Astronomy 111
Observing Project

The *observing project* gives you the opportunity to put classroom learning into practice as you observe and describe select objects in the sky. **Projects are worth *10%* of your final grade**.

You will need ***planetarium* software**, **skychart(s)**, a quadrant (see website under 'Info & Handouts') and **information collected during group & individual outdoor observing sessions**.

** Projects must be completed on the provided pages and submitted to VIULearn as a single, reasonably sized PDF file by 6pm on Fri, Nov 10. Late projects will NOT be accepted. **

Planetarium software

Some exercises **require** the use of *planetarium software* - either *Starry Night* (available in the computer lab located in B315-113 or available with some textbooks) or *SkySafari* (available as an inexpensive purchase for your iOS and Android phone or tablet). More information and basic tutorials for both are available on the class website on the 'Info & Handouts' page.

Location, Date & Time of Computer Observations

Unless otherwise stated set your program to ***Mon Oct 2, 2023*** at ***10:00 pm (PDT)*** in Nanaimo (approx 49° N, 124° W) ***for all computer based observations*** (MAKE SURE you 'freeze' the date/time on these settings as described in the online tutorials). ***ANY change(s) from the above date/time/location will be clearly stated***. Check your date/time/location EACH time you begin a new computer observation and (re)set values as needed. If you do NOT set the date/time/location correctly ***your observing results WILL be INCORRECT***.

Group & Indvidual Outdoor Observing Sessions

Computer observations are supplemented with **mandatory** class & individual outdoor observing as the real sky looks very different from a skychart or program! Group sessions include observing with the naked eye, binoculars, and a telescope and take about 1-2 hours. When attending outdoor observing sessions, dress **WARMLY** (hat, gloves, shoes, etc.), and bring **pen/pencil & paper**, **skychart**, and a **(red) flashlight**. There are a **limited number** of these sessions per term.

Some portions of the observing project require independent observations to be made on particular days (or within some set period). There should be enough flexibility in these dates to accommodate work, school schedules and the uncertainty of weather conditions, but even so, **DO NOT** leave it until the last moment. **The observing project CANNOT be done entirely by computer!**

Quadrant

You will need a quadrant (or equivalent); instructions to build a simple one are given on the website.

Describing Positions of Objects

***When describing the location of objects in the sky, imagine helping a (non-astronomy) friend find objects while stargazing. Use* compass directions (N, SE, WSW, etc.) and *approximate* height above the horizon (near horizon, near zenith, 1/2 way in-between, etc.) *DO NOT* use technical descriptions such as declination, right ascension, azimuth, etc.**

Detailed Descriptions

In places throughout the observation project, you will be asked to describe objects ***in detail***. This means exactly that - imagine 'painting a picture' in words. Things to comment on include (*but are not limited to!*) elements such as size, shape, colour, brightness, and distribution of features & textures. Imagine describing what you are viewing to someone who has never seen the object themselves and who will attempt to draw it based *solely* on your description. ***Poor or incomplete descriptions will result in few or no marks on these types of questions!***

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Constellations & Deep Sky

1. [*2 marks*] Perform the following from a ***single, fixed location*** during a group observation session or on your own after sunset, once Polaris is visible. Find Polaris as discussed in class and use your quadrant to **measure Polaris' angular height above the horizon twice on the same night and from the same location** but at least two hours apart. **Record the date, time, angular height and approximate compass direction in the table below.**

	Polaris			
	Date	Time	Height (°)	Direction
Observation #1:				
Observation #2:				

Comment on your results. How/why might Polaris be useful for navigation?

2. [**5 marks**] Do the following from a ***single, fixed OUTDOOR location*** (during a class observing session or observing on your own) **within a few weeks** of the specified project observation date & time (*the skychart below will best match the real sky on the specified observation date & time but should be similar within a few weeks of that date and a couple of hours of that time*). **With a highlighter trace out the 5 most obvious ASTERISMS when viewing with the naked eye; ONLY highlight those segments of asterisms that are truly 'obvious' when viewing in 'real life'. IN ADDITION, circle AND number the 5 brightest INDIVIDUAL OBJECTS** (eg. stars, planets) **in the sky from 1 - 5** (in order of decreasing brightness).
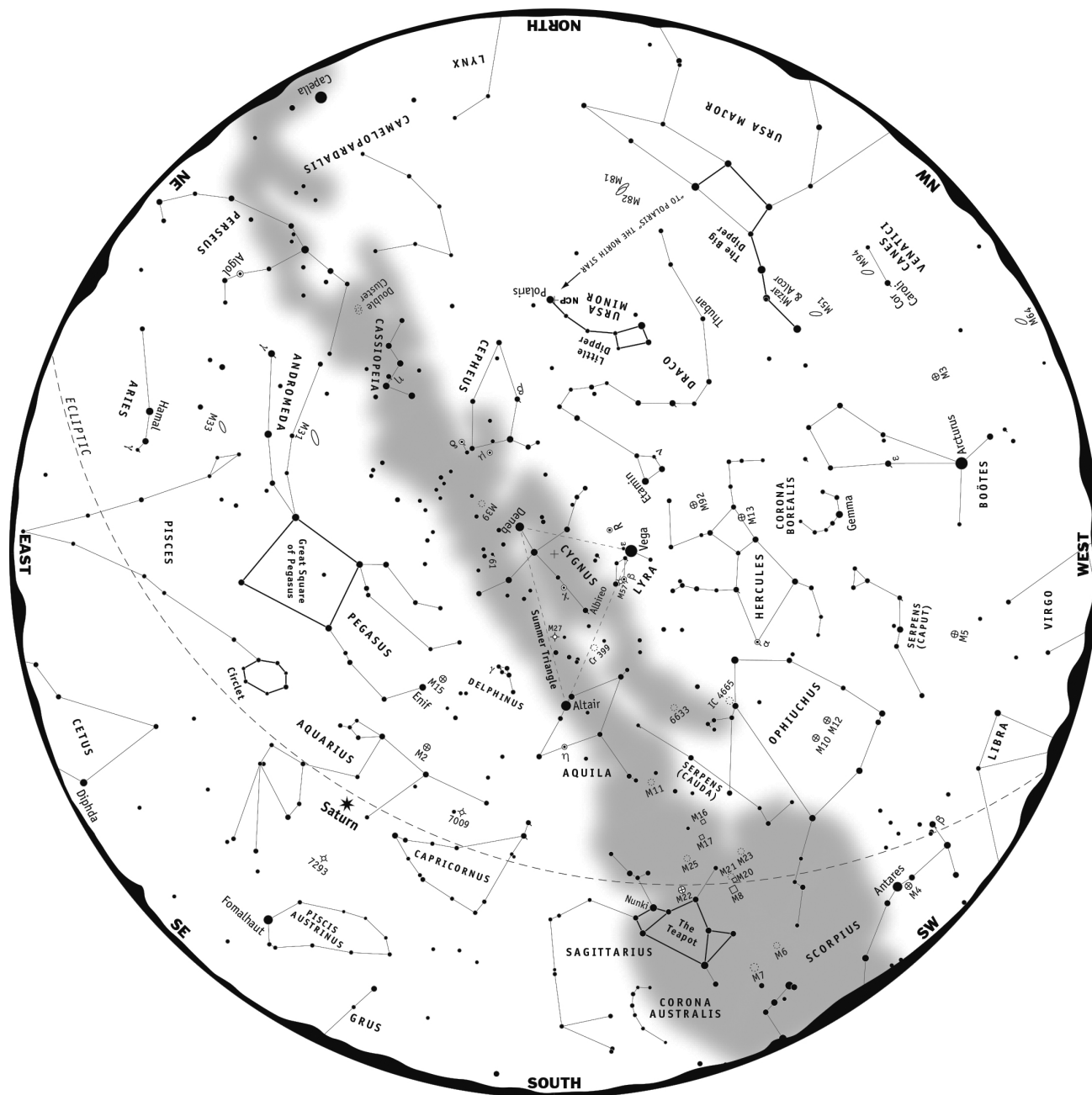
3. [*10 marks*] **Fill in the required information in the tables below for the object *M27*.**

Observing Date	Time	Height (°)	Direction

Common name(s)	
Type of object:	
Resides in constellation:	

In the circular FOV on the left HAND DRAW a DETAILED view of the object as seen through a telescope at an observing session OR (if available) from its image on the VIU Rooftop Observing page (course website under Links). In the circular FOV on the right HAND DRAW a DETAILED, labeled, COLOUR view of the object as viewed on the same date using planetarium software; *ZOOM IN* so the object fills about HALF the screen.
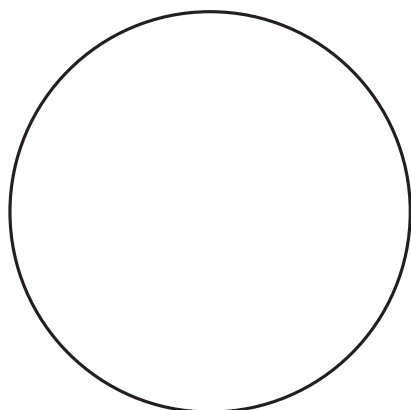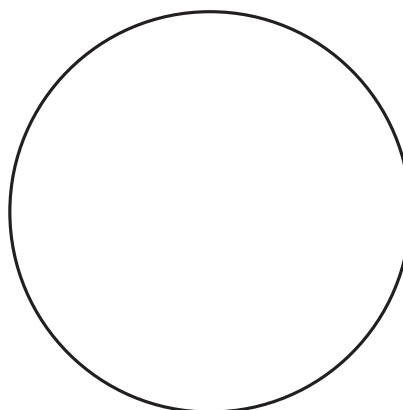
telescope ("live")   *planetarium program*

Describe the object's appearance *in detail* (as seen both during the outdoor observing session AND using the computer. **Comment on significant differences between the two views**.

The Moon

1. [**3 marks**] Set your planetarium program location to Nanaimo (if not already set as such). Switch on constellation lines/figures & constellation labels (see tutorials online if needed). **On the skychart fragment below record the position and phase of the Moon at 9pm every SECOND night during Sept 22 - Sept 30, 2023 (inclusive). Mark the Moon's position** with a '+' and trace a dime-sized or smaller circle around that point; you MAY need to *'hide horizon'* on some days to determine the Moon's position. **Record the date next to each position & *shade in* the phase (white=lit, black=unlit). Is the Moon's phase & position in the sky changing as expected based on class discussions? Explain.**
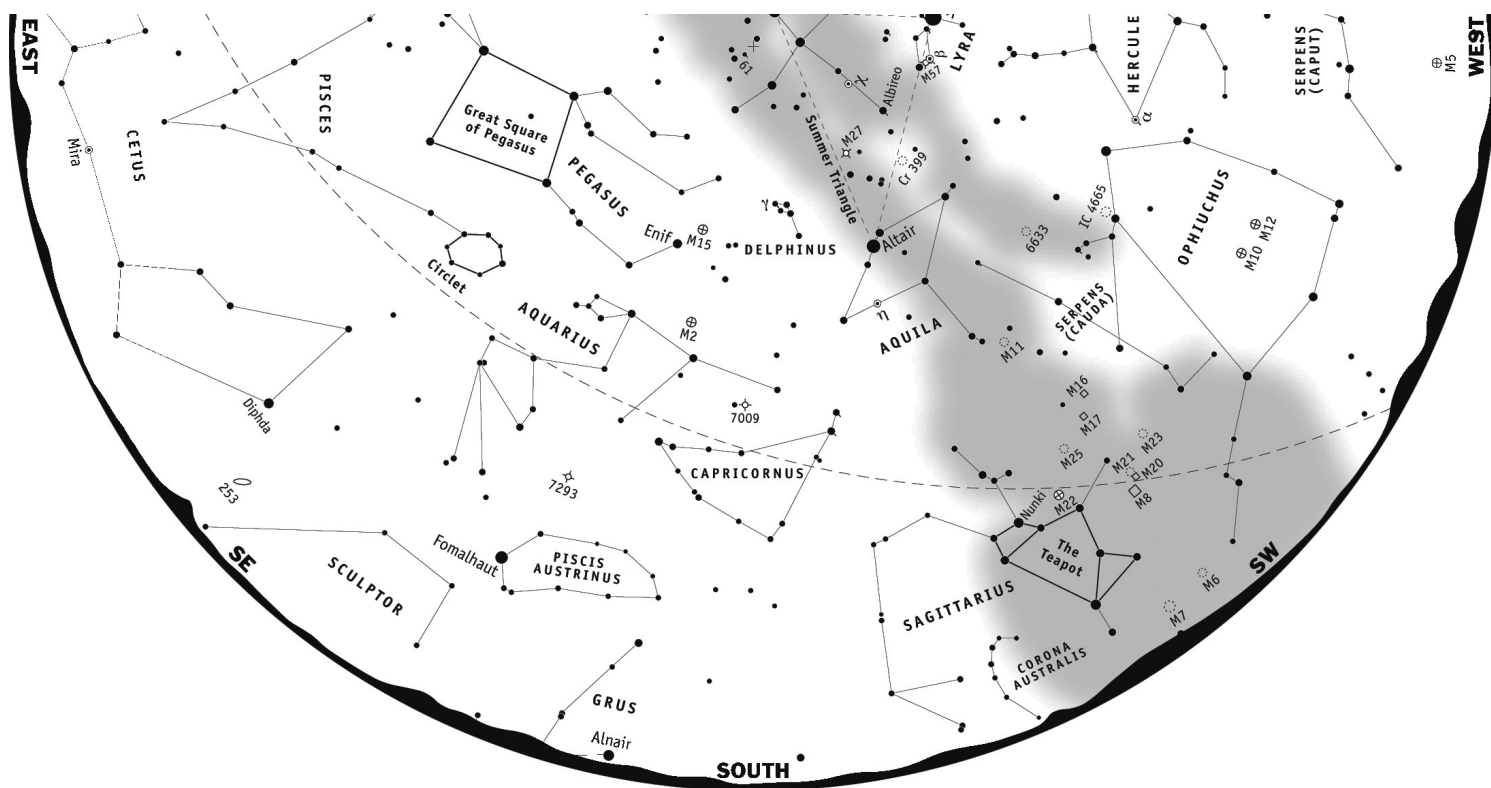
2. [**10 marks**] Set your planetarium program date/time/location as directed at the start of the project and locate the Moon. **Specify the Moon's *position* in the sky, the *constellation* it is located in, and its apparent (visual) *phase*.**

Using the circles provided below, **draw BY HAND how the Moon appears in *Starry Night* for three (3) different cases**: *naked eye* (zoom in on the Moon until the *field of view* (FOV) is 10°), with *binoculars* (zoom in on the Moon until the FOV is 2°), and with a *telescope* (zoom in on the Moon until the FOV is 0.5°). **Describe *IN DETAIL* the appearance of the Moon in each view** - see instructions at start of project. Include variations in colour, surface details, size & shape of features, their distribution on the surface, texture, etc. On your *most* magnified view **label three (3) specific, uniquely named features NOT easily visible in previous views**.

Naked Eye View (write your DETAILED description next to drawing)

Binocular View (write your DETAILED description next to drawing)
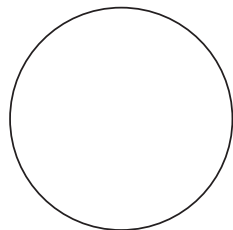
Telescopic View (write a DETAILED description below; label 3 uniquely named features)