6. An originally stationary car with a mass of 1500 kg reaches a velocity of 15 m/sec 5 sec after starting. What is the car's acceleration? How much force was required to reach this acceleration?

(A) $acc = \frac{F_v - I_v}{t} = \frac{15\,m/s - 0\,m/s}{5\,sec} = 3\,m/s^2$

(B) $F = ma$

$(1500\,kg)(3\,m/s^2)$

$= 4500\,N$

7. An astronaut has a mass of 50 kg.

a. How much does she weigh before liftoff?

$W = mg \rightarrow (50\,kg)(9.8\,m/s^2) = 490\,N$

b. When her space vehicle is 6400 km above the Earth's surface, she will weigh one quarter of what she weighed on the Earth.

(1) What does she weigh at that point in space?

$490 \div 4 = 122.5\,N$

(2) What is the acceleration on her mass at that point in space?

$W = mg \rightarrow g = \frac{W}{m} \rightarrow \frac{122.5\,N}{50\,kg} = 2.45\,m/s^2$

8. A 7000-kg plane is launched from an aircraft carrier in 2 sec by a force of 350,000 N. What is the plane's acceleration? What is the plane's velocity?

(A) $F = ma \rightarrow g = \frac{F}{m} \rightarrow \frac{350{,}000\,N}{7{,}000\,kg} = 50\,m/s^2$

(B) V = speed + direction

$V = (acc)(t)$

$(50\,m/s^2)(2\,sec) = 100\,m/s$