Practical round. Problems to solve

7. Jupiter. In 2009, a nucleus of unknown comet or an asteroid crashed into Jupiter's atmosphere. A powerful explosion formed a dark cloud, which gradually stretched parallel to equator due to zonal flow in the atmosphere. Hubble Space Telescope was able to take a few pictures of Jupiter during this period.

Determine the rate at which the dark cloud on the surface of Jupiter increased its length after the impact with the comet or asteroid by measuring the length of image fragments on the set of the 3 top images displayed on the right.

The photos were taken in the same position of the cloud relative to the central meridian. The scale is determined from the image of Jupiter and position of the fragment marked on it. The equatorial diameter of Jupiter is 143842 km.

8. Comet. In the middle of July 2014, an automatic interplanetary spacecraft Rosetta of European Space Agency made the discovery that the comet 67P / Churyumov–Gerasimenko had a bipartite nucleus. On September 5th Rosetta was able to determine that its albedo was about 0.04 and the maximum nucleus length, 4 km.

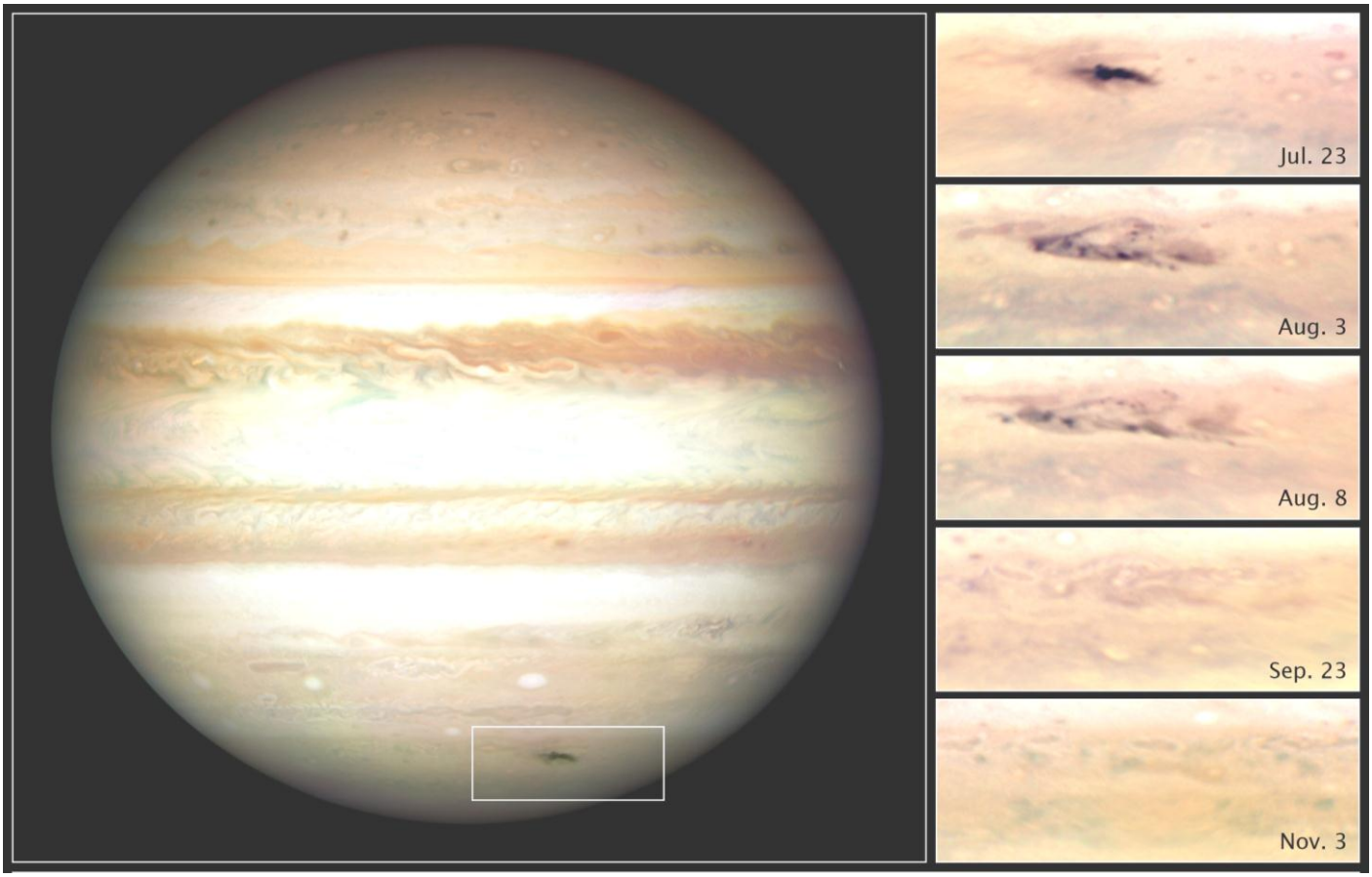
On a separate sheet are the pictures demonstrating rotation of the comet nucleus, taken with 40 minutes intervals. Each picture has the date when it was taken and the angle of nucleus rotation relative to the first picture indicated on it. Using these images, determine the rotation period of the comet and plot its light curve based on them. Assume the same albedo over the entire surface of the comet.

According to NASA, the estimated distances at that time were as following:

Rosetta to Sun 557 794 935 km,
Rosetta to Earth 407 252 536 km,
Rosetta to the comet 12 294 km.

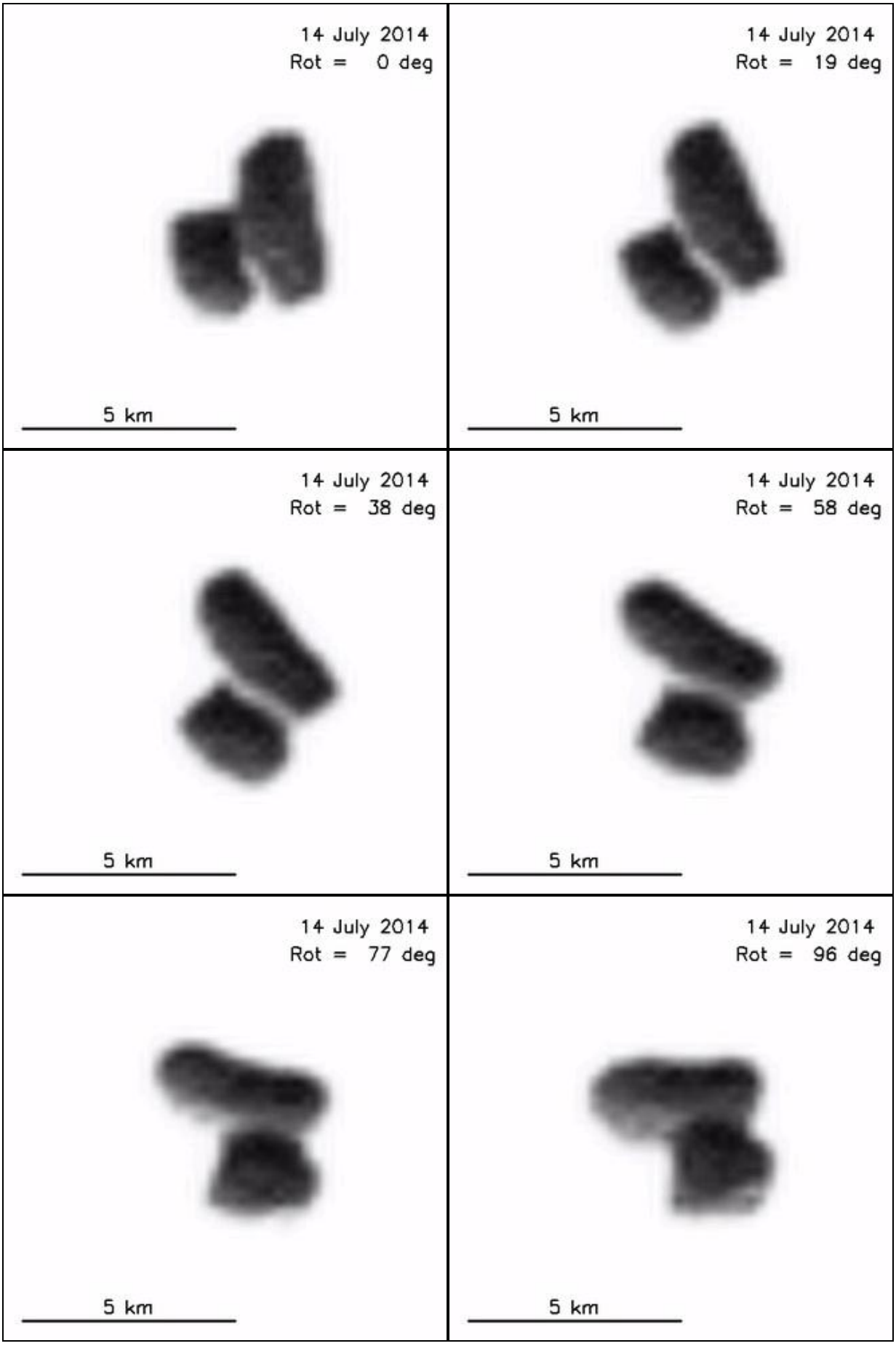
7. Юпитер.

7. Jupiter.



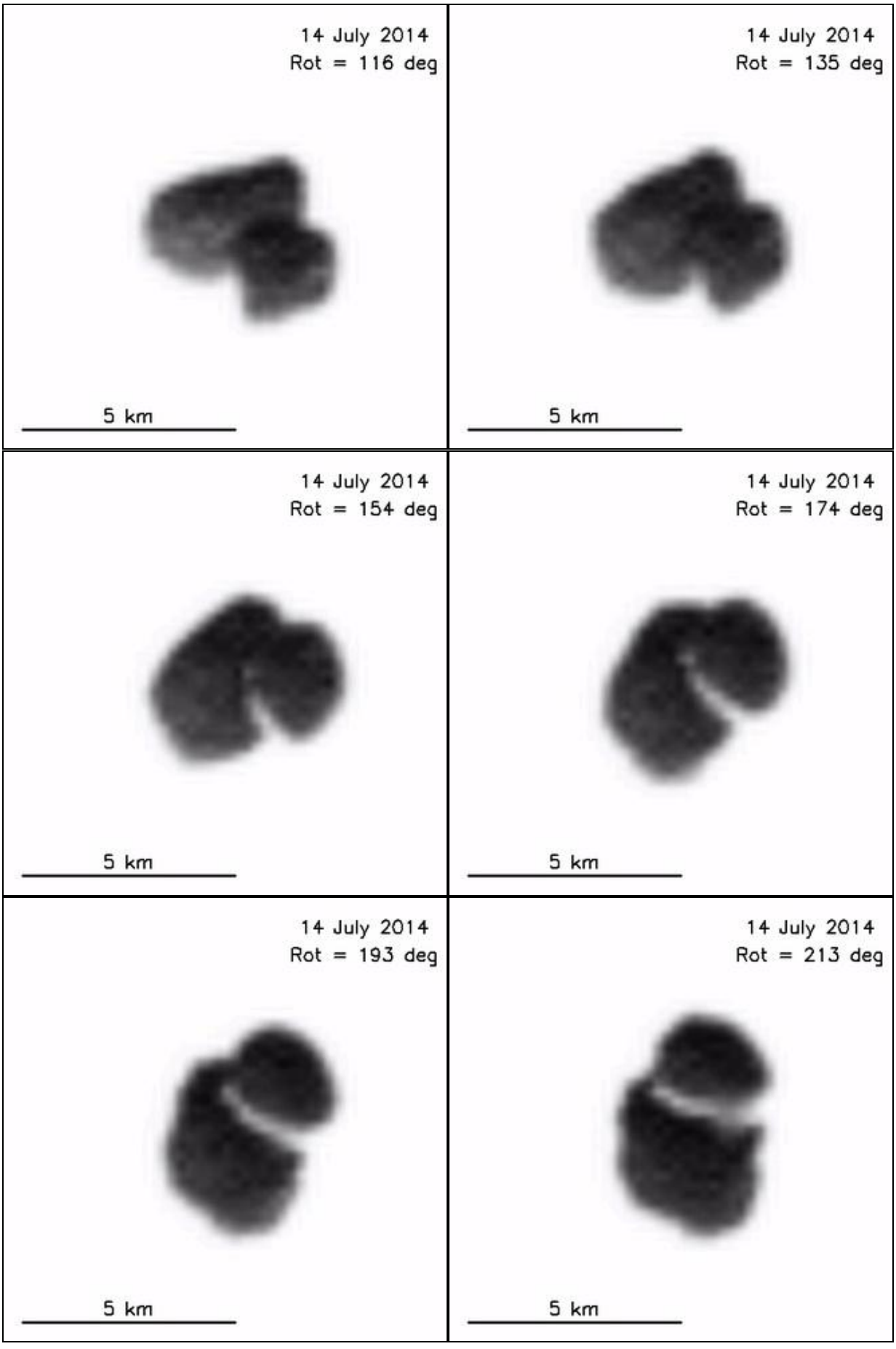
8. Комета. 8. Comet.

1



8. Комета. 8. Comet.

2



8. Комета. 8. Comet. 3

