

Thunder Bay Centre

Royal Astronomical Society of Canada



Observer's Certificate

Level II



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The Thunder Bay Centre introduced the **Observing Certificate** program in January 2000. The original program has now been modified and divided into two units, *Level I* and *Level II*.

The purpose of this program is to assist the amateur astronomer identify some of the more obscure constellations and stars along with a more difficult selection of celestial objects and events in the night sky.

It is expected that the observer has completed the beginner level *Observer's Certificate Level I* program. The *Observer's Certificate Level II* program is intended to help refine your observing techniques and practices even more.

Upon completion of the requirements, the *Observer's Certificate Level II* will be presented to the observer at the next general meeting and their achievement mentioned in the Centre's newsletter "**The Northern Sky**".

Once this exercise has been completed you will be ready for the more advanced observing programs such as the Centre's *Observer's Certificate Level III* (under review) as well as those offered through the RASC National's Observing Committee.

Requirements for the *Observer's Certificate Level II* are as follows:

1. You shall not use the "Go-To" function of a computerized mount to find these objects.
2. A star map will be needed to locate some of these objects.

All observations as recorded in your Observer's Log must include:

1. Object name
2. Time and date of observation (Specify EST, CST, EDT or CDT as well as 12/24 hr. system) and date (DD/MM/YYYY)
3. Diagram and position of object (Azimuth and Altitude) as required
4. Observing conditions -- Refer to "Seeing and Transparency"
5. Observing method: Naked eye, Binoculars (record magnification and aperture) or Telescope (record type and aperture size of telescope as well as focal lengths of telescope and oculars used)
6. Appearance of object as observed (Colour, Size, Brightness, etc.) as required
7. Submit observations legibly and organized on paper. The Observing Committee will confirm and sign/date each category on your certificate no later than the next meeting. (Photographic images are acceptable as long as the entire constellation, major stars and object under observation is/are labelled and can be identified during the reviewing session.)
8. When all observing parameters have been completed and signatures obtained, the Centre Seal will be awarded and placed on your certificate. This will indicate your achievement and success in our observing program.
9. Upon completion of the requirements, the *Observer's Certificate Level II* will be presented to the observer at the next general meeting and their achievement mentioned in the Centre's newsletter "**The Northern Sky**".

Note:

This list of requirements cannot cover all situations that may occur during these observations and certain individuals may have access problems which would limit their ability to complete this certificate. Any deviations from the listed requirements will require approval from the committee prior to submitting results for consideration.

Observing Certificate Level II

Constellations (*N*) (20 Required)

Spring

- Canes Venatici
- Leo Minor
- Coma Berenices
- Corvus
- Serpens (Caput)
- Corona Borealis

Summer

- Cepheus
- Ophiuchus
- Lacerta
- Hercules
- Delphinus
- Scutum

Autumn

- Cetus
- Aries
- Sagitta
- Pisces
- Aquarius
- Vulpecula

Winter

- Camelopardalis
- Cancer
- Lepus
- Triangulum
- Monoceros
- Lynx

Major Stars (*N*) (15 Required)

Spring

- ϵ Boötis
- γ Virginis
- η Ursae Majoris
- β Leonis

Summer

- β Lyrae
- β Cygni
- γ Aquilae
- β Librae

Autumn

- β Persei
- α Andromedae
- γ Andromedae
- α Draconis

Winter

- η Tauri
- γ Orionis
- κ Orionis
- β Tauri
- δ Orionis
- β Canis Majoris
- β Ursae Minoris
- β Aurigae

Multiple Star Systems (10 Required)

Spring

- ζ (Zeta) Ursae Majoris (*N/B*)
- α (Alpha) Canum Venaticorum (*T*)
- γ (Gamma) Leonis (*T*)
- μ (Mu) Bootis (*B*)
- ξ (Xi) Bootis (*T*)
- γ (Gamma) Virginis (*T*)
- ι (Iota) Cancri (*T*)
- α (Alpha) Ursae Minoris (*T*)

Summer

- α (Alpha) Librae (*B*)
- β (Beta) Scorpii (*T*)
- β (Beta) Cygni (*T*)
- ϵ (Epsilon) Lyrae (*B/T*)
- α (Alpha) Herculis (*T*)
- ρ (Rho) Herculis (*T*)
- \omicron (Omicron) Cygni (*B*)
- ρ (Rho) Ophuchi (*B*)
- 61 Cygni (*T*)
- γ (Gamma) Delphini (*T*)

Autumn

- α (Alpha) Capricorni (*N*)
- ν (Nu) Draconis (*B/T*)
- β (Beta) Capricorni (*B*)
- γ (Gamma) Andromedae (*T*)
- γ (Gamma) Arietis (*T*)
- η (Eta) Cassiopeiae (*T*)

Winter

- α (Alpha) Geminorum (*T*)
- σ (Sigma) Orionis (*T*)
- γ (Gamma) Arietis (*T*)
- β (Beta) Monocerotis (*T*)
- γ (Gamma) Leporis (*B*)
- δ (Delta) Orionis (*B*)

Planets (5 Required)

- Mercury (*N*)
- Venus (*N*)
- Mars (*N*)
- Jupiter (*N*)
- Saturn (*N*)
- Uranus (*N/B/T*)
- Neptune (*B/T*)

Deep Sky (10 Required)

Spring

- M-44 Cancer (Gal. Cl.) (*N/B*)
- M-3 Canes Venatici (Glob. Cl.) (*B*)
- M-81/82 Ursa Major (Galaxies) (*B/T*)
- M-51 Canes Venatici (Galaxy) (*B/T*)
- M-101 Ursa Major (Galaxy) (*T*)

Summer

- M-13 Hercules (Glob. Cl.) (*B*)
- Collendar 399 (Coathanger) (asterism) (*N/B*)
- M-11 Scutum (Wild Duck) (Open Cl.) (*B*)
- M-27 Vulpecula (Dumbell) (Pl. Neb.) (*B/T*)
- M-57 Lyra (Ring) (Pl. Neb.) (*T*)

Autumn

- M-103 Cassiopeia (Open Cl.) (*B/T*)
- NGC 869/884 Perseus (Double Cluster) (*N/B*)
- NGC 7293 Aquarius (Helix) (Pl. Neb.) (*B/T*)
- M-1 Taurus (Supernova Remnant) (*T*)

Winter

- M-41 Canis Major (Open Cl.) (*B/T*)
- M-34 Perseus (Open Cl.) (*B/T*)
- M-36 Auriga (Open Cl.) (*B/T*)
- M-47 Puppis (Open Cl.) (*B/T*)

Other Astronomical Events (6 Required)

- Eclipse of the Moon (Total/Partial/Penumbral)
- Earth Shine
- Occultation (Lunar)
- Planetary/lunar Grouping (3 bodies)
- Aurora Borealis
- Meteor Shower
- Orbiting artificial satellites (at least 3)
- International Space Station
- Iridium Flare
- Comet
- Asteroid
- Zodiacal Light

- (*N*) Naked eye
- (*N/B*) Naked eye/Binocular
- (*B*) Binocular
- (*B/T*) Binocular/Telescope
- (*T*) Telescope

Bayer Designations for Star Identification

The Bayer designation of a specific star is a designation in which a star is identified by a *Greek letter* followed by the genitive form of its parent constellation's *Latin name*.

<u>Greek Letter</u>	<u>Name</u>	<u>Phonetic Sound</u>
α	Alpha	al-fah
β	Beta	bay-tah
λ	Gamma	gam-ah
δ	Delta	del-tah
ε	Epsilon	ep-si-lon
ζ	Zeta	zay-tah
η	Eta	ay-tay
θ	Theta	thay-tah
ι	Iota	eye-o-tah
κ	Kappa	cap-ah
λ	Lambda	lamb-dah
μ	Mu	mew
ν	Nu	new
ξ	Xi	zzEye
ο	Omicron	om-ah-cron
π	Pi	pie
ρ	Rho	row
σ	Sigma	sig-ma
τ	Tau	tawh
υ	Upsilon	oop-si-lon
φ	Phi	figh or fie
χ	Chi	kigh
ψ	Psi	sigh
ω	Omega	o-may-gah

Measuring Atmospheric Conditions

Seeing

Seeing is the measure of the steadiness of the atmospheric conditions when observing planets and stars at night. It is affected mainly by heat and turbulence in the atmosphere.

The Antoniadi scale is a traditional scale for grading the seeing conditions is as follows:

- I. Perfect seeing, without a quiver
- II. Slight undulations, with moments of steadiness lasting several seconds
- III. Moderate seeing, with large tremors and shimmer
- IV. Poor seeing, constant shimmer and undulations
- V. Very bad seeing, details lost and poor image resolution

Transparency

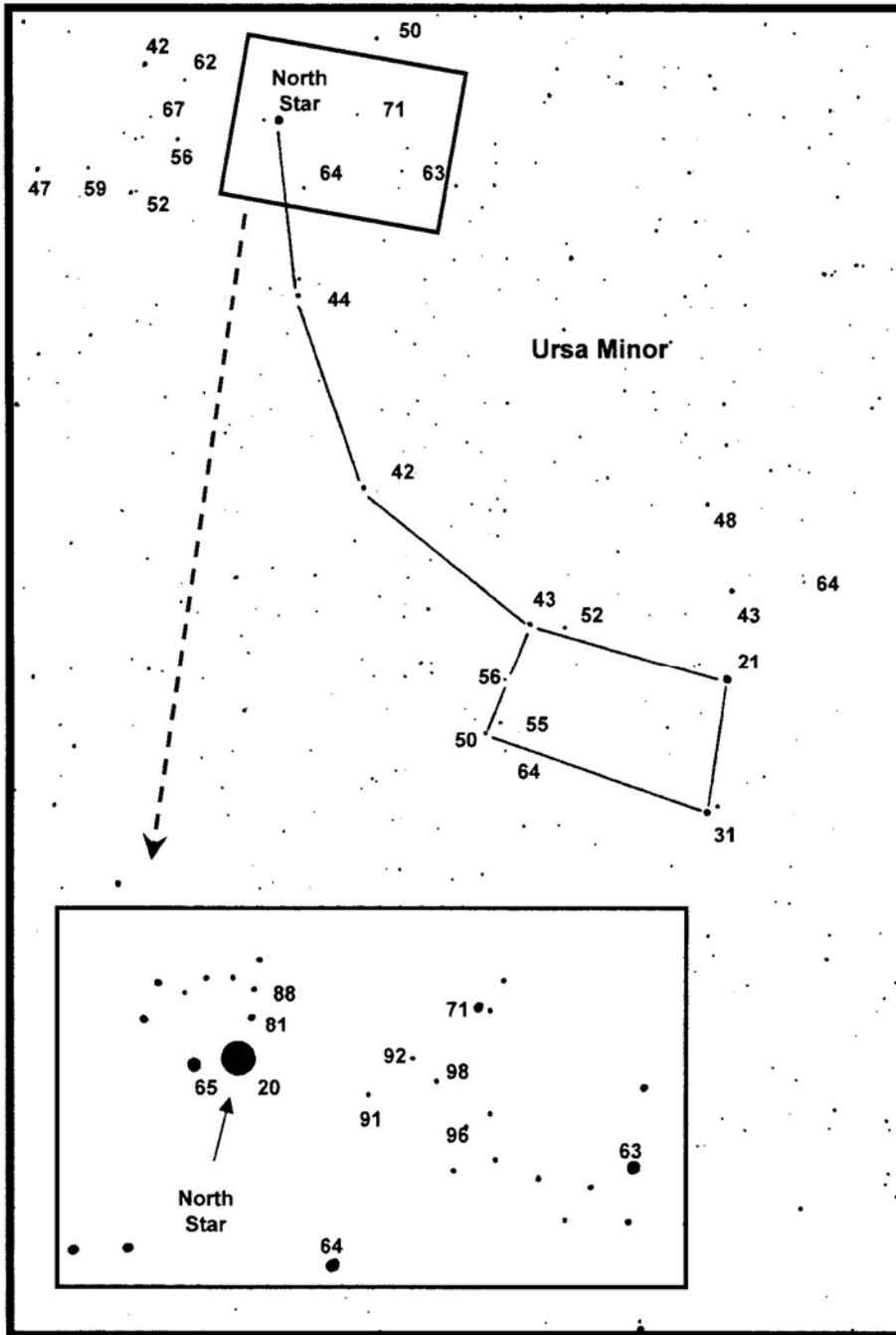
Transparency, or clarity, of the atmosphere is a measure of how bright the stars appear. Haze, smoke, particulates, and smog all contribute to the loss of atmospheric clarity. Light pollution washes out the fainter stars as well.

A scale for transparency is more standard and simple to follow:

Most observers rate night sky atmospheric clarity by locating the faintest stars they can see with the naked eye at the time of their observations. The scale runs from 0 (only the brightest stars are visible such as Sirius or Vega) to 6.0 (faintest stars visible to the unaided eye). Refer to a star chart for stellar brightness (magnitudes). Many observers use the stars of the “Little Dipper” in Ursa Minor to determine the transparency of the night sky at observing time.

Like everything else in astronomy, the more experience you gain, the easier it is to gauge and measure the seeing and transparency levels. Always include an entry of these two factors with your observations in your observing log.

Transparency



One method to help determine the transparency of the night sky is to locate the faintest star that can be seen with the naked eye at your observing site. The numbers designate the magnitudes of various stars with the decimal points omitted.