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## ASTRONOMY

### *Section 1 : Award List*

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**Campers attempting this award must be Junior or equivalent aged Day campers:**

1. Junior Astronomer

**Proficiency in Astronomy requires all of the awards in the order listed below:**

1. Lunar
2. Solar
3. Telescope
4. Constellation
5. Star ID

**Proficiency in Astronomy also requires any 2 of the awards listed below:**

1. Lecture Citation
2. Sundial
3. Mythology
4. Mercury
5. Gemini
6. Apollo
7. Creative Constellation

**Upon completion of the proficiency award requirements, the following award may be attempted:**

1. Astrophysicist

**Other "fun" awards may be earned at astronomy:**

1. UFO Award

### *Section 2: General Rules & Safety*

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1. General Camp Emergency Procedures (search siren, fire, severe weather)
2. Maximum ratio of staff to participant is 1:20.
3. Any age can participate.
4. Staff supervision required for telescope use.





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5. Only use the stairs to go to the observatory (poison ivy and erosion).
6. Rocket building must be closely supervised.
7. Campers must be at least 20 feet away during rocket launches.

### ***Section 3: Award Requirements***

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#### **Junior Astronomer Award**

##### ***Objective***

- To learn about what astronomy is and about the stars and our solar system.

##### ***Prerequisites***

- Must be a Junior camper or Junior Day camper

##### ***Safety Rules***

- General camp safety rules.
- Do not point flashlights in other people's eyes.
- Do not point flashlights toward the dome or any telescopes.
- Stay with your partner at night.

##### ***Knowledge Required***

- What are the 9 planets, what is it like on the Moon, name 5 constellations.

##### ***Skills Required***

- Go stargazing at the observatory
- Identify the Big Dipper.

#### **Lunar Award**

##### ***Objective***

- Campers will gain an understanding of the relationship between the Earth and its Moon.

##### ***Prerequisites***

- None

##### ***Safety Rules***

- General Camp Rules
- Do not enter the Astronomy Hut without permission.

##### ***Knowledge Required***

- Basic knowledge about the Moon and the effects of the Moon's orbit on the Earth.

##### ***Skills Required***

- Basic knowledge of theory.

#### **Solar Award**

##### ***Objective***

- Campers will gain an understanding of solar system.

##### ***Prerequisites***

- Lunar Award

##### ***Safety Rules***

- General Camp Rules



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- Do not enter the Astronomy Hut without permission.

#### ***Knowledge Required***

- Basic knowledge about the planets and the solar systems.

#### ***Skills Required***

- Basic knowledge of theory

## **Telescope Award**

### ***Objective***

- Campers will learn the basic theory behind telescopes. They will also learn the parts of the telescope and how to use one.

### ***Prerequisites***

- Lunar Award
- Solar Award

### ***Safety Rules***

- General Camp Rules
- Do not use telescopes without supervision.
- Never look at the Sun through a telescope.

### ***Knowledge Required***

- Basic knowledge about the different types of telescopes and how they work.

### ***Skills Required***

- Demonstrate the safe observation of Sunspots and locate 6 celestial objects.

## **Constellation Award**

### ***Objective***

- To learn about constellations, their uses, and how to identify them..

### ***Prerequisites***

- Lunar Award
- Solar Award
- Telescope Award

### ***Safety Rules***

- General camp safety rules.
- Do not point flashlights in other people's eyes.
- Do not point flashlights toward the dome or any telescopes

### ***Knowledge Required***

- Basic theory and knowledge of constellations and their uses.

### ***Skills Required***

- Identify 10 constellations at night.

## **Star I.D. Award**

### ***Objective***

- To learn about the types of stars and star groups, the physics behind them, and how to locate them at night.



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### ***Prerequisites***

- Lunar Award
- Solar Award
- Telescope Award
- Constellation Award

### ***Safety Rules***

- General camp safety rules.
- All special Astronomy rules so far.

### ***Knowledge Required***

- Basic theory and knowledge about stars and groups of stars.

### ***Skills Required***

- Identify 20 stars at night.
- Locate 5 types of star clusters using the Dynascope.

## **Lecture Citation Award**

### ***Objective***

- To learn about the basic presentation skills necessary for making an informative and interesting scholarly presentation

### ***Prerequisites***

- Lunar Award
- Solar Award

### ***Safety Rules***

- General camp safety rules.

### ***Knowledge Required***

- Basic knowledge of a food presentations.

### ***Skills Required***

- A 10 minute presentation to the astronomy class on a relevant topic of interest to the camper, chosen with the help of a staff person.

## **Sundial Award**

### ***Objective***

- To learn the theory and practical application of Sundials.

### ***Prerequisites***

- Lunar Award
- Solar Award

### ***Safety Rules***

- General camp safety rules.

### ***Knowledge Required***

- Basic theory and knowledge of Sundials.

### ***Skills Required***

- Build a Sundial
- Be able to tell time using the Sundial that you built.



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## Mercury Award

### *Objective*

- To learn the basic parts of rockets and the safety rules for launching them.

## Mythology Award

### *Objective*

- To learn about the mythology behind the names of constellations and stars.

### *Prerequisites*

- Lunar Award
- Solar Award
- Telescope Award
- Constellation Award

### *Safety Rules*

- General camp safety rules.
- Do not point flashlights in other people's eyes.
- Do not point flashlights toward the dome or any telescopes.

### *Knowledge Required*

- Basic knowledge of mythological characters and events.

### *Skills Required*

- Identify 10 constellations with mythological names and tell the story that lies behind each name.

## Astrophysicist Award

### *Objective*

- To learn the fundamentals of astrophysics.
- To demonstrate proficiency in telescope use.
- To demonstrate self-learning through use of camp resources.

### *Prerequisites*

- Proficiency in Astronomy.

### *Safety Rules*

- General camp safety rules.
- All Astronomy program safety rules.

### *Knowledge Required*

- Basic theory and knowledge of light, optics, spectroscopes, and the celestial sphere.

### *Skills Required*

- Log telescope observations of:
  - The Sun
  - The Moon
  - 2 of the following planets, Venus, Mars, Jupiter, or Saturn
  - 5 stars
  - 5 binary stars
  - 5 galaxies
  - 5 nebulae
- Locate 10 stars of the 1st or 2nd magnitude in the evening sky



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- Demonstrate how a star finder works, showing the changing positions of the constellations during a 24-hour period, and during a 12 month cycle.
- Locate 10 stars of the 1st or 2nd magnitude in the evening sky.
- Name the 20 brightest stars.

## **UFO Award**

### ***Objective***

- The camper will learn facts and myths about UFO's

### ***Prerequisites***

- None

### ***Safety Rules***

- General camp safety rules.

### ***Knowledge Required***

- Basic knowledge of UFO's
- Characteristics of UFO's
- Physical Effects of UFO's
- History of UFO's

### ***Skills Required***

- None

## ***Section 4: Theory Sheets***

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A clean master copy of each theory sheet, with all diagrams etc ready for copying & distribution.

- Junior Astronomer
- Lunar
- Solar
- Telescope
- Constellation
- Star Identification
- Lecture Citation
- Sun Dial
- Mythology
- Astrophysicist

## ***Section 5: Day-by-day schedule***

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### **Evaluating Ability:**

Campers should not all be treated the same from Monday. Return campers, stayovers, or campers more experienced in Astronomy will get frustrated if each Monday starts over again. Returning campers should know what awards they have completed. The award card file for Astronomy should



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list awards that a camper has completed in prior years. Ask campers when they sign up on Sunday night what award they think they have. On Monday, have campers start on the next award in the proficiency sequence. Campers who have stayed-over should begin the next award, help out with getting new campers started, or continue working on the project or theory that they started the previous week.

As the week goes on, campers should be observed to make sure that they are successfully completing the award goals that they set out to achieve at the start of the week. Campers who are unsuccessful will likely be so because they are no longer interested in what they started. In this case you can either fire them back up or steer them into something of greater interest.

### **Sunday to Saturday schedule for teaching (assumes 3 staff: A, B, C).**

Sunday: Program Sign-up

- **Skit:** Stress stargazing, the overnight on Thursday and the Rocketry. These things are fun and campers will like learning in order to be able to do them.  
**Sign –up: Continue pumping up the program, be loud and obnoxious.**

#### **Periods 1 to 4 – Theories:**

- with help of Star ID campers (part of proficiency requirement).  
**Lunar then Solar, then Telescope then Constellation**
- With help of Star ID & campers working on other awards.  
Experiential Learning with Juniors and Day Camp, include a tour of the Observatory.
- Rocketry** Start  
Mercury's with theory, then how to use rocket instructions. Have older campers help. Give the "Rocket Show", showing the rockets the campers can buy on Tuesday. Be sure to pump up the cheaper rockets as some kids won't have enough money to buy a big one.

Advanced award campers can study, work on project, or assist beginner campers.

**Star Gazing:** Run Star Gazing if the night is clear.

#### **Tuesday:**

**Periods 1 to 4**

- *Give Solar and Lunar tests*
- Sell rockets and begin to work on them.
- Read a story from Truly Weird or do a G-Force or two, get a little crazy.
- Run Star Gazing if clear.

#### **Wednesday:**

**Periods 1 to 4**

- Rocketry – try to finish up rockets and encourage Mercury tests.

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- Test advanced theory kids.
- Lunar, Solar and Junior tests and new theories, study help

#### **Thursday:**

##### **Periods 1 to 4**

- A. Lunar and Solar tests and study help, Juniors take Lunar theory and experiential games
- B. Rocketry – last day to test, paint day
- C. Advanced theories, tests, questions

##### **Open Program**

- A. Random questions and Theories & study help sign-up
- B. Random questions and Theories & study help sign-up
- C. Astronomy overnight preparation

##### **Astronomy Overnight**

1. Have enough staff volunteers that the staff to camper ratio stays at the ACA standard (1:5), adhere to all Camp Eberhart overnight policies.
2. The 3 staff on duty should rotate the following responsibilities over the course of the evening:
  - **Telescope:** Supervise telescopes, testing and answering of questions.
  - **Constellation:** Test for awards; supervise non-telescope campers, answer questions.
  - **Fire:** Supervise the campfire area, snack, water, and bathroom runs.

#### **Friday:**

##### **Periods 1 to 4**

- A. Experiential games and rocket launch help
- B. Tests and award cards
- C. Rocketry - Launch Day!

## ***Section 6: Teaching Tips***

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### **Props:**

Kids react best to hands on learning. Things they can touch and feel help them to learn about the things that they have just read and heard about. This is really important, even if there are diagrams on the theory sheets. For beginner level award theories, get some rocks and paint them like the Sun, the Moon, and the Earth. Then use the rocks to explain the diagrams on the theory sheet by putting the rocks in the same places. In the case of a Solar eclipse, you could even use shadows to make the point if it's a sunny day. You'll have good luck using these tools on basic concepts like the Earth's axis and the time it takes for the Moon to orbit the Earth.

Constellations can be a bit of a challenge in the day. Practice by having campers orient a star chart to the sky, then have them look up and get used to where in the sky they can look for a certain constellation when they come out at night. Also, the new planetarium in Dave's House is an excellent resource for daytime constellation work. Telescopes are a little easier, as you can still see the scopes and touch them during the day. Sunspots are a good introduction, as is trying to find the clock across the lake. (The clock is on the outside of a red and white cottage that is south of





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the island. The cottage is east of Roberts Campground. Of course it may not still be there when you start the summer, but you get the idea.) Be very careful when looking toward the sun.

Star ID, these campers will be pretty studious, make sure that they get the proper amount of attention at night, once you're done with some of the less advanced theories. These campers can reinforce learning by helping less advanced campers.

Rocketry students should have theory first and rockets second so that they can learn about it and then build it. Use teachable moments to illustrate the technical and physics aspects. The weekly rocket launch also provides some good teachable moments.

Using campers that have advanced awards to help with Lunar and Solar theory is a good thing. The advanced camper learns self-confidence and esteem, while the beginner camper learns lessons about learning from ones peers. It is important to introduce advanced campers to this process by having them observe theories being given, ask questions, and then practice, with some critique given on the first few theories.

Experiential Learning activities can be developed using the attached resource manual to select games and activities. The manual will likely inspire you to create your own activities and will provide resources to help break the monotony of 9 weeks of the same games!

Stargazing gives you a great opportunity to see the really cosmic part of the program/universe. It's really the heart of the program. Ask campers not to turn-on flashlights once on the mound. Have a 4-D cell Mag-Lite to point out constellations in the sky. Use telescopes to show what is available, use the Moon to observe if it is up; Saturn, Jupiter, M-13, and the Ring Nebula are great fallbacks for the 12½" Dynascope.

### ***Section 7: Bad weather alternatives***

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Provided that weather is good enough to stay on the island:

1. Study weather phenomena and compare it to Sunspot activity.
2. Build rockets under the overhang.
3. Study in the observatory.

### ***Section 8: Inventory***

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## ***Section 9: Things to Remember***

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### **What makes Astronomy fun?**

The Astronomy program represents a fantastic opportunity for youth to learn about what lies beyond the edge of their hometown and the places that they are familiar with.

As an Astronomy program staff, prepare for the season, and review every once in awhile throughout the summer ... it's important to keep a fresh perspective on a few things.

Astronomy is not only about watching the stars. In fact Astronomy is a great way for youth to build their personal interests in science. Campers are likely to be interested by several aspects of the program. First of course is the lure of stargazing and being able to be out of the cabin after Taps. Then of course there's the launch of a rocket that you built, into the sky over the bay in front of Camp. Of course the Astronomy overnight has a great deal of appeal too. The chance to sleep out of doors after having a great campfire and hopefully a clear sky so you could see a few cool things in the 12½" Dynascope.

There are a few things that can be done to "entice" campers to learn in order to do fun things. If the Astro staff really hypes the overnight from the skits on Sunday through the sign up period Monday, the kids will want to go. If the catch is to get Lunar and Solar, then many kids with interest in the overnight will get the awards. The campers know that learning can be fun; it's up to you to write the script so that it can be that way. Be fun and caring as you interact, and the kids will respond.

Whatever fun things you come up with, tie-in earning a few awards to a reward that will be a great experience (like the overnight). Camp is about learning, but learning is only a tool that helps youth build other important life assets, like self-esteem and social skills. You, the positive adult role model, make it all happen. Thank you!

### **Astronomy Overnight:**

#### **Safety:**

1. Have volunteer counselors be responsible to keep an eye out for campers trying to sneak off.
2. Be sure to have a first-aid kit and an emergency flashlight.
3. Take a radio and an extra battery that you can change, at least before **you** go to sleep, that way in an emergency your radio is already on.

#### **Action:**

1. Hold sign-up on Thursday during Open Program.
2. Tuesday morning, at breakfast, you can ask the kitchen for the supplies you will need on Thursday. Give them the number of people, and be sure to arrange a time for pick-up.



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3. Recruit staff to help go along. It seems pretty fair that if a lot of campers from one cabin are going on the overnight, a lot of counselors from that same cabin should go too.
4. At start of overnight, take staff aside and go over your expectations for them.

#### **Prerequisites:**

1. Must have Lunar and Solar
2. Senior campers should be working on an award This just helps keep the job easier. Seniors with a mind to fool around will just make for more work. But hey, if you have the staff, go for it.

#### **Needs:**

1. Extra staff so that the ratio is 1 staff person to every 10 campers.
2. Snacks and water on the island.
3. Separate sleeping areas for Girls and Boys, Island and Dave's House.
4. Fire Wood

#### **Rocketry**

Be sure that accounting is straight with store; organize this with the store person.

Be careful with rockets after launch, make sure that campers can pick up their whole rocket at the store during check out, as this tends to keep parents happy (they get to take home the rocket they bought for their kid). Make sure on the Wednesday of each week that supplies are adequate for the next week (rocket kits, paint, glue, Exacto blades...).

#### **Star Gazing Coverage**

Astronomy, by name, has something to do with looking at the sky at night. This is hard to do from inside a cabin. So, Astronomy staff should try to arrange suitable cabin coverage if it is a clear night. In order to ease the burden on other cabin staff, only one Astronomy staff person should be in any given cabin, and should cover the cabin whenever possible on cloudy nights.

Campers and staff should leave the island no later than 11:45pm and be back in their cabins absolutely no later than 12:15am

**Pre-requisite:** Lunar and Solar, and must be working on an award.

#### **Testing**

1. Awards should be tested only after it has been at least 24 hours since the theory was taken.
2. Staff should have already earned those awards for which they are testing campers. This is part of the long term Program building strategy at Eberhart. Developing staff from campers requires that interested and eager people are encouraged. They are given a series of successes that grow in magnitude of challenge each time. The outcome from a series of



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bigger challenges is a camper who is more confident, who knows more, who develops social skills, who has learned to be responsible for him/herself and compassionate towards others.

3. Tests should ask for relevant facts and theories. Be reasonable; for example knowing something about each planet and how many moons it has is far more realistic than reciting each paragraph on the Solar theory sheet. Many relevant facts are in italics or bold type.
4. Skill demonstration should always consider safety, equipment care, and demonstration of the required skill. It is a good thing to have campers repeat a skill until they can demonstrate it with ease. If they fumble through and pass, then they will forget and end up with low self-esteem because they know that they didn't really demonstrate the skill.
5. Let the campers use the props to explain things, if they want to.

### **Awards**

Keep a sheet each week of who signed up for the program. Write down what awards campers pass as they pass them. Then on Friday it is a little easier to fill out the cards and update the permanent files.

Awards are one of the keys to Camp Eberhart's summer program. Awards provide an opportunity for campers to enhance their self-esteem through shared learning experiences, which in turn enhances social skills. Awards are a metaphor for a tool that allows a group of youth to come together in a sense of community. Juniors through Seniors are led in turn by young adults through a week of social and physical skill development. Best of all, it is fun. Campers actually like working hard to earn awards if they do so in order to get something that they want. It's the carrot and the stick, in a fun way that promotes positive youth development.

### **Telescope Maintenance**

Keep the scopes covered in the Observatory, the wasps love to nest in them.

On overnights, be careful that scopes are not left pointed upward for long periods, the dew will actually settle on the mirrors.

Grease the mounts at the start and end of the summer season. Clean the mirrors with compressed air (the same way photography cleans the inside of a camera). DO NOT wipe the mirrors with a cloth and especially not a paper towel. Paper towels are made of wood and wood will scratch the mirror coating, it will also scratch lenses. Soft, clean clothes are good for cleaning lenses.

Keep the both Observatory doors locked when not in use.



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### ***Section 10: Opening and Closing the Program***

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1. Grease the mounts for the telescopes at the start and end of season. Outdoor Education and Weekend groups are likely to use this equipment in the Spring and Fall. The summer season is when the most use happens, so it is when the maintenance needs to be done.
2. The Astronomy office is not mouse proof; texts and papers should be stored in mouse proof containers. Be aware that this building is subject to a great deal of vandalism in the winter months; try not to leave valuables inside for long. This also means bringing the lenses in off the island in the spring and fall.