Further calculus – A2 Further Mathematics P2

1. June/2022/Paper_7367/02/No.2

Find the mean value of the function $f(x) = 10x^4$ between $x = 0$ and $x = a$

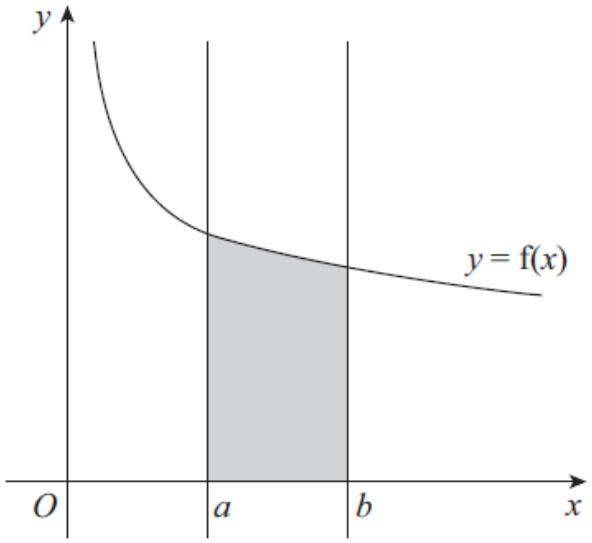
Circle your answer.

[1 mark]

$10a^3$ $40a^3$ $2a^4$ $4a^5$

2. June/2022/Paper_7367/02/No.12

The shaded region shown in the diagram below is bounded by the x-axis, the curve $y = \mathrm{f}(x)$, and the lines $x = a$ and $x = b$



The shaded region is rotated through 2π radians about the x-axis to form a solid.

(a) Show that the volume of this solid is

$$\pi \int_a^b (\mathrm{f}(x))^2 \, \mathrm{d}x$$

[4 marks]

(b) In the case where $a = 1$, $b = 2$ and

$$f(x) = \frac{x+3}{(x+1)\sqrt{x}}$$

show that the volume of the solid is

$$\pi\left(\ln\left(\frac{2^m}{3^n}\right) - \frac{2}{3}\right)$$

where m and n are integers.

[7 marks]