio.

5. Coloque la bandeja de accesorios oculares sobre la abrazadera central del trípode. Enrosque la bandeja en el agujero estriado del centro del soporte de las patas hasta que esté totalmente asentada.

NOTA: Si es necesario, gire en sentido contrario a las agujas del reloj la bandeja de accesorios hasta que los agujeros de los accesorios no queden cubiertos por los brazos del soporte como se indica a continuación.

6. Instale los diales de control de movimiento lento **A** a su soporte. Aunque tienen dos longitudes de brazo distintas, puede elegir cuál instalar en qué punto de control.

7. Coloque los diales de control de movimiento lento sobre el eje del engranaje en formato D y presiónelos hacia dentro para asegurarse de que estén totalmente asentados. Use los dedos para apretar los tornillos en el eje del engranaje. Apriete más el tornillo con un destornillador de cabezal plano si lo desea.

8. Instale el dial de tensión del control de azimut.

9. Instale su soporte para trípode de telescopio, catalejo o binoculares en el perno de montaje.

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