



GCSE ELASTIC POTENTIAL ENERGY

The energy stored by objects which have been elastically deformed (stretched or compressed within the limit of proportionality).

$$E_e = \frac{1}{2} k e^2$$



- Write down the equation using words rather than symbols and name the units.
- Calculate the elastic potential energy stored by:
 - A spring with a spring constant of 72 N/m that is extended by 0.30 m
 - A spring with a spring constant of 72 N/m that is extended by 0.15 m
 - A spring with a spring constant of 36 N/m that is extended by 0.30 m
 - Compare what happens to the elastic potential energy of a spring when its extension is halved versus when its spring constant is halved
- Rearrange the equation to make **k** the subject, then ii) rearrange to make **e** the subject.
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- Fill in the table with the missing values to 2 sf (E_e = elastic potential energy.)

E_e (J)	k (N/m)	Extension (m)	Calculations
	5.0	1.2	
	17	0.90	
110		0.40	
280		0.60	
240	78		



5. A bird feeder is suspended on the end of a spring. The spring has a spring constant of 129 N/m and has an original length of 12 cm . When the bird feeder, which is full of bird food, is hung from the spring, the spring extends to 17 cm .

- Calculate the extension of the spring
- Calculate the elastic potential energy stored in the spring



Over the course of a few days, all the bird food is eaten. The elastic potential energy of the spring is now a quarter of what it was in part (b.)

- Calculate the new extension of the spring, and hence its final length

6. A 10 cm long spring, with a spring constant of 27 N/m , is used to reload the ball in a pinball machine. The spring is compressed by 4.0 cm by a mechanism in the machine and then let go.

- Calculate the elastic potential energy stored in the spring

A new spring is fitted into the machine. It only needs to be compressed by 3.0 cm to store the same amount of elastic potential energy as the previous spring.

- Calculate the spring constant of this new spring

The owner of the game wants to double the potential energy stored in this new spring.

- Calculate the compression of the spring needed in order to achieve this

A child, eating a 30 cm long gummy snake which has a spring constant of 15 N/m , comes to play on the machine. The child pulls the gummy snake until its length has doubled.

- Calculate the elastic potential energy stored in the gummy snake assuming the gummy snake has been stretched within the limit of proportionality

