

How to Calculate a Point Load

By Jim Dorsch; Updated June 08, 2017

A distributed load is a force spread over a surface or line, which can be expressed in terms of force per unit area, such as kilonewtons (kN) per square meter. A point load is an equivalent load applied to a single point, which you can determine by calculating the total load over the object's surface or length and attributing the entire load to its center.

Determine the total length or area to which a load is applied. For example, if a load of 10 kilonewtons (kN) per square meter is applied to an area measuring 4 meters by 6 meters, then the total area is 24 square meters. If a load of 10 kN per meter is applied to a beam measuring 5 meters in length, then the total length is merely 5 meters.

Determine the center of the area or length. If you plot the 4-by-6-meter rectangle with its lower left corner at the origin and its length along the X-axis, then its corners are at (0,0), (6,0), (6,4) and (0,4), and its center is at (3,2). The center of a 5-meter beam is 2.5 meters from either end.

Multiply the load per unit area or length by the total area or length. For the rectangle, you compute 10 kN per square meter multiplied by 24 square meters to get 240 kN. For the beam, you calculate 10 kN per meter multiplied by 5 meters to get 50 kN.

Write your answer as the total load in Step 3 applied to the point you determined in Step 2. For the rectangle, the point load is 240 kN applied to a point 3 meters from an end in the length dimension and 2 meters from an end in the width dimension. For the beam, the point load is 50 kN applied to a point 2.5 meters from either end.

Tip

You can use this general method for any shape if you can determine its centroid (the center of its mass) and total area. For example, the centroid of a circular area of uniform mass is its center, and its area is pi times the square of its radius.