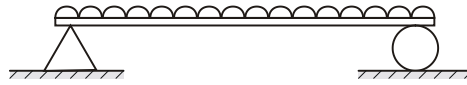


Uniformly distributed load



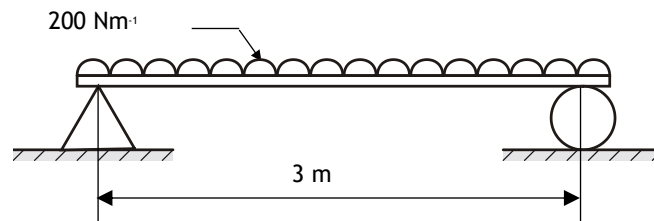
A uniformly distributed load (UDL) is a load which is spread constantly along the length of a beam. In practice, this is the usual type of load a beam will require to support.

The load is given in terms of the total force acting on each metre length of the beam i.e. kN m^{-1} .

In order to calculate the forces acting on the beam, it is assumed that the UDL acts centrally on the beam as a single force.

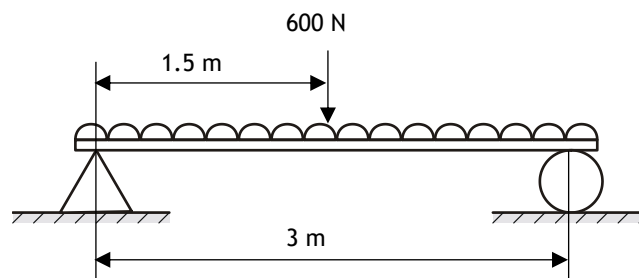
Worked Example

Calculate the force acting on the beam.



$200 \times 3 = 600 \text{ N}$ acting in the centre of the beam (i.e. 1.5 m from the end).

The diagram can be redrawn as shown below.



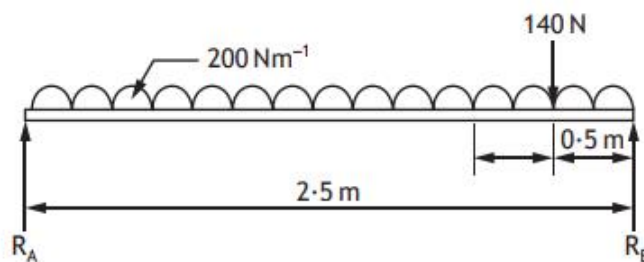
Assignment

MARK

- Flat pack furniture and other items are to be stored on shelving in a home improvement store. The shelving must be designed to support both point loads and uniform distributed loads.



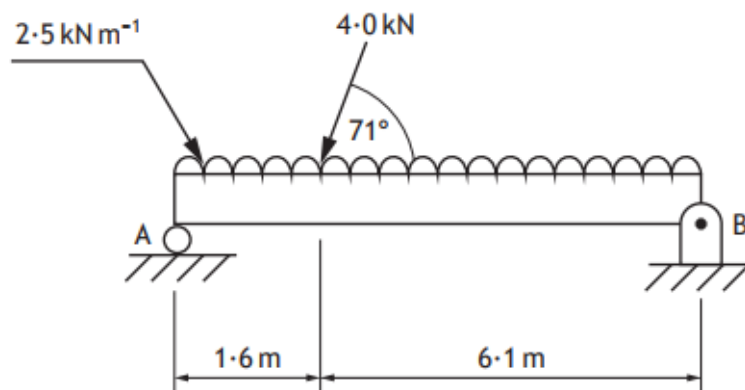
A simplified free body diagram of the forces expected on one shelf is shown below.



Calculate the reaction force R_B .

3

- A beam to be used in the construction of a new holiday cottage is being tested.

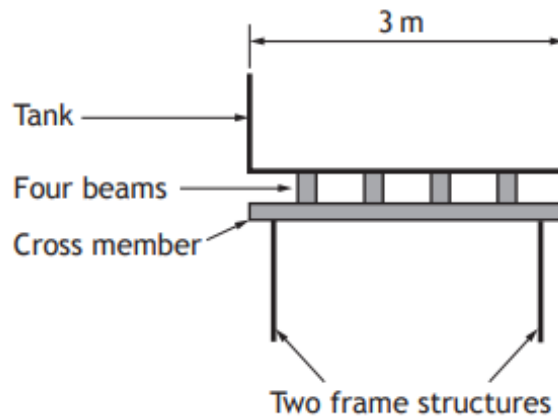


Calculate, by taking moments about B, the vertical reaction at A.

3

8. The water storage system below shows a water tank which is filled by an electrical pump. The tank with dimensions $3\text{ m} \times 3\text{ m}$ sits on four timber beams. The beams are secured to a cross member at one end and fixed into the wall at the other. Each beam carries an equal share of the water tank's weight.

The cross member is supported by two frame structures.



Front View

- (a) Calculate the maximum uniformly distributed load exerted on each beam if the water level in the storage tank does not exceed 1.5 metres. Ignore the weight of the tank.

(1 m^3 of water has a mass of 1000 kg.)