The Second International Astronomy Olympiad

October 22-28, 1997.

Theoretical exam.

Problems to solve, 8-10 Form

1. Two stars have the same absolute magnitude. One is thousand times farther away than the other. What is the difference in apparent magnitudes? Which magnitude larger?

2. What would an observer have seen sitting on the Moon and looking at the Earth, when the total eclipse of the Sun took place on the Solovetz Islands (34œ45' East, 65œ01' North) at 5 a.m. July 22, 1990? Illustrate your answer with a drawing.

3. The duration of the day on Mars is only approximately 2.5 % longer than on Earth. The orbital period of Mars is 687 days. Find (approximately) the difference between the duration of the siderial day and the mean solar day on Mars.

4. On the day of the all-the-world holiday (fortieth anniversary of the launch of the first satellite), October 4, 1997, Venus was not far from its Eastern elongation, its coordinates were approximately a = 15^h20^m, d = -22œ.
   Using the above data, estimate its coordinates and position relative to the Sun on the day of the launch of the first satellite, October 4, 1957. The orbital period of Venus is 0.61521 of the tropical year.

5. Let us consider that observer is sitting on a planet of Syrius. Which object is brigter one in "his sky":
          either our Sun or the stars of the Big Dipper?

6. Let us say that the Sun is in Zenith, if it covers the Zenith by its disc. Where is it possible to see such an event more often - in Quito (latitude = 0œ) or in San-Paulo (latitude = = -23.5œ)?
Explain.

Theoretical exam.
Problems to solve, 11-12 Form

1. If a star is moving away from the Earth at very high speed, will the star have a continuous spectrum that appears hotter or cooler than it would if the star were at rest? Explain.

2. See problem 2. for 8-10 Form.

3. In the course of star war one crazy civilization cut a star in two halfs (without varing substance density and its temperature). How did this lofty deed change the star's magnitude? What is the magnitude of the resulting double star compared to that of the original star?

4. See problem 4. for 8-10 Form.

5. See problem 5. for 8-10 Form.

6. What limits the resolving power of the 6-meter telescope BTA in SAO? Calculate it. Explain your calculations.

Observational examination.

Rules of the Examination, 9-12 Form

Every participant has to show all the constellations in the following parts of the sky (sky was not open, some parts of it were covered by trees):
1. North-East.
2. South.
3. North.

Practical exam.
Problem to solve, 9-12 Form

Practical exam.
Problem is about Doppler-effect, to find velosities of two stars using their spectra and spectrum of our Sun, to estimate speed of the Earth moving around the Sun.