Q1: An elastic spring is 70cm long. When it is stretched by hanging some load its length increases to 100cm. Calculate its extension?

DATA

L_1= 70 cm

L_2= 100 cm

$$Extension = L_2 - L_1$$

$$Extension = 100 - 70$$

$$\Delta x = 30\ cm$$

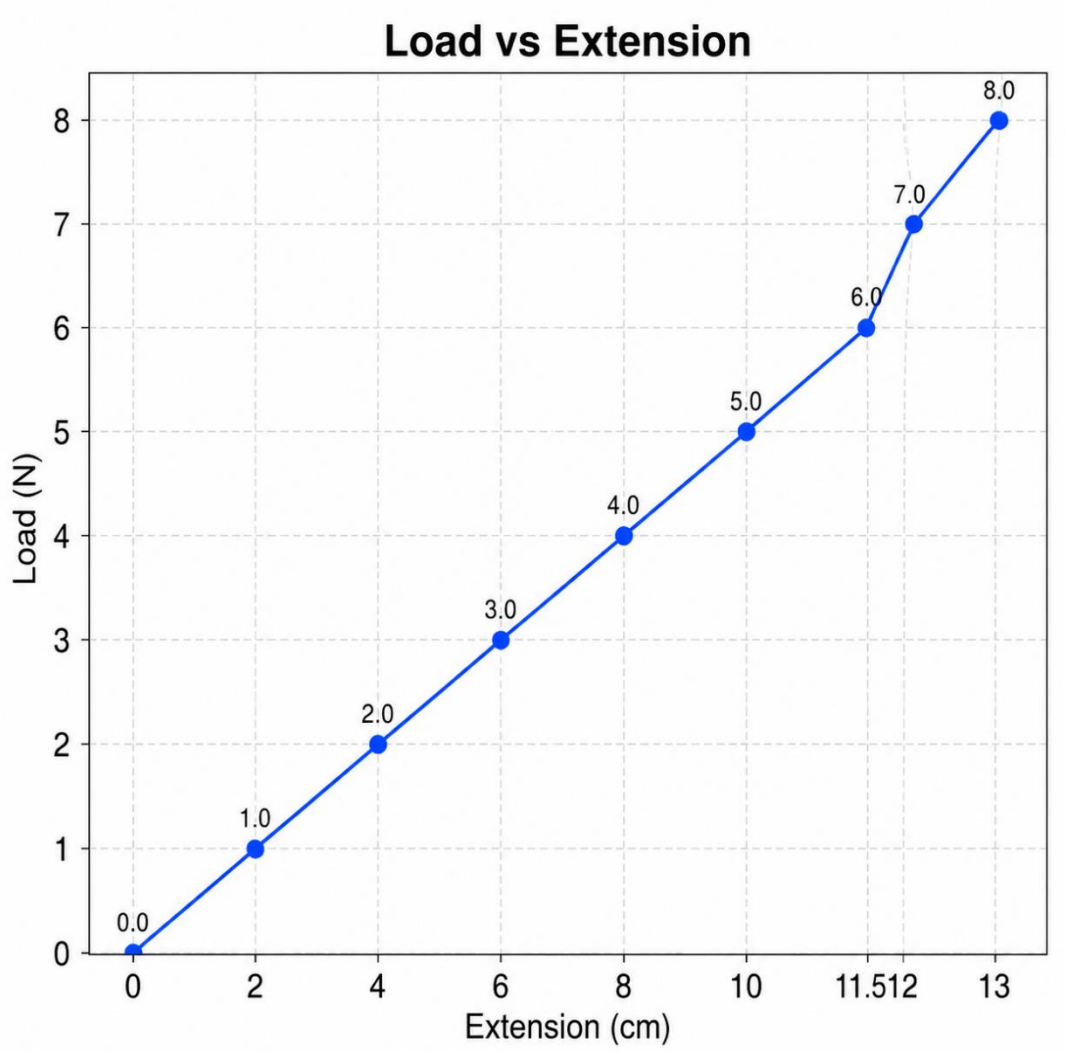
Q2: Table shows the results of an activity to stretch an elastic spring. Complete the table and draw a graph to represent this data.

Load (N)	Length (cm)	Extension (cm)
0.0	30	0.0
1.0	32	
2.0	34	
3.0	36	
4.0	38	
5.0	40	
6.0	41.5	
7.0	42	
8.0	43	

SOLUTIONS

LOAD (N)	LENGTH (cm)	EXTENSION(cm)
0.0	30	0.0
1.0	32	2.0
2.0	34	4.0
3.0	36	6.0
4.0	38	8.0
5.0	40	10.0
6.0	41.5	11.5
7.0	42	12
8.0	43	13

Graph between load and extension.



Q3: How much force is needed to pull a spring to a distance of 30cm, the spring constant is 15 Nm–1?

DATA

$x = 30\ cm$

$x = \frac{30}{100}\ cm$

$x = 0.3\ m$

$k = 15\ N/m$

$$F = k\ x$$

$$F = (15)\ \ (0.3)$$

$$F = 4.5\ cm$$

Q4: Write two properties of spring.

Two properties of a spring are:

1. **Elasticity** — A spring returns to its original length when the load is removed, if it is not overstretched.
2. **Obeys Hooke's Law** — Within its elastic limit, the extension of a spring is directly proportional to the load applied.

Use the idea of pressure to explain

Q5: Sharks and crocodiles have sharp teeth.

ANS: Sharks and crocodiles have **sharp teeth** so that they can exert **high pressure** on their prey.

Pressure is given by:

$$\text{Pressure}=F/A$$

Sharp teeth have a **very small surface area** at the tip. So, when the shark or crocodile bites with a large force, the pressure becomes very high. This high pressure helps the teeth **pierce, cut, and grip flesh easily**

Use the idea of pressure to explain

Q6: Camels have wide, flatted feet.

ANS:

Camels have **wide, flat feet** to **reduce pressure** on the sand.

Pressure is given by:

$$\text{Pressure}=\text{force}/\text{ area}$$

A camel's wide feet have a **large surface area** , so its weight is spread over a bigger area. This produces **less pressure** on the sand, so the camel does not sink easily and can walk more easily in the desert.

Use the idea of pressure to explain

Q7: If you walk on wooden floor wearing shoes with very narrow heels, you will damage the floor.

ANS:

Shoes with very narrow heels have a small contact area with the wooden floor.

Pressure is given by:

$$\text{Pressure}=\text{Force}/\text{Area}$$

Since the area is very small, the pressure on the floor is very high. This high pressure can dent, scratch, or damage the wooden floor.

Q8: A wooden block of dimensions 0.5m×0.6m×1.0m kept on the ground has a mass of 200kg. Calculate the maximum pressure acting on the ground.

ANS:

Maximum pressure occurs when the block rests on its **smallest face** .

Smallest area:

$$smallest\ Area = 0.5\ x\ 0.6 = 0.30\ m^2$$

Weight of block

$$W = mg$$

$$W = (200)(9.8)$$

$$W = 1960\ N$$

$$maximum\ Pressure = \frac{Weight}{smallest\ Area}$$

$$maximum\ Pressure = \frac{1960}{0.30}$$

$$maximum\ Pressure = 6533.3\ N/m^2$$

OR

$$maximum\ Pressure = 6.53 \times 10^3\ N/m^2$$

Q9: If the density of sea water is 1150 kg/m^3, calculate the pressure on a body of 50m below the surface of sea?

ANS:

DATA

$\rho = 1150\ kg/m^3$

$h = 50\ m$

$P = ?$

Pressure due to seawater at depth

$$P = \rho\ g\ h$$

$$P = (1150)\ (9.8)\ (50)$$

$$P = 5.63 \times 10^5\ Pa$$

Q10: Dam holds water at high altitude. The walls of the dam are made wider at the base. Explain why?

ANS:

The walls of a dam are made wider at the base because water pressure increases with depth .

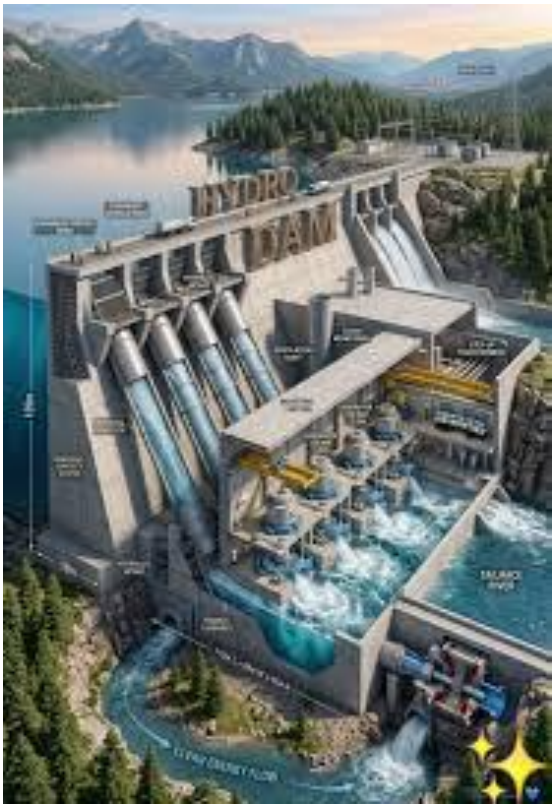
The pressure due to water is:

$$P = \rho\ g\ h$$

So, as depth h increases, pressure also increases. This means the **bottom part of the dam experiences the greatest pressure and force** from the water.

Therefore, the base is made thicker/wider to:

- **withstand the larger water pressure,**
- **prevent cracking or breaking,**
- make the dam stable and strong.



Q11. In a hydraulic press, a force of 100 N is applied on the pump of cross-sectional area $0.01m^2$. Find the force that compresses a cotton bale placed on larger piston of cross-sectional area $1m^2$.

DATA

$F_1 = 100$ N

$A_1 = 0.01\ m^2$

$F_2 = ?$

$A_2 = 1\ m^2$

SOLUTIONS

$$\frac{F_2}{F_1} = \frac{A_2}{A_1}$$

$$\frac{F_2}{100} = \frac{1}{0.01}$$

$$F_2 = \frac{100}{0.01}$$

$$F_2 = 10\,000\ N$$

Q12. Write down the names of four machines that you have seen working on the principle of pascal's law.

ANS:

Four machines that work on the principle of **Pascal's law** are:

1. **Hydraulic press**
2. **Hydraulic lift**
3. **Hydraulic brakes**
4. **Hydraulic jack**