2. Let m_1 be mass of vehicle.

Let m_2 be mass of wheel.

k_1 be spring constant of spring

k_2 be spring constant of the tire

b be damping constant of the shock absorber.

Free body diagram for M_1 and equations are

$$m_1 \frac{d^2y}{dt^2} + b\frac{d(y_1 - y_2)}{dt} + k_1(y_1 - y_2) = 0 \quad \text{— (1)}$$

For m_1 the equations of motion are

$$m_2 \frac{d^2y}{dt^2} + b\frac{d(y_2 - y_1)}{dt} + k_1(y_2 - y_1) + k_2 y_2 = k_2 x$$

Solving m_1,

$$\frac{d^2y}{dt^2} = \left[k_1 y_2 - k_1 y_1 - b\frac{(y_2 - y_1)}{dt}\right]\frac{1}{m_1}$$

$$\frac{d^2y}{dt^2} = \left[k_2 x - b\frac{d(y_2 - y_1)}{dt} - k_1 y_2 + k_1 y_1 - k_2 y_2\right]\frac{1}{m_2}$$