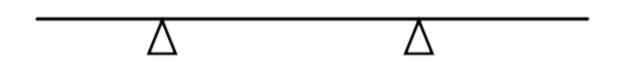# 1. Tilting

When a rigid body is on the point of tilting about a pivot, the reaction at any other support (or tension in any other wire/string) is zero.

Example
A uniform beam AB, of mass 12kg and length 6m rests on two pivots at P and Q, where AP = 1m and QB = 1.5m.
A particle of M kg is placed at A and the beam is about to tilt about the pivot at P. Find the mass of the particle and the reaction force at P.

Test Your Understanding – Suspended System *(Textbook)*

A non-uniform rod AB, of length 10 m and weight 40 N, is suspended from a pair of light cables attached to C and D where $AC = 3$ m and $BD = 2$ m.

When a weight of 25 N is hung from A the rod is on the point of rotating.

Find the distance of the centre of mass of the rod from A.

Test Your Understanding *(EdExcel M1 May 2013 Q6)*

A beam AB has length 15 m. The beam rests horizontally in equilibrium on two smooth supports at the points P and Q, where $AP = 2$ m and $QB = 3$ m. When a child of mass 50 kg stands on the beam at A, the beam remains in equilibrium and is on the point of tilting about P. When the same child of mass 50 kg stands on the beam at B, the beam remains in equilibrium and is on the point of tilting about Q. The child is modelled as a particle and the beam is modelled as a non-uniform rod.

(a) (i) Find the mass of the beam.

    (ii) Find the distance of the centre of mass of the beam from A.

<div align="right">(8)</div>

When the child stands at the point X on the beam, it remains horizontal and in equilibrium. Given that the reactions at the two supports are equal in magnitude,

(b) find AX.

<div align="right">(6)</div>

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