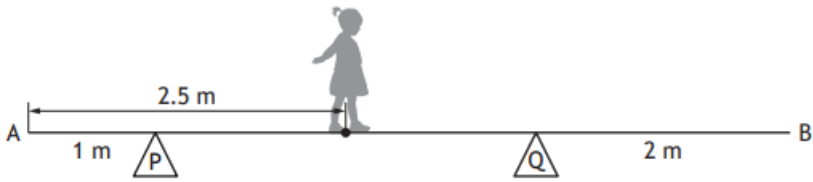
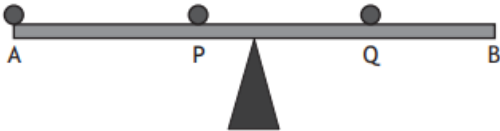
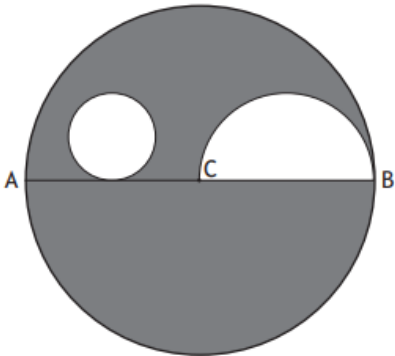
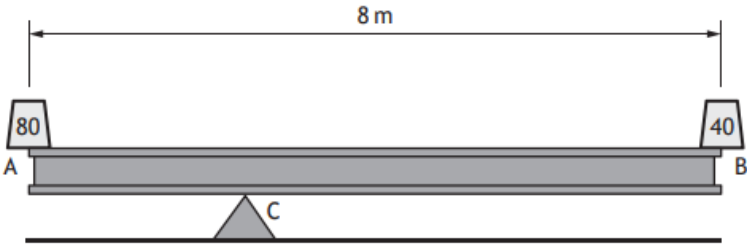
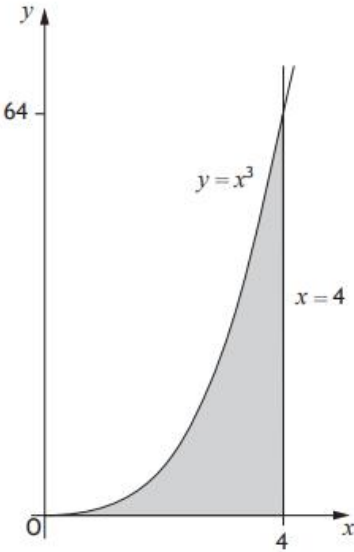
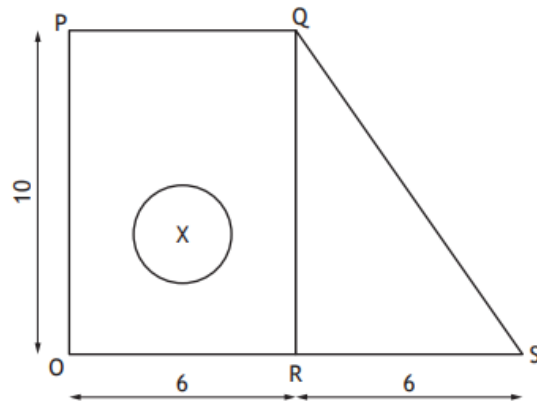


Y	Q	Moments and Centre of Mass
2024	7	<p>A uniform beam AB, of length 6 metres and mass 45 kg, is placed on two supports at points P and Q, where AP is 1 metre and QB is 2 metres.</p>  <p>When a child of mass 22 kg stands on the beam at a distance of 2.5 metres from A, the beam rests horizontally in equilibrium, as shown in the diagram.</p> <p>Calculate the magnitude of the reaction force at Q.</p> <p style="text-align: right;">3</p>
2019	6	<p>A uniform rod AB, of length 8 metres and mass 30 kg, is placed on a support at its centre.</p>  <p>Masses of 10 kg, 5 kg and 12 kg are placed at the points A, P and Q respectively, as shown in the diagram, where AP is 3 metres and QB is 2 metres.</p> <p>(a) Calculate the magnitude and direction of the turning effect on the rod about its support.</p> <p style="text-align: right;">3</p> <p>The support is repositioned so that the rod is in equilibrium.</p> <p>(b) Determine how far the support was moved from its original position.</p> <p style="text-align: right;">3</p>
2018	10	<p>A uniform circular lamina with diameter AB = 8 cm and centre C has mass per unit area m.</p> <p>Two holes have been made in the lamina as shown in the diagram.</p>  <p>The circular hole has radius 1 cm and touches the line AB at a point 2 cm from A. The other hole is a semi-circle with diameter BC.</p> <p>(a) Find the position of the centre of mass of the lamina relative to the point A.</p> <p style="text-align: right;">6</p> <p>(b) The lamina is freely suspended from the point A. Calculate the angle that the line AB makes with the downward vertical.</p> <p style="text-align: right;">1</p>

2017	4	<p>A uniform beam of length 8 metres has mass 200 kg and has a support placed at C. To enable it to rest horizontally, masses of 80 kg and 40 kg are attached at ends A and B as shown in the diagram.</p>  <p>Determine the position of the support relative to the point A.</p>	4
2016	11	<p>A uniform lamina is bounded by the curve $y = x^3$, the line $x = 4$ and the x-axis.</p>  <p>Find the coordinates of the centre of mass of the lamina.</p>	4

2016
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A uniform lamina is made from a rectangle $OPQR$ and a right-angled triangle RQS . A circular hole of radius 1 cm is removed as shown in the diagram. The centre X of the circular hole is 3 cm from both OS and OP .

- (a) Taking O as the origin, find the coordinates of the centre of mass of the lamina. 5
- (b) When the lamina is suspended from a point T on OP , it hangs in equilibrium with OS vertical. Give the length of OT . 1