Answer on Question #51077 – Physics – Mechanics, Kinematics, Dynamics

Question: an upward force of $1.2 \cdot 10^4 \ N$ acts on elevator of mass $2.0 \cdot 10^3 \ kg$. Calculate the acceleration of the elevator. Take $g = 9.8 \ \frac{m}{s^2}$.

Solution: let us use the Newton's second law. The object has 2 forces acting on it. Its weight is pushing it down and the elevator is pushing it up. The projection of forces along upward direction is

$$ma = F - mg$$

Here a is acceleration of the lift, m is its mass, F is the upward force. Thus,

$$a = \frac{F}{m} - g = \frac{1.2 \cdot 10^4}{2 \cdot 10^3} - 9.8 = -3.8 \ \frac{m}{s^2}$$

We see that lift is moving downward with acceleration $a = -3.8 \ \frac{m}{s^2}$.

Answer:

$$\text{lift is accelerating downward at } 3.8 \ \frac{m}{s^2}$$