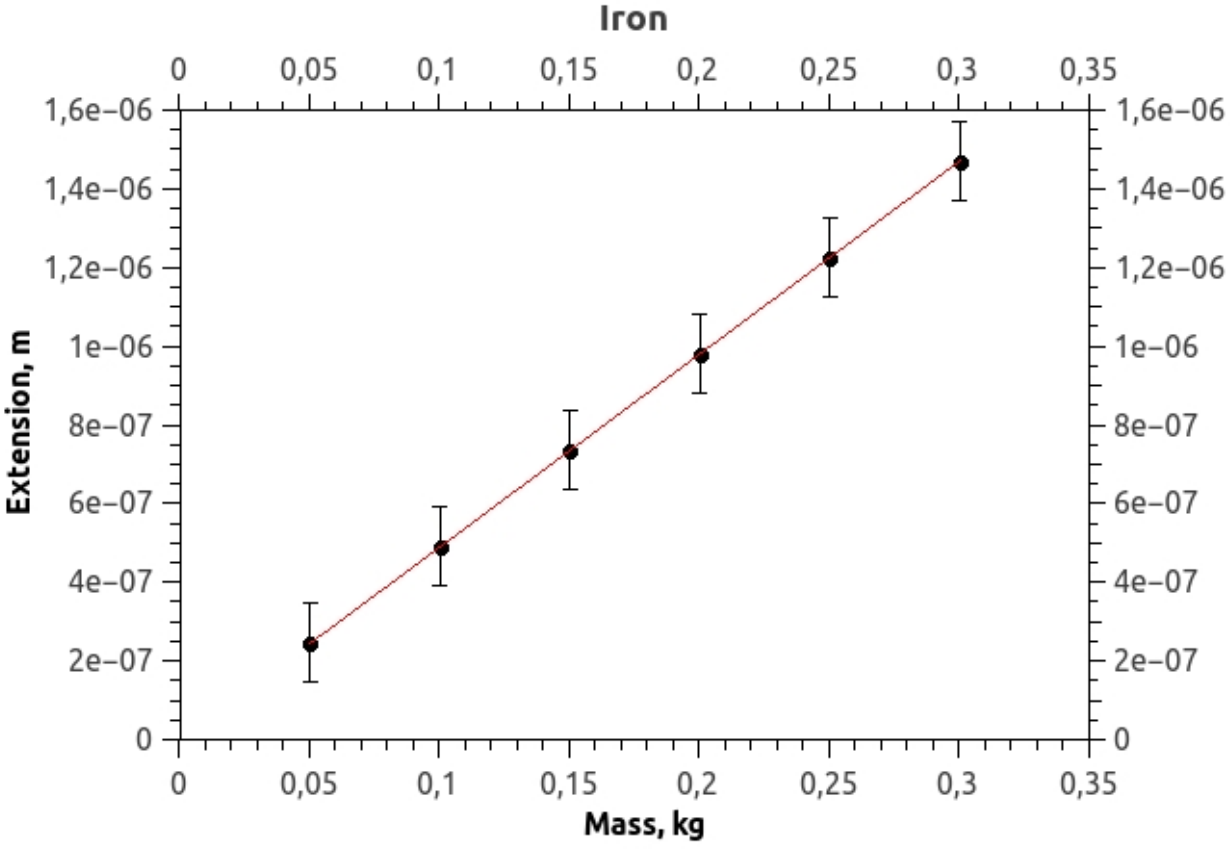
Answer on Question #44651, Physics, Mechanics | Kinematics | Dynamics

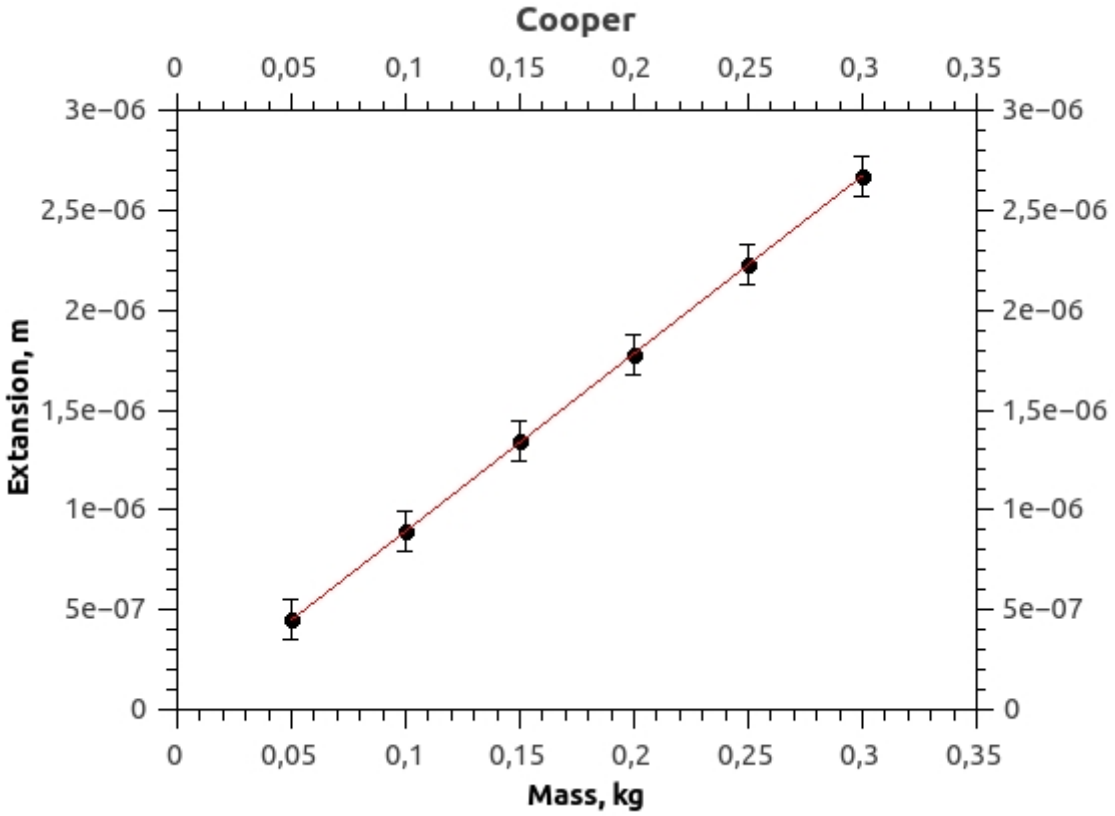
For all three strings:
L = 0,1 m (length)
A = 1 mm^2 (cross section area)
$g = 9{,}8\, m/sec^2$
Hoock's Law:
$F = -K \cdot X$, K – extension coefficient, X – extension of the string. ΔX – error for X value.
M – mass of the block that was put on the string.

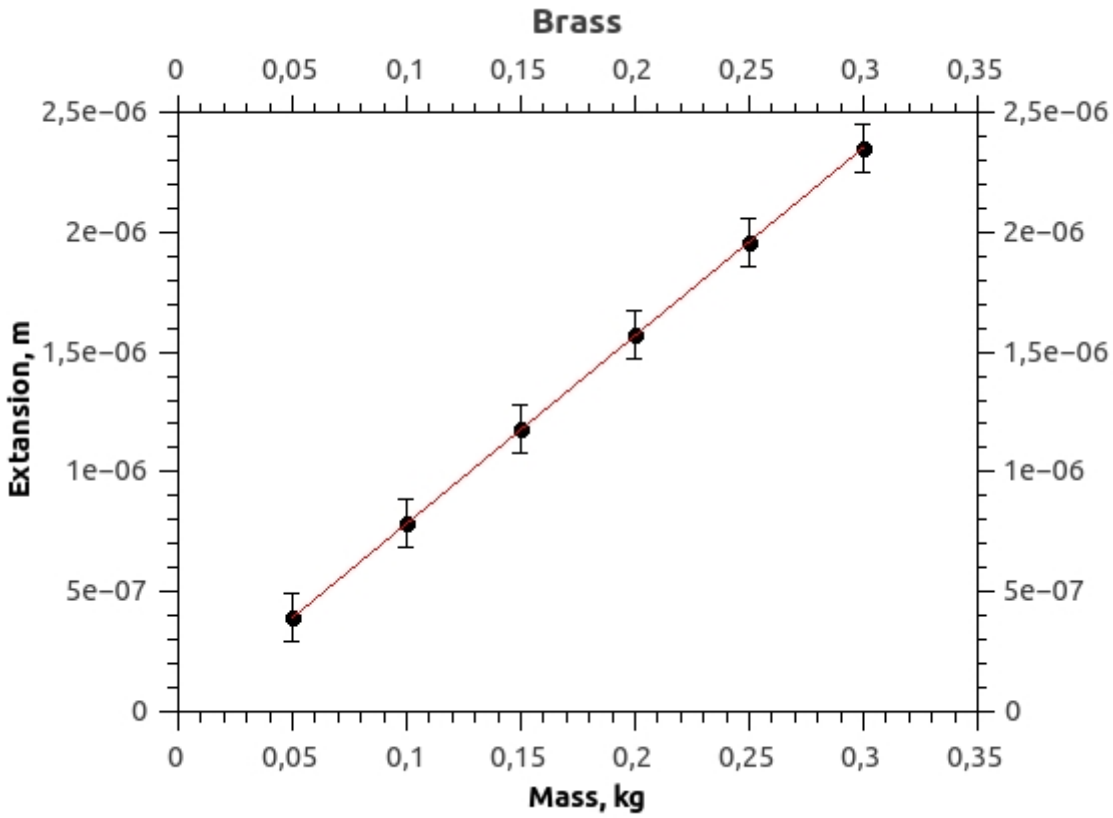
Iron		
X, m	Δ X, m	M, kg
0,000000245	0,0000001	0,05
0,00000049	0,0000001	0,1
0,000000735	0,0000001	0,15
0,00000098	0,0000001	0,2
0,000001225	0,0000001	0,25
0,00000147	0,0000001	0,3

Cooper		
X, m	Δ X, m	M, kg
0,00000045	0,0000001	0,05
0,00000089	0,0000001	0,1
0,00000134	0,0000001	0,15
0,00000178	0,0000001	0,2
0,00000223	0,0000001	0,25
0,00000267	0,0000001	0,3

Brass		
X, m	Δ X, m	M, kg
0,000000392	0,0000001	0,05
0,000000784	0,0000001	0,1
0,000001176	0,0000001	0,15
0,000001568	0,0000001	0,2
0,00000196	0,0000001	0,25
0,000002352	0,0000001	0,3




Cooper
0
0,05
0,1
0,15
0,2
0,25
0,3
0,35
3e−06
2,5e−06
2e−06
1,5e−06
1e−06
5e−07
0
Extansion, m
Mass, kg


Brass
0
0,05
0,1
0,15
0,2
0,25
0,3
0,35
2,5e−06
2e−06
1,5e−06
1e−06
5e−07
0
Extansion, m
Mass, kg

As we can see from the graphs all three strings obey Hoock's law.

To compare our results with the table data with the table data, we need to find Young's modulus.

$$K = \frac{E \cdot A}{L} \quad => \quad E = \frac{K \cdot L}{A}$$

We can find K from the plot. Linear law was used to fit the data:

$$F = K \cdot X = M \cdot g \quad => \quad X = M \cdot \frac{g}{K}$$

For Iron: $X = a * M + b = 4{,}89 \cdot 10^{-6} \cdot M + 2 \cdot 10^{-22}$, So $\frac{g}{K} = 4{,}89 \cdot 10^{-6}$ => $K = 2 \cdot 10^{6}$ m/N

$$E = \frac{2 \cdot 10^{6} \cdot 0{,}1}{1 \cdot 10^{-6}} = 200\,GPa$$ (the same as table data)

For cooper we make the same calculations:

E = 110 GPa (the same value as table data)

For Brass:

E = 115 Gpa (the same value as table data)