Sol: O1 (15 pt)

Each correct answer is worth 3 pts.

Object	Number	Object	Number
Jupiter		β Her / Antilicus	
Saturn		α Oph / Rasalhague	
Mars		ϵ Peg / Enif	3
α And / Alpheratz		α Per / Mirfak	1
α Aql / Altair		α Sco / Antares	2
α Boo / Arcturus	4	α Ser / Unukalhai	
α CrB / Alphecca		ϵ Sgr / Kaus Australis	
β Dra / Rastaban		β UMi / Kochab	5

Sol: O2 (15 pt)

One method is to aim the telescope at an object, with easily recognizable markings (such as a building) and scroll through several (n) fields of view using only a single axis, while recording the difference between angles ($\Delta\alpha$) marked on the axis.
The final formula is:

$$FOV = \frac{\Delta\alpha}{n}$$

Full Markings will be given for the range values of $FOV = 0.6 - 1.2°$, but only if accompanied with a working method.

Sol: O3 (6 pt)

$F = f \cdot \frac{AFOV}{FOV}$
Full markings will be given for the range $f =$ **940-1875mm**, but only if calculated using a correct formula and a value of FOV from previous question.

Sol: O4 (14 pt)

One method is to follow the line with a telescope to the end of the building and remember the point. After that students could use rulers to measure x and y coordinate differences at an arm's length and calculate the angle.
Full markings will be given for the range **39.5-47.5°**

Sol: O5 (9 pt)

Naming each lense type:
1. (C) Gregorian (3 pt) 2. (A) Newtonian (3 pt) 3. (H) Cassegrain (3 pt)

Sol: O6 (21 pt)

Filling missing Equatorial constellations:
3. Aql (Aquila) (2 pt)
7. Tau (Taurus) (2 pt)
8. Eri (Eridanus) (2 pt)
9. Ori (Orion) (2pt)
12. Hya (Hydra) (2pt)
13. Sex (Sextans) (2 pt)
14. Leo (Leo) (2pt)

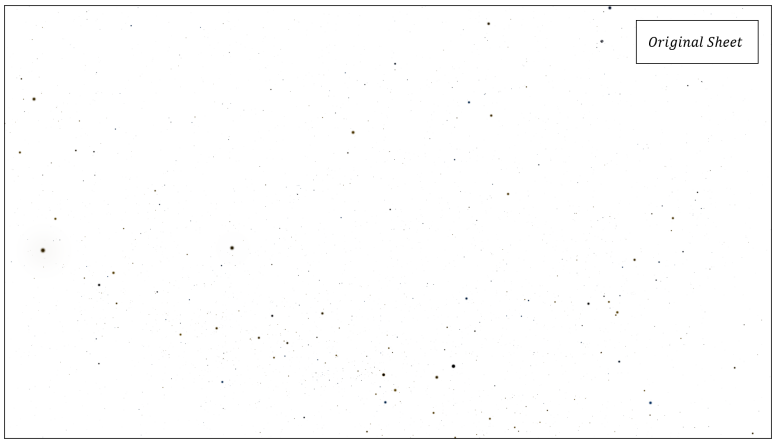
Ecliptic constellations are following:
Aqr (Aquarius) (1 pt)
Leo (Leo) (1 pt)
Oph (Ophiuchus) (2 pt)
Psc (Pisces) (1 pt)
Vir (Virgo) (1 pt)
Tau (Taurus) (1 pt)

Sol: O7 (20 pt)

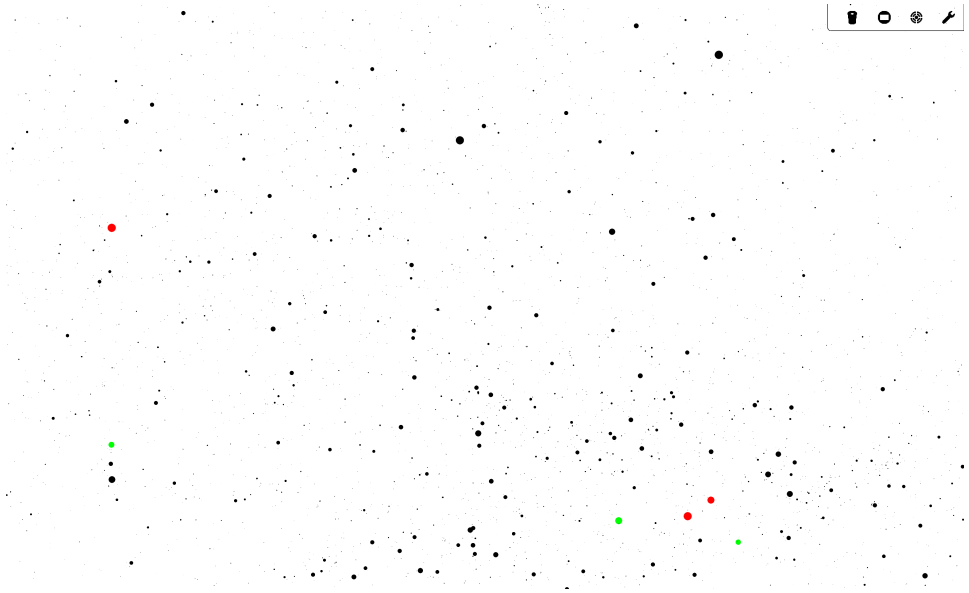
I. M81 (2.5 pt). UMa (Ursa Major) (1.5 pt)
II. M101 (2.5 pt). UMa (Ursa Major) (1.5 pt)
III. M27 (2.5 pt). Vul Vulpecua (1.5 pt)
IV. M42 (2.5 pt). Ori (Orion) (1.5 pt) ,
V. M73 (2.5pt). Aqr (Aquatius) (1.5 pt)

Sol: O8 (30 pt)

For the each correct answer student gets (5pt)



Corrections into a flawed sheet:



Sol: O9 (5 pt)

Time difference between initial and final figures are 6H 20M.

Sol: O1 (15 pt)

Each correct answer is worth 3 pts.

Object	Number	Object	Number
Jupiter		β Her / Antilicus	
Saturn		α Oph / Rasalhague	
Mars		ϵ Peg / Enif	3
α And / Alpheratz		α Per / Mirfak	1
α Aql / Altair		α Sco / Antares	2
α Boo / Arcturus	4	α Ser / Unukalhai	
α CrB / Alphecca		ϵ Sgr / Kaus Australis	
β Dra / Rastaban		β UMi / Kochab	5

Sol: O2 (15 pt)

One method is to aim the telescope at an object, with easily recognizable markings (such as a building) and scroll through several (n) fields of view using only a single axis, while recording the difference between angles ($\Delta\alpha$) marked on the axis.
The final formula is:

$$FOV = \frac{\Delta\alpha}{n}$$

Full Markings will be given for the range values of $FOV = 0.6 - 1.2°$, but only if accompanied with a working method.

Sol: O3 (6 pt)

$F = f \cdot \frac{AFOV}{FOV}$
Full markings will be given for the range $f =$ **940-1875mm**, but only if calculated using a correct formula and a value of FOV from previous question.

Sol: O4 (14 pt)

One method is to follow the line with a telescope to the end of the building and remember the point. After that students could use rulers to measure x and y coordinate differences at an arm's length and calculate the angle.
Full markings will be given for the range **39.5-47.5°**

Sol: O5 (9 pt)

Naming each lense type:
1. (C) Gregorian (3 pt) 2. (A) Newtonian (3 pt) 3. (H) Cassegrain (3 pt)

Sol: O6 (21 pt)

Filling missing Equatorial constellations:
3. Aql (Aquila) (2 pt)
7. Tau (Taurus) (2 pt)
8. Eri (Eridanus) (2 pt)
9. Ori (Orion) (2pt)
12. Hya (Hydra) (2pt)
13. Sex (Sextans) (2 pt)
14. Leo (Leo) (2pt)

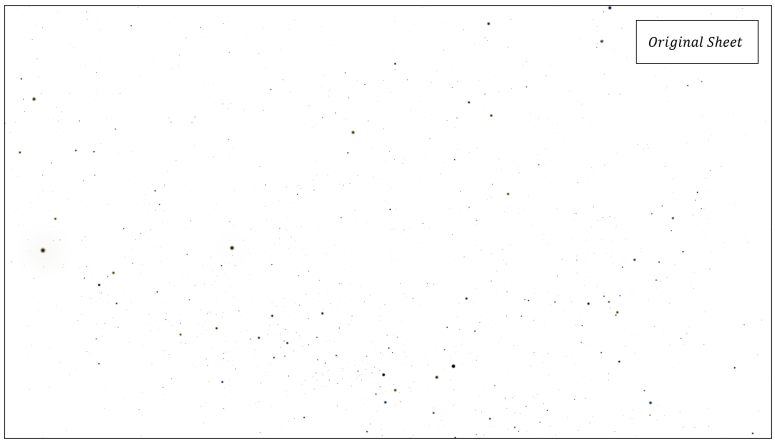
Ecliptic constellations are following:
Aqr (Aquarius) (1 pt)
Leo (Leo) (1 pt)
Oph (Ophiuchus) (2 pt)
Psc (Pisces) (1 pt)
Vir (Virgo) (1 pt)
Tau (Taurus) (1 pt)

Sol: O7 (20 pt)

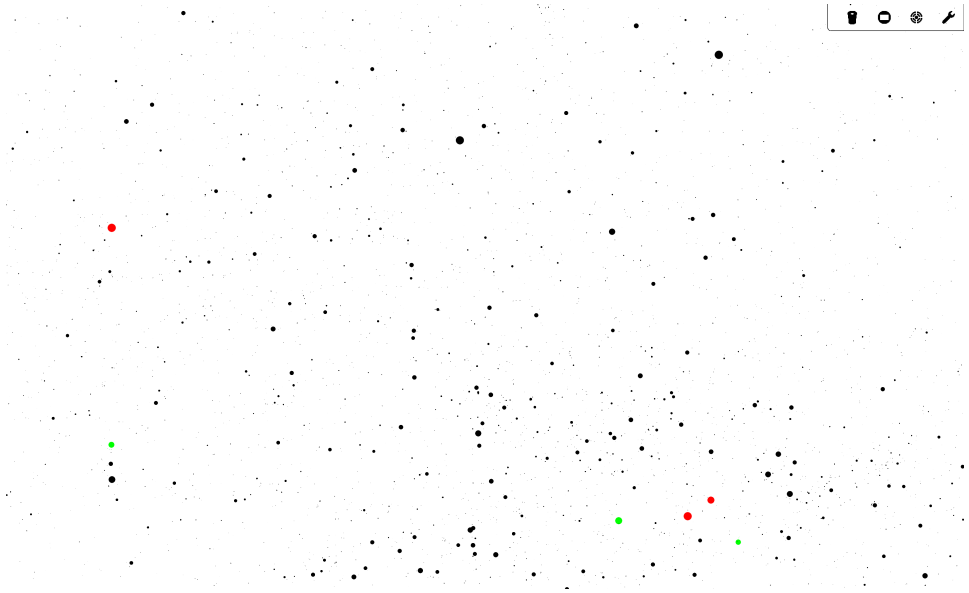
I. M81 (2.5 pt). UMa (Ursa Major) (1.5 pt)
II. M101 (2.5 pt). UMa (Ursa Major) (1.5 pt)
III. M27 (2.5 pt). Vul Vulpecua (1.5 pt)
IV. M42 (2.5 pt). Ori (Orion) (1.5 pt) ,
V. M73 (2.5pt). Aqr (Aquatius) (1.5 pt)

Sol: O8 (30 pt)

For the each correct answer student gets (5pt)



Corrections into a flawed sheet:



Sol: O9 (5 pt)

Time difference between initial and final figures are 6H 20M.

August 2022
IOAA
Georgia

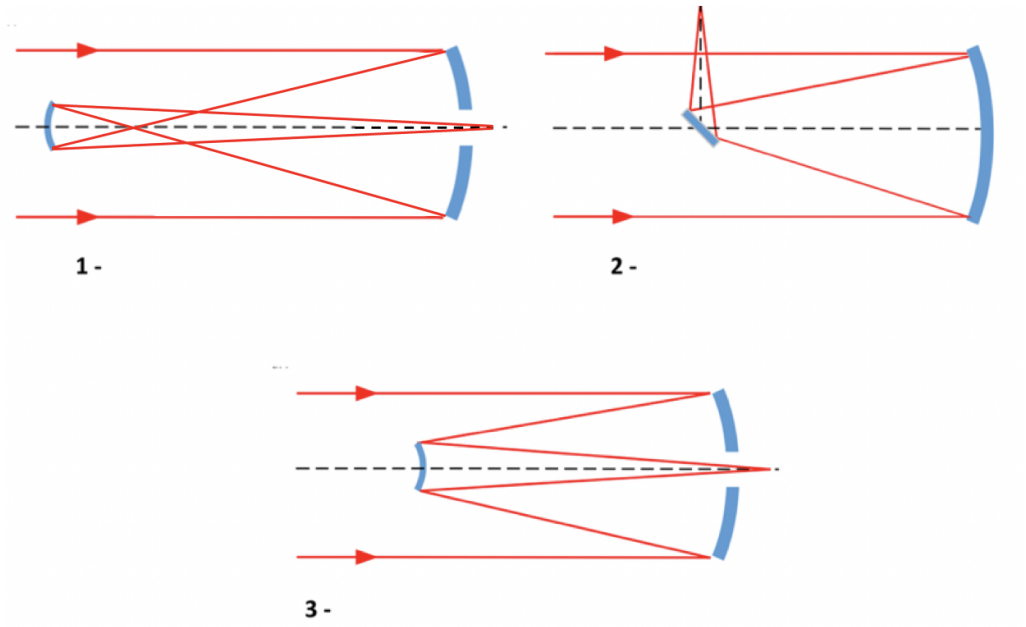
Daytime Observation

Cover Sheet

Student Code

O5 [9 Points]

The image below shows schematic representations of three different types



of reflectors.
For each one, choose the correct name from the list below. (3 points each)
(A) Newtonian (B) Pfund (C) Gregorian (D) Herschelian (E) Keplerian (F) Coudé (G) Galilean (H) Cassegrain

1. _____
2. _____
3. _____

Student Code

O6 [21 Points]

The equatorial constellations are listed below. Fill in the missing ones in the correct order. Use the IAU codes or official names accepted by the IAU.

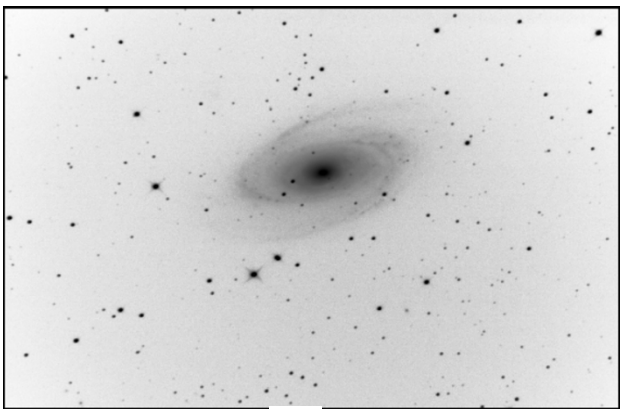
1. Serpens (Ser) 2. Ophiuchus (Oph) 3. _____ 4. Aquarius (Aqr) 5. Pisces (Psc). 6. Cetus (Cet)7. _____ 8. _____ 9. _____ 10. Monoceros (Mon) 11. Canis Minor (CMi)12. _____ 13. _____ 14. _____15. Virgo (Vir)

Which of these 15 constellations are also on the ecliptic? If you give more than the required number of constellations, only the first ones you write (in order) will be considered.

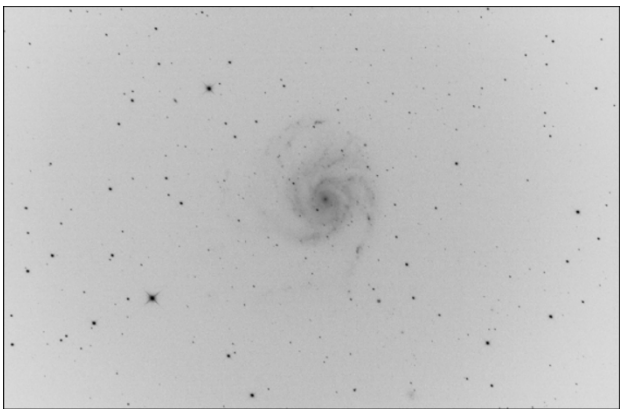
ccv

O7 [20 Points]

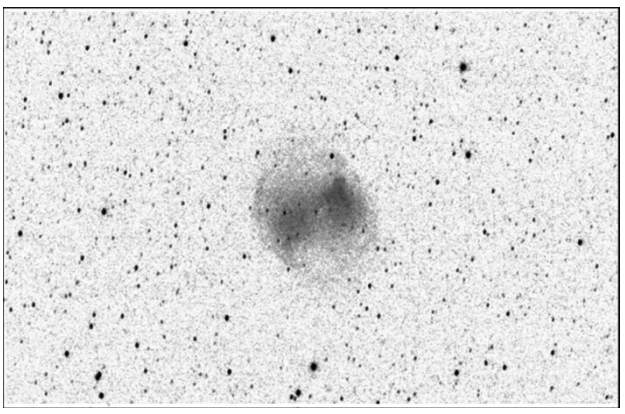
Write the numbers in Messier catalogue, and the constellations (IAU code) of the given Messier Objects (4 points for each object).

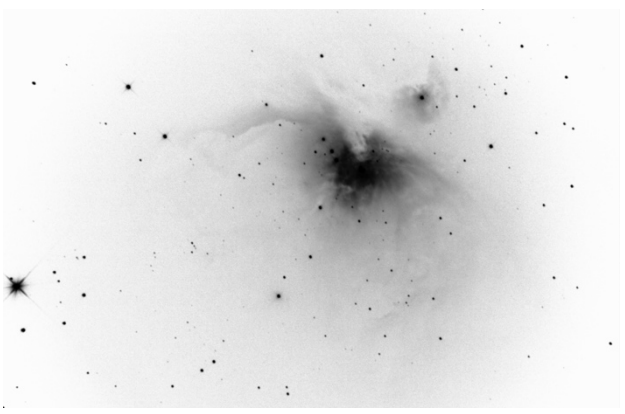


I

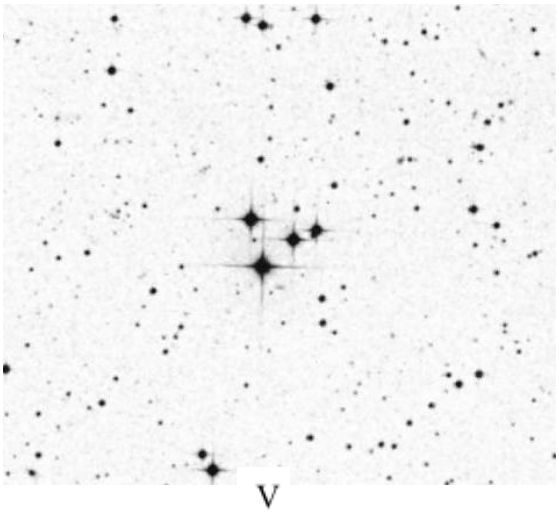


II





Student Code



V

I _____

II _____

III _____

IV _____

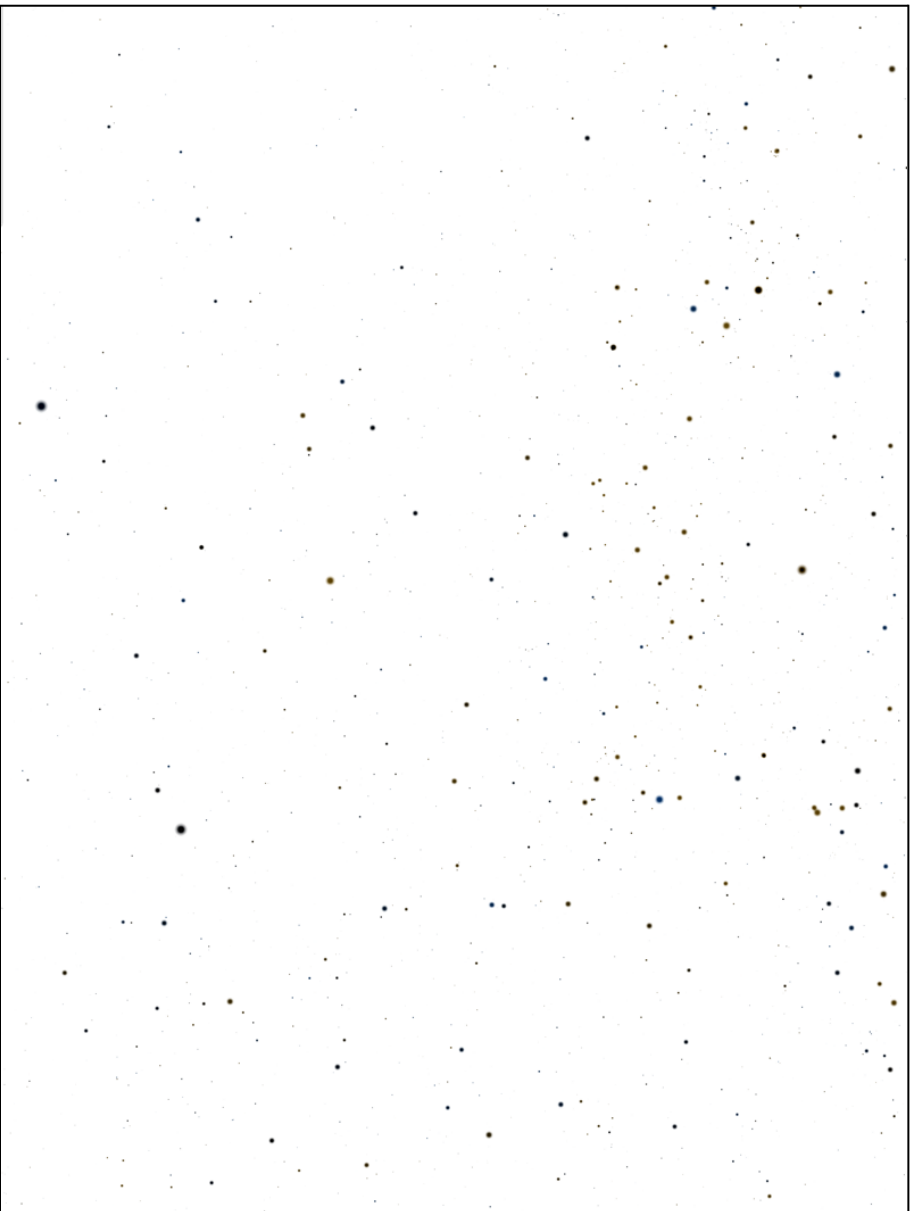
V _____

Student Code

O8 [30 Points]

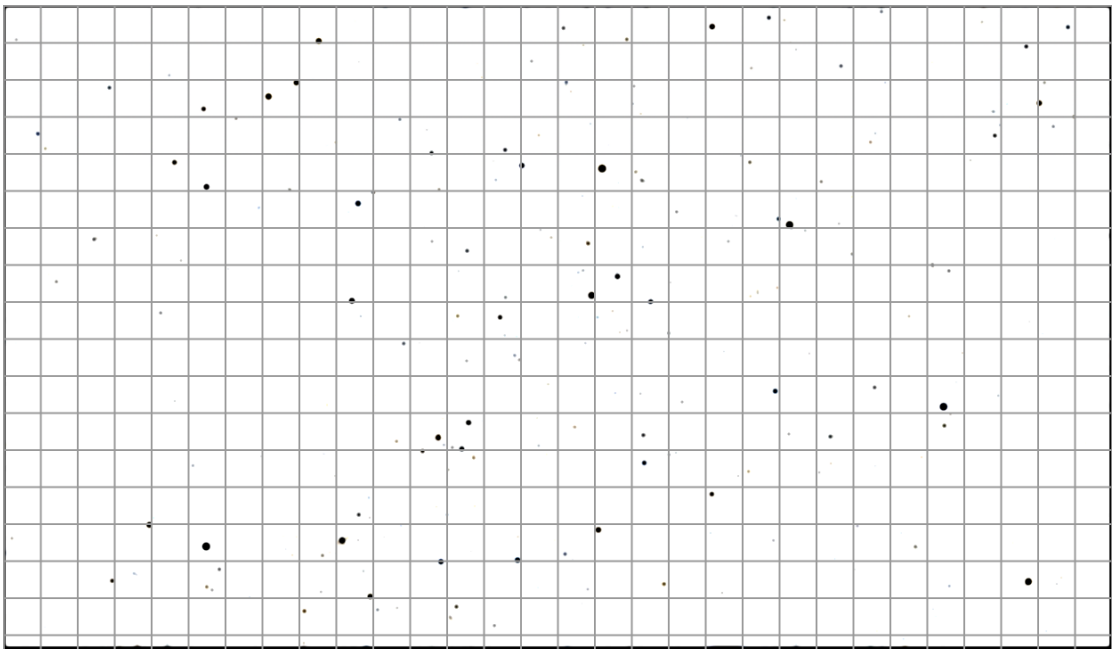
There are three additional and two missing stars on the figure given below. Circle them and number them as 1, 2, 3 (additional stars), 4, 5 and 6 (missing stars).

O9 [5 Points]



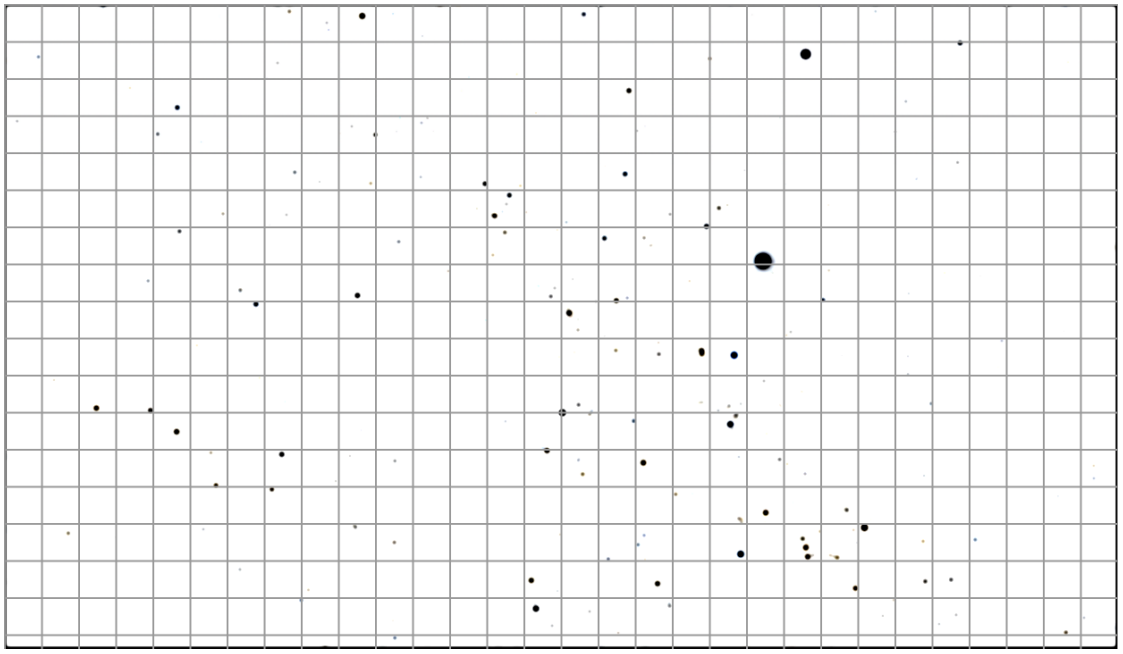
Student Code

Calculate the time interval between the two figures given below if the first figure occurs earlier than the second one, and the time interval is



less than one sidereal day

Initial



Final

ccv

Telescope Information	
Eyepiece's field of view	45°
Eyepiece's focal length	25 mm

O1 (15 points)

Time available: 5 min

Your task is to identify the circled objects in the images that you will see through the telescopes (numbered 1-5). The images are posted in the windows of the academic building and the telescopes are already pointed to each image. A single object will be marked on each board. For each object in the list below, if it was marked on one of the boards, write the corresponding telescope number in the list. You will get 30 seconds per telescope.

Object	Number	Object	Number
Jupiter		β Her / Antilicus	
Saturn		α Oph / Rasalhague	
Mars		ϵ Peg / Enif	
α And / Alpheratz		α Per / Mirfak	
α Aql / Altair		α Sco / Antares	
α Boo / Arcturus		α Ser / Unukalhai	
α CrB / Alphecca		ϵ Sgr / Kaus Australis	
β Dra / Rastaban		β UMi / Kochab	

O2 (15 points)

Time available: 4 min

Determine the field of view FOV of the given telescope using the 25 mm eyepiece.
Show your calculations for the method used.

O3 (6 points)

Time available: 2 min

Using the result from problem O2, determine the focal length of the telescope. Assume the apparent field of view of the 25 mm eyepiece is 45 degrees.

Show and explain your calculations.

O4 (14 points)

Time available: 4 min

β Cyg (Albireo) is a visual binary star. You will be shown a picture a this binary system from one of the windows of the building nearby. Aim the telescope at this picture, and estimate the acute angle between horizon and the line going through systems' stars.