Answer on Question#45361, Physics, Mechanics | Kinematics | Dynamics

a) Since the body is at rest at the table, the normal force is equal to gravitational force ($N = mg$). In order for block to move, the tension of the string must be bigger than the frictional force, which is $F_f = \mu N = \mu mg$, where μ is the coefficient of static friction.
For clean steel, this coefficient is equal to $\mu_1 = 0.74$. Hence, minimum string tension is $T = F_f = \mu mg \approx 14.52\,N$.

b) First, let us find the acceleration of the block, if string tension is $20\,N$. According to 2nd Newtons law, $a = \frac{F_{net}}{m} = \frac{F - \mu mg}{m} = \frac{F}{m} - \mu g \approx 2.74 \frac{m}{s^2}$.
Hence, velocity of the block as a function of time is $v(t) = at$. The displacement is $S(t) = \frac{at^2}{2}$. The time needed to move S meters is $t = \sqrt{2\frac{S}{a}}$, thus velocity at that moment is $v = a\sqrt{2\frac{S}{a}} = \sqrt{2Sa} \approx 2.34 \frac{m}{s}$.

c) Using formulas from $b)$ with coefficient of friction of lubricated steel $\mu_2 = 0.16$, obtain $a = 8.43 \frac{m}{s^2}$ and $v = 4.1 \frac{m}{s^2}$.