

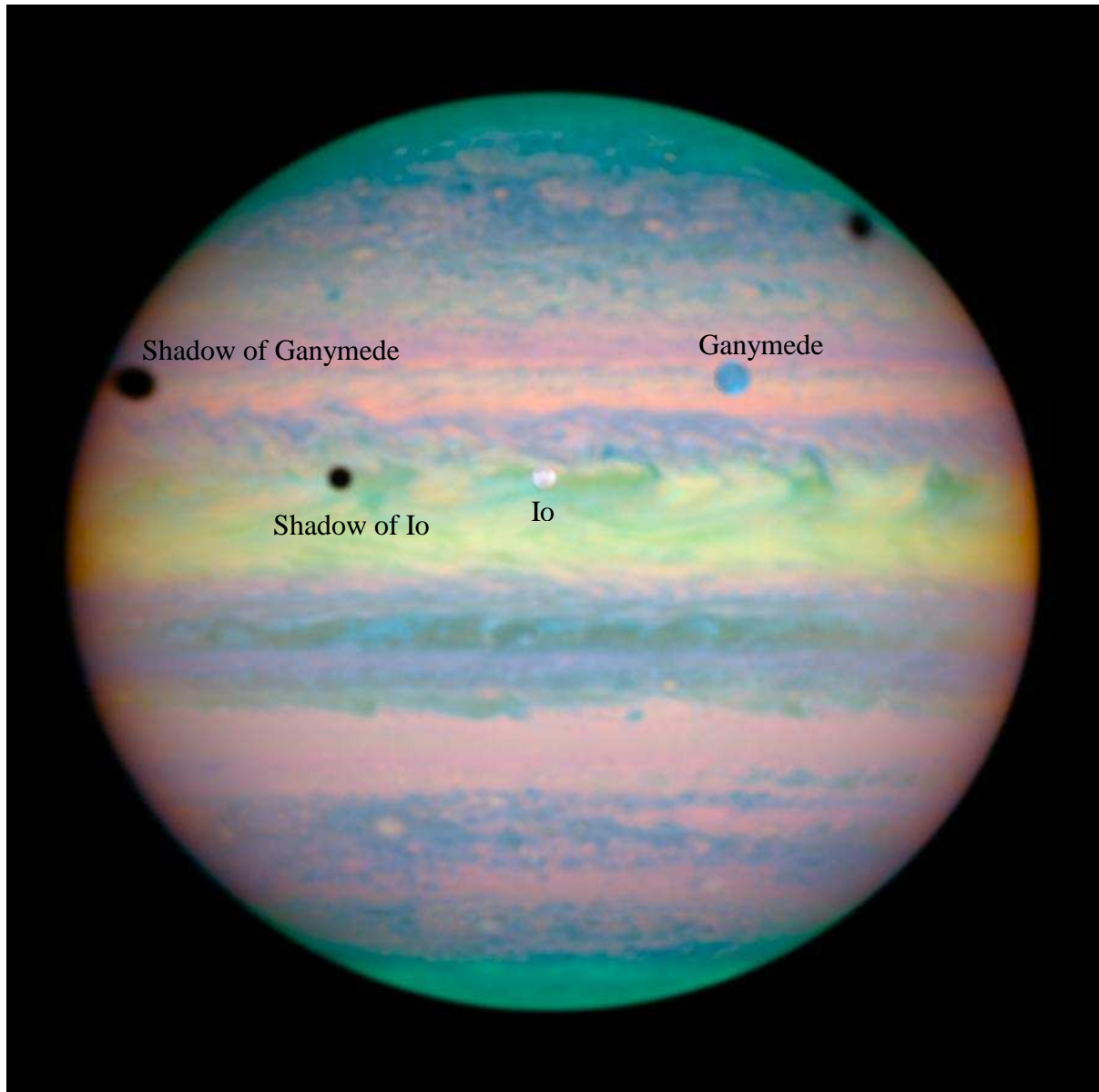
IESO 2012 Written TEST ASTRONOMY

Name _____ Nationality _____

- (1) The full moon was photographed using a telescope equipped with a camera whose field of view was too small, so that only part of the moon is visible. Recalling that the angular diameter of the moon is about $30'$, using rulers and/or compass, estimate the field of view of this camera. **You must write down the whole process on this paper.** (10 pts)



- (2) In the image of Jupiter with its moons (taken from Hubble Space Telescope on March 28, 2004), three shadows from the Io, Ganymede, and Callisto are visible, respectively, and two moons are visible in this image, Io in the center and Ganymede at the upper right. However, Callisto is out of the image.

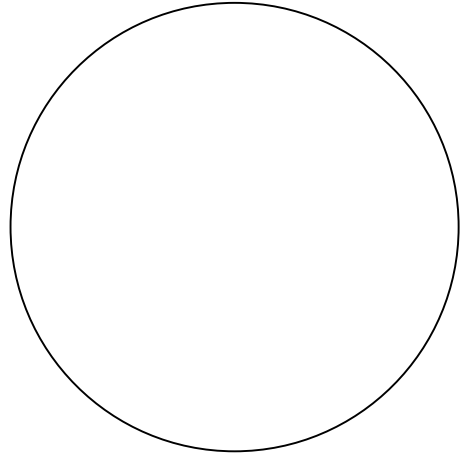
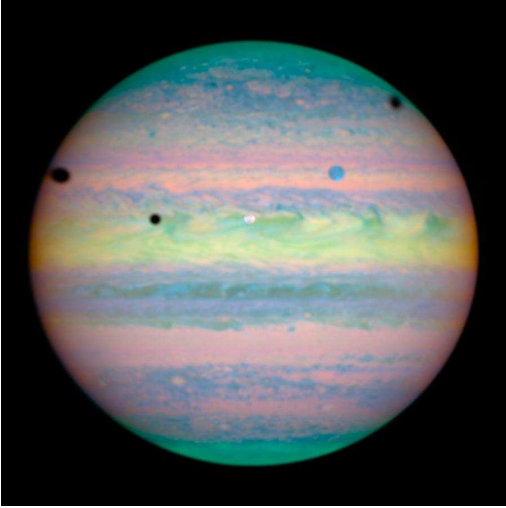


- (2-1) Callisto is out of the image. On the image above, draw an arrow pointing to where Callisto would be located. (1 pt)
- (2-2) The diameter of Io is 3646 km, and the diameter of Ganymede is 5262 km. What is the scale (km/mm) of this image. (2 pts)

(2-3). Find the direction of light from Sun to Jupiter

Refer to the image and drawing on the page below. The image, taken from the Hubble Space Telescope is shown on the upper-left side, and the circle on upper-right side is a view from the northern sky of Jupiter, with the circle line representing the equator of Jupiter. The diameter of Jupiter is 143000 km.

- (i) Plot a circle, C, inside the equator circle of Jupiter, showing the latitude of the shadow of Io. (2 pts)
- (ii) Plot the position of the shadow of Io on circle C. (2 pts)
- (iii) Draw the line through Io to the Earth. (1 pt)
- (iv) The rays of light from the Sun to Jupiter and its moons are almost parallel. The radius of the orbit of Io is about 422000 km. Draw a circle outside the equator circle representing the orbit of Io. (1 pt)
- (v) Mark a point representing the location of Io. (1 pt)
- (vi) Draw a line from the shadow of Io to the direction of Sun. (1 pt)
- (vii) Calculate the distance between Io and its shadow in km? (2 pts)



↓
To Earth