

How to set up and use a telescope

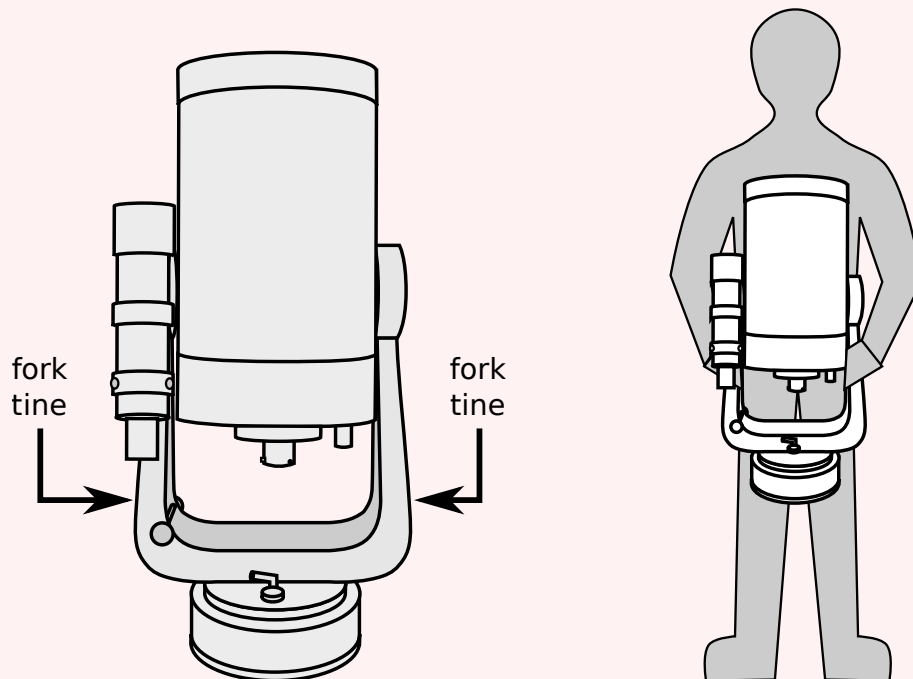
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1 | Collecting a telescope

Read the following before collecting a telescope!

- Carry the telescope with two hands, by the fork tines.



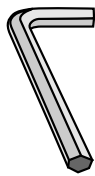
- Do not touch any clear glass surface of the telescope with your hands, as these surfaces are lenses, and will become smudged.
- Pay careful attention to when you are instructed to unlock the Declination and Right Ascension. Failure to do so will result in damage to the telescope. These instructions are always in **bold face**.

1. Send two group members to collect a telescope from the lab TA. One member will carry the telescope, while the other will carry the box of optics and the wedge.

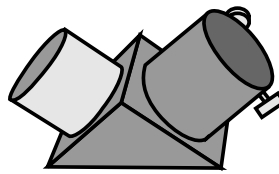
2. Check that the optics box contains: 4 bolts, a wrench, a star diagonal, a long eyepiece, a short eyepiece, and a power cord.



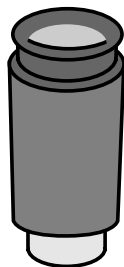
4 bolts



Allen
wrench



star
diagonal



40 mm
low power
eyepiece

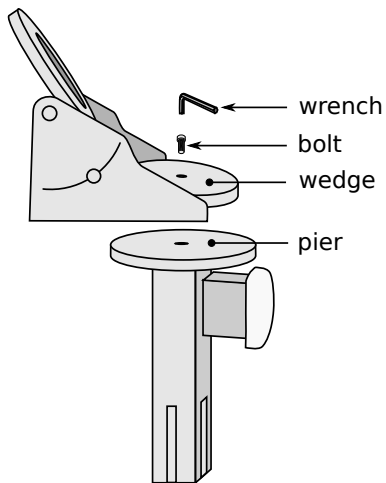


26 mm
high power
eyepiece

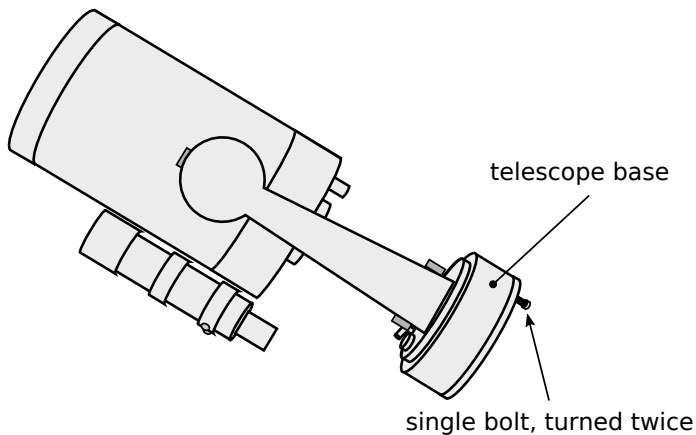
3. Carry the telescope, wedge, and optics to a pier.

2 | Assembly

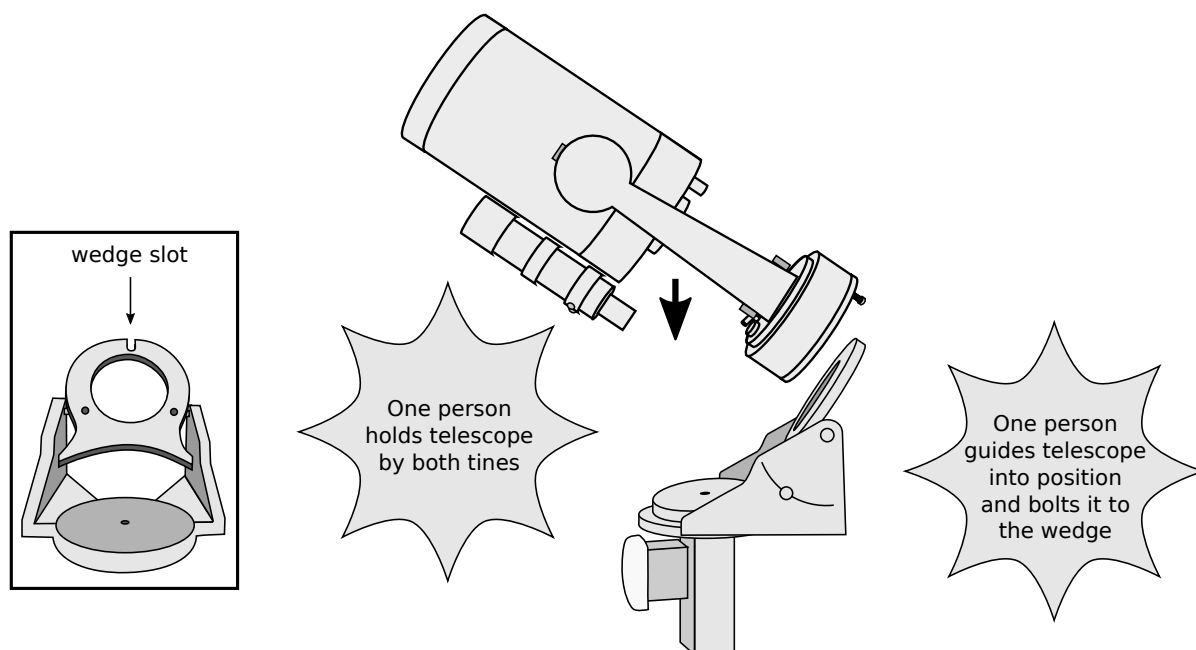
1. Use a single bolt to connect the wedge to the pier. Use the wrench to make the bolt tight enough that you could not remove it by hand.



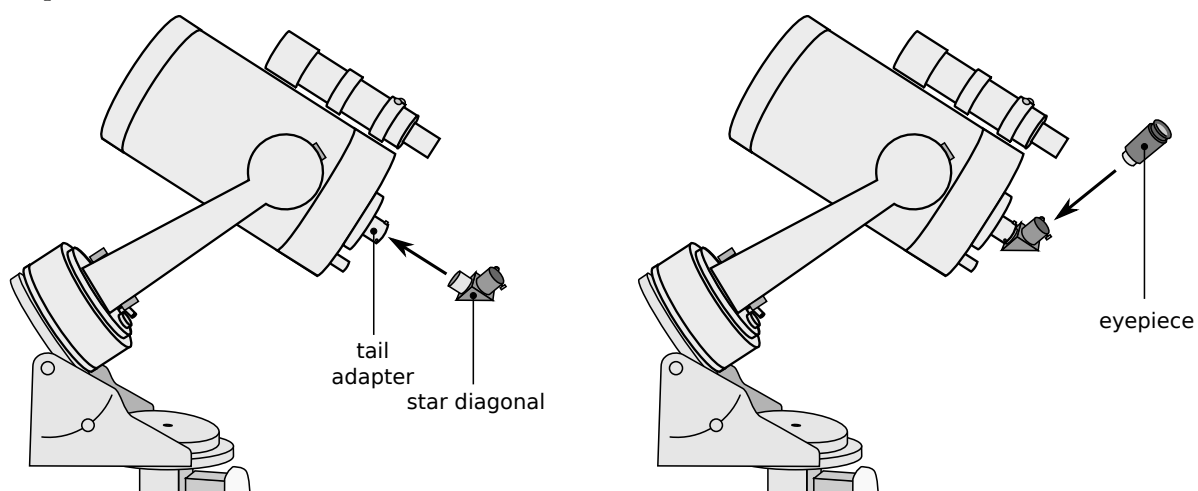
2. Thread a single bolt into the base of the telescope, turning it only twice.



3. The wedge has a slot at its top. Lower the telescope onto the wedge so that the bolt you started on the telescope's base goes into the slot, using the bolt to align the base of the telescope with the wedge.



4. Insert the remaining two bolts, through the wedge, into the base. Use the wrench to tighten the three bolts enough that you could not remove them by hand.
5. Insert the smaller (shiny) end of the star diagonal into the tail adapter. If it will not insert all the way, loosen the small screws on the tail adapter and try again. Tighten the small screws on the tail adapter until they hold the star diagonal in place.
6. Insert the longer eyepiece into the star diagonal, using the small screws to hold the eyepiece in place.



7. Remove any lens covers over the telescope, finder scope, or eyepiece by pulling them straight off. No lens cover should be twisted off!

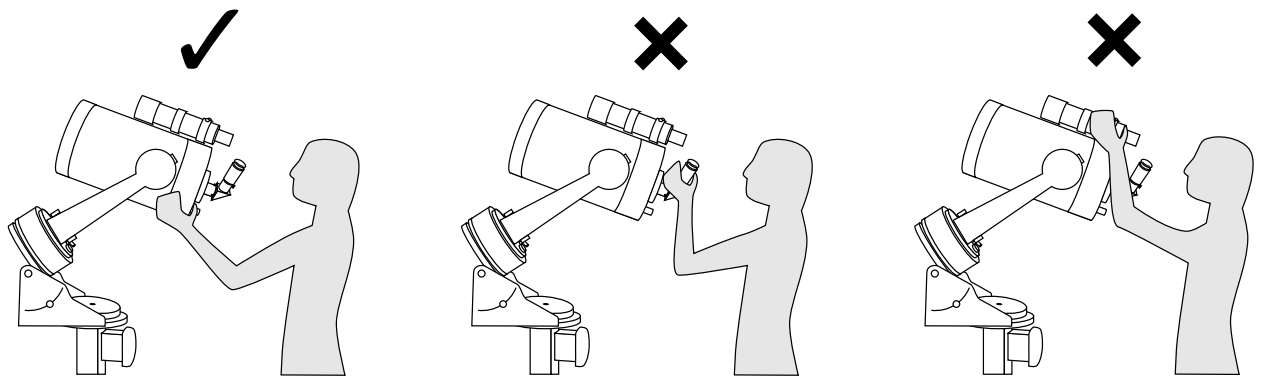
Check off

Do not proceed until the instructor or TA has checked your telescope assembly!

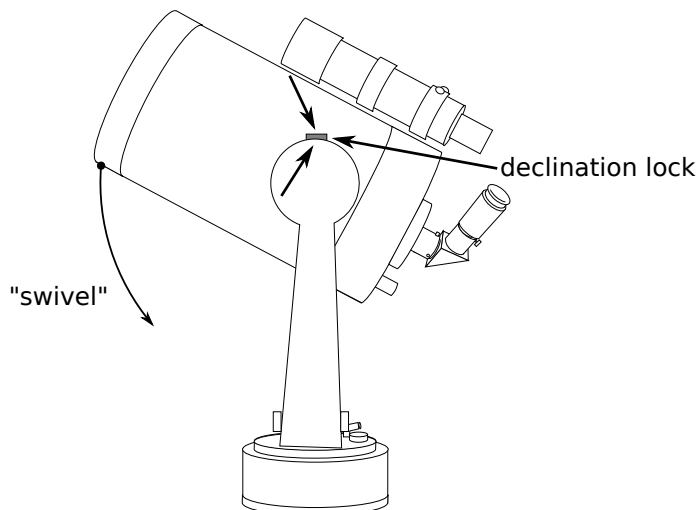
3 | Pointing

To make a large adjustment to the telescope:

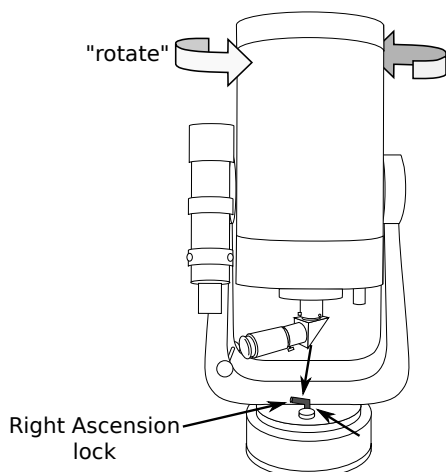
1. Hold on to the back of the telescope (not the eyepiece or finder) with one hand when making large adjustments.



2. The Declination lock is a screw or switch at the top of one of the fork tines. **Loosen the Declination lock** until the telescope swivels easily. If the telescope does not swivel easily after loosening the declination lock, notify your instructor.



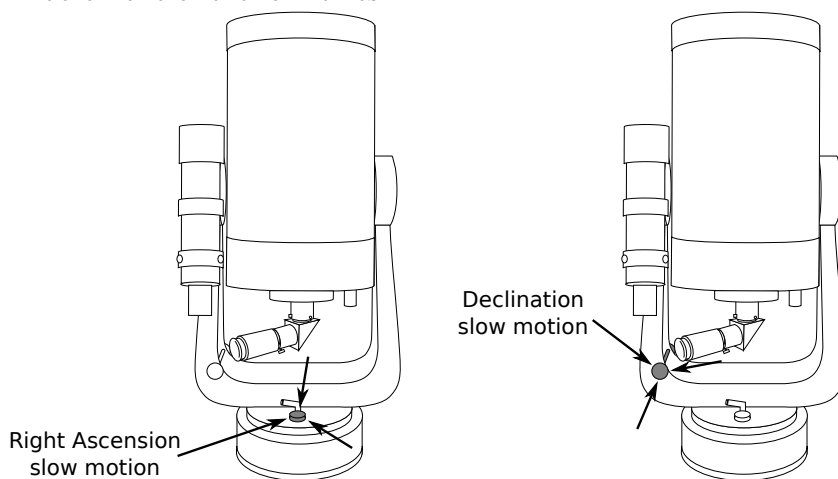
- The Right Ascension lock is a switch on the base. **Unlock the Right Ascension** so that the telescope rotates easily.



- Use your hand to guide the back of the telescope until it is pointing in the desired direction.
- Tighten the Declination lock and lock the Right Ascension.

To make a small adjustment to the telescope:

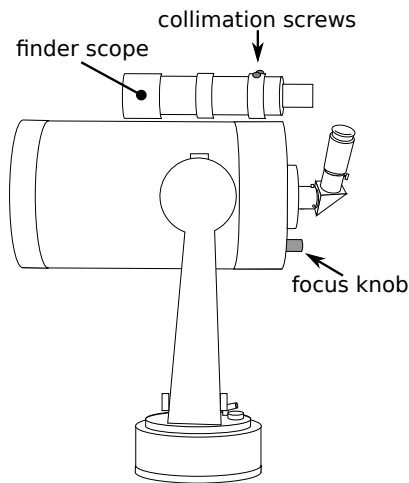
- The Right Ascension slow motion is a knob on the base. The Declination slow motion is a knob on one of the fork tines.



- Hold the Right Ascension slow motion with one hand.
- Unlock the Right Ascension.**
- Turn the Declination slow motion knob, and the Right Ascension slow motion knob. If the declination slow motion knob is difficult to turn, try turning it the other direction.
 - If the declination slow motion is easy to turn the other direction, follow the instructions on page 6 to make a large adjustment to the declination past where you want to point the telescope, then use the slow motion in the other direction.
 - If the declination slow motion is difficult to turn in both directions, lock the telescope in place and notify your instructor.
- When you are done, lock the Right Ascension.

4 | Calibration

The finder scope is the smaller telescope attached to the side of the large telescope. The collimation screws are the small screws on the finder scope, which are furthest from the large telescope.



Before collimating, check that the finder scope is not loose. Lock the telescope in place, and gently nudge the finder scope. If the finder scope moves noticeably, ask for help from the instructor.

To collimate:

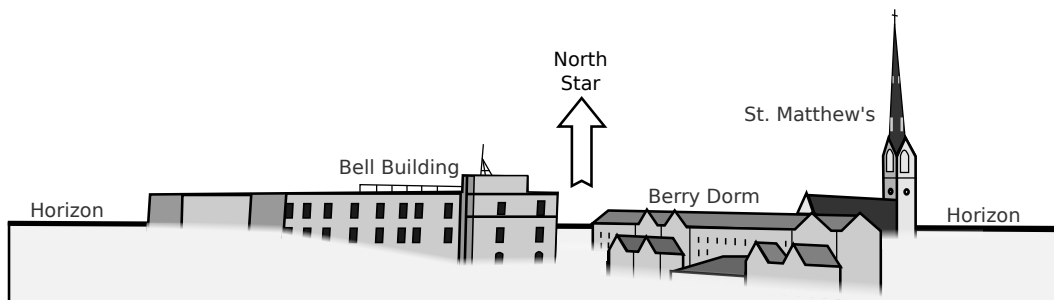
1. Locate a distant light source on the Earth. Examples: radio towers lights, bridge lights.
2. Make a large adjustment to point the telescope in the direction of the light source you found.
3. Turn the focus knob until the view through the telescope is in focus.
4. While looking through the **telescope eyepiece**, make small adjustments until the light source is centered in the view, and lock the telescope in place.
5. While looking through the **finder scope**, turn the small collimation screws on the finder scope until the cross hairs of the finder scope are over the light source you centered in the view of the eyepiece of the telescope.
6. NOTE: after you have collimated, you should NOT continue to use the collimation screws while finding and centering stars.

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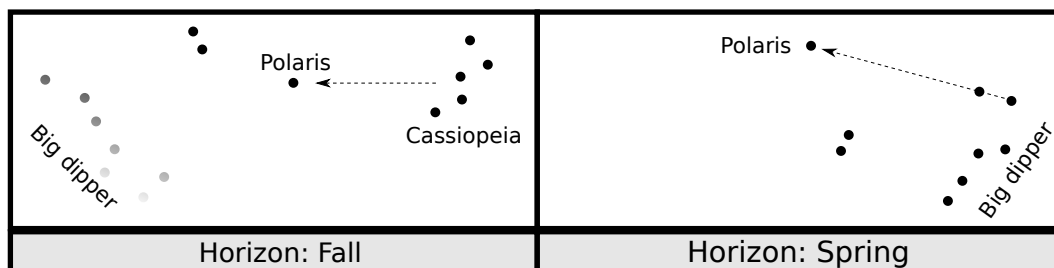
Do not proceed until the instructor or TA has checked your telescope collimation!

To polar align:

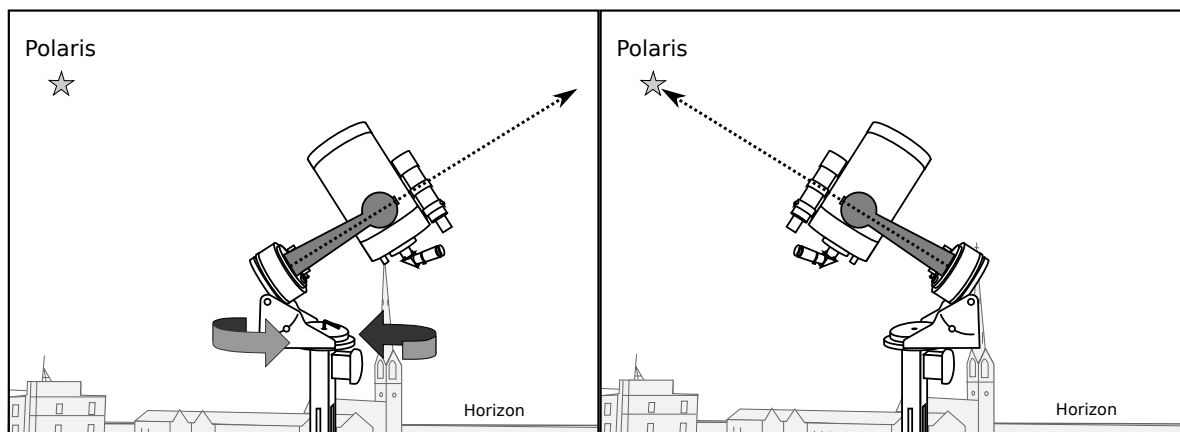
1. Find the North Star (Polaris). The horizon, when looking north, is illustrated below. Polaris will be above the Bell building, Berry Dorm, or St. Matthews, depending on where you stand.



2. Guide stars for finding Polaris are also shown. In the Fall, look for the first noticeable star to the left of the "W" shaped constellation Cassiopeia. In the Spring, use the line through the front two stars of the Big Dipper (dashed line) to find Polaris.



3. Use the Allen wrench to loosen the bolt connecting the wedge and pier, ONLY enough so that you can turn the wedge.
4. Rotate the wedge so that the base and tines (gray) point in the direction of Polaris.



5. Tighten the bolt connecting the wedge to the pier.
6. Plug in the telescope before using the telescope to observe stars.

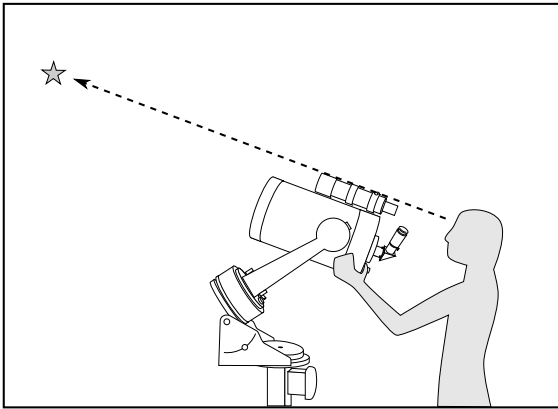
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Do not proceed until the instructor or TA has checked your telescope alignment!

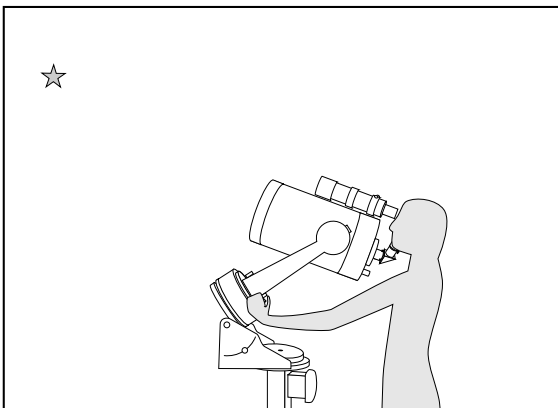
5 | Finding a star

To observe a star with the telescope:

1. Make a coarse adjustment to the telescope, so that when you look along the top, it aligns with the star you wish to observe.



2. The star should now appear in the finder scope when you look through it. NOTE: The stars you are asked to find are very bright, and will be significantly brighter than their neighbors when viewed through the finder.
3. While looking through the finder, make fine adjustments to the telescope pointing, until the star is in the cross hairs of the finder.



4. The star should now appear in the eyepiece of the telescope.