Course Code: ESC106A
Course Title: Construction Materials and Engineering Mechanics

Lecture No. 26:
Supports and Support Reactions

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Lecture Intended Learning Outcomes

At the end of this lecture, students will be able to:

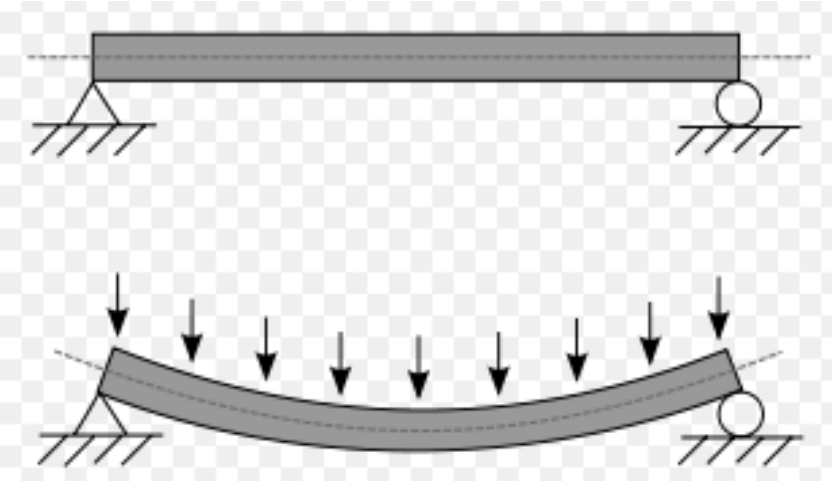
- Define a beam
- Describe types of supports
- Explain types of beams
- Choose the appropriate number of reactions developed in the supports

Contents

Types of supports, beams, reactions

Beam

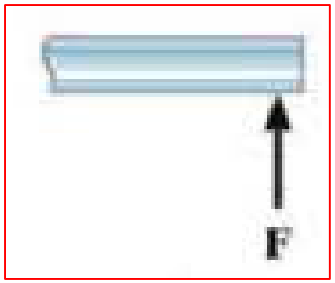
- A beam is the horizontal member of a structure carrying transverse loads.

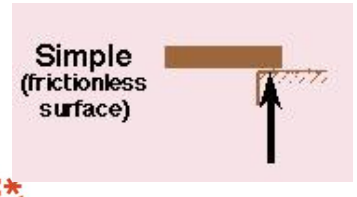


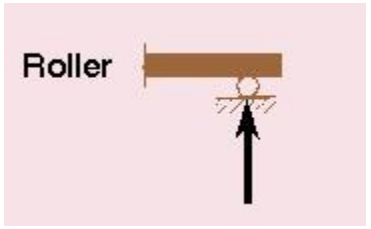
Beam

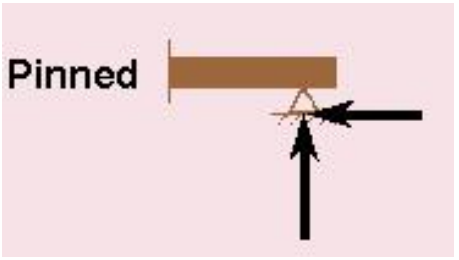
Types of Supports in Beams

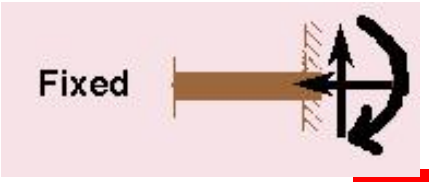
- Simple Support
- Roller support
- Hinged Support
- Fixed Support



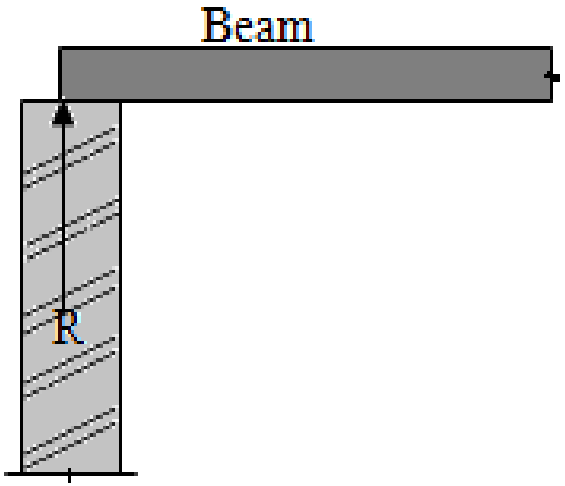






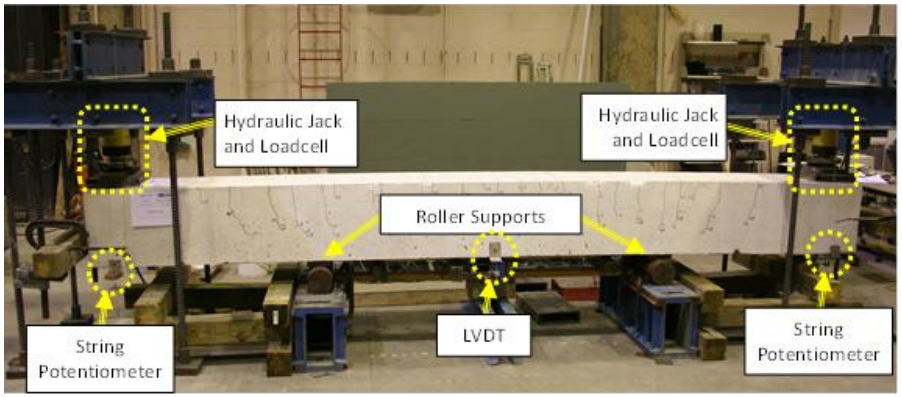


Simple Support

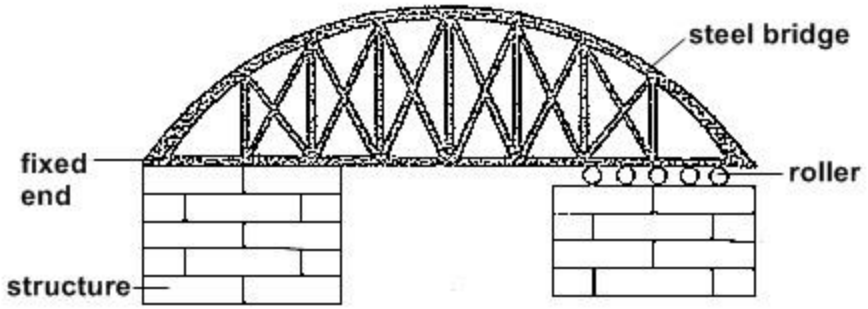


- This is a support where a beam rests freely on a support.
- The beam is free to move only horizontally and also can rotate about the support.
- In such a support, one reaction which is perpendicular to the plane of support, is developed

Roller support

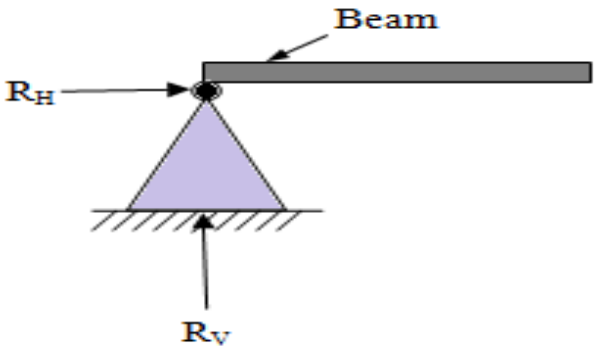


- This is a support in which a beam rests on rollers, which are frictionless.
- Here the beam is free to move horizontally and as well rotate about the support.
- In this case only one reaction which is perpendicular to the plane of rollers is developed.
- Roller supports are commonly located at one end of long bridges. This allows the bridge structure to expand and contract with temperature changes.



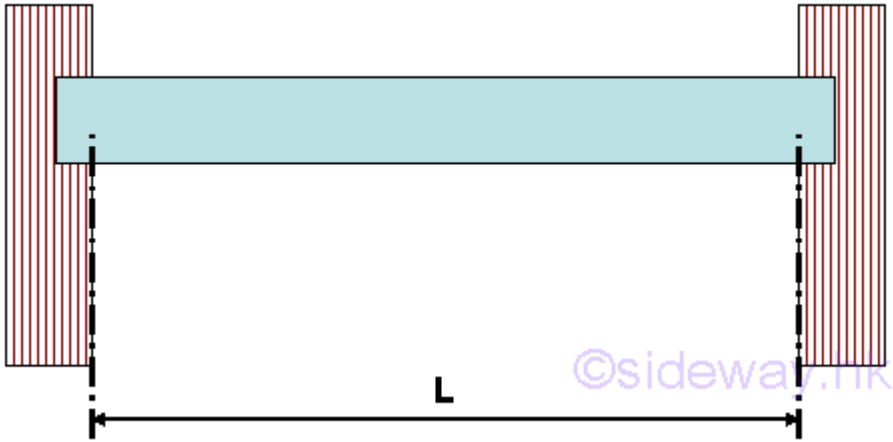
Hinged/Pinned Support

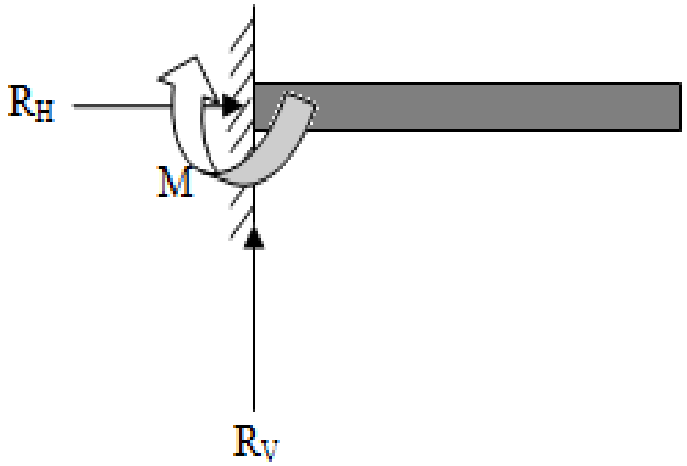
- The hinge support is capable of resisting forces acting in any direction of the plane.
- This support does not provide any resistance to rotation.
- The horizontal and vertical component of reaction can be determined using equation of equilibrium



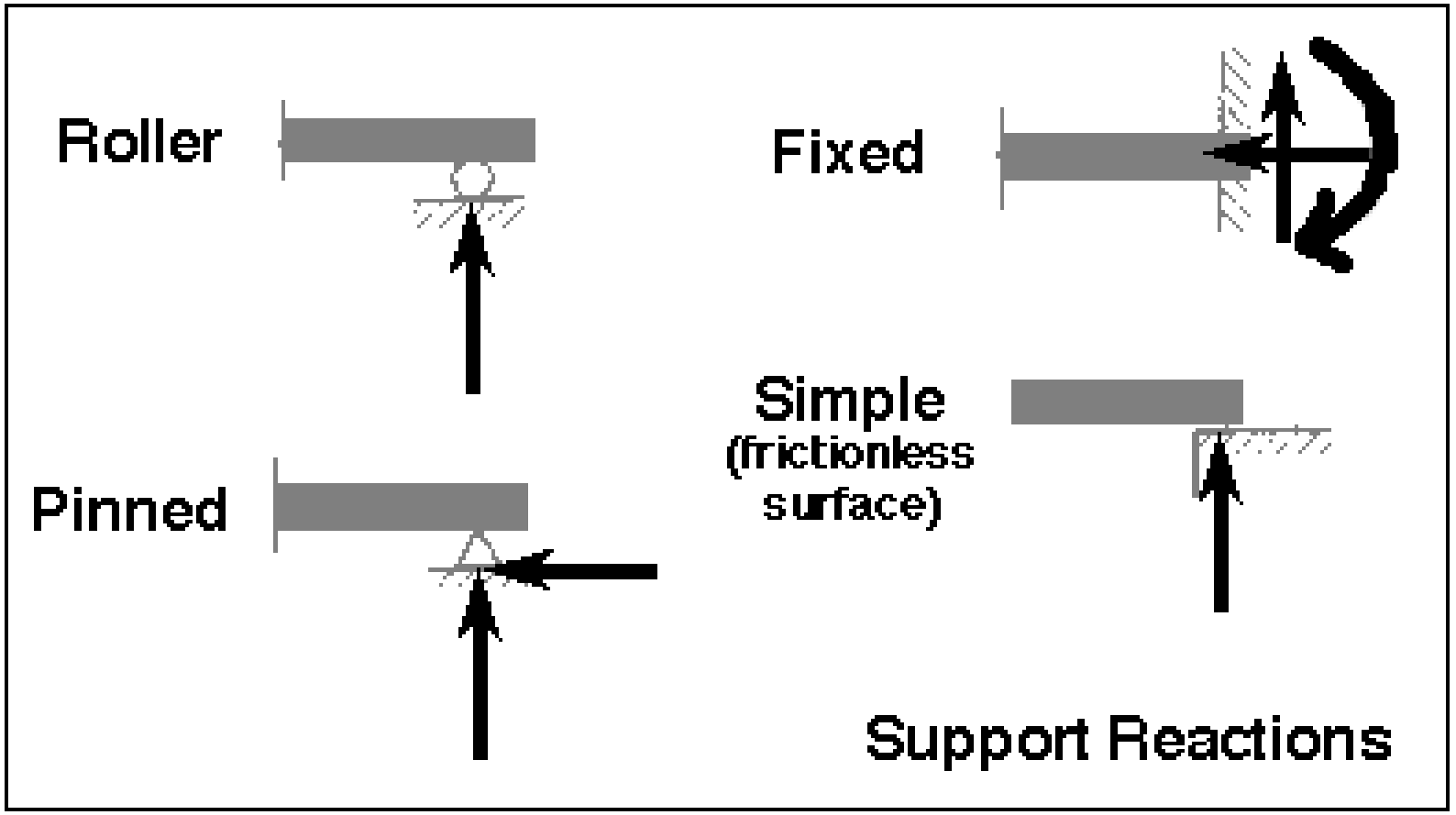
Fixed support

- This is a support which prevents the beam from moving in any direction and also prevents rotation of the beam.
- In such a support a horizontal reaction, vertical reaction and a Fixed End Moment are developed to keep the beam in equilibrium.





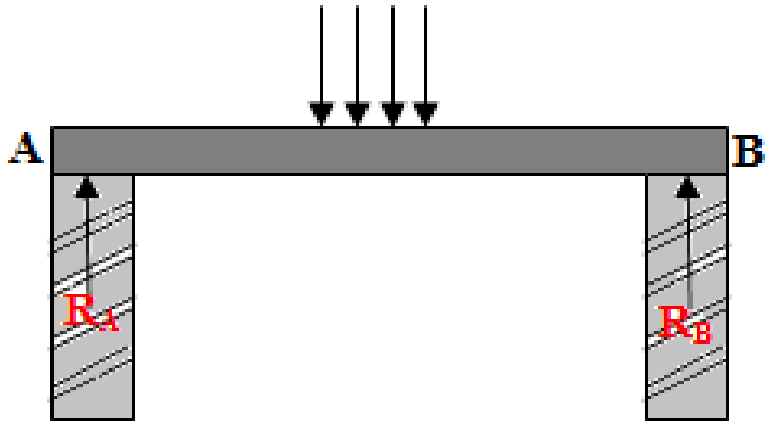
Types of supports



Types of Beams

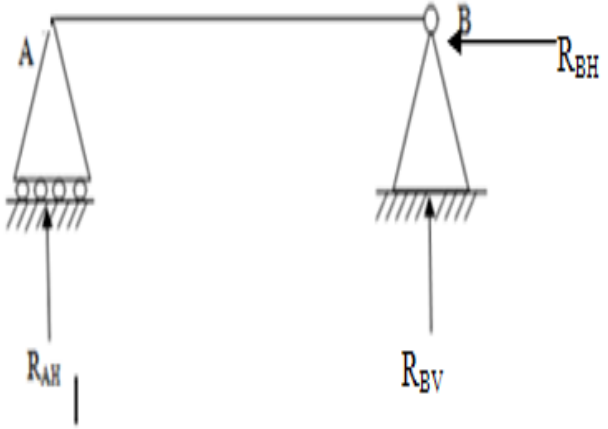
Simply supported beam

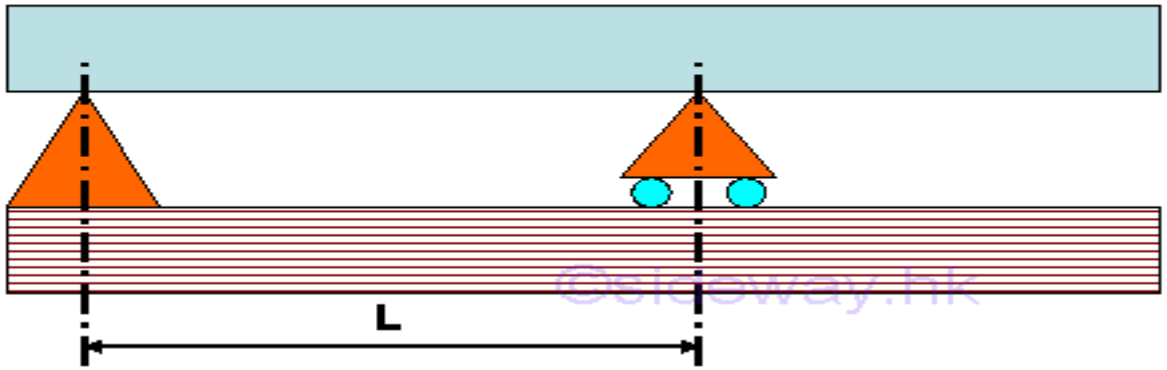
- A beam is said to be simply supported when both ends of the beam rest on simple supports.
- Such a beam can carry or resist vertical loads only.



Beam with one end hinged & other on rollers

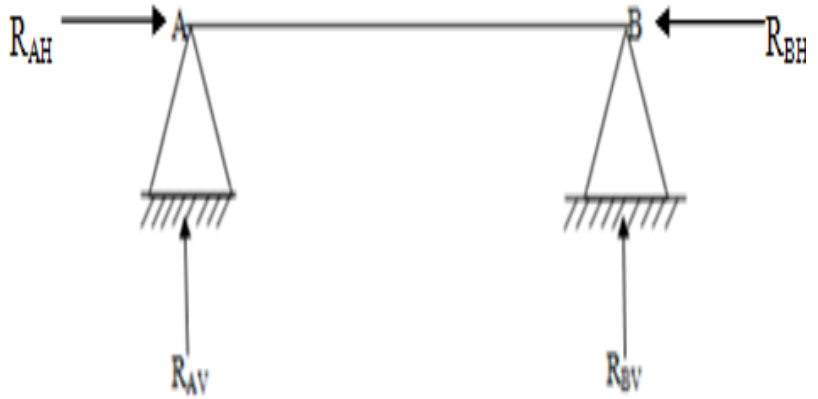
- It is a beam where one end of the beam is hinged to a support and the other end rests on a roller support
- Such a beam can carry any type of loads





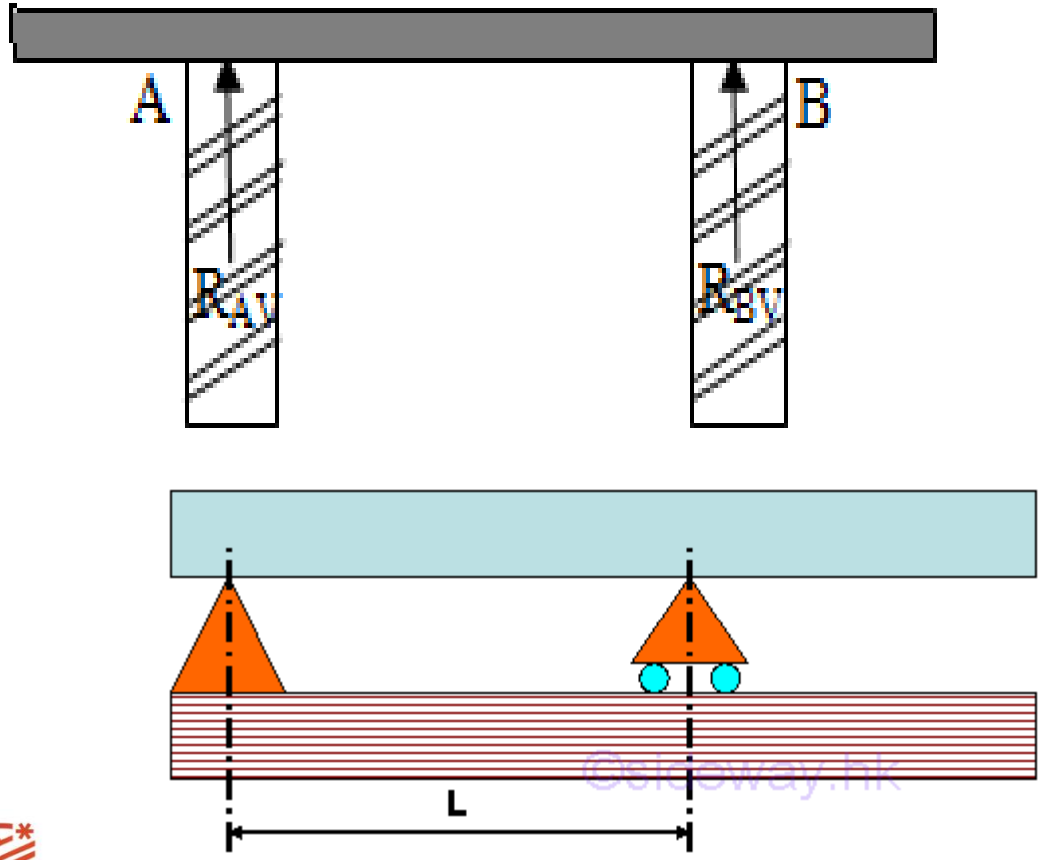
Hinged Beam

- It is a beam which is hinged to supports at both ends. Such a beam can carry loads is any direction



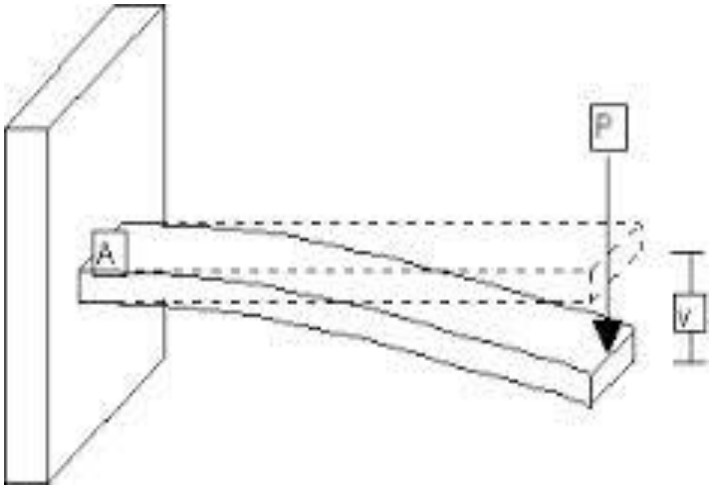
Over hanging beam

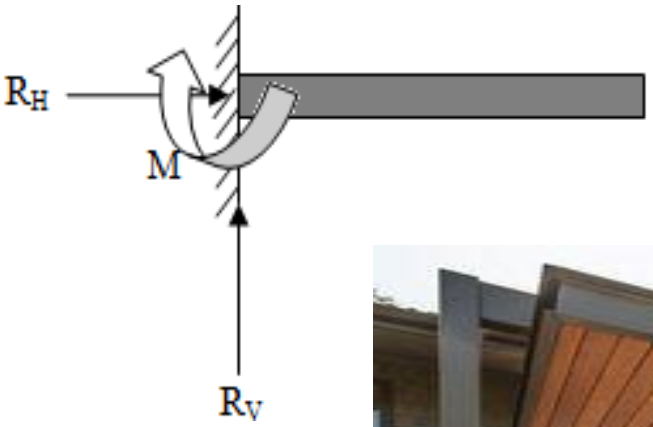
- It is a beam which projects beyond the supports.
- A beam can have over hanging portions on one side or on both sides.



Cantilever Beams

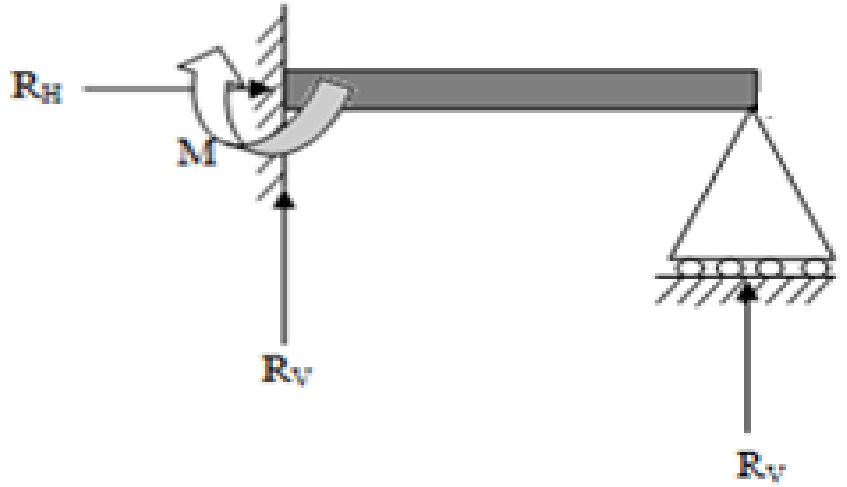
- It is a beam, with one end fixed and other and free
- Such a beam can carry loads in any directions

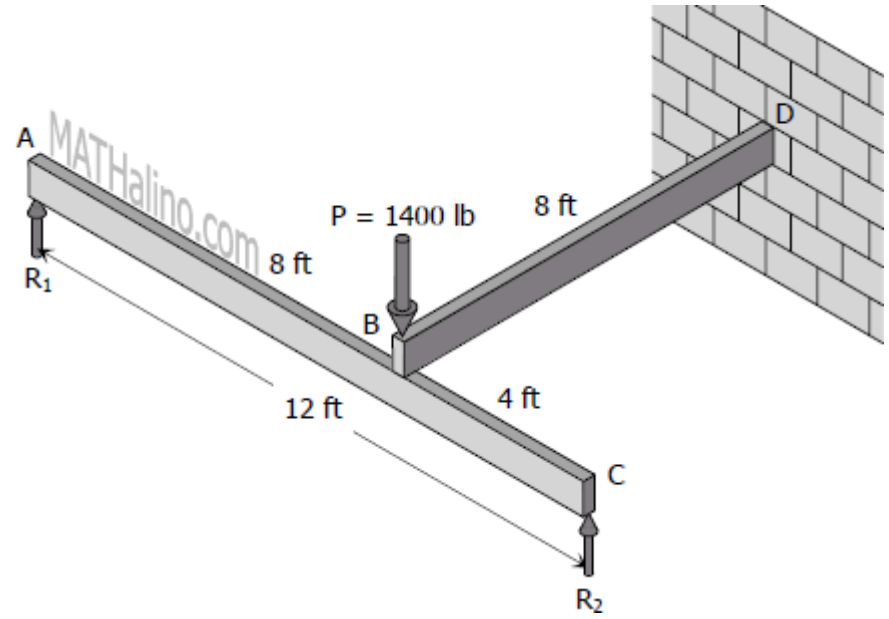




Propped cantilever

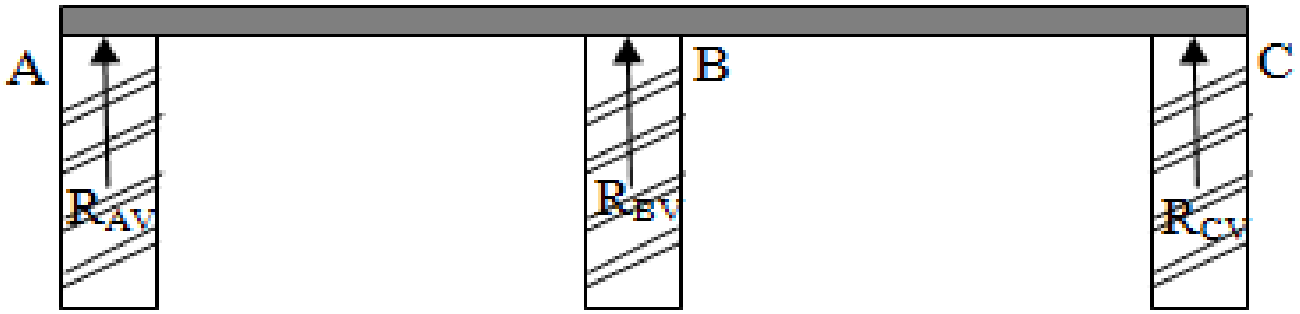
- It is a beam which has a fixed support at one end and a simple support at the other end.





Continuous beam

- It is a beam which rests over a series of supports at more than two points



Summary

- A beam is the horizontal member of a structure carrying transverse loads and is rectangular in cross section
- Types of supports in a beam consist of simple, roller, hinged and fixed
- A beam is said to be simply supported when both ends of the beam rest on simple supports
- A hinged beam is hinged to supports at both ends and such a beam can carry loads is any direction
- An overhanging beam is the beam which projects beyond the supports
- A fixed beam is a beam, with one end fixed and other end free and it can carry loads in any direction