

We recommend you to choose the most interesting tasks out of these seven. The list of the questions in each task can be used as a plan of the whole answer or you can answer the questions separately. Provide your answers with a reasonable number of examples and explanations at your discretion.

Task 1. The main character of the Tomorrowland movie looks at the sky and points out the stars she sees: Sirius (α Canis Majoris), Canopus (α Carinae), Arcturus (α Boötis), Alpha Centauri, Vega, (α Lyrae), Procyon (α Canis Minoris), Capella (α Aurigae), Betelgeuse (α Orionis). Could she really see all these stars at the same time? Which stars could she possibly see? Which ones she couldn't? How can we find it out?

Task 2. Why does the Moon moves away from the Earth while Phobos, one of Mars' moons, gets closer to Mars?

Task 3. Imagine the building 400 km high. The International Space Station is about the same distance far from the Earth. Will being on board the ISS and being on top of such building be the same? Will they be different? What will be the difference? Which height should the building be so there will be no any difference?

Task 4. Why can a mirage be seen in a desert more often than in any other region (like a steppe or the sea)? Which weather should it be to maximize a chance to see a mirage?

Task 5. How can we learn the star's age? Can we say if the star is young or old just by looking at it? In which cases we can say so and in which we can't?

Task 6. On the 13th of July 2019, the Russian-German Spektr-RG space observatory was launched. It will study space on wavelength from 0.04 to 4 nanometers (0.3-30 keV), invisible for the human eye. What kind of objects can it study?

Task 7. *Find the mistakes in the following text. Make a list of the wrong facts mentioned in the text. Correct the mistakes by suggesting what should be changed to make the text right and which way it should be changed.*

On the 20th of July 1969 a man landed on another planet for the first time. The first man to touch the Moon surface was Louis Armstrong. Buzz Aldrin and Michael Collins were also the crewmembers. They could run on the Moon surface after Louis Armstrong.

The great job was done before this flight. At first, there was a series of test launches to work all needed maneuvers out. The Apollo-7 spaceship made it in the near-Earth orbit while the Apollo-8 spacecraft became the first manned spacecraft orbiting the Moon. The Apollo-8 was also the first spaceship to gain the solar escape velocity. The Apollo-9 performed the Moon landing scenario on Earth. The Apollo-10 performed the full test circuit, and the Apollo-11 was the first spacecraft with people on board to successfully land on the Moon surface.

The landing module landed on the wall of Tycho crater. The astronauts installed the USA national flag in the place where they landed. After that, they watched the Earth going down the lunar horizon, set some scientific equipment and collected 21.55 kilos of moon soil samples to bring to the Earth. Some other missions took place later. The Apollo-16 was the last one. There were 6 expeditions to the Moon, and 12 people landed on its surface in general. The astronauts of one expedition performed famous Galilei and Newton experiments. Performing Galilei experiment, they threw a light feather and a heavy hummer at the same time. The feather fell down before the hummer in the space vacuum. Also, the vibration sensor were installed. They showed that the speed of the sound waves is more in vacuum. To go faster on the Moon surface, some expeditions brought special moon cars with them. They helped to go rather far. The astronauts said that it was quite difficult for them to navigate because the Earth and the Moon constellations differ very much. They had to use a compass for navigation. Well-reflecting dust adhered to their spacesuits and was blinding the astronauts in the bright sunlight.

After these missions, there were doubts about them. Some people believed that they never happened. Now there are no any doubts. Modern satellites can easily take photos of the landing module, the flag, the moon car and even the astronauts' footprints.