Task 8. Using the starchart **(Fig.1)** answer the following questions:

8.1. What is the ecliptic latitude of the galactic center?

Answer: β = _____ deg   *(1 pt)*

8.2. The positions of four objects from the Messier catalog are indicated using Latin letters. Which are these objects?

A: M_____   B: M_____   C: M_____   D: M_____   *(2 pts)*

Task 9. All eight stars brighter than 2 mag have been erased from the map **(Fig.2).**

9.1. Fill in their positions and names (e.g. Deneb or α Cyg) back on the map.

(4 pts)

9.2. Which constellation is exactly in the southwestern (SW) corner of the map? Write its standard three-letter Latin designation.

Answer: _____   *(1 pt)*

Task 10. The diagram **(Fig.3)** shows how the altitude of three stars above the horizon changes during a night near the winter solstice as observed from the Rozhen observatory (41°41′N, 24°44′E). The one-digit numbers on the chart are the numbers of the stars, while the two-digit numbers are angular distances from the moon in degrees.

10.1. What are the equatorial coordinates of the three stars?

Star 1:   α = _____ h   δ = _____ deg
Star 2:   α = _____ h   δ = _____ deg
Star 3:   α = _____ h   δ = _____ deg   *3 pts*

10.2. How many days after the preceding new moon is this night?

Answer: t = _____ d   *2 pts*
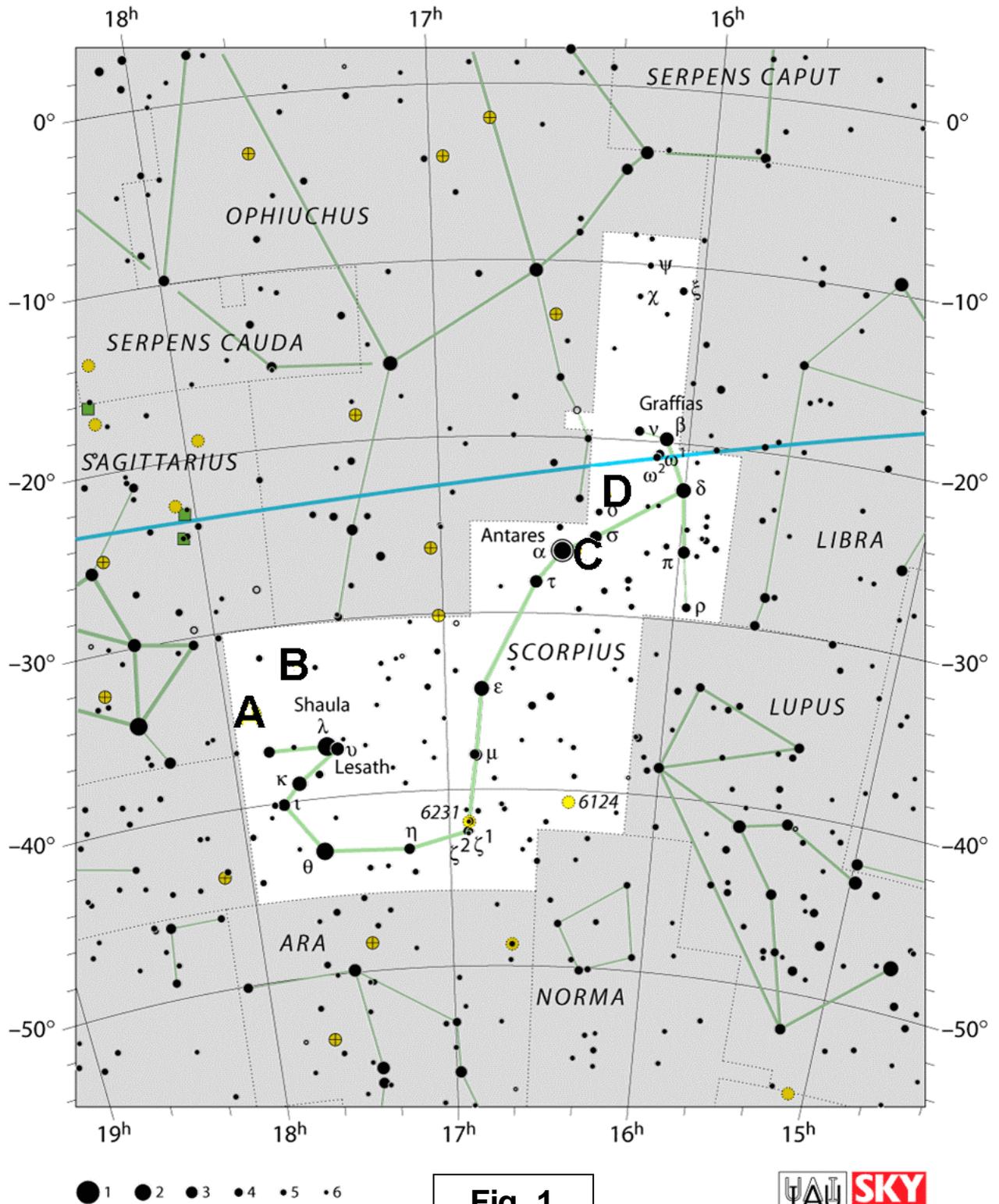
Fig. 1
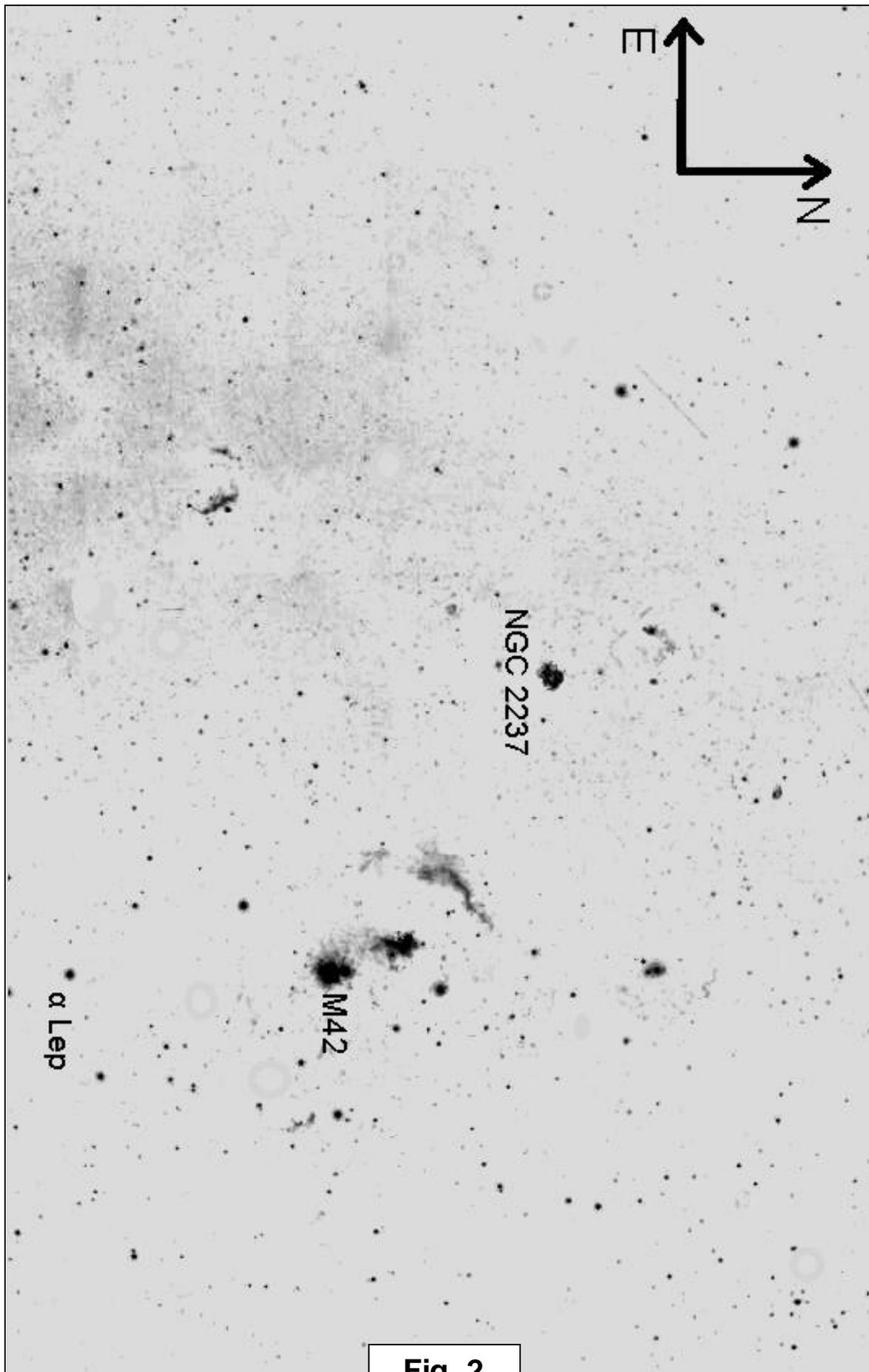
Fig. 2
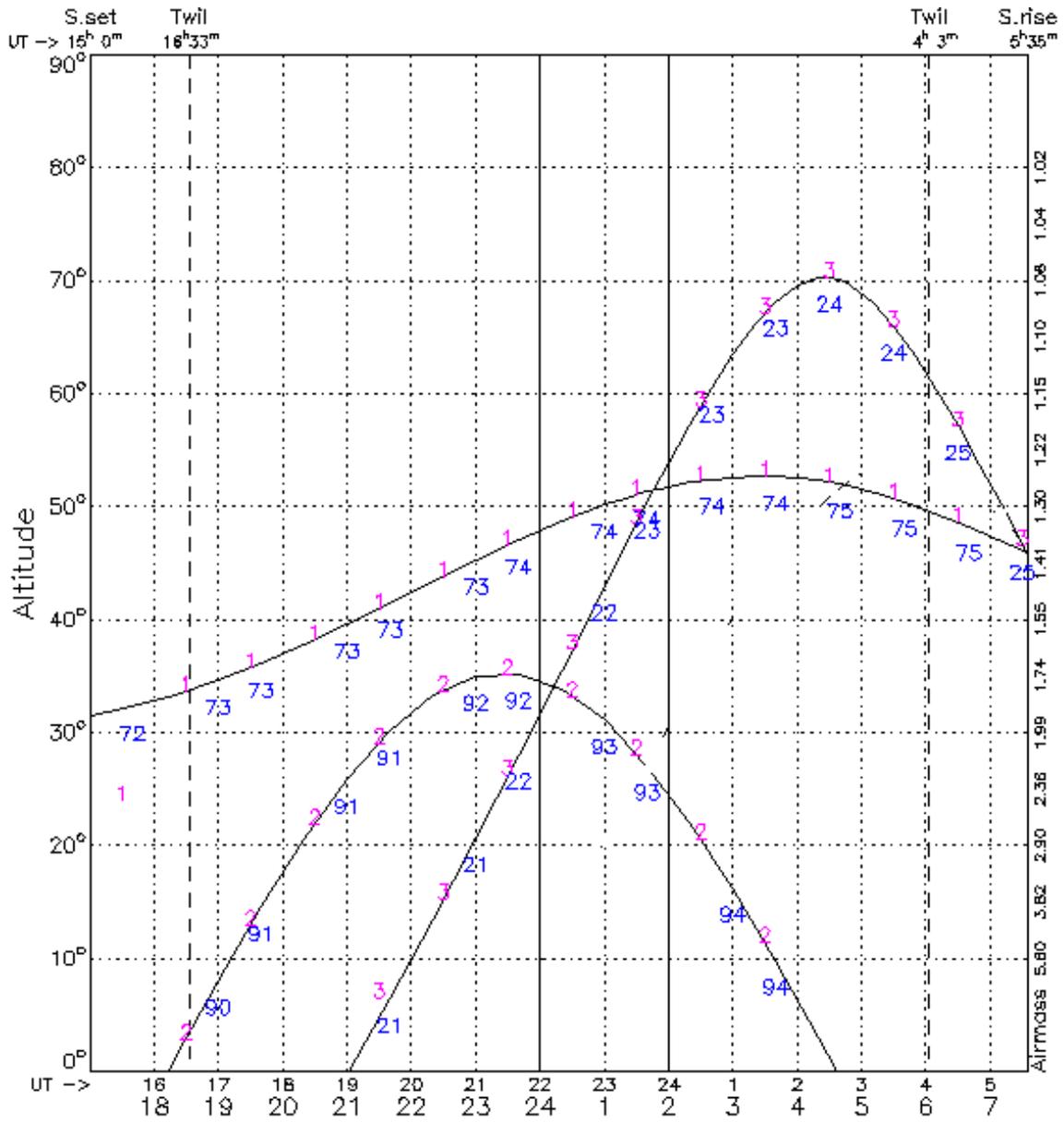
Fig. 3

Task 11. This image of a field around a quasar is obtained with a 35-cm telescope.
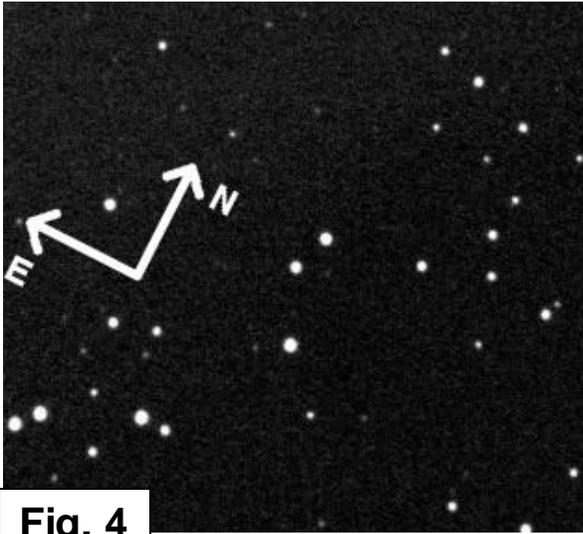
Fig. 4

It is one of the following four quasars (on the finder charts on **Fig. 5**):

11.1. Which quasar is on the image? Identify the field and circle the correct answer.

Answer: *3C 66A / OJ 287 / 3C 454.3 / PKS 1510-08*   *1 pt*

11.2. What changes have to be made in the equatorial coordinates of the telescope in order to put the quasar in the center of the field?

Answer: $\Delta\alpha =$ _____ ″ $\Delta\delta =$ _____ ″   *2 pts*

11.3. Approximate distances to some field stars are indicated on the charts in parsecs. Estimate roughly the distance to the quasar:

Answer: d = _____ *pc*   *1 pt*

Task 12. The speed of the daily motion of stars due to the rotation of the Earth is artificially increased *(video clip)*. What is the geographical latitude of the location of the observation that the software is simulating? North or south of the equator (underline the correct option)?

Answer: _____*North/South*   *3 pts*

Fig. 5