8. Einstein defined the relativistic momentum as

$$p = (m v) /(1 - v^2 /c^2)^{1/2}$$

$$p = (4000 \text{ kg}) (0.8 c) / [1 - (0.8 c)^2 / c^2]^{1/2}$$

$$p = (3200 \text{ kg}) (3 \times 10^8 \text{ m/s}) / (1 - 0.64)^{1/2}$$

$$p = (9.6 \times 10^{11}) / (0.36)^{1/2} \quad \text{kg m / s}$$

$$p = (9.7 \times 10^{11}) / 0.6 \quad \text{kg m / s}$$

$$p = 16.2 \times 10^{11} \text{ kg m / s}$$

$$p = 1.62 \times 10^{12} \text{ kg m / s}$$

Compare this to the momentum calculated (erroneously) by non-relativistic methods

$$p = m v = (4000 \text{ kg}) (0.8) (3 \times 10^8 \text{ m / s})$$

$$p = 9.6 \times 10^{11} \text{ kg m / s}$$

The relativistic momentum is 1.7 times as large as the value calculated using non-relativitic approaches.