

integral $3x^3/x^4+5$
Please provide explanation

Answer:

If question is:

$$\int \frac{3x^3}{x^4} + 5 dx$$

Then solution:

$$\frac{3x^3}{x^4} + 5 = \frac{3}{x} + 5$$

So:

$$\int \frac{3x^3}{x^4} + 5 dx = \int \frac{3}{x} + 5 dx = 3 \int \frac{1}{x} dx + 5 \int 1 dx$$

As it is known:

$$\int \frac{1}{x} dx = \ln x + \text{const}$$

$$\int 1 dx = x + \text{const}$$

Thus:

$$\boxed{\int \frac{3x^3}{x^4} + 5 dx = 3 * \ln x + 5 * x + \text{const}}$$

But is the question is (which is more likely, I suppose you missed the brackets):

$$\int \frac{3x^3}{x^4 + 5} dx$$

Using:

$$4x^3 dx = d(x^4)$$

And

$$d(x^4 + 5) = d(x^4)$$

Get:

$$\int \frac{3x^3}{x^4 + 5} dx = \frac{3}{4} \int \frac{d(x^4 + 5)}{x^4 + 5}$$

As it is known:

$$\int \frac{1}{x} dx = \ln x + \text{const}$$

So:

$$\int \frac{3x^3}{x^4 + 5} dx = \frac{3}{4} \ln(x^4 + 5) + \text{const}$$