



SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35
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DEPARTMENT OF AGRICULTURE ENGINEERING

19AGT202 – MACHINE DESIGN

II YEAR IV SEM

UNIT 5 – DESIGN OF MACHINE ELEMENTS

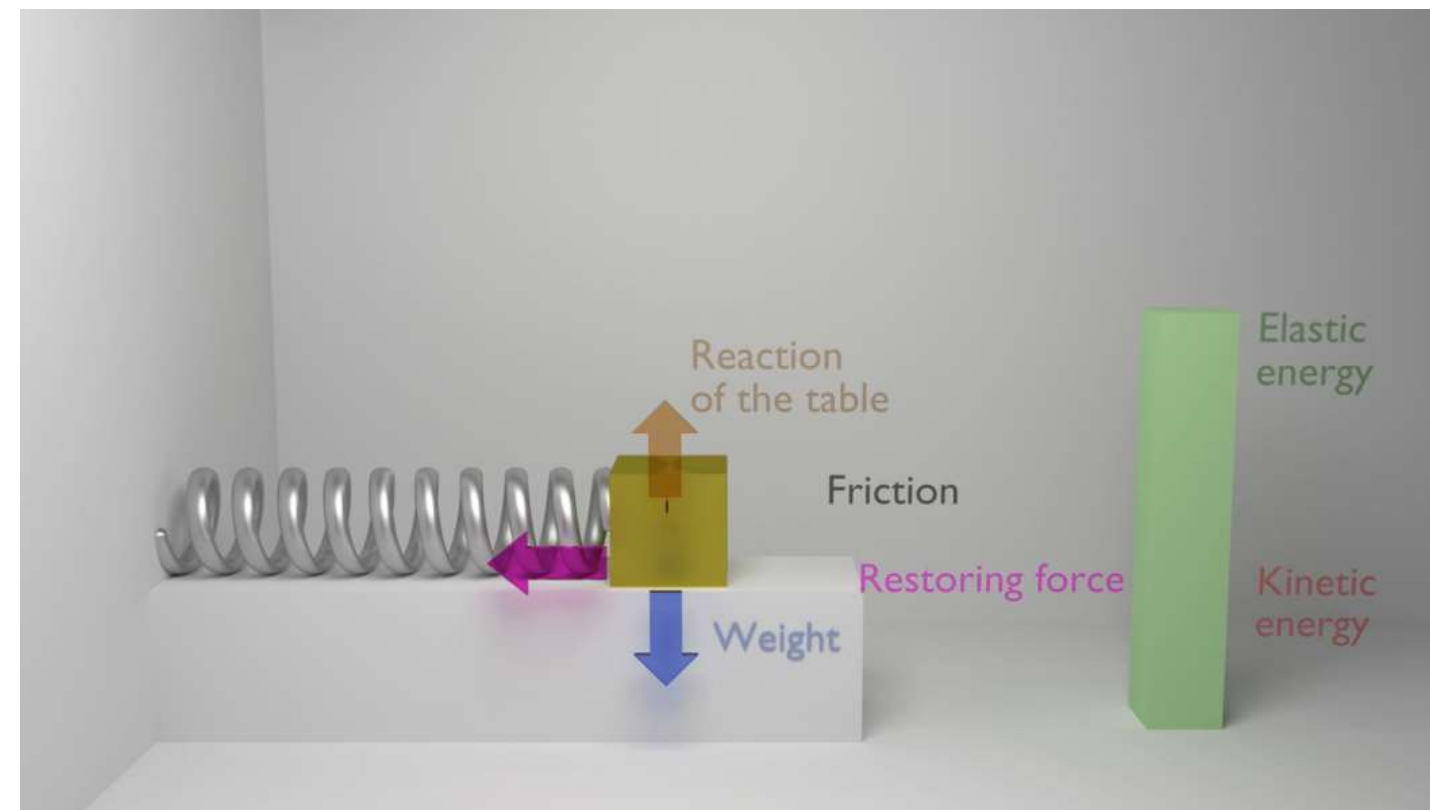
TOPIC 3 – SPRINGS

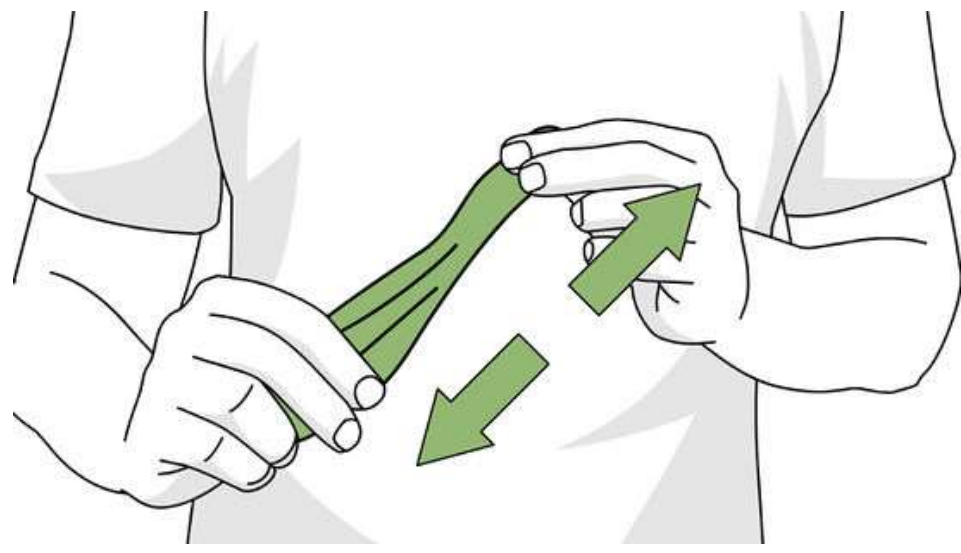
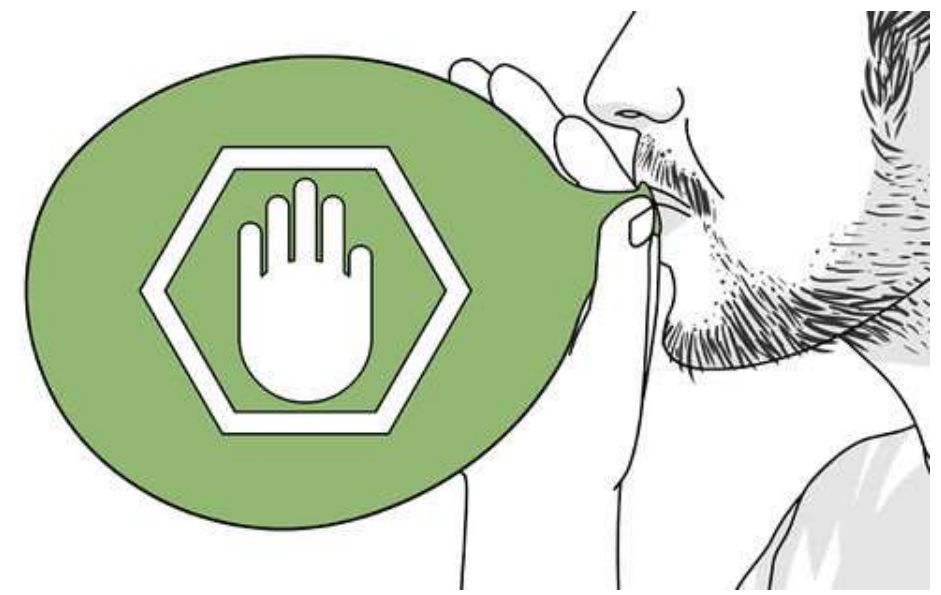
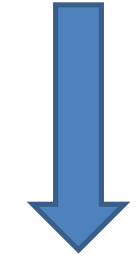
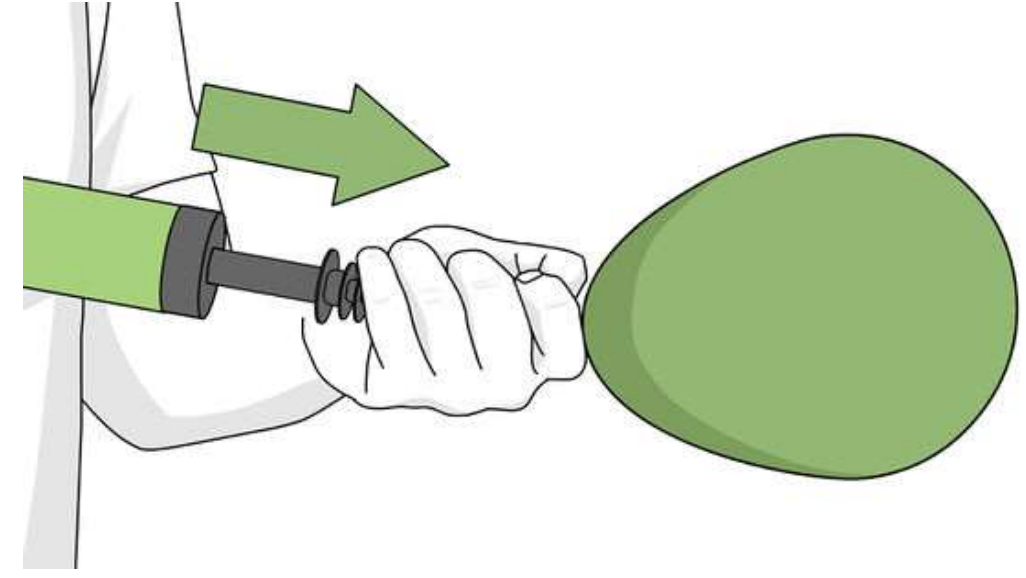
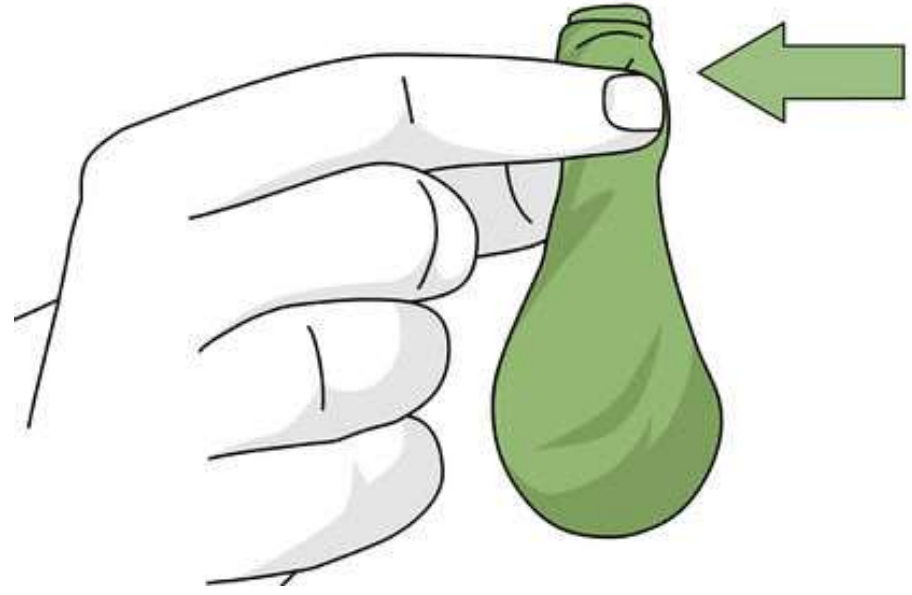




Springs

- Springs are elastic members whose primary function is to deform under load and regain its original shape when the load is removed.







Applications of Spring

- Brakes, clutches, watches, spring balance weighing machine, shocks absorbers.



Premium spring

rentalspecproducts.co.uk





Types of Springs

1. Helical springs

- Compression helical springs
- Tension helical spring

2. Torsion Springs

3. Leaf Springs

4. Disc Springs





Helical Springs



- It is made up of a wire coiled in the form of a helix and is primarily intended for compressive load or tensile loads.
- The cross section of the wire from which the spring made may be circular, square or rectangular.
 - Compression helical springs
 - Tension helical springs



Closed coil helical spring



Open coiled helical spring



Torsion Springs

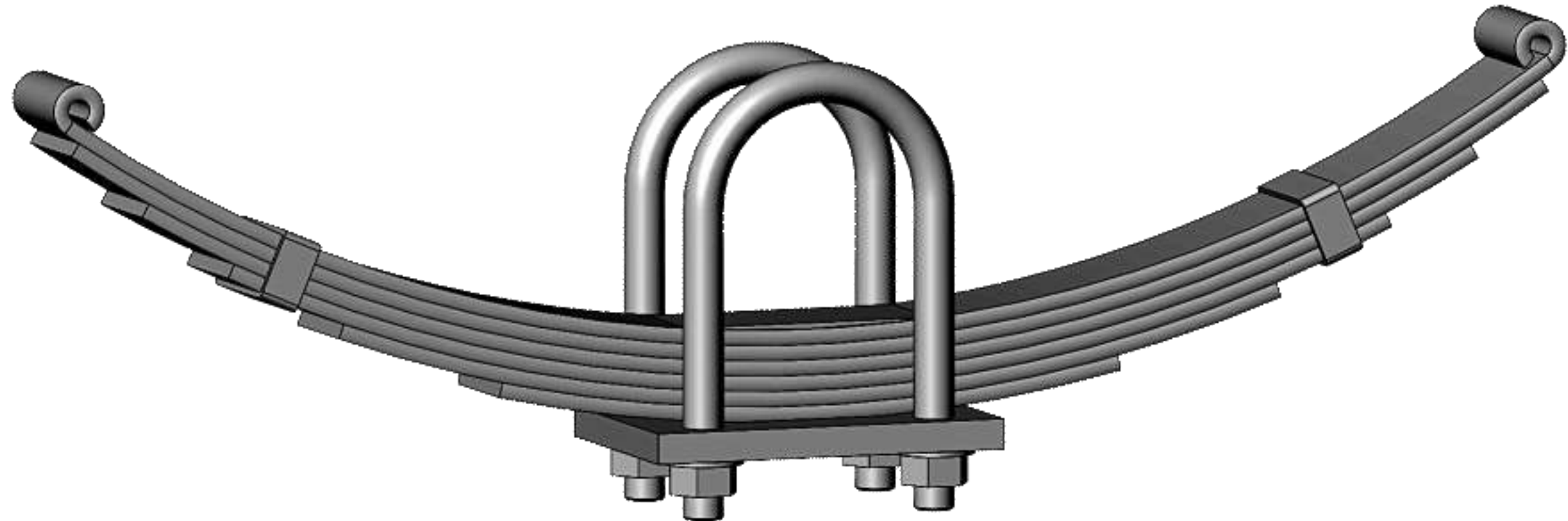
- These springs may be helical or spiral type.
- It is used only in applications where the load tends to wind up the spring and are used in various electrical mechanism.





Leaf Springs

- It consist of a number of flat plates of varying length held together by means of clamps and bolts.
- They are mostly used in automobiles.





Disc Springs

- It consist of conical discs held together against slipping of central bolt or tube.





Materials Used

- Springs are commonly made with carbon content from 0.5% C to 1% C
- Alloy steels
- Brass, Bronze etc.

Terminology

- Spring index
- Deflection
- Stiffness
- Shear stress factor
- Solid length
- Free length



Application of Springs in Agricultural Engineering



- Planting equipment, including tillers and plows
- Harvesting equipment
- Irrigation equipment
- Landscaping equipment
- Turf roaders
- Wagons and trailers
- Towing equipment
- Snowplows
- Sprinklers
- Sprayers
- Hoses
- Fluid and air control equipment
- Gate and fence hinges and releases



OBJECTIVE TYPE QUESTIONS

1. A spring used to absorb shocks and vibrations is
 - (a) closely-coiled helical spring
 - (b) open-coiled helical spring
 - (c) conical spring
 - (d) torsion spring
2. The spring mostly used in gramophones is
 - (a) helical spring
 - (b) conical spring
 - (c) laminated spring
 - (d) flat spiral spring
3. Which of the following spring is used in a mechanical wrist watch?
 - (a) Helical compression spring
 - (b) Spiral spring
 - (c) Torsion spring
 - (d) Belleville spring
4. When a helical compression spring is subjected to an axial compressive load, the stress induced in the wire is
 - (a) tensile stress
 - (b) compressive stress
 - (c) shear stress
 - (d) bending stress



5. In a close coiled helical spring, the spring index is given by D/d where D and d are the mean coil diameter and wire diameter respectively. For considering the effect of curvature, the Wahl's stress factor K is given by

(a) $\frac{4C - 1}{4C + 4} + \frac{0.615}{C}$

(b) $\frac{4C - 1}{4C - 4} + \frac{0.615}{C}$

(c) $\frac{4C + 1}{4C - 4} - \frac{0.615}{C}$

(d) $\frac{4C + 1}{4C + 4} - \frac{0.615}{C}$

6. When helical compression spring is cut into halves, the stiffness of the resulting spring will be

(a) same

(b) double

(c) one-half

(d) one-fourth

7. Two close coiled helical springs with stiffness k_1 and k_2 respectively are connected in series. The stiffness of an equivalent spring is given by

(a) $\frac{k_1 \cdot k_2}{k_1 + k_2}$

(b) $\frac{k_1 - k_2}{k_1 + k_2}$

(c) $\frac{k_1 + k_2}{k_1 \cdot k_2}$

(d) $\frac{k_1 - k_2}{k_1 \cdot k_2}$



8. When two concentric coil springs made of the same material, having same length and compressed equally by an axial load, the load shared by the two springs will be to the square of the diameters of the wires of the two springs.
- (a) directly proportional (b) inversely proportional
(c) equal to
9. A leaf spring in automobiles is used
- (a) to apply forces (b) to measure forces
(c) to absorb shocks (d) to store strain energy
10. In leaf springs, the longest leaf is known as
- (a) lower leaf (b) master leaf
(c) upper leaf (d) none of these

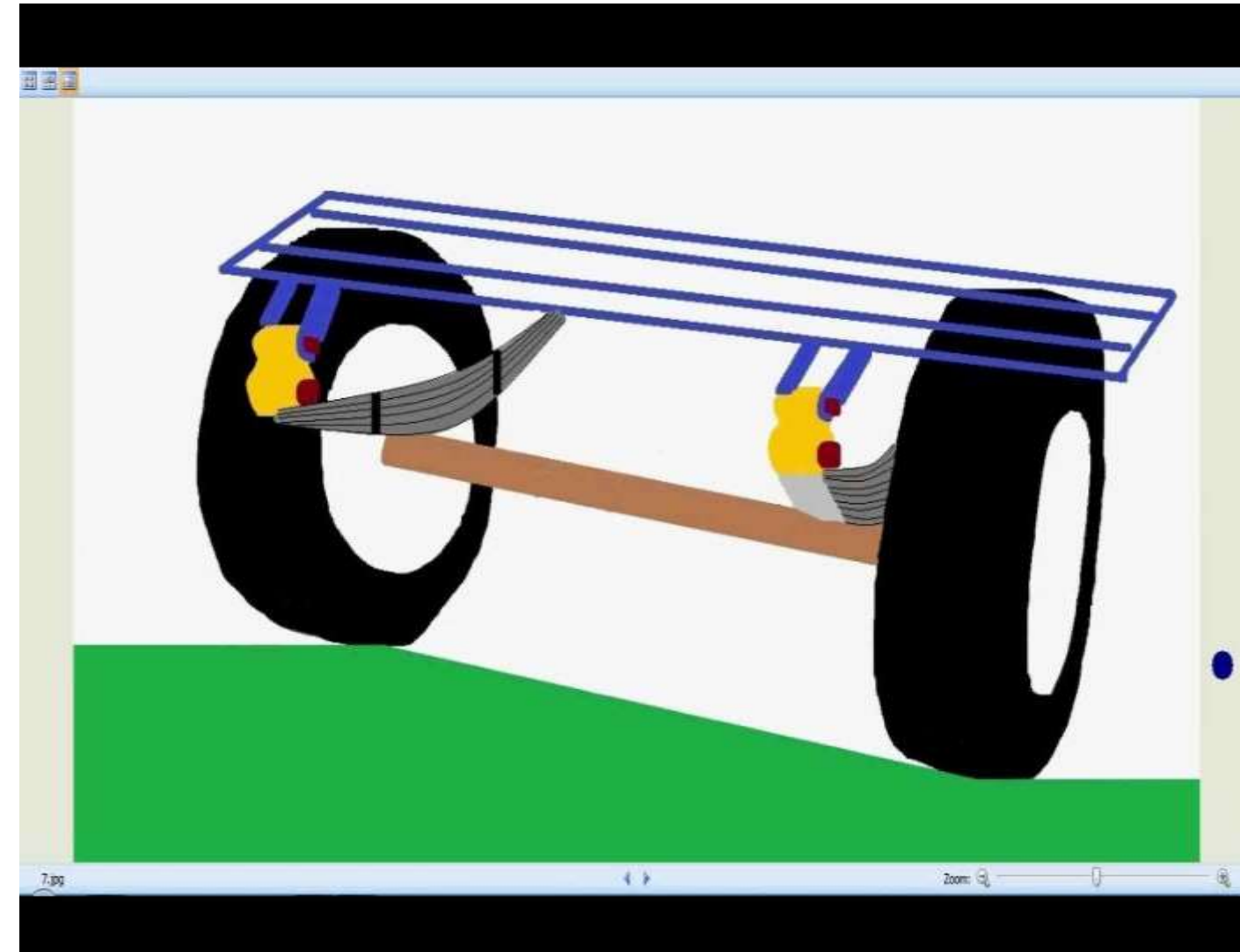
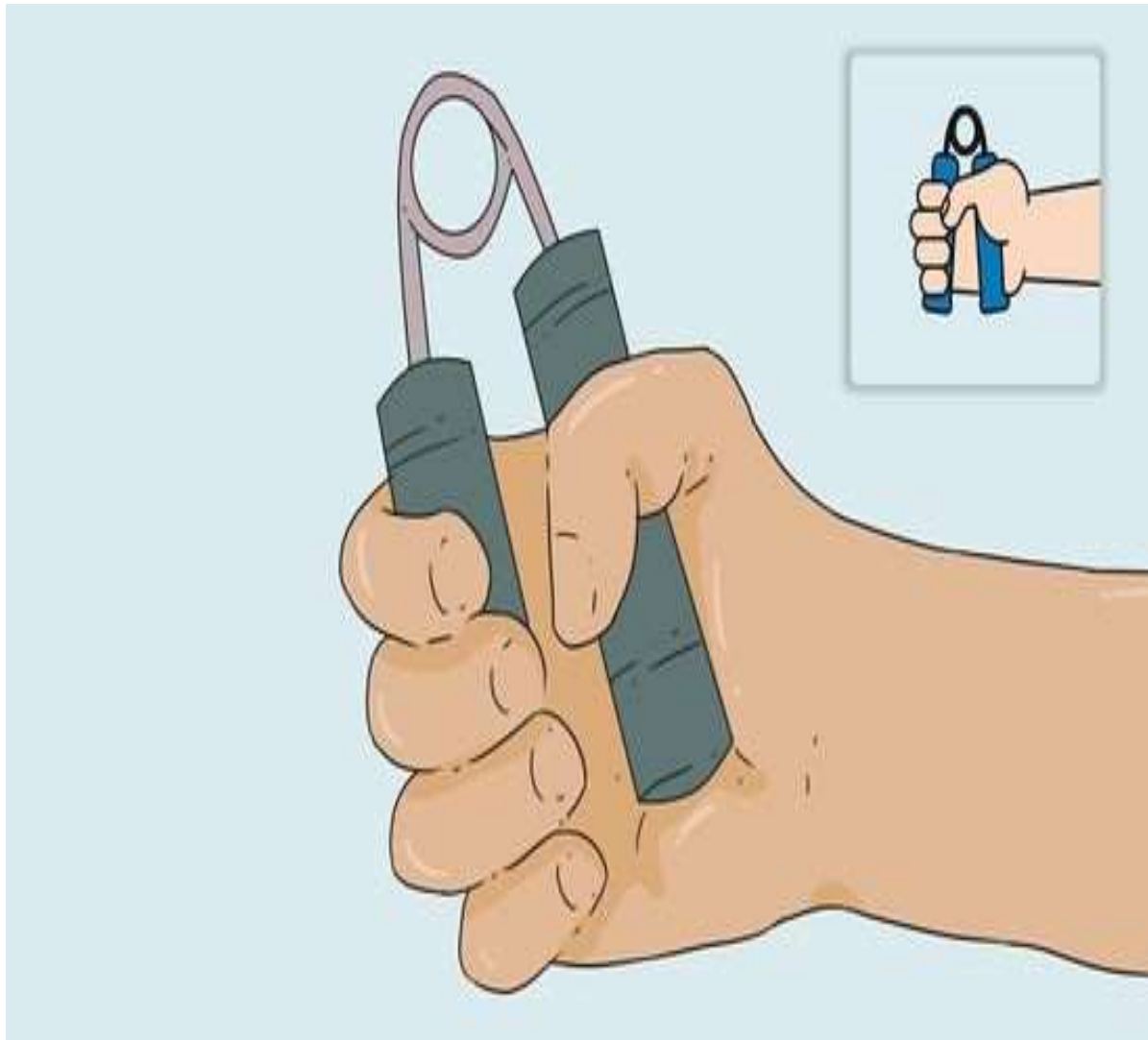
ANSWERS

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (e) | 2. (d) | 3. (c) | 4. (c) | 5. (b) |
| 6. (b) | 7. (a) | 8. (a) | 9. (c) | 10. (b) |



Assessment

Identify which type springs used in given diagram ?





Assessment

Identify which type springs used in given diagram ?





References



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Thank You!
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