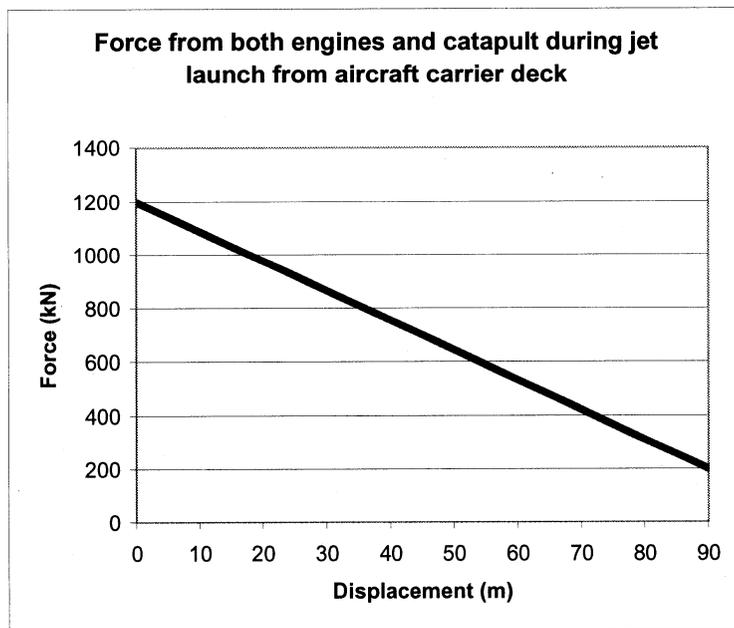


The following graph shows the force provided by the jet engines and the catapult as a jet moves down the carrier deck during launch. The mass of the jet is 20000 kg.



1. How much work is done by the engines and catapult during launch? (5 points)

$$\begin{aligned}
 W &= \text{AREA UNDER THE CURVE OF } F \text{ vs. DISPLACEMENT} \\
 &= \frac{1}{2} (1000 \text{ kN})(90 \text{ m}) + (200 \text{ kN})(90 \text{ m}) \\
 &= 45,000,000 \text{ J} + 18,000,000 \text{ J} \\
 &= 63,000,000 \text{ J}
 \end{aligned}$$

2. Ignoring friction and air resistance, what is the speed of the aircraft (relative to the carrier) as the plane leaves the deck? (5 points)

$$\begin{aligned}
 W &= \Delta K = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \\
 63,000,000 \text{ J} &= \frac{1}{2} (20,000 \text{ kg}) v_f^2
 \end{aligned}$$

$$v_f^2 = 6300 \frac{\text{m}^2}{\text{s}^2}$$

$$v_f = 79 \text{ m/s} \quad (\approx 154 \text{ KTS})$$

$$1 \text{ KTS} = .5144 \text{ m/s}$$

$$W = \int_a^b \vec{F} \cdot d\vec{r}$$

$$W = \Delta K$$

$$K = \frac{1}{2} m v^2$$

Extra Credit: Who were the last three Athletic Directors at the Naval Academy?

CHET GRADCHUCK
JACK LENGYEL
BO COPPEGE