B7 Springs

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Numeric answers should ideally be in SI form, without prefixes. For questions with two parts, both answers must be correct for the mark.

B7.1 A spring with constant 50 N m^{-1} has a load of 12.5 N applied to it. What will be its extension?

B7.2 A spring of natural length 10.0 cm and spring constant 4.00 N cm^{-1} has a load of 22.0 N placed on it. What is its new length?

B7.3 If a spring of natural length 1.50 cm stretches to 1.65 cm when a 16 N force is applied, what is its spring constant?

B7.4 What mass should be suspended from a spring of length 20 cm and spring constant 6.0 kN m^{-1} in order for the spring to be stretched to a length of 22 cm.

B7.5 A spring has natural length of 8.60 m, and you know that it requires a force of 30 N to stretch it to a length of 9.15 m. Work out the spring constant.

B7.6 A spring with natural length 0.70 m requires 3.2 N to stretch it by 17.5 cm. Work out the force required to stretch the spring to a length of 83 cm.

B7.7 Two identical springs, each of natural length 2.0 m and spring constant 80 N m^{-1} are placed in series (that is, one joined to the end of the other), with a weight of 7.5 N suspended from the bottom spring.

a) State the tension in each spring.

b) Work out the total extension of the system.

c) If the two identical springs were placed in parallel so that they can share the load, with the same weight of 7.5 N suspended from the combination, work out the tension in each of the springs.

d) What is the total length of the system?

B7.8 If three identical springs were put in series, how would:

a) the spring constant of the system and

b) the total extension of the system compare to just one of the springs on its own with the same force applied?

B7.9 If five identical springs were placed in parallel, how would:

a) the stiffness of the system

b) the total extension of the system compare to just one of the springs on its own with the same force applied?