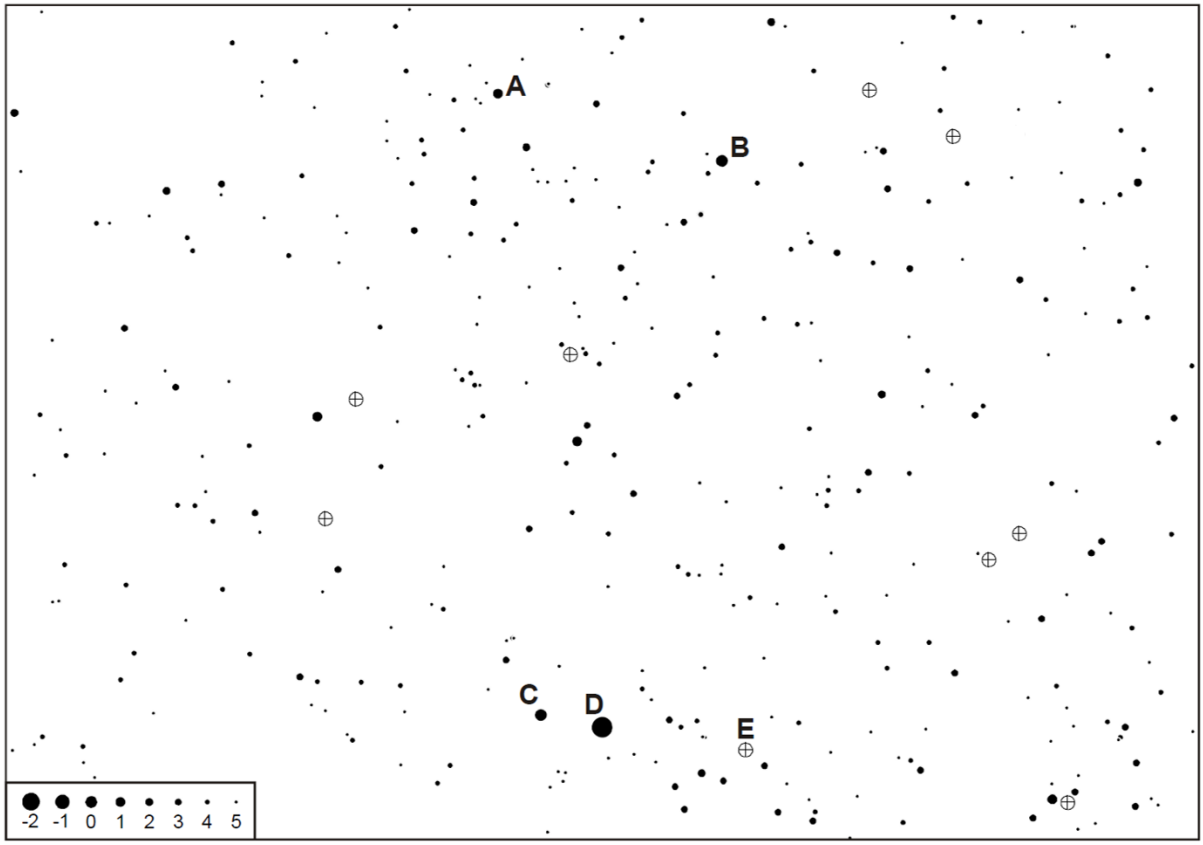
Israel Open Astronomy Olympiad 2025

Junior and Senior age group problems

Stellar map (20 p)

Below you see a map of a part of the sky (field of view is about 90 degrees) visible during a night in July. The small black disks show positions of the stars and planets. The disk radius is larger for brighter objects. The legend in the lower left of the map shows the correspondence between the apparent magnitude of an object and the diameter of the disk. The crossed empty circles show positions of globular star clusters.



A Identify the objects denoted by letters A to E. If you have several options for the object identification, enter all of them in the corresponding text field. The unreasonable answers will be penalized.

Answer:

- Object A is [ ] (2 p.)
- Object B is [ ] (2 p.)
- Object C is [ ] (2 p.)
- Object D is [ ] (2 p.)
- Object E is [ ] (2 p.)

Solution: After carefully looking at the star map one can see the Scorpio at the right bottom angle, the Corona Borealis at the right top, and the Summer Triangle at the center part of the star map. The objects A and B are thus Deneb and Vega. Object E is the M22 cluster.

There are no bright stars in the region where C and D objects are shown, so these are planets. Only Jupiter and Venus may be as bright as -2^m, but Venus cannot be located so far from the Sun, so object D is Jupiter. The only doubtful identification is object C that may be either Mars or Saturn. Either answer will be accepted as correct, and those giving both object names will be awarded bonus points.

B Arrange the objects in the order of increasing distance from the Earth at the map observation time. For example, enter "ABCDE" in the answer field if you think that A was the closest to the Earth, followed by B, etc., and E was the farthest from the Earth during the observation time.

Answer: [ ] (10 p., with 2 p for each correct relative distance)

Solution:

The farthest object is the globular star cluster, as they all are quite far from the Earth. Identifying this cluster is not essential for concluding on relative distance.

Remembering that Vega is a white main sequence star, but Deneb is a blue supergiant, one can conclude that Vega is located much closer to the Sun. If C is identified as Mars, then the correct sequence is CDBAE, and if C is identified as Saturn, the correct sequence is DCBAE. Both answers are considered fully correct.

The actual date corresponding to the map is July 2020, and the object C is Saturn, but we cannot expect from the participants to guess it.