## Satellite Motion 1



## Satellite Motion

An Earth satellite is simply a falling object
It is simply traveling with enough tangential velocity to fall around the Earth, rather than into it.

## Mountain Cannon

$8000 \mathrm{~m} / \mathrm{s}$
A satellite close to the Earth has a tangential speed of $8 \mathrm{~km} / \mathrm{s}$. ( $19,000 \mathrm{mi} / \mathrm{hr}$ )

During each second, the satellite falls 5 m beneath each successive 8 km tangent.


## "Falling Moon"

explanation of how satellite motion would work
apple falls to surface of Earth b/c gravity.....moon orbits b/c gravity

## Tangential Velocity

too slow - $\mathrm{F}_{\mathrm{g}}$ makes satellite fall into earth too fast - satellite goes into outer space


Unit: m/s


## Circular Orbits

circular orbit - $V_{t}$ matches available $F_{g}$
the speed of the satellite is constant


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## Elliptical Orbits

If the tangential speed of the satellite is greater than $8 \mathrm{~km} / \mathrm{s}$, the satellite will overshoot a circular path and follow an ovalshaped path or ellipse.


## Escape Speed

Escape speed is the minimum initial speed an object must have in order to escape the pull of Earth's gravitational field.

Escape speed from Earth is $11.2 \mathrm{~km} / \mathrm{s}$. $\quad 11,200 \mathrm{~m} / \mathrm{s}$ ( $25,300 \mathrm{mi} / \mathrm{hr}$.)


## TV Satellite

7000 mph at about 22,200 miles above the Earth

http://science.nasa.gov/realtime/jtrack/3d/JTrack3D.html/
(a)

## Assignments



- Begin Chapter 13 Homework \#1-4

