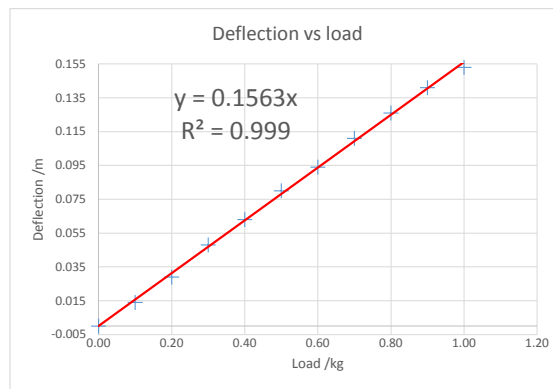


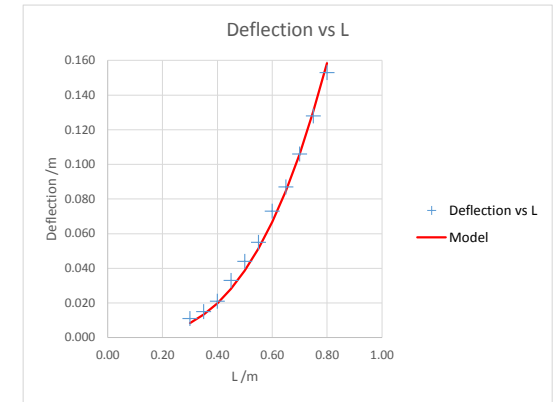
Fixed extension (L=0.800m), variable load

| h /mm | deflection /m | load /kg |
|-------|---------------|----------|
| 871   | 0.000         | 0.00     |
| 857   | 0.014         | 0.10     |
| 842   | 0.029         | 0.20     |
| 823   | 0.048         | 0.30     |
| 808   | 0.063         | 0.40     |
| 791   | 0.080         | 0.50     |
| 777   | 0.094         | 0.60     |
| 760   | 0.111         | 0.70     |
| 745   | 0.126         | 0.80     |
| 730   | 0.141         | 0.90     |
| 718   | 0.153         | 1.00     |



Fixed load (1.00kg), variable L

| h /mm no load | h /mm load | deflection /m | L /m | L^3   | model deflection /m |
|---------------|------------|---------------|------|-------|---------------------|
| 870           | 717        | 0.153         | 0.80 | 0.512 | 0.158               |
| 868           | 740        | 0.128         | 0.75 | 0.422 | 0.130               |
| 868           | 762        | 0.106         | 0.70 | 0.343 | 0.106               |
| 865           | 778        | 0.087         | 0.65 | 0.275 | 0.085               |
| 867           | 794        | 0.073         | 0.60 | 0.216 | 0.067               |
| 860           | 805        | 0.055         | 0.55 | 0.166 | 0.051               |
| 859           | 815        | 0.044         | 0.50 | 0.125 | 0.039               |
| 858           | 825        | 0.033         | 0.45 | 0.091 | 0.028               |
| 853           | 832        | 0.021         | 0.40 | 0.064 | 0.020               |
| 853           | 838        | 0.015         | 0.35 | 0.043 | 0.013               |
| 849           | 838        | 0.011         | 0.30 | 0.027 | 0.008               |



Second moment of area  
(in m^4)

2.226E-09

Young's modulus of a wooden ruler is between 3 and 10 GPa.

[https://www.engineeringtoolbox.com/timber-mechanical-properties-d\\_1789.html](https://www.engineeringtoolbox.com/timber-mechanical-properties-d_1789.html)

$$\delta = \frac{mg}{3Y \times \frac{1}{3}wt^3} L^3 \quad \delta = 0.3093L^3 \quad \Rightarrow 0.3093 = \frac{mg}{Ywt^3} \quad \Rightarrow Y = \frac{mg}{0.3093wt^3}$$

$$\Rightarrow Y = \frac{1.00 \times 9.81}{0.3093 \times 27.75 \times 10^{-3} \times (6.22 \times 10^{-3})^3} = 4.80 \times 10^9 \text{ Pa}$$

$$\Rightarrow Y = 4.90 \text{ GPa}$$

