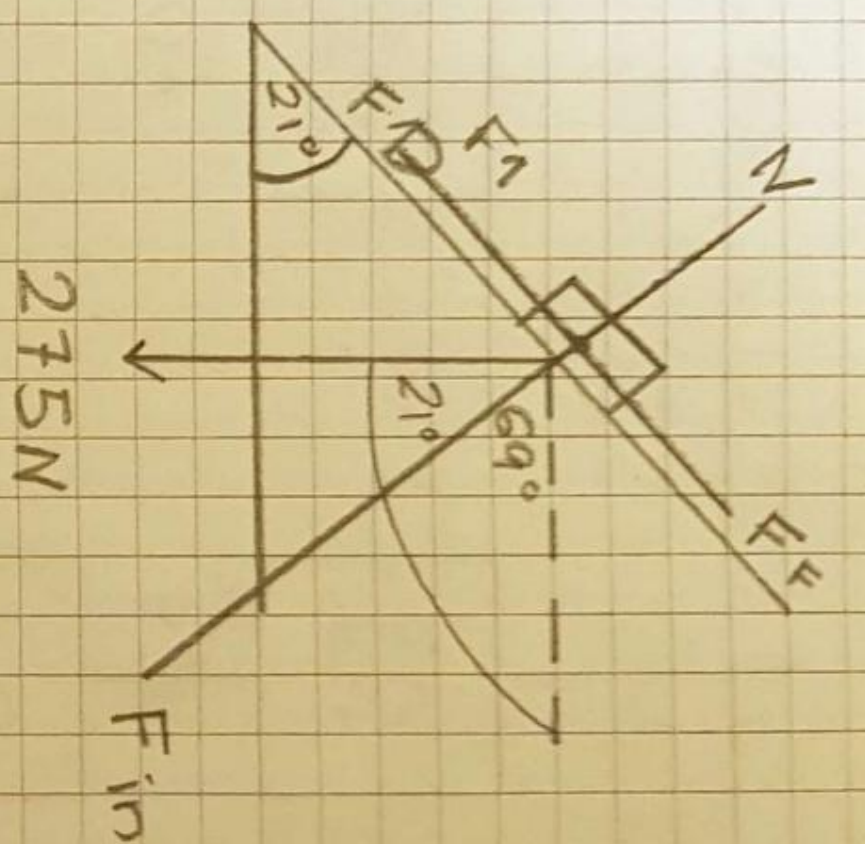


1) a)

$$F_F = F_D$$

$$N = F_{in}$$



i) $275 \times \cos 69 = \underline{98.55}$

ii) angle is 21°

iii) $275 \times \cos 21 = 256.73$

$$F_{in} = N$$

$$N = 256.73$$

b) Momentum = mass $\times$ velocity

i) $\underline{P = mv}$

ii) $P \text{ in } \text{m/s} = \text{kg m/s}$

c)

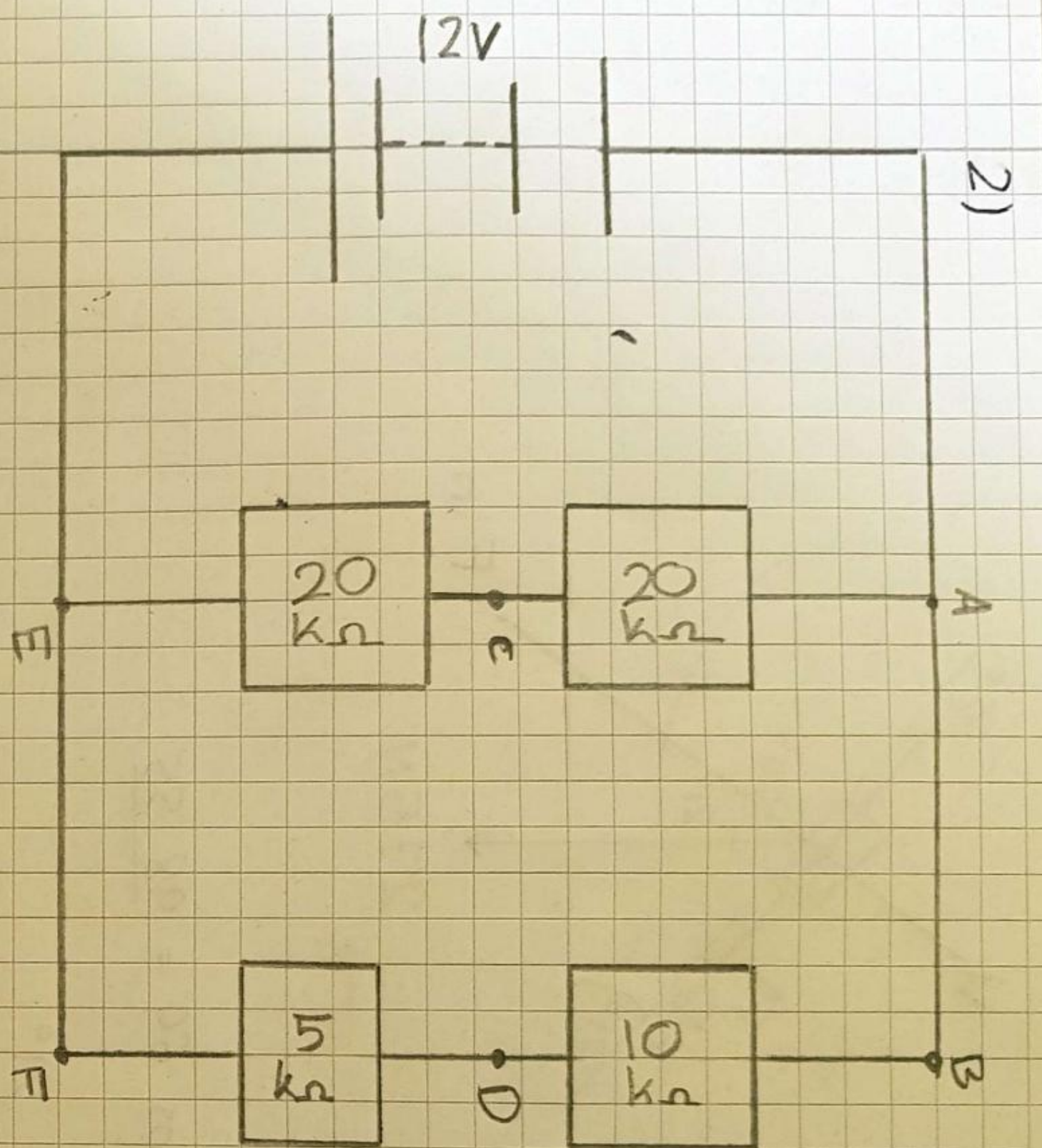
$$\text{mass} = \frac{275}{9.81} = 28.03 \times 2.5 = 70.08$$

$$F1 = 70.08$$

ii)

$$28.03 \times 7.5 = 210.23 \text{ kg m/s}$$

$$P = 210.23 \text{ kg m/s}$$



$$1) \quad 20k\Omega + 20k\Omega = 40k\Omega$$

$$10k\Omega + 5k\Omega = 15k\Omega$$

$$\frac{1}{40} + \frac{1}{15} = \frac{11}{120000}$$

$$120000 \div 11 = 10909.09\Omega = \underline{10.91k\Omega}$$

$$ii) \quad I = \frac{V}{R}$$

$$\frac{12}{10.91} = 1.10A$$

$$I = 1.10A$$

$$iii) \quad V = IR$$

$$W = A \times V$$

$$20k \times 1.10000092 \times 10^{-3} = 22V$$

$$22 \times 1.10000092 \times 10^{-3} = \underline{0.02 \text{ watts}}$$

$$10k \times 1.100000092 \times 10^{-3} = 11V$$

$$11 \times 1.100000092 \times 10^{-3} = \underline{0.01 \text{ watts}}$$

$$5k \times 1.100000092 \times 10^{-3} = \underline{6.05 \text{ watts}}$$

b) i)

$$12 \left(\frac{20}{20+20} \right) = 6V$$

ii)

$$V \left(\frac{R_1}{R_1+R_2} \right)$$

$$12 \left(\frac{5}{15} \right) = 4V$$

iii)

$$12 - 10 = \underline{2V}$$

3) The moment of a force about a point is equal to the force multiplied by the perpendicular distance between the line of action of the force and pivot.

$$b) M = Fd$$

$$250 \times 0.048 = 12Nm$$

$$ii) F = \frac{12}{0.027} = 444.44 Nm$$

$$ii) k = \frac{F}{x} = \frac{444}{0.015} = \underline{30kNm^{-1}}$$

$$c) P = \frac{E}{t} \Rightarrow W = \frac{J}{s}$$

$$ii) \frac{3.3}{2.25} = 1.5 \text{ watts}$$

$$iii) W = \frac{1}{2}$$

$$\frac{1}{2} \times 444 \times 0.015 = 3.3 \text{ J}$$

d)

$$3.2 \times 1000 = \frac{3200}{3.3} = 969.7 \text{ J} \times 3.3 = 3200.01 \text{ J}$$

From the equation we can interpret that the trigger will be squeezed 970 times.