

GCSE Physics Hooke's Law ($F = kx$)

Ramped Calculation Questions

1. A fisherman uses a spring balance to weigh a large fish. The spring extends by 4.0 cm when a force of 8.0 N is applied. Calculate the spring constant of the spring.
2. A luggage scale contains a spring with a spring constant of 250 N/m. A suitcase exerts a force of 15 N. Calculate the extension of the spring.
3. A toy pogo stick contains a spring with a spring constant of 400 N/m. The spring compresses by 3.0 cm when a child jumps on it. Calculate the force acting on the spring.
4. The suspension spring on a mountain bike has a spring constant of 8000 N/m. It compresses by 1.5 cm when the rider sits on the bike. Calculate the force applied to the spring.
5. A spring in a trampoline has an original length of 12 cm. When a gymnast stands on it, its length becomes 18 cm. The spring constant is 300 N/m. Calculate the force applied to the spring.
6. A laboratory spring has an original length of 20 cm. A force of 12 N stretches it to a length of 28 cm. Calculate the spring constant.
7. A bungee cord behaves like a spring with a spring constant of 120 N/m. During a test, it stretches from 2.0 m to 2.25 m. Calculate the force in the cord.
8. A car suspension spring supports part of the vehicle's weight. A force of 1800 N causes the spring to compress from 25 cm to 19 cm. Calculate the spring constant.
9. An engineer tests a spring for a garage door mechanism. The spring constant is 5000 N/m and a force of 350 N is applied. Calculate:
 - a) the extension of the spring
 - b) the final length if the spring was originally 15 cm long
10. A crane uses a heavy-duty safety spring. The spring length increases from 40 cm to 52 cm while lifting a load. The spring constant is 7500 N/m. Calculate:
 - a) the extension of the spring

- b) the force applied to the spring
- c) the mass of the load (take $g = 10 \text{ N/kg}$)