

Change in the Orbit of Satellite.

When the satellite is transferred to a higher orbit ($r_2 > r_1$) then variation in different quantities can be shown by the following table

Quantities	Variation	Relation with r
Orbital velocity	Decreases	$v \propto \frac{1}{\sqrt{r}}$
Time period	Increases	$T \propto r^{3/2}$
Linear momentum	Decreases	$P \propto \frac{1}{\sqrt{r}}$
Angular momentum	Increases	$L \propto \sqrt{r}$
Kinetic energy	Decreases	$K \propto \frac{1}{r}$
Potential energy	Increases	$U \propto -\frac{1}{r}$
Total energy	Increases	$E \propto -\frac{1}{r}$
Binding energy	Decreases	$BE \propto \frac{1}{r}$

Note: Work done in changing the orbit $W = E_2 - E_1$

$$W = \left(-\frac{GMm}{2r_2} \right) - \left(-\frac{GMm}{2r_1} \right)$$

$$W = \frac{GMm}{2} \left[\frac{1}{r_1} - \frac{1}{r_2} \right]$$

