BRESSER

Telescope 70/700 NG

Art. No. 88-45000

GB Operating Instructions

Dear parents,

This product is ideal for children wanting to explore their world in a completely new way. The device is as such, easy to use and care for, rugged and good-looking.

More important to you and of course to us is that it is safe to use. During manufacture, we made sure that this product is as safe it can be for children to use. Some residual risk is, however, unavoidable. This product, after all, is not a toy in the usual sense but rather an optical instrument that children can use to experiment, research and discover their world.

That‘s why we request your cooperation here. These operating instructions were written for children but please read them through together with your child or children and answer his/her/their questions. Don‘t forget to explain possible risks. These are summarised under the heading „warnings“. Please adjust/set up the device together with your child or children and never allow any child to use any of our optical products unsupervised.

We hope all users and their parents will enjoy our products.

Your Bresser team

Dear junior researcher,

Congratulations on becoming the proud owner of this product.

You‘ll be amazed when reading these instructions just how much can be done and explored with your new device.

Take a look and emerge yourself into the adventurous world of nature and discovery.

It really is exciting and a lot of fun discovering the world with this product.

Before you get started, read the operating instructions fully, as there are a few things you need to know to get the best out of your new device.

The „Warnings“ should be read carefully. Use the product exactly as per the operating instructions to avoid any risk or injury. Keep these instructions in a safe place for later reference. If you give the device away or make a present of it make sure these instructions accompany it.

And now it just remains to say, „Have loads of fun researching and discovering“

Pia

RISK to your child!

Never look through this device directly at or near the sun. There is a risk of BLINDING YOURSELF!

Children should only use this device under supervision. Keep packaging materials (plastic bags, rubber bands, etc.) away from children. There is a risk of SUFFOCATION!

Fire/Burning RISK!

Never subject the device - especially the lenses - to direct sunlight. Light ray concentration can cause fires and/or burns.

RISK of material damage!

Never take the device apart. Please consult your dealer if there are any defects. The dealer will contact our service centre and send the device in for repair if needed.

Do not subject the device to temperatures exceeding 60 C.

TIPS on cleaning

Clean the lens (objective and eyepiece) only with the cloth supplied or some other soft lint-free cloth (e.g. micro-fibre). Do not use excessive pressure - this may scratch the lens.

Dampen the cleaning cloth with a spectacle cleaning fluid and use it on very dirty lenses.

Protect the device against dirt and dust. Leave it to dry properly after use at room temperature. Then put the dust caps on and store the device in the case provided.

RESPECT privacy!

This device is meant for private use. Respect others' privacy – do not use the device to look into other people's homes, for example.

DISPOSAL

Dispose of the packaging material/s as legally required. Consult the local authority on the matter if necessary.

Your telescope has the following parts (Figures 1–3)

1 Telescope tube
2 Finder
3 Adjusting crews for finder
4 Tube opening
5 Objective lens
6 Eyepiece holder
7 Focus adjustment knob
8 Tube holder
9 Tripod head (with pole elevator cradle and mount)
10 Accessory tray
11 Locking clips (on tripod)
12 Mounting bracket for the tray (on division bar)
13 Tripod legs
14 Flexible shaft (long)
15 Flexible shaft (short)
16 Tripod leg brace
17 Latitude control rod
18 3 Eyepices (Ø 31.7 mm or 11/4”): f = 20 mm, f = 12 mm, f = 4mm
19 Zenith mirror
20 Inverting lens 1.5x

Parts of the Eyepiece holder (Figure 8)
21 Clamping screw
21a Lens Cover

Parts of the Zenith Mirror (Figure 9)
22 Clamping screw

Parts of the Finder (Figure 10)
23 Front lens mount (objective lens)
23a Objective lens counter-ring
24 Finder holder

Parts of the Telescope Tube (Figure 12)
25 Lens Cover

Axel with flexible shaft (Figure 13)
26,27 Clamping screw for the flexible shaft

Pole elevator cradle (Figure 14)
28 Clamping screw for pole elevator cradle
29 Latitude control rod
30 Tilt plate

Parts of the Mount (Figure 15)
26 Flexible shaft (for counterweight shaft, for tracking)
27 Flexible shaft (for declination shaft)
31 Vertical clamp
31a Declination shaft
32 Dovetail adapter
33 Horizontal clamp

STEP I – Assembly

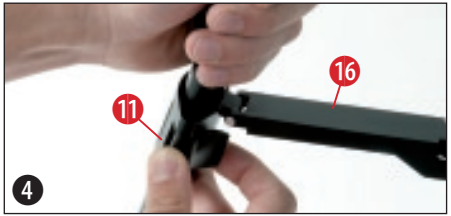
2. General Information regarding Assembly, Positioning

Before beginning with the assembly, choose a suitable position for your telescope.
It will help if you assemble this apparatus at a spot from where you have a clear view of the sky, a sturdy surface beneath you, and enough space.

Important: Tighten screws only as much as you can by hand - do not „over-tighten“ the screws.

3. Tripod

Take the three-legged tripod and set it vertically on the floor with the feet pointing downwards. Now take two of the tripod legs (13) and pull these legs carefully out away from each other, until they have reached their fully opened position. During this time, the entire weight of the



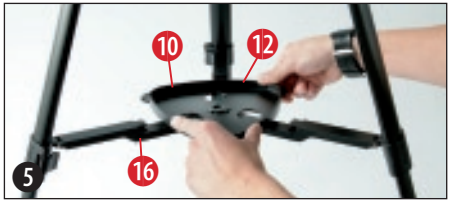
tripod rests on one leg. Finally, set the tripod down on all legs, so that it stands straight.

Loosen the three locking clips (11) (Figure 1 + 4) on the tripod legs, pull each individual tripod leg out until it has reached the desired length (see figure 4), close up the locking clips and set the tripod down on a sturdy, even surface.

TIP:
A small water level on the accessory tray can help you position your tripod horizontally.

4. Mounting the tray:

The accessory tray (10) (Figure 1 + 3) must be positioned with its flat side down in the middle of the tripod leg brace (16) (Figure 1), and then must be mounted by turning it 60° in a clockwise direction (Figure 5).



The three projections on the tray plate must match up to the mounting brackets on the division bars (12) (Figures 1 + 3) and must snap into place. If necessary, you may push the tripod leg brace downwards a little.

5. Tube

In order to mount the telescope tube (1) (Fig. 1), loosen the locking screw on the tube clamp (8) (Fig. 6) and open up the clamp.

Set the tube in the middle of the holder and snap the clamp shut again. Please screw the locking screw on the holder tightly, using your hand only.

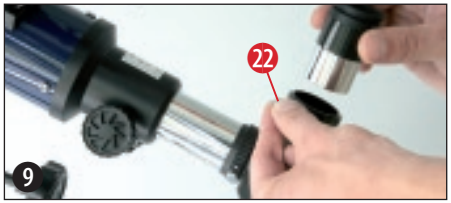
Now set the tube (and holder) onto the mount with the objective opening in the direction marked (N-marking on the tripod head, north point and telescope figure on the mount). Then fasten the tube holder with the clamping screw of the dovetail adapter on the mount head (Figure 7).

6. Inserting the Eyepiece

Three eyepieces (18) (Figure 2) and one zenith mirror (19) (Figure 2) come with your telescope. With the eyepieces, you can control the magnification of your telescope.

Before installing the eyepieces and the zenith mirror, take the lens cap (21a) out of the eyepiece holder (6) (Figure 1). Loosen the clamping screws (21) on the eyepiece holder and insert the zenith mirror. Then screw the clamp screws (21) back on.

Finally, in the same way (by opening and closing the clamp screws) secure the 20-mm eyepiece in the zenith mirror.



Be sure that the entrance of the eyepiece (the end you look into) is facing straight upwards. This will make observation easier. Alternatively, loosen the clamp screws (21) on the eyepiece holder and turn the zenith mirror into this position.

7. Mounting and Adjusting the Finder

Slide the foot of the finder holder (24) completely into the finder holder base on the telescope tube (Figure 10). The finder holder will snap into place. Be sure that the objective lens on the finder is pointing in the direction of the front tube opening.

On the finder holder, there are adjusting screws for the finder (3) (Figure 1): two clamp screws (black) and one spring-loaded counter screw (silver). The clamp screws (black) are to be screwed (equally as far) in so that you can feel some resistance; the finderscope is then secure.

Before beginning an observation, it is absolutely necessary that you align the finderscope – the finderscope and the main telescope must point to exactly the same position. Here is the process for alignment:

Take the 20-mm eyepiece, set it into the zenith mirror and aim the main telescope at an easy to find, clearly defined earthbound object (Figure 11, e.g. church steeple, gable of a house). The object should be at least 200-300 meters away. Hone in on the object so that it is exactly in the middle of the field of vision when you look through the eyepiece.

The image reproduced will be upright, but rotated around its vertical axis (you will see a mirror-image). In the finder, however, the reproduced image will be upright and its sides will not be reversed, as above. Now turn one of the two clamp screws (right/left) of the finderscope while looking continuously through the finder. Continue to turn until the finder's crosshairs are exactly over the position that corresponds to what you see when you look through the eyepiece of the main telescope.

Focusing the finderscope:
Turn the front lens mount (23) one to two rotations to the left. Now you can adjust the counter-ring (23a) by itself.

Look through the finder and focus on a far-away object. Turn the front lens mount (23) in one direction or another until the object appears in focus. Now screw the counter-ring (23a) in the direction of the lens mount.

8. Lens Covers

In order to protect the interior of your telescope from dust and dirt, the opening of the tube is protected by a lens cover. There is also a lens cover (21) on the eyepiece holder (6) (Figure 1).

For observing, take the caps off the openings.

9. Flexible shafts

In order to facilitate the exact fine adjustment of the declination- and right ascension shafts, the flexible shafts have been placed on the holders of both these shafts, in the places designed for that purpose.

The long flexible shaft (14) (Figure 1) is mounted parallel to the telescope tube. It is secured with a clamp screw (16, 17) on the designated indentation on the shaft.

The short flexible shaft (15) (Figure 1) is mounted sideways. It is secured with a clamp screw (16, 17) on the designated indentation on the shaft. Your telescope is now ready for use.

STEP II – Using the Telescope

1. Operation –Mounting

Your telescope comes with a mount that gives you two possibilities for observation.
A: Azimuthal = ideal for viewing objects on the Earth (terrestrial observation)
B: Parallactic = ideal for viewing objects in the sky (astronomical observation)

Regarding A:
In azimuthal mode, the telescope swings horizontally and vertically.

Loosen the pole elevator clamp screw (28) and lower the tilt plate (30) until it is horizontal (in other words, until it stops). Screw the pole elevator clamp screw back on.

Loosen the vertical clamp (31) and set the tube in a horizontal position. Screw the clamp back on.

By turning both flexible shafts (14, 15) (Figure 1), the telescope can be moved horizontally and vertically.

Regarding B: Kapitel (3–11).

2. Set-Up (at night)

A dark location is very important for many observations, as bothersome lights (lamps, lanterns) can have quite a negative effect on the detail and clarity of the telescope image.

If you leave a bright room at night to go outside, your eyes need time to adjust to the darkness. After approx. 20 minutes, you can begin with the astronomical observation.

Do not observe from closed spaces, and set up your telescope with the accessories approx. 30 minutes before beginning observation; this will ensure that the temperatures inside the tube have adjusted.

In addition, you should be careful to set your telescope on a level, stable surface.

3. First time Set-up

Loosen the pole elevator clamp screw (28) and set the tilt plate (32) roughly to the latitude of your location, according to the scale of the latitude control rod (29) - in Germany, this is about 50°. Point the part of the tripod with the North-marking (N) in a northerly direction. The upper side of the tilt plate will also be pointing north. The latitude control rod will be pointing south.

4. Positioning of Geographical Latitude

From a street map, an atlas, or the Internet, find out your location's angle of latitude. Germany lies between 54° (Flensburg) and 48° (Munich) north geographical latitude. Now loosen the pole elevator clamp screw (28) and tilt the tilt plate (32) until the number on the latitude control rod (29) that is next to the clamp is the same number as your location's angle of latitude (e.g. 51°).

TIP:
The angle of latitude can always be found in an atlas on the right side, or on the left side of a map. You can get more information at your city hall, your land registry office, or on the Internet: for instance, at www.heavens-above.com. There, under "Anonymous user > Select," you can choose your country; the relevant information will then come up.

5. Final orientation

Turn the declination shaft (8) as well as the telescope holder upwards 90° (white arrow markings at the front of the mount will be across from each other). Set the tube the right way around (see telescope illustration and north arrow) in the holder and tighten the clamp screw. The eyepiece of the telescope is now pointing at the ground; the objective lens is pointing at the North Star. Loosen first the clamp of the latitude control rod and then the clamp of the declination shaft, and bring the North Star into the middle of the eyepiece field of vision.
Finally, retighten the clamp. From this point onward, the tripod may not be moved or adjusted because the orientation will be lost.

The telescope is now properly oriented. This procedure is necessary for tracking celestial bodies.

6. Tracking- and/or Observation Position

Loosen the vertical clamp (8) and tilt the telescope tube 90° downwards. Loosen the horizontal clamp (33) and turn the telescope 180° to the right or left, until the objective lens is pointing in the direction of the sky.

Retighten all clamps so that you can track with the flexible shaft.

The manual operation of the counterweight axis (right ascension axis, R.A. axis) via the flexible shaft (26) allows for the rotation of the Earth in such a way that the positioned object always stays in the eyepiece field of vision.

If you would like to switch to another object, loosen the clamps, swing with the tube in the proposed direction and retighten the clamps. The fine adjustment is then performed with the flexible shafts (14, 15) (Figures 1).

7. Finder

Your telescope is now roughly aligned and set up.

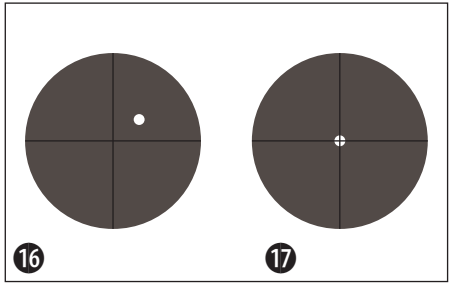
In order to obtain a comfortable observation position, carefully loosen the screw on the tube clamp (8) (Figure 1) so that you can turn the telescope tube. Bring the eyepiece and the finderscope into a position from which you can observe comfortably.

The fine adjustment happens with the help of the finderscope (2). Look through the finder and try to hone in on, for instance, the North Star (Figure 16), positioning it in the middle of the finder's crosshairs (Figure 17). For the exact adjustment, the shaft of the counterweight axis (26) as well as the shaft of the declination axis (27) will be helpful.

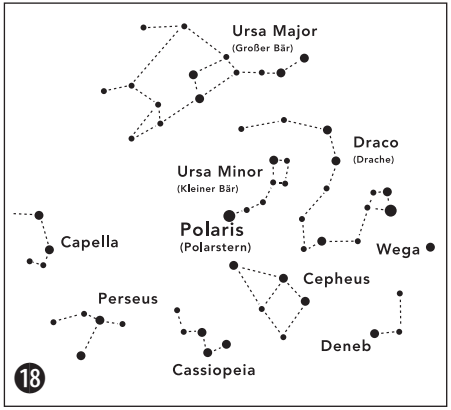
8. Observation

After you have located the North Star in the finder, you will be able to recognize the North Star when you look through the eyepiece of the telescope. If needed, you can angle the telescope even more exactly toward the star (with the help of the flexible shafts), or you can adjust the focus with the focus knob (7) (Figure 1).

Additionally, you can now switch to a higher magnification by changing the eyepiece (to a smaller focal width). Please be aware that the magnification of the stars is barely perceptible.



TIP:
Eyepieces are lens systems designed for your eye. In an eyepiece, the clear image that is generated in the focal point of a lens is captured (in other words, made visible) and magnified still more. Eyepieces with various focal widths are necessary in order to achieve various degrees of magnification. Begin each observation with an eyepiece with a low magnification (= large focal width, e.g. 20 mm).



9. Finding stars

In the beginning, you will certainly find it difficult to orient yourself in the sky, since stars and constellations are always moving, and their position in the sky varies according to the season, date, and time.

The North Star is an exception to this. If you were to imagine the polar axis of the Earth extending out into space, it would approximately hit the North Star. The so-called north celestial pole is the starting point for all star charts.

On the drawing (Figure 18), you see a number of the more familiar constellations and star clusters, which are visible throughout the year. The position of the stars is, of course, dependent on date and time.

If you have fixed your telescope on one of these stars, you will notice that within a short time it disappears from the eyepiece field of vision. In order to compensate for this effect, operate the flexible shaft (17) of the counterweight axis, und your telescope will follow the apparent path of this star.

10. Accessories

Three eyepieces (18) (Figure 2) come with your telescope. By switching the eyepieces, you can control the magnification of your telescope.

Note:

Focal width of the telescope tube :	Focal width of the eyepiece =	Magnification
Let's calculate:	700 mm : 20 mm = 35x	
	700 mm : 12 mm = 58x	
	700 mm : 4 mm = 175x	

The zenith Mirror (19) (Figure 2) produces an image reversal (mirror-image) and is only used for astronomical observation.

In order to see an image that is upright and properly orientated side-to-side (no mirror-image, in other words), you must use the inverting lens that came with your telescope. Loosen the clamping screw (39) and take the zenith mirror out of the eyepiece holder (6) (Figure 1). Then set the inverting lens (20) (Figure 2) straight into the eyepiece holder and retighten the clamping screws with your hand. Then, place the eyepiece (e.g. f = 20 mm) into the opening of the inverting lens and tighten the clamping screw there.

11. Dismantling the Telescope

Hopefully your observation session will have been interesting and successful; afterwards, it is recommended to store the telescope in a dry and well-ventilated room. Please do not forget to place the lens caps back onto the front tube opening and the eyepiece holder. All eyepieces and optical accessories should also be stored in their respective containers.

TIP:
The inverting lens is not suitable for astronomical observation. Here, work with just the zenith mirror and an eyepiece. For terrestrial observations and for viewing nature, you may use the inverting lens with an eyepiece.

Troubleshooting:

Problem	Solution
No image	Remove lens cap from lens opening
Fuzzy image	Adjust focus with focus adjustment knob
Focusing is not possible	Wait for temperatures inside tube to balance out (about 30 minutes)
Bad image	Never observe through a pane of glass.
Object of observation is visible in finder, but not in telescope	Align finder (see chapter 7)
Sluggish or stiff steering of the shafts	Balance telescope
Image is “askew,” even with zenith mirror	The eyepiece holder in the zenith mirror must be aligned vertically

1. Technical data:

- Double-lens system (achromatic) made of glass
- Alt-azimuth mount with equatorial wedge (Optimised mounting system with flexible shafts)
- Magnification: 35x – 262x
- Lens Diameter: 70 mm
- Focal Length: 700 mm
- 3 eyepieces: K-20 / K-12 / K-4 mm
- Diagonal Mirror
- 6x25 Viewfinder
- 1,5x Erecting lens
- Adjustable Aluminium Tripod

2. Possible objects for observation:

We have compiled and explained a number of very interesting celestial bodies and star clusters for you. On the accompanying images at the end of the instruction manual, you can see how objects will appear in good viewing conditions through your telescope using the eyepieces that came with it.

The Moon
The moon is the Earth's only natural satellite. Figure 19)
Diameter: 3.476 km
Distance: approx. 384 401 km

The moon has been known to humans since prehistoric times. It is the second brightest object in the sky (after the sun). Because the moon circles the Earth once per month, the angle between the Earth, the moon and the sun is constantly changing; one sees this change in the phases of the moon. The time between two consecutive new moon phases is about 29.5 days (709 hours).

Orion Nebula (M 42)
M 42 in the Orion constellation (Figure 20)
Right ascension: 05:32.9 (Hours: Minutes)
Declination: -05:25 (Degrees: Minutes)
Distance: 1.500 light years

With a distance of about 1500 light years, the Orion Nebula (Messier 42, abbreviation: M 42) is the brightest diffuse nebula in the sky – visible with the naked eye, and a rewarding object for telescopes in all sizes, from the smallest field glass to the largest earthbound observatories and the Hubble Space Telescope.

When talking about Orion, we're actually referring to the main part of a much larger cloud of hydrogen gas and dust, which spreads out with over 10 degrees over the half of the Orion constellation. The expanse of this enormous cloud stretches several hundred light years.

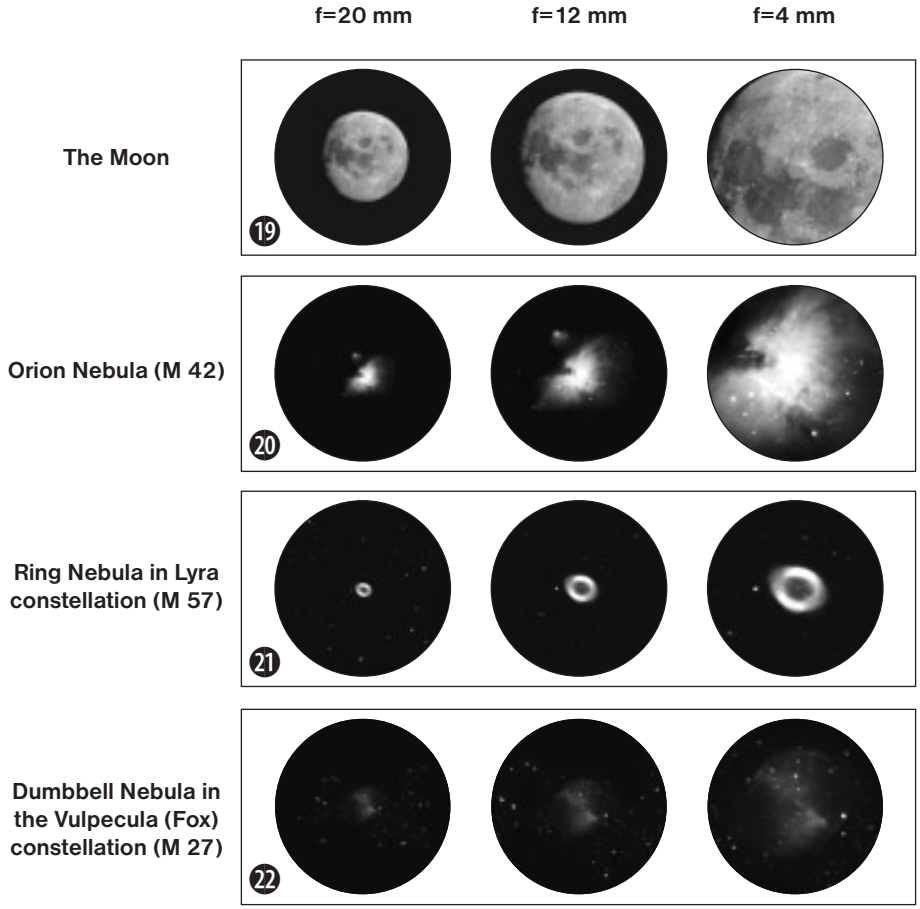
Ring Nebula in Lyra constellation (M 57)
M 57 in the Lyra constellation (Figure 21)
Right ascension: 18:51.7 (Hours: Minutes)
Declination: -+32:58 (Degrees: Minutes)
Distance: 2.000 light years

The famous Ring Nebula M 57 in the constellation of Lyra is often viewed as the prototype of a planetary nebula; it is one of the magnificent features of the Northern Hemisphere's summer sky. Recent studies have shown that it is probably comprised of a ring (torus) of brightly shining material that surrounds the central star (only visible with larger telescopes), and not of a gas structure in the form of a sphere or an ellipsis. If you were to look at

the Ring Nebula from the side, it would look like the Dumbbell Nebula (M27). With this object, we're looking directly at the pole of the nebula.

Dumbbell Nebula in the Vulpecula (Fox) constellation (M 27)
M 27 in the Fox constellation (Figure 22)
Right ascension: 19:59.6 (Hours: Minutes)
Declination: -+22:43 (Angle: Minutes)
Distance: 1.250 light years

The Dumbbell Nebula (M 27) in Fox was the first planetary nebula ever discovered. On July 12, 1764, Charles Messier discovered this new and fascinating class of objects. We see this object almost directly from its equatorial plane. If you could see the Dumbbell Nebula from one of the poles, it would probably reveal the shape of a ring, and we would see something very similar to what we know from the Ring Nebula (M 57). In reasonably good weather, we can see this object well even with small magnifications.



3. Telescope ABC's

What do the following terms mean?

Barlow Lens:
The Barlow Lens was named after its inventor, Peter Barlow, a British mathematician and physicist who lived from 1776-1862. The lens can be used to increase the focal width of a telescope. Depending on the type of lens, it is possible to double or even to triple the focal width. As a result, the magnification can of course also be increased. See also "Eyepiece."

Focal width:
Everything that magnifies an object via an optic (lens) has a certain focal width. The focal width is the length of the path the light travels from the surface of the lens to its focal point. The focal point is also referred to as the focus. In focus, the image is clear. In the case of a telescope, the focal widths of the telescope tube and the eyepieces are combined:

Lens:
The lens turns the light which falls on it around in such a way so that the light gives a clear image in the focal point after it has traveled a certain distance (focal width).

Eyepiece:
An eyepiece is a system made for your eye and comprised of one or more lenses. In an eyepiece, the clear image that is generated in the focal point of a lens is captured and magnified still more.

There is a simple formula for calculating the magnification:
Focal width of the telescope tube / Focal width of the eyepiece = Magnification

You see: In a telescope, the magnification depends on both the focal width of the telescope tube and the focal width of the eyepiece.

From this formula, we see that if you use an eyepiece with a focal width of 20 mm and a telescope tube with a focal width of 600 mm, you will get the following magnification:
600 mm / 20 mm = 30 times magnification

Inverting lens:
The inverting lens is set into the eyepiece holder of the telescope before the eyepiece itself. This lens can produce an additional magnification (mostly around 1.5x) via the integrated lens in the eyepiece. As the name suggests, the image will be turned around if you use an inverting lens, and appears upright and even properly oriented on the vertical axis.

Magnification:
The magnification corresponds to the difference between observation with the naked eye and observation through a magnification apparatus (e.g. a telescope). In this scheme, observation with the eye is considered "single", or 1x magnification. Accordingly, if a telescope has a magnification of 30x, then an object viewed through the telescope will appear 30 times larger than it would with the naked eye. See also "Eyepiece."

Zenith mirror:
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 zenith mirror appears upright, but rotated around its vertical axis (what is left appears right and vice versa).

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