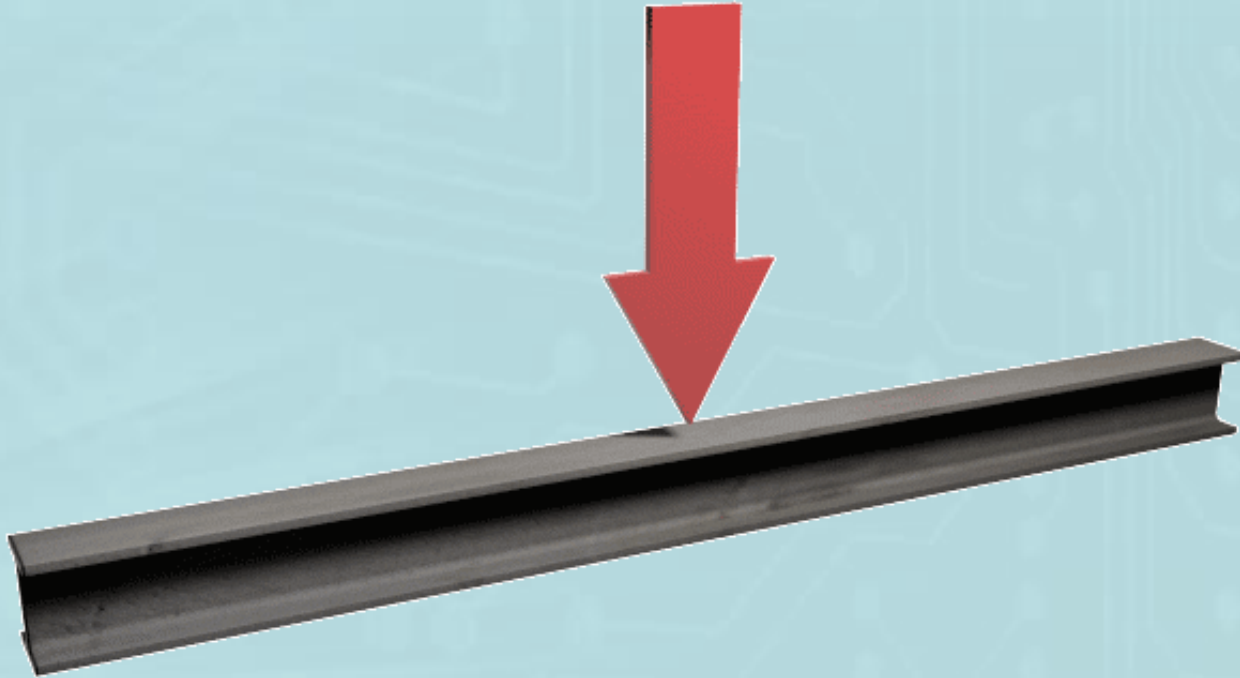
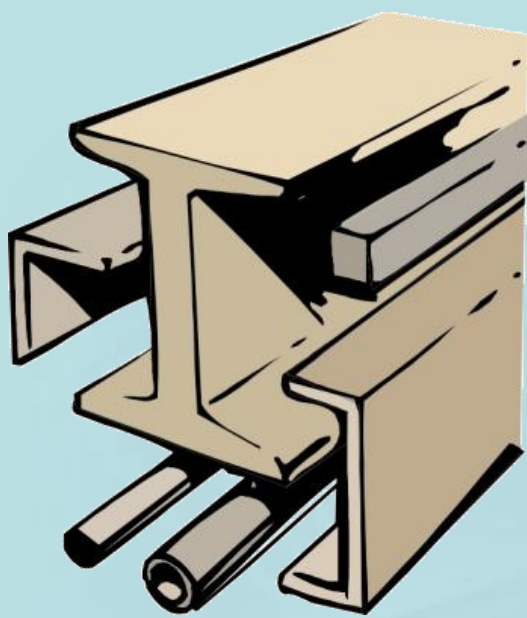


Beams

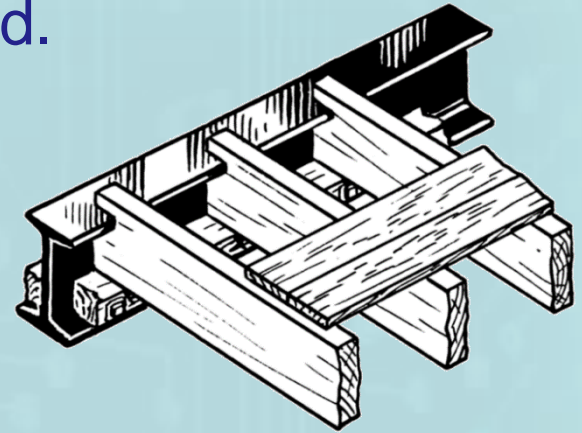


In this presentation you will:

- identify the properties of beams that make them important in construction



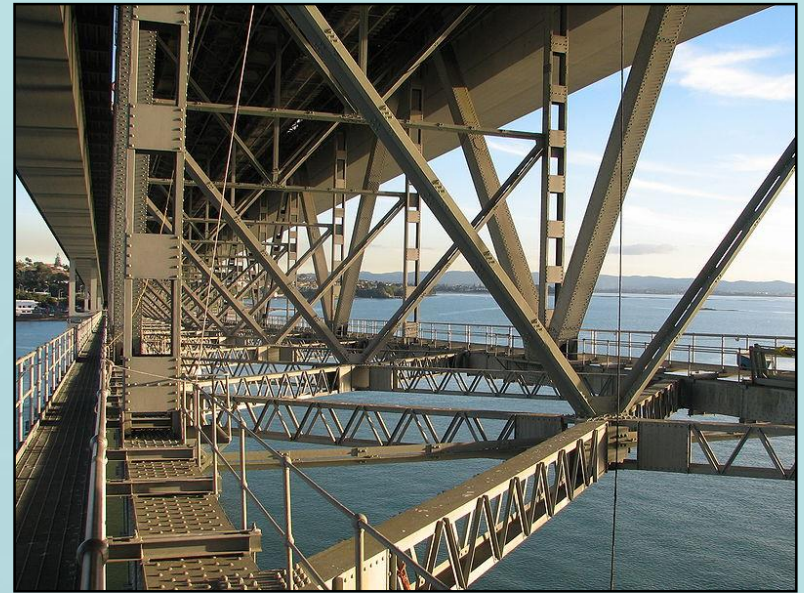
The shape of a beam can be used to minimize the materials needed to support the load.



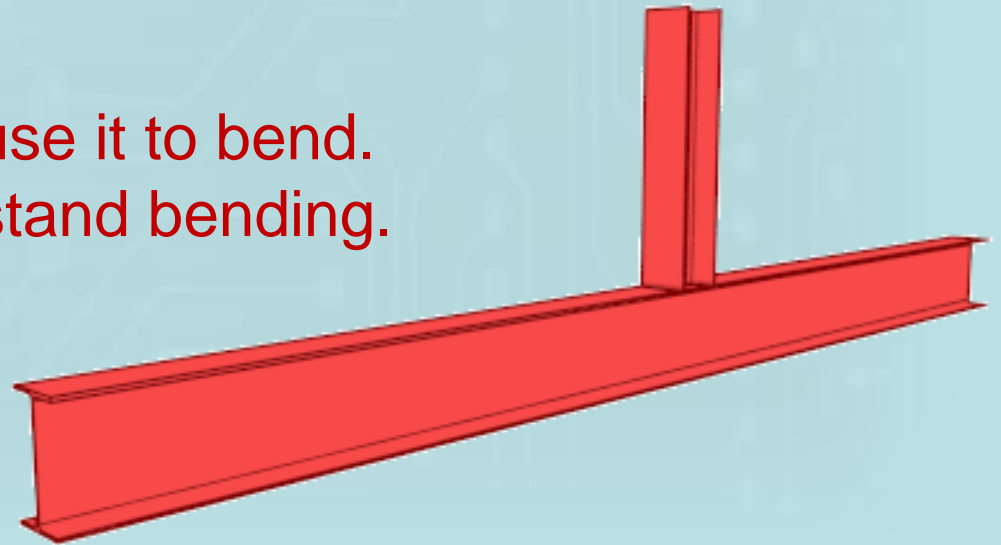
By minimizing the amount of materials used in a building structure, energy use and overall costs can be reduced.



A beam is a long thin structure supported at both ends and designed to carry a load.



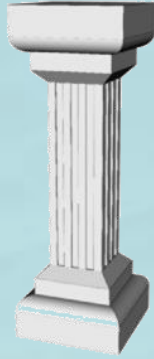
The load on a beam will cause it to bend.
A beam is designed to withstand bending.



Question 1

Which of the following shows a beam?

A)



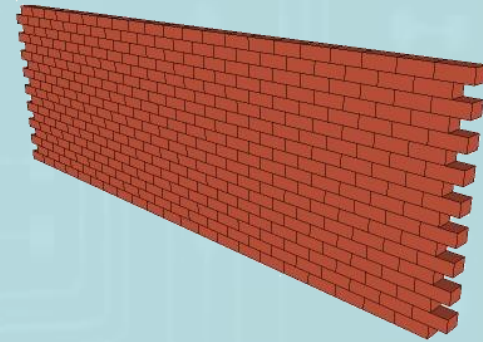
B)



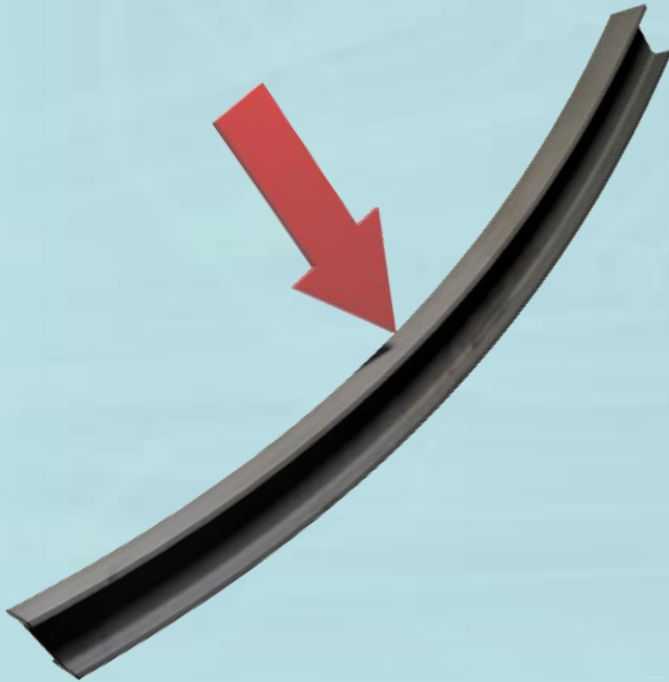
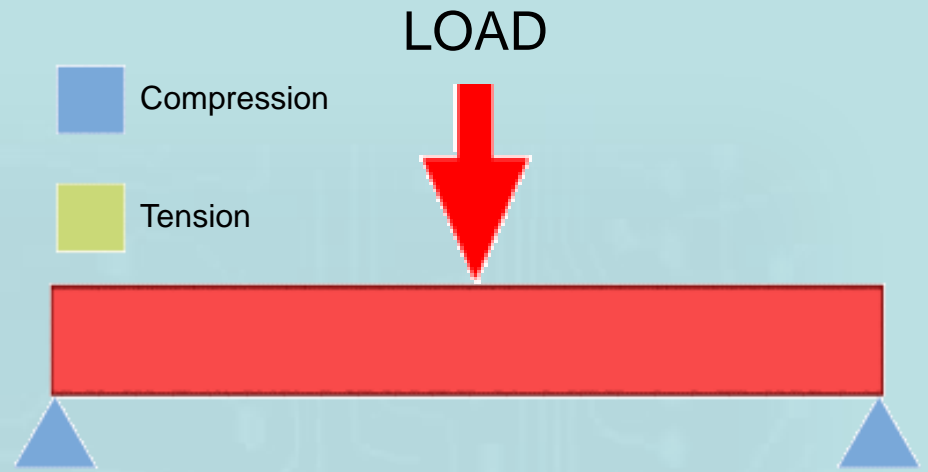
C)



D)



The top of the beam is under a compression force and the bottom of the beam is under tension.



Materials used for beams need to withstand both these forces.
Steel is a suitable material for this.

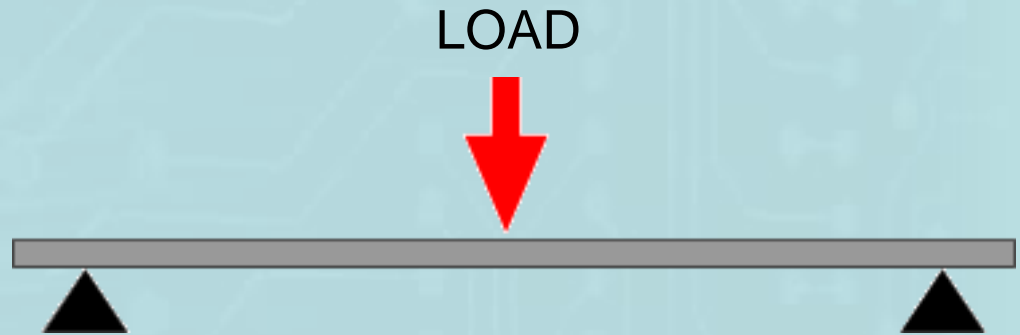
Question 2

What will happen to a beam when it is loaded in the middle as shown?

A) It will bend

B) It will twist

C) It will be crushed



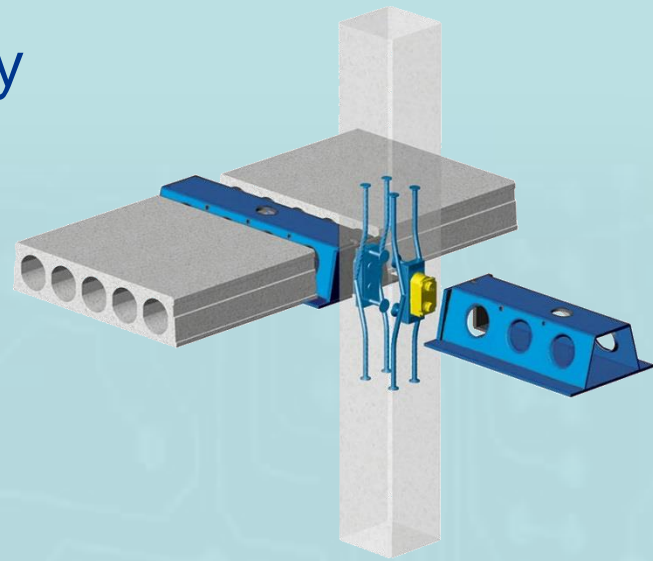
Question 3

Where will the greatest tension force be on a beam under load?

- A) On the top surface of the beam
- B) On the bottom surface of the beam
- C) In the middle of the beam
- D) At the ends of the beam

When engineers design beams they aim to reduce the amount of bending under load.

They try to make the beam as stiff as possible so it bends as little as possible.



The factors that affect stiffness of a beam are:

- The length of the beam
- The material it is made from
- The cross sectional shape

Question 4

Which of the following factors affect the stiffness of a beam?

- A) The length of the beam
- B) The material from which the beam is made
- C) The cross sectional shape of the beam
- D) All of the above

Length and Load

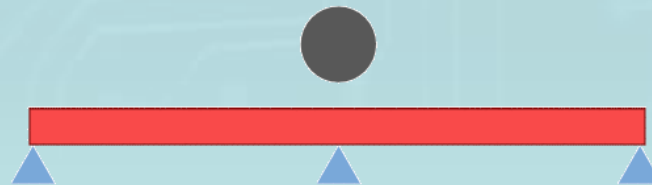
The larger the load, the more the beam will bend.



With the same load, a longer beam will bend more.



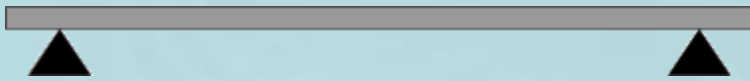
Long beam bridges are often supported in the middle by piers, reducing the amount of bending.



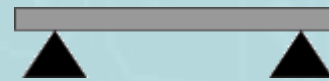
Question 5

If the following beams carried the same load, which would bend the most?

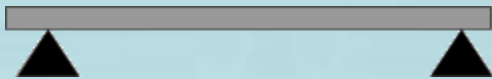
A) Beam A



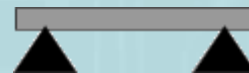
B) Beam B



C) Beam C



D) Beam D



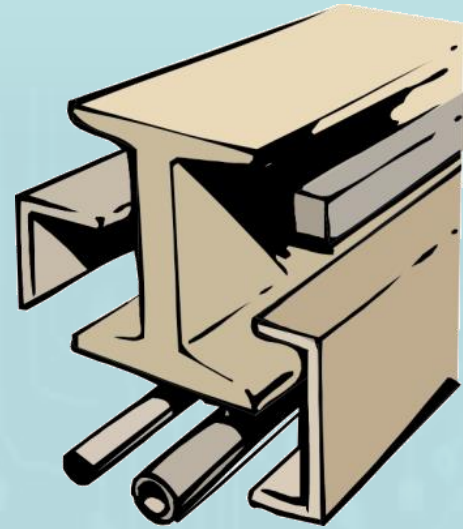
Beams can be made from a range of different materials. They need to withstand compression and tension forces.



Beams can be made from wood, stone, steel, concrete, and even plastic.



One of the most important factors in beam design is the cross section of the beam.



The most efficient shape for a beam is the I beam shape.



You will probably have seen steel beams this shape in buildings. They are very common.



Question 6

If each had the same cross sectional area, which of the following would give the stiffest beam?

- A) Square cross section
- B) Circle cross section
- C) I cross section
- D) Triangle cross section

Summary

In this presentation you should have:

- identified the properties of beams that make them important in structures