WORK BACKWARDS FROM AFTER COLLISION.

BEFORE COLLISION		AFTER COLLISION
$m_c v_c$	=	$(m_s + m_c) V_{sc}$

V_{sc} → SHOULD BE EQUAL TO ESCAPE VELOCITY

$$V_{sc} = \sqrt{\frac{2GM_p}{r}}$$

r → DISTANCE FROM SATELLITE TO CENTER OF PLANET

$$m_c v_c = (m_s + m_c)\sqrt{\frac{2GM_p}{r}}$$

$$V_c = \frac{(m_s + m_c)\sqrt{\frac{2GM_p}{r}}}{m_c}$$

$$V_c = 1.288 \times 10^5 \text{ m/s}$$

- m_s = MASS OF SATELLITE
- m_c = MASS OF BLOB
- m_p = MASS OF PLANET
- R_p = RADIUS OF PLANET
- r = ORBITAL RADIUS + RADIUS OF PLANET
- V_c = VELOCITY OF BLOB

NOW TO CALCULATE ENERGY AT BEGINNING AND RELATE TO ENERGY AT END

$$\frac{1}{2}kx^2 - \underbrace{\frac{G m_c m_p}{R_p}}_{2.69 \times 10^{13}} = \underbrace{\frac{1}{2} m_c v_c^2}_{4.14 \times 10^{13}} - \underbrace{\frac{G m_c m_p}{r}}_{7.38 \times 10^{11}}$$

SOLVE FOR x

$$\frac{1}{2}kx^2 = \frac{1}{2}m_c v_c^2 - \frac{G m_c m_E}{r} + \frac{G m_c m_E}{R_E}$$

$$x = \sqrt{2k\left(\frac{1}{2}m_c v_c^2 - \frac{G m_c m_e}{r} + \frac{G m_c m_e}{R_e}\right)}$$

$x = 52.64\ m$

CONCEPTUAL QUESTIONS ?

CAN YOU BE IN A GEOSTATIONARY ORBIT ABOVE A POLE?

NOPE, IT HAS TO STAND STILL TO BE STATIONARY ABOVE A POLE HENCE WHY THERE ARE THRUSTERS ON?

WHAT FORCE ARE THRUSTERS APPLYING ?

$$F = \frac{G m_1 m_2}{r^2}$$

COULD WE MEASURE HOW MUCH TIME IT TAKES TO REACH SATELLITE?

YES, BUT NOT WITH THE PHYSICS TOOLS AT OUR DISPOSAL, VARIABLE FORCE RESULTS IN CHANGING ACCELERATION WHICH WE HAVE NOT DEALT WITH.

IF WE DID NOT LAUNCH FROM THE POLE WHAT COMPLICATIONS WOULD WE HAVE TO DEAL WITH?

ROTATION OF THE EARTH WOULD ADD X VECTOR TO VELOCITY.