

Instrumentation—Study Guide

INSTRUCTIONS: **Make sure that your first and your last name and date appear at all applicable locations, yes, even the first page.** This examination is in the form of multiple choice and a few fill-in-the blank questions/statements. After reading the question or instructions carefully, select your answer(s) and mark it (or them) plainly on the answer sheet provided with this test. The answer sheet can be found at the end of the exam. You may detach it. Only answer the odd or even questions depending upon whether your exam number is odd or even. **Take a moment to circle the questions which are your questions throughout the exam.** You may work alone or with **ONE PARTNER** who is taking the other portion of the exam to help each other attain a higher grade. **There will be no communications between teams.** All correct answers must be provided to receive full credit; however, partial credit will be given unless stated otherwise. This exam has a total value of 25 points. **MUCH SUCCES!**

CANVAS INSTRUCTIONS: This Quest is in the form of multiple-choice questions and a few fill-in-the blanks. After reading the question carefully, select your answer or answers. **If the question calls for multiple answers, two or more, you must provide all answers and all answers must be correct.** Canvas does not allow for partial credit. Because of this, I will give you two attempts to take the test. Consider this open book. All answers can be found in the lecture material created in class, the assigned reading material, and the PowerPoint presentations, but if you feel the need to consult online sources, books, or magazines, please feel free to do so. This Quest has a total value of 25 points. **MUCH SUCCESS!!!**

1.-5. **INSTRUCTIONS:** The following statements labeled "a" through "h" are the possible answers to the questions which are listed below. No letter is used more than once. Know what these words mean and you cannot miss questions 91-96.

- | | |
|----------------------------|-------------------|
| a. light gathering ability | e. field of view |
| b. resolve, resolution | f. magnification |
| c. contrast | g. aperture |
| d. definition | h. spider support |

Key Concept: Know the definitions of these words. They are defined in your book.

6. The way the stars look in the Hubble Space Telescope image shown below, immediately tells the viewer that this instrument has (a) _____.

Hint: Consider the way the brightest stars look in this HST photo and what is causing this effect. The main part of the image details two galaxies that are in collision.



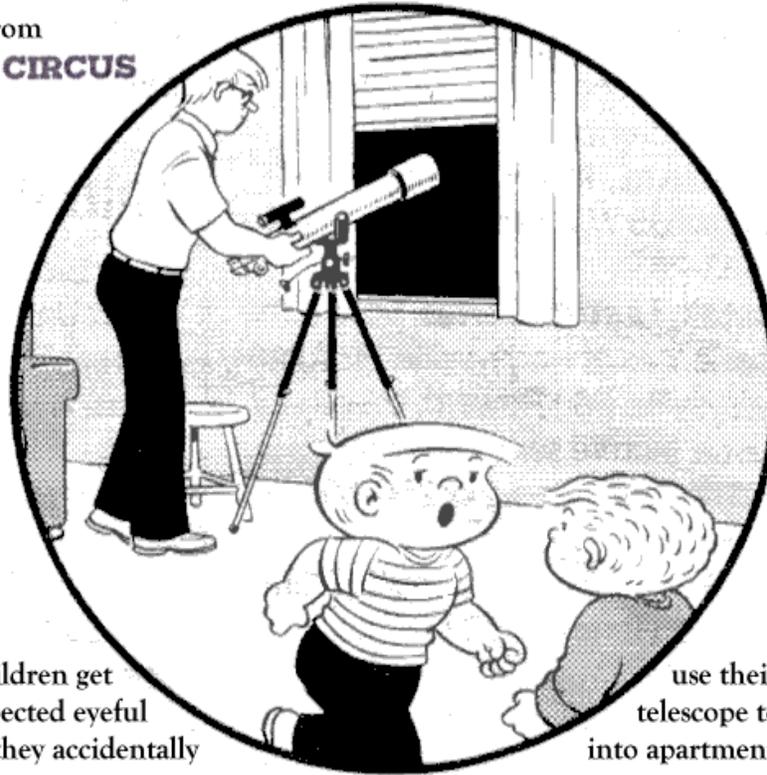
7. The inventor of the telescope was a Dutch lens grinder who really made a "spectacle" of himself. His name was
Key Concept: This is a major misconception in the history of astronomy and telescopes.
8. Which one of the following criteria is **INCORRECT** concerning the astronomical refractor?
Key Concept: Know the characteristics of an astronomical refractor and its light path.
9. **PRACTICAL APPLICATION:** You are a very poor Moravian College student who wants to purchase an all-purpose telescope to view and maybe even photograph a certain significant other from your dorm window. What funny thing might you be prompted to do? **Take your mind out of the gutter and think optically, please!**
Hint: Follow the light path of a refracting telescope to the eyepiece and see what it does to the image that is being observed.
10. **Two answers required:** Considering that the following telescopes have the same apertures and exactly the same eyepieces, which focal ratio will produce the lowest magnification and therefore the widest field of view and which focal ratio will give the highest magnification and the smallest field of view?
Key Concept: Understand how the focal ratio of a telescope is related to magnification and how magnification is calculated for telescopes.
11. The construction of the two 10-meter aperture Keck binocular reflectors on Mauna Kea Observatory on the Big Island in Hawaii was conceived for what **TWO** reasons? Keep in mind they are about 80 meters apart from each other.
Key Concept: Understand what drives astronomers to build bigger and bigger aperture telescopes. What advantage do two big telescopes have when they work together as one instrument?

INSTRUCTIONS: The following answers will apply to the next four questions. Each statement begins with, “I am a telescope with a...” Know the light paths and the optical elements for the telescopes studied in class if you want to be successful in this section of the quiz.

Key Concept: Understand the light paths of the telescopes that we discussed in class and are found in *Becker’s Astronomy Survival Notebook*, Session Six.

12. I am a telescope with a parabolic mirror that is 6-inches in diameter and 24 inches in focal length. My secondary mirror is a flat...
13. I am a telescope with a midsized tube length and a parabolic mirror that is 6-inches in diameter and 72-inches in focal length. My tube is open to the night air and I have a secondary mirror which is a convex...
14. I am a telescope with a double convex lens followed by a plano-concave lens...
15. I am a short, squat telescope with a spherical primary mirror and an aperture of 6-inches in diameter and 72-inches in focal length. My secondary mirror is a convex piece of aluminized glass...
16. The magnitude scale quantified by 19th century astronomers was first used by the Greeks over two thousand years ago. Choose the statement which **INCORRECTLY** describes the current system that is being used today.
Key Concept: The magnitude system for understanding the brightnesses of stars is a nonintuitive system. Understand how the magnitude classification works and what is peculiar about it.
17. Identify a correct statement about the following cartoon. Please read the cartoon’s caption at the bottom of the picture.
Hint: OMG, what could these poor children have possibly seen? Deals with humor and telescope/optical terminology...

Adapted from
FAMILY CIRCUS



Bill
and
JEFF
KEANE

Bryon's children get
an unexpected eyeful
when they accidentally

use their father's
telescope to peek
into apartment 4B.

18. The object in the list below which has the brightest apparent magnitude is
[Key Concept: Understand one of the nonintuitive concepts of stellar magnitude.](#)
19. An amateur astronomer who is interested in viewing the sky at different magnifications would most likely
[Key Concept: How do you get different magnifications from the same telescope?](#)
20. What is the **PRIMARY** reason why astronomers are so hung up about building bigger and bigger telescopes?
[Hint: Bigger mirrors are better for seeing...](#)
21. From the information given below, state the correct order in which you would set up your telescope for a night of observation.
[Key Concept: Understand the order in which a telescope is set up to begin a sequence of astronomical observations.](#)
22. Most of the mounting systems that are located in the astronomy lab in Room 106 are...
[Key Concept: Be able to identify the different types of mounting systems](#)
23. Which type of telescope is not represented in Room 106.
[Key Concept: Be able to identify the different types of telescopes in Room 106.](#)

Instructions: The following questions on this page and the next page deal with the hand controllers for the Celestron telescopes that you have been using. A picture of the hand controller can be found at the end of this selection.

[Key Concept:](#) Understand how to use the Celestron hand controllers and operate the Celestron telescopes. This applies for the next five questions, 96-100.

24. List the procedure for bringing an Advanced VX mount from hibernation so the scope can slew (move) to the first object that you would like to view. Your answers must be in their correct order.
25. It is time to close down your telescope for the evening. What will be the procedure in order for you to accomplish this? Your answers must be in their correct order.
26. You are observing the planet Mars and now you want to observe a deep sky object like the Andromeda Galaxy, Messier 32. What sequence will allow you to accomplish this task? Your answers must be in their correct order.
27. To prepare your telescope for a night of observing, what will you have to do? Your answers must be in their correct order. Start with the battery.
28. If your telescope is not in hibernation when you turn it on, what will you have to do in order to get the telescope ready for observing? Your answers must be in their correct order.

All of the possible answers can be found on the next page.

a. Input the atomic time	24
b. Take the telescope out of hibernation	24
c. Turn on the mount	24
d. Input the time zone	24
e. Input the date	24
f. back it out to Advanced VX	25
g. Go to Utilities and enter	25
h. Scroll up or down until Home is seen and enter	25
i. Enter Home, enter Go Home	25
j. Hibernate the telescope	25
k. Turn the power off	25
l. Go to Menu and enter	25
m. Follow hand controller instructions to set time, daylight/standard time, time zone, date.	26
n. Advance VX (telescope ready)	26
o. Use Enter and Align buttons to find four calibration stars. Center in finder (Enter), Center in scope (Align).	26
p. Use Enter and Align to find two alignment stars. Center in finder (Enter), Center in scope (Align).	26
q. Start observing.	26
r. Turn on power to telescope.	27
s. Remove Celestron hand controller from protective wrapping.	27
t. Remove battery from box.	27
u. Plug in hand controller into HC slot.	27
v. Turn on power to battery.	27
w. Plug 12-volt adapter into battery and screw into battery port on mount.	27
x. Enter	28
y. Enter Messier	28
z. Scroll up or down until Messier is seen	28
aa. Use the back button to get to Advanced VX	28
bb. Use the number keys to enter 032	28
cc. Enter Deep Sky	28



Align: Instructs the hand control to begin the process of aligning your telescope.

Catalog Keys: The Advanced VX has a key on the hand control to allow direct access to each of the main catalogs in its 40,000+ object database. Your mount contains the following catalogs in its database:

Menu: Displays the many setup and utilities functions, such as tracking rate and user defined objects and many others.

Option (Celestron Logo): Can be used in combination with other keys to access more advanced features and functions.

Liquid Crystal Display (LCD) Window

Enter: Pressing **ENTER** allows you to select any of the Advanced VX functions, accept entered parameters and slew the telescope to displayed objects.

Back: Pressing **BACK** will take you out of the current menu and display the previous level of the menu path. Press **BACK** repeatedly to get back to a main menu or use to erase data entered by mistake.

Direction Keys: Allows complete control of the Advanced VX mount in any direction. Use the direction keys to center objects in the eyepiece or manually slew telescope.

Catalog Keys
Scroll Keys: Used to scroll up and down within any of the menu lists. A double arrow symbol on the right side of the LCD indicates that the scroll keys can be used to view additional information.

Sky Tour

Scroll Keys

Motor Speed: Slews the telescope faster or slower when the direction buttons are pressed.

Object Info: Displays coordinates and useful information about objects selected from the Advanced VX database.