In a performance test, each of two cars takes 8.3 s to accelerate from rest to 29 m/s. Car A has a mass of 1361 kg, and car B has a mass of 1871 kg. Find the net average force that acts on (a) car A and (b) car B during the test.

Solution:

$V = 29\frac{m}{s}$ – velocity of the cars;

$t = 8.3$ s- time required to reach the speed V

$m_A = 1361$ kg - mass of the car A;

$m_B = 1871$ kg - mass of the car B;

F_A, F_B –net forces that acts on cars A and B during the test.

First, we can find the acceleration of the car. Rate equation along the X axis:

$$V = at$$
$$a = \frac{V}{t}$$

Newton's second law for the car:

$$F = ma = \frac{mV}{t} \Longrightarrow$$
$$F_A = \frac{m_A V}{t} = \frac{1361\text{ kg} \cdot 29\frac{m}{s}}{8.3\text{ s}} = 4755\text{N}$$
$$F_B = \frac{m_B V}{t} = \frac{1871\text{ kg} \cdot 29\frac{m}{s}}{8.3\text{ s}} = 6537\text{N}$$

Answer: a) 4755N

b) 6537N