**The laboratory work 10**

The material point of mass m is in the gravitational field of a thin ring of mass M and radius R. At the initial moment of time, the point is placed at point Q1, located on the axis of the ring at a distance x0 <R from the plane of the ring and begins to perform oscillatory movements.



If x0 <0.1R, then the oscillations of x are described by the following equation:



If x0≥0.1R or as a result of oscillations the condition x0≥0.1R is fulfilled, then the oscillations are described by the following equation:

, where G is the gravitational constant.

Every C1 seconds, a radius of the ring alternately instantaneously expands and is compressed N times. If the point deviates from the ring by more than 10 times of its original radius, the system collapses.
Construct a model of this system.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variant | m | M | R | x0 | C1 | N |
| 1 | 10 kg | $$10^{20} kg$$ | 900 m | 2.5 m | 25 s | 15 |
| 2 | 1 kg | $$10^{20} kg$$ | 1000 m | 1 m | 15 s | 10 |
| 3 | 9 kg | $$10^{20} kg$$ | 850 m | 1.6 m | 30 s | 5 |
| 4 | 3 kg | $$10^{20} kg$$ | 1500 m | 2.9 m | 10 s | 6 |
| 5 | 5 kg | $$10^{20} kg$$ | 1460 m | 2.3 m | 25 s | 15 |
| 6 | 8 kg | $$10^{20} kg$$ | 790 m | 1.1 m | 45 s | 7 |
| 7 | 6 kg | $$10^{20} kg$$ | 1860 m | 2.6 m | 50 s | 9 |
| 8 | 4 kg | $$10^{20} kg$$ | 1630 m | 2.1 m | 10 s | 12 |