6.

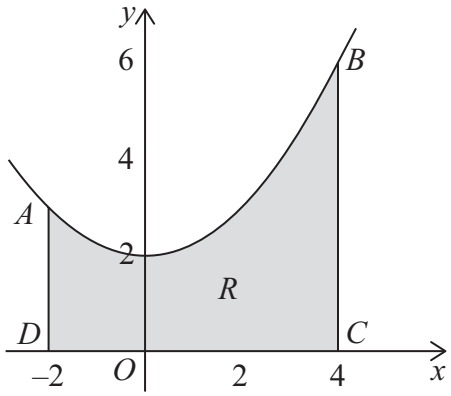


Figure 4

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

A uniform lamina $ABCD$ is in the shape of the region R

The region R is bounded by the curve with equation $y = \frac{1}{4}(x^2 + 8)$, the line with equation $x = 4$, the x-axis and the line with equation $x = -2$, as shown shaded in Figure 4.

The area of R is 18

(a) Show that the x coordinate of the centre of mass of the lamina is $\frac{3}{2}$

(4)

(b) Show that the y coordinate of the centre of mass of the lamina is $\frac{17}{10}$

(4)

The lamina is freely suspended from B and hangs in equilibrium with BC at an angle θ to the downward vertical through B

(c) Find the exact value of $\tan\theta$

(2)

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Question 6 continued

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Question 6 continued

(Total for Question 6 is 10 marks)